



FIELD GUIDE TO KENTUCKY'S INVASIVE PLANTS



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FIELD GUIDE TO

Kentucky's Invasive Plants

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European Privet

Photo by: Robert Vidéki, Doronicum Kft., Bugwood.org

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Mimosa, photo by Chris Evans, University of Illinois, Bugwood.org

Multiflora Rose, photo by Leslie J. Mehrhoff, University of Connecticut, Bugwood.org

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Poison Hemlock

Photo by: John Cardina, The Ohio State University, Bugwood.org

INTRODUCTION

Invasive plants are non-native plants that cause ecological, environmental, or economic damage. Because they can spread rapidly and take over, forming dense monocultures, invasive plants threaten the diversity and health of forests, prairies, streams, and other natural areas. In addition, they can cause a range of other problems, from harm to native plants and animals to losses in agriculture, tourism, and property value. Many invasive plants were intentionally introduced and promoted. From use in erosion control (e.g., kudzu) to potential wildlife benefits (e.g., autumn olive) to ornamental value (e.g., callery pear, wintercreeper), these plants seemed like a good idea at the time. Unfortunately, we can now see that the negative aspects of these species outweigh their potential benefits.

The goal of this booklet is to introduce some of the most common invasive plants across Kentucky. For each of the species covered here, we provide an overview of basic information regarding identification, impact, and control. This booklet is intended to be a field reference and is far from comprehensive. As of 2024, the list provided by the Kentucky Invasive Plant Council considers 87 plants as severe or significant threats with an additional 87 as moderate threats or that should be watched. There are many invasive plants that are not covered in this booklet, and new invasive plants will continue to arrive and spread. In addition, while this booklet touches on general best practices for control of each species, this information is limited and should be used in conjunction with other resources to determine the best management practices, taking into account site characteristics, severity of infestation, other vegetation, time of year, applicator preference, and other factors. When applying any pesticide, read and follow the label and ensure that you follow any federal, state, or local regulations.



Japanese Chaff Flower

Photo by: Chris Evans, University of Illinois, Bugwood.org

TREES



Callery Pear

Photo by: Leslie J. Mehrhoff, University of Connecticut, Bugwood.org

There are several different invasive tree species that cause problems in natural areas. Many of these species are prolific seed producers. Some have wind-dispersed seeds, while others are consumed and moved by birds, allowing them to rapidly colonize disturbed areas. The resulting monocultures prevent the natural processes that would otherwise support a diversity of plant species.

Some invasive trees, such as tree of heaven, can easily seed into disturbed areas and form dense thickets, outcompeting native trees that would be more valuable, both ecologically and economically. Others, such as callery pear cultivars like Bradford pear, have been planted intentionally for ornamental purposes but seed into and invade natural areas.

CALLERY PEAR

Pyrus calleryana

- Deciduous ornamental tree that can grow 30–50 feet tall.
- Leaves simple, alternate, and 1–3 inches long. Dark green, turning red to purple in fall.
- Young buds and branches may be thorny and sharp.
- Flowers bloom before leaves emerge, often with unpleasant odor. Produces small clusters of five petaled white flowers.
- Small, hard, round fruit. Similar in color to domestic pears, and less than 0.5 inch in diameter.

ORIGIN

Southeastern Asia, China, and Vietnam.

SIMILAR PLANTS

Callery pear can resemble domestic pear, as well as domestic apple and crabapple.

DISTRIBUTION

Found in grasslands, roadsides, fields, forests and frequently planted as ornamentals in urban and suburban areas. Prefers full sun but can withstand moderate shade. Well-adapted to difficult growing conditions including urban pollution and occasional drought. Found broadly throughout the eastern United States, from New Hampshire to Texas.

THREAT

Can grow relatively quickly. Birds readily disperse seeds. Callery pear can take over pastures, forests, and agricultural land. They can form dense thickets that shade out native plant species.

CONTROL

Young seedlings can be manually dug out by hand or tractor. Larger trees are most effectively cut down with chainsaw. Glyphosate or triclopyr-based herbicides should be applied on stump shortly after cutting the tree. Basal bark herbicide treatment (for smaller trees) and hack-and-squirt herbicide treatment (for larger trees) are also effective options, as is foliar herbicide application for smaller plants.



MIMOSA

Albizia julibrissin

- Small- to medium-sized tree with multiple trunks and spreading crown.
- Leaves finely divided and fern-like
- Bark light brown.
- Flowers a delicate white and pink in clusters like pom-poms in midsummer.
- Bean pods six inches long and conspicuous through early winter.

ORIGIN

Iran to Japan.



DISTRIBUTION

Found throughout the eastern United States from Massachusetts to Texas. Grows in native grasslands, fields, road cuts, and forest edges.

THREAT

Strong competitor in open areas, disturbed forests, and forest edges. Crowds out native trees and shrubs. Can grow in a variety of soils. Can also be a problem along streams.



CONTROL

Small trees can be hand pulled or treated with foliar herbicide application. For larger trees, basal bark herbicide treatment, hack-and-squirt herbicide treatment, and cut-stump herbicide treatment are all effective options with triclopyr and glyphosate commonly used (follow label directions). Root or stump sprouting and the emergence of new seedlings are likely, and follow-up with foliar herbicide is recommended.

PRINCESS TREE

Paulownia tomentosa

- Leaves large, heart-shaped, slightly fuzzy. Occur in pairs along stems.
- Upright clusters of persistent over-wintering seed pods.
- Showy blue-lavender to violet flower clusters in early spring.

ORIGIN

Western and central China.

DISTRIBUTION

Found throughout the eastern half of the U.S. and scattered across Kentucky. Frequently along rights-of-way, stream sides, forest openings and edges, and disturbed sites.

THREAT

Invades disturbed forest areas where its fast growth can change forest composition. Stream banks and rocky slopes are vulnerable to invasions, placing biological diversity at risk.

CONTROL

Small trees may be hand pulled (in first year, this can be difficult due to taproot) or treated with a foliar herbicide. For larger trees, basal bark herbicide treatment, hack-and-squirt herbicide treatment, and cut-stump herbicide treatment are all effective options with triclopyr and glyphosate commonly used (follow label directions). Root or stump sprouting and the emergence of new seedlings are likely, and follow-up with foliar herbicide is recommended.

Empress Tree, Royal Paulownia



TREE OF HEAVEN

Ailanthus altissima

Chinese sumac, stink sumac

- 11–25 spear-shaped leaflets per leaf. Leaflet edge smooth.
- Small lobes at leaflet base a key identifier, each lobe having a small hard bump (gland).
- Crushed leaves, broken twigs, and cut bark have acrid burnt peanut butter odor.
- Pink-yellow-green flowers cluster at end of limbs in July, turn to gray seed clusters in winter.

ORIGIN

Central China.

SIMILAR PLANTS

Sumac (smooth, staghorn, shining/winged), but sumac has milky sap. Black walnut, but crushed walnut leaves have walnut odor, not the acrid tree of heaven odor.

THREAT

Grows thickly, excluding native species. Roots exude chemicals that push out native plants. Infests closed woodlands but most common along open areas and forest edges.

DISTRIBUTION

Widespread across the U.S. and Kentucky in urban areas, roadsides, and disturbed forests.

CONTROL

Small trees can be hand pulled or treated with foliar herbicide application. For larger trees, basal bark herbicide treatment and hack-and-squirt herbicide treatment are effective options. Root or stump sprouting and the emergence of new seedlings are likely, and follow-up with foliar herbicide is recommended. Cut-stump herbicide treatment can result in aggressive resprouting of the tree from roots and is not recommended.



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REFERENCES

Information and resources provided by Penn State Extension Office, the Missouri Department of Conservation, North Carolina Extension Office, TN & SE Exotic Pest Plant Councils (tneppc.org and se-eppc.org), Southern Appalachian Man and the Biosphere Program (samab.org), TVA, The University of Tennessee, US Fish & Wildlife Service, The Nature Conservancy, and the Plant Conservation Alliance.

PHOTO CREDITS

Callery Pear: ¹John Ruter, University of Georgia, Bugwood.org, ²David Stephens, Bugwood.org, ³Richard Gardner, Bugwood.org

Mimosa: ⁴Chris Evans, University of Illinois, Bugwood.org, ⁵Robert Vidéki, Doronicum Kft., Bugwood.org, ⁶Lesley Ingram, Bugwood.org

Princess Tree: ⁷Chris Evans, University of Illinois, Bugwood.org, ⁸Robert Vidéki, Doronicum Kft., Bugwood.org, ⁹Nancy Loewenstein, Auburn University, Bugwood.org

Tree of Heaven: ¹⁰Annemarie Smith, ODNR Division of Forestry, Bugwood.org, ¹¹Annemarie Smith, ODNR Division of Forestry, Bugwood.org

SHRUBS



Autumn Olive

Photo by: Nancy Loewenstein, Auburn University, Bugwood.org

Invasive shrubs are a serious problem in the region's forests, creating an understory layer that crowds out native plants. Not only is this detrimental to overall diversity of plants, insects, and animals, but it prevents seedlings from growing into future dominant forest trees. In addition, invasive shrubs can form dense thickets in old fields and disturbed areas, outcompeting and shading out other species, forming a monoculture.

Some invasive shrubs, such as multiflora rose, bush honeysuckle, and autumn olive, were intentionally introduced and promoted for many years for erosion control and wildlife benefits. We now know that the negative aspects of these species in natural areas outweigh potential benefits. Others, such as privet and burning bush, are commonly used as ornamental plants but seed into and invade natural areas.

AUTUMN OLIVE

Elaeagnus umbellata

- Shrub that grows to 30 feet with a bushy and spreading crown.
- Leaves are alternate, short-petioled, smooth, dark green above and silvery underneath.
- Twigs are silvery or golden brown, often with prominent spines.
- Abundant berries turn red as they mature in the fall and are speckled with brown to silvery scales.
- Small clusters of fragrant tube-shaped yellowish flowers bloom May-June.

ORIGIN

China, Korea, and Japan.

SIMILAR PLANTS

Russian olive (*Elaeagnus angustifolia*), another invasive species that has become a pest in much of the U.S. Russian olive can be distinguished by its narrower leaves. Autumn olive has wider distribution and is more common in Kentucky.



THREAT

Rapid growth enables this shrub to outcompete native species. Prolific fruit production. An individual plant can produce up to 8 lbs. of fruit each year and plants develop fruit annually after three years of age. Birds and small mammals distribute seeds.

DISTRIBUTION

Widespread throughout the eastern U.S. from Maine to Louisiana, it is especially common in areas previously mined, where it was commonly planted for restoration of vegetation.

CONTROL

Small plants can be hand pulled or treated with foliar herbicide application. For larger shrubs, basal bark herbicide treatment and cut-stump herbicide treatment are effective options. For dense infestations of large shrubs, with no valuable non-target species intermixed, mulching of vegetation followed by a foliar spray of new growth the following fall can also be an effective option. Root or stump sprouting and the emergence of new seedlings are likely and follow-up with foliar herbicide is recommended.



BURNING BUSH

Euonymus alatus

winged euonymus, winged wahoo, winged spindle-tree

- Deciduous shrub with gray stems and corky wing-like ridges.
- Opposite leaves, elliptic with a tapered tip, with fine serrations on the margins.
- Leaves turn bright red color in fall.
- Flowers are small, yellowish green in color

and inconspicuous in pairs at the tips of y-shaped stems.

- Smooth, purple to red fruits are a half-inch long and present from September through October. Each fruit contains approximately four red to orange seeds.

ORIGIN

Northeastern Asia.

SIMILAR PLANTS

Winged elm (*Ulmus alata*). When dormant, burning bush twigs may resemble winged elm. Native strawberry bush (*Euonymus americana*). Native strawberry bush lacks wings on its stems.

DISTRIBUTION

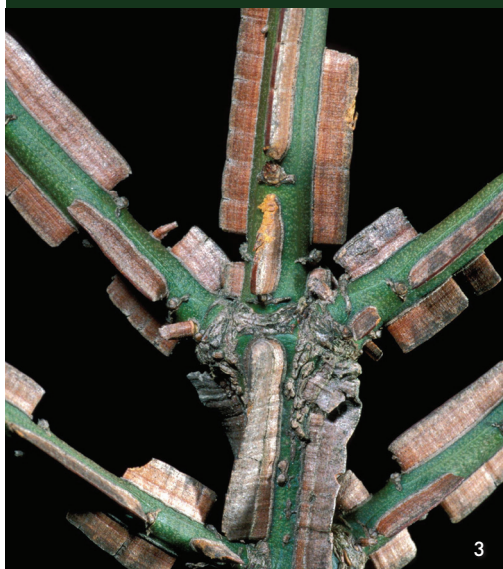
Widespread in the U.S. and scattered throughout Kentucky. Promoted as an ornamental.

THREAT

Can form dense thickets in natural woods and shade out native plants. It is also an adaptive plant, growing well in a wide range of soil types and pH levels. Spreads quickly by root suckers and from birds dispersing seeds.

CONTROL

Small plants can be hand pulled or treated with foliar herbicide application. For larger shrubs, basal bark herbicide treatment and cut-stump herbicide treatment are effective options.



BUSH HONEYSUCKLE

Lonicera maackii, *L. morrowii*, *L. tatarica*, *L. x bella*, *L. fragrantissima*

- Shrubs typically 6–25 feet in height.
- Egg-shaped to oblong opposite leaves are 1–2.5 inches long; leafing out first in spring and persisting into late fall.
- Pairs of fragrant, tubular white to pink flowers in late spring.
- Fruits are red berries containing many seeds.

ORIGIN

China, Asia, and Russia. *L. x bella* is a hybrid of *L. morrowii* and *L. tatarica*.

SIMILAR PLANTS

Coralberry (*Symphoricarpos orbiculatus*) has slender purple to brown twigs, and the berries have a purple hue.



CONTROL

Small plants can be hand pulled, treated with foliar herbicide application, or treated with a basal bark herbicide application. For larger shrubs, cut-stump herbicide treatment is typically the preferred option. For dense infestations of large shrubs, with no valuable non-target species intermixed, mowing or mulching followed up by a foliar spray of new growth the following fall can also be effective. Root or stump sprouting and the emergence of new seedlings are likely. Late fall foliar treatment can be highly effective and avoid non-target damage.

DISTRIBUTION

Introduced for use as ornamentals and for wildlife food and cover. Bush honeysuckles are found in a wide variety of habitats from the Central Great Plains to southern New England and south to Tennessee and North Carolina.

THREAT

Aggressively forms dense shrub layer that crowds out native plant species. Can reduce tree regeneration and eliminate understory species due to deep shade cast by the dense thickets. Fruits are rich in carbohydrates but do not offer migrating birds the high-fat, nutrient-rich food sources needed for long flights. Increased nest predation has been attributed to branching structure and lack of thorns which enables predators easy access.



EUROPEAN BUCKTHORN

Rhamnus cathartica

- Deciduous woody shrub.
- Simple, dark green, opposite leaves with jagged toothed margins.
- 3–5 pairs of prominent veins per leaf.
- Male and female flowers on separate plants. Small abundant fruit, green ripening to purplish black.
- Twigs have thorns at tips between terminal buds.

ORIGIN

Europe and western Asia.

SIMILAR PLANTS

Carolina buckthorn. This native buckhorn has alternate leaves, with finer teeth. No thorns on twigs. Glossy buckthorn, another invasive species, has leaves that are hairy underneath and do not have teeth. No thorns on twigs.

DISTRIBUTION

Scattered in Kentucky, northern Ohio River counties, the Bluegrass region, and south to Laurel County. In the U.S. from New England to the Midwest and Great Plains.

THREAT

The shrub reproduces prolifically, displacing native vegetation with dense stands. Releases toxins into soil which inhibit other plants' growth. Alters ecosystem processes through the reduction of flammable litter needed to carry fire.

CONTROL

Small shrubs can be hand pulled or treated with foliar herbicide application. For larger shrubs, basal bark, hack-and-squirt, and cut-stump herbicide treatments are effective options with triclopyr and glyphosate commonly used (follow label directions). For dense infestations of large shrubs, with no valuable non-target species intermixed, mowing or mulching of vegetation followed up by a foliar spray of new growth the following fall can also be an effective option. Root or stump-sprouting and the emergence of new seedlings are likely and follow-up with foliar herbicide is recommended.



MULTIFLORA ROSE

Rosa multiflora

- Thorny, round shape, medium to large shrub.
- Leaflets in arrangement of seven to nine, each leaflet fingernail size, serrated on edges. Longer-than-wide stipules at base of leaf are feathery.
- Flowers are small and white to pinkish white.
- Fruit are rose hips turning from green to red to brown through winter.

ORIGIN

Japan, Korea, and Eastern China.

SIMILAR PLANTS

Native roses. Other roses have stipules at the base of leaf stems, but lack the feathery or comb-like characteristic of stipules on multiflora rose.

DISTRIBUTION

Widely distributed in Kentucky along roadsides, fencerows, stream sides, forest edges and interior, and un-maintained fields.

THREAT

Forms single species thickets crowding out native plants, especially at stream sides. Seeds are spread by birds and other animals.

CONTROL

Small shrubs can be hand pulled or treated with foliar herbicide application. For larger shrubs, basal bark herbicide treatment and cut-stump herbicide treatment are effective options with triclopyr and glyphosate commonly used (follow label directions). Prescribed fire and mowing can have a place in some management but will need to be followed up with herbicide application.



PRIVET

Ligustrum sinense, *Ligustrum vulgare*, and *Ligustrum obtusifolium*

- A shrub growing to 30 feet in height. Widely used as hedges.
- Leaves are glossy, stiff, and oval to elliptical, one-half to two inches long, arranged opposite other leaves, forming two rows along stem with leaves at nearly right angle to stems.
- Small white four-petaled flowers in loose clumps.
- Berries are dark blue to black, and less than one-quarter inch in diameter forming in October.

ORIGIN



DISTRIBUTION

Invasive throughout the southeast and scattered across Kentucky. Thickly invades stream sides, fencerows, roadsides, and forest edges.

THREAT

Grows in dense stands eliminating native species underneath, especially in moist areas. Seeds spread prolifically by birds. Tolerates shade and lower elevations, invades forests.



CONTROL

Small shrubs can be hand pulled or treated with foliar herbicide application. For larger shrubs, basal bark herbicide treatment and cut-stump herbicide treatment are effective options with triclopyr and glyphosate commonly used (follow label directions). Late fall is a good time for foliar treatment to avoid non-target damage as native plants will have lost their leaves. For dense infestations of large shrubs, with no valuable non-target species intermixed, mowing or mulching of vegetation followed up by a foliar spray of new growth the following fall can also be an effective option.

REFERENCES

Information and resources provided by TN & SE Exotic Pest Plant Councils (tneppc.org and se-eppc.org), Southern Appalachian Man and the Biosphere Program (samab.org), TVA, The University of Tennessee, US Fish & Wildlife Service, The Nature Conservancy, Plant Conservation Alliance, Wildland Invasive Species Team, Virginia Native Plant Society, Virginia Natural Heritage Program, and the USDA.

PHOTO CREDITS

Autumn olive: ¹Chris Evans, University of Illinois, Bugwood.org, ²James R. Allison, Georgia Department of Natural Resources, Bugwood.org

Burning Bush: ³Barry Rice, sarracenia.com, Bugwood.org, ⁴James H. Miller, USDA Forest Service, Bugwood.org

Bush Honeysuckle: ⁵Ryan Armbrust, Kansas Forest Service, Bugwood.org, ⁶John M. Randall, The Nature Conservancy, Bugwood.org,

European Buckthorn: ⁷Leslie J. Mehrhoff, University of Connecticut, Bugwood.org, ⁸Robert Vidéki, Doronicum Kft., Bugwood.org, ⁹Leslie J. Mehrhoff, University of Connecticut, Bugwood.org

Multiflora Rose: ¹⁰Richard Gardner, Bugwood.org, ¹¹Chris Evans, University of Illinois, Bugwood.org, ¹²Rob Routledge, Sault College, Bugwood.org

Chinese Privet: ¹³Richard Webb, Bugwood.org, ¹⁴Karan A. Rawlins, University of Georgia, Bugwood.org, ¹⁵Karan A. Rawlins, University of Georgia, Bugwood.org

VINES



Kudzu

Photo by: Barry Rice, sarracenia.com, Bugwood.org

There are many different invasive vines that can cause problems in natural areas, invading a variety of habitats from forests to stream sides. These can carpet areas, forming dense ground covers that exclude the growth of other species. Not only is this detrimental to the overall diversity of plants, insects, and animals, but it prevents seedlings from growing into future dominant forest trees. In addition, some vines can climb up trees and grow into their canopies. Some of these (such as kudzu) can smother even tall forest trees while others, like oriental bittersweet, can strangle small trees and impair their growth and form. The weight of vines can break limbs and their added weight can cause trees to be uprooted in windstorms.

Some invasive vines, such as kudzu, were intentionally introduced and promoted for forage and erosion control. Others, such as wintercreeper and Japanese honeysuckle, are used as ornamental plants but seed into and invade natural areas.

ASIAN BITTERSWEET

Celastrus orbiculatus

Oriental, Round-leaved,
or Asiatic bittersweet

- Twining vine with round, glossy to semi-glossy, finely toothed leaves the size of a quarter or larger.
- Flowers and fruit occur at base of leaf stems, produced in small clusters at leaf joints.
- Greenish-yellow flowers in May with five petals.
- Greenish-yellow fruit splits open to reveal three red-orange fleshy seeds.

ORIGIN



SIMILAR PLANTS

American bittersweet (*Celastrus scandens*) has flowers only at ends of vines and oblong (not round) leaves.



THREAT

Aggressively covers, shades, and chokes native vegetation at all levels. Believed to readily hybridize with native bittersweet. Tolerates shade. Can invade forests from edges and gaps.

DISTRIBUTION

Scattered in Kentucky with populations spreading. Found in woodlands, roadsides, thickets, and old home sites.

CONTROL

For large vines growing into the canopy of trees, cut vines (taking a several-inch-wide disk out of the lower vine stem) and treat freshly cut stumps with herbicide (watch for sprouts) and/or foliar herbicide spray new shoots. Basal bark herbicide application and hack-and-squirt herbicide application are also possible but care must be taken to avoid damage to non-target trees. Do not attempt to pull vines out of trees as this risks harming you and the trees. Lower, carpeting growth can be treated with a foliar herbicide application. Glyphosate and triclopyr are commonly used (follow label).



CHINESE YAM

Dioscorea batatas

- Chinese Yam and air potato are long-climbing vines with 2- to 3-inch wide shiny heart-shaped leaves having arc-shaped veins.
- Leaves may vary in shape to arrowhead-like with lobes at the leaf base.
- Pea- to marble-sized bulbils like small potatoes occur at leaf nodes in late summer. These may become potato-sized in other regions and species.
- Ripe bulbils drop readily.

Cinnamon Vine, Air Potato

ORIGIN

Asia.

DISTRIBUTION

Found increasingly along stream corridors, forest openings, roadsides and around old home sites.

THREAT

The vine is fast-growing (up to 1 inch per day at peak). It covers trees, shrubs, ground vegetation, and structures. It reproduces prolifically starting in late June, and can spread rapidly along forest edges and openings.



SIMILAR PLANTS

The native yam has similar leaves, but does not grow as aggressively. It often remains small and vertical (non-vine) and is found in shady forests and lacks above ground bulbils.



CONTROL

Because of its numerous tubers, typically pulling and mowing alone are not effective for control unless dealing with very small areas. Digging up tubers or mulching over patches can be effective for smaller areas. Foliar herbicide application is the best option for larger infestations with triclopyr and glyphosate commonly used (follow label directions).

JAPANESE HONEYSUCKLE

Lonicera japonica

- Semi-evergreen perennial. A trailing or twining woody vine with simple, opposite, oval leaves around 1.5 inches long with smooth edges with occasional lobes.
- Extremely fragrant, two-lipped flowers, 1–2 inches long in pairs throughout summer, mostly white to yellow.
- Small black berries in early autumn.
- Spreads by seeds, underground rhizomes, and above ground runners.
- New stems are reddish brown, while older vines have light brown to gray bark that peels into long strips.
- Creates dense, tangled masses.

ORIGIN

East Asia (including Japan and Korea).

SIMILAR PLANTS

Native honeysuckles (*Lonicera sempervirens* and others) have fused leaves through which the stem grows along newer growth.

DISTRIBUTION

Common throughout much of the U.S. and found across Kentucky along roadsides, in forests, along streams.

THREAT

Dense, strangling growth shades out and excludes native shrubs and herbs.

CONTROL

Small infestations can be pulled up but grazing and mowing are generally ineffective as more shoots will rapidly sprout. Foliar herbicide application is the best option for larger infestations, with triclopyr and glyphosate commonly used (follow label directions). Follow-up will be needed to address resprouts and new seedlings.



KUDZU

Pueraria montana var. *lobata*

- Fast-growing vine, usually has three leaflets but may be fused into one or two with major to minor lobes.
- Leaflets 2–4 inches wide and hairy on edges.
- Light purple/pink flowers with a fragrant, sweet grape smell in late summer.
- Roots are fleshy with massive tap roots.

ORIGIN

Asia (China, Japan).

SIMILAR PLANTS

Native grapevines are similar at a distance, but leaf edges are saw-toothed, not smooth and not divided into three leaflets. In winter other vines generally lack fuzziness on youngest growth.

DISTRIBUTION

Major infestations in eastern and western Kentucky with scattered populations statewide.

THREAT

Kudzu kills or degrades other plants by shading them under a blanket of leaves, by girdling stems and tree trunks, and by breaking branches or uprooting trees by its weight.

CONTROL

Kudzu has large tubers which must be killed for management. Mowing or grazing alone are typically not effective for control unless repeated regularly (monthly over several growing seasons) as initial preparation for future herbicide application or when dealing with very small infestations. Foliar herbicide is effective (pick the most appropriate chemical, taking into account proximity to sensitive environments and non-target plants, follow label directions). Late season cutting of vines at root tops followed by immediate cut-stump herbicide treatment can be effective. Spring prescribed burn can be useful in site prep followed by foliar herbicide later in summer. Follow-up treatment will be needed.



MILE-A-MINUTE

Persicaria perfoliata

- Quick growing annual vine that can grow up to six inches a day and up to 25 feet in a growing season.
- Vines thin and slender with small, hooked thorns growing from the stems and under the leaves.
- Light green, triangular shaped leaves, 1–3 inches long.
- Small clusters of white flowers form in the early summer and develop into blue and violet berries in the late summer and fall.

ORIGIN

India, Pacific Islands, and Eastern Asia.

SIMILAR PLANTS

Mile-a-minute is in the buckwheat family (*Polygonaceae*) and can closely resemble domestic buckwheat. Its berries can have a similar color to porcelain berry, *Ampelopsis brevipedunculata*.

DISTRIBUTION

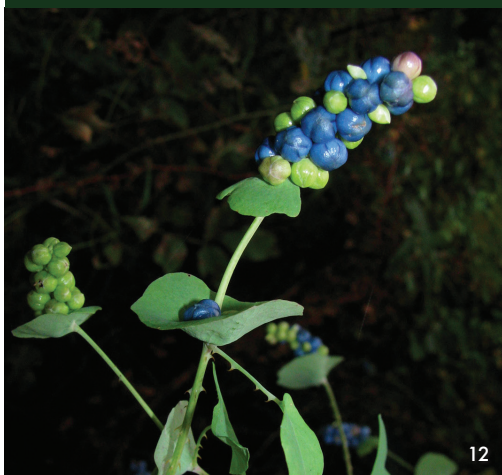
Often found in disturbed and open areas with full sun and little shade. Grows in forest openings, roadsides, unused agricultural land, and stream banks. Present across much of the Northeast and Mid-Atlantic with small pockets in the Southeast and Midwest.

THREAT

Highly aggressive and can quickly climb over small trees and bushes. Can create dense mats that block sunlight and outcompete many understory plants.

CONTROL

For small infestation, pulling up and mowing can be effective but must be repeated. Gloves should be worn if removing by hand due to the sharp thorns on stems. If berries are present, make sure they don't shake loose while pulling (bag up pulled plants). Foliar herbicides are effective, especially for larger infestations that are not growing interspersed with non-target vegetation. Glyphosate and triclopyr are commonly used (follow label). Seedlings will continue to grow from seed bank, so follow-up will be needed.



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WINTERCREEPER

Euonymus fortunei

- Evergreen vine that can form a dense groundcover. Can grow as a shrub up to 3 feet in height, or climb 40- to 70-foot vertical surfaces.
- 1–2.5 inch long paired leaves are dark green, shiny, and egg-shaped with finely toothed margins and whitish veins.
- Inconspicuous greenish white, five-petaled flowers that bloom June to July.
- Fruits are white to red capsules that split open to expose seeds with a fleshy orange coating in the fall.



ORIGIN

China.

SIMILAR PLANTS

Periwinkle (*Vinca spp.*) also invasive, has glossy leaves and is evergreen. However, flowers are purple and leaf-shape is more elliptic.

DISTRIBUTION

Scattered throughout the eastern U.S., common in Kentucky and surrounding states.

THREAT

Forms dense ground cover that eliminates native species from the understory. Impedes recruitment of canopy species. Can overtop trees and cause decreased vigor.

CONTROL

Lower growth can be treated with a foliar herbicide application; 3% triclopyr with 1% methylated seed oil and surfactant added has proven effective (follow label). Foliar treatment on warm days during the dormant season is effective and can minimize non-target damage to other interspersed plants. For large vines growing into the canopy of trees, cut vines (taking a several-inch-wide disk out of the lower vine stem) and treat freshly cut stumps and new shoots. Basal bark herbicide application and hack-and-squirt herbicide application are also possible. Do not attempt to pull vines out of trees, as this risks harming you and the trees.

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FORBS AND HERBACEOUS PLANTS



Lesser Celandine

Photo by: Leslie J. Mehrhoff, University of Connecticut, Bugwood.org

There are many different invasive forbs and herbaceous plants that can cause problems in natural areas. These species, which do not have woody stems, are typically lower growing than invasive shrubs and trees. They can invade many different habitat types, from disturbed open areas to prairies to forests to stream sides, and they reduce biodiversity by creating a dense groundcover and replacing native vegetation.

As with any invasive species, different invasive plants are more problematic in different systems and areas. For example, garlic mustard can take over in forest understories while sericea lespedeza is most problematic in areas with more light like grasslands, old fields, and reclaimed mining sites. In addition, some, like poison hemlock, are not only a threat to natural areas but are toxic to humans and livestock if consumed.

CANADA THISTLE

Cirsium arvense

- Perennial herb in Aster family, can grow up to 4 feet tall.
- Spread by wind-dispersed seeds as well as creeping horizontal root shoots.
- Entire plant covered in spiny hairs including the irregularly lobed lanceolate leaves with prickled margins.
- Multiple small (approximately 1-inch) purple to white flower heads bud in early June and bloom into July.
- Basal rosettes first appear in early spring and again September to November after seed production.

ORIGIN



CONTROL

While hand removal can be effective for individual plants (removing as much of the root system as possible), management of larger areas typically requires multiple foliar herbicide treatments over several seasons (fall and spring). A range of herbicides are used in different settings (e.g. glyphosate, clopyralid). Make sure to read labels and select the best option given any environmentally sensitive areas and/or non-target plant species. Foliar herbicide treatment of rosettes in the fall can be highly effective. Mowing prior to flowering can reduce seed set and be incorporated into other management plans.



DISTRIBUTION

Extremely widespread across much of the U.S. It is largely absent in the Southeast from Texas to Georgia. Invades a variety of open habitats including barrens, glades, grasslands, pastures, stream banks, and open forests. This species is not shade tolerant.

THREAT

Accidentally introduced to North America in the 1600s. Currently designated as a noxious weed in 43 states. It spreads aggressively and is very difficult to eradicate. Once established, it can form dense stands that shade out and displace native plants. This can change the plant community structure and species composition, while also reducing biodiversity.



COMMON CHICKWEED

Stellaria media

- Annual plant with stems that typically lie flat on the ground, rooting at nodes and branching freely, forming mats or clumps
- Leaves small, ovoid-elliptic, opposite.
- Tiny white flowers, five deeply cleft petals, appearing as 10.

ORIGIN

Europe.

SIMILAR PLANTS

Native star chickweed has ascending stems, larger white flowers.

DISTRIBUTION

In open and shaded sites throughout Kentucky and the U.S. Observed in lawns, along roadsides, stream banks and wet cliffs, and trails, but also found deep in forests.

THREAT

Forms dense mats that outcompete native plants for space and nutrients. A high seed producer that spreads easily, taking over fields and forests quickly, especially in moist rich forests and wetlands. Seeds remain viable for several years and are easily spread in hay, in soil on shoes and tires, or by water.

CONTROL

Control small populations quickly to avoid larger populations, which are more difficult to manage. Repeated hand pulling can be effective, bag and remove plants to prevent re-rooting from shoots. Foliar herbicide application is effective and a range of herbicides are used in different settings (e.g. glyphosate). Make sure to read labels and select the best option for your work given any environmentally sensitive areas (e.g. aquatic safe herbicides) and/or non-target plant species.



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CROWN VETCH

Securigeria varia

- Creeping stem reaches 2.5 feet in length.
- Compound leaves range from 2–4 inches in length and have nine to 25 oblong leaflets.
- Five to 20 pea-like flowers that vary from pink, rose, or lilac appearing in late May to August.
- The seed is a four-angled legume with three to seven one-seeded segments.

ORIGIN

Europe, southwest Asia, and northern Africa.

SIMILAR PLANTS

Partridge pea (*Cassia fasciculata*) and other native vetches and non-native plants in the Pea family. Look for compound leaves and an odd number of leaflets. The flowers, stalks, and leaves arise from the main stem, and flowers form an umbel.

THREAT

Overgrows native vegetation and outcompetes for resources by covering over them. Can form single-species stands that can totally dominate open natural areas in grasslands. Spreads vegetatively by underground roots or rhizomes and by seed. Seeds remain viable in the soil for several years requiring consistent post-treatment monitoring.



DISTRIBUTION

Widely distributed as an ornamental ground cover and for erosion control on banks and reclamation of mine lands.

CONTROL

Repeated pulling/digging can be effective. While mowing alone will not eradicate the plant, repeated mowing in the flower bud stage, as close to the ground as possible for two to three consecutive years, can reduce vigor and spread. In addition, mowing or burning prior to follow-up foliar herbicide can be beneficial. Foliar herbicide application is effective, and a range of herbicides are used in different settings (e.g. glyphosate, clopyralid and aminopyralid). Make sure to read labels and select the best option for your work given any environmentally sensitive areas (e.g. aquatic safe herbicides) and/or non-target plant species. Repeated treatments are often needed due to the dense growth form of the plants.



GARLIC MUSTARD

Alliaria petiolata

- This is a biennial species that grows as a basal rosette in its first year and then produces a flowering stalk in its second year.
- Basal rosette leaves (first year) are dark green and kidney-shaped, 2–4 inches in diameter with scalloped edges.
- Stemmed plants (second year) are 1–3 feet tall with leaves that are 1–3 inches wide, smaller toward the top.
- Small white four-petaled flowers produce many seeds.
- Young leaves of both stages have a garlic smell when crushed.

ORIGIN

Northern Europe.



DISTRIBUTION

Widespread throughout northeastern and midwestern U.S. Abundant in the Bluegrass region. Found in scattered locations across Kentucky, especially in moist areas with productive soils. Invades forests and open fields.

THREAT

Forms dense ground cover excluding native herbaceous plants in deep forests. Spreads quickly by flooding and animals, and is hard to control once invasions have occurred. Known to be allelopathic, releasing toxins into the soil that inhibit the growth of other plants.



CONTROL

Small infestations can easily be pulled up before seed set (both rosettes and flowering stalks), bagging and removing plants to prevent seed from developing. Mowing is also possible but must be continuous for ~5 years. Foliar herbicide application can also be conducted, with glyphosate and triclopyr commonly used (follow label). Prescribed burning can be a helpful tool in long-term management.

JAPANESE CHAFF FLOWER

Achyranthes japonica

- Perennial herb, member of the Amaranth family. Can reach heights of 3–6 feet. Begins growth in late spring and flowers in late July.
- Leaves simple and opposite, displaying distinct arcing venation similar to dogwood.
- Seedlings have red/purple stems, which persist as the plant grows, particularly at the branch nodes.
- Flower lacks petals and occurs in an erect spike like a bottle-brush.
- Fruit develops in August. Lying flat against the stem and equipped with a pair of stiff bracts, they can easily hitchhike on clothing and in fur to aid dispersal.

ORIGIN

East Asia.

SIMILAR PLANTS

White vervain, lopseed or one of the pigweeds. All of these species have coarsely-toothed leaf margins, whereas chaff flower does not.

DISTRIBUTION

First recorded in eastern Kentucky in the 1980s. It initially colonized along the Ohio River and other connected streams. It prefers rich, moist soils and is shade tolerant. It is increasingly common in Kentucky and nearby states along riverbanks, in bottomlands and floodplains, and along roadsides.



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THREAT

Dense growth habit easily shades out and displaces native plants. Spreads quickly due to the seed's ability to stick to clothing and fur as well as move on waterways.

CONTROL

Seedlings can be hand pulled from moist soils (remove as much of the root as possible) but larger roots of established plants make hand pulling difficult. Regular mowing during the growing season can inhibit seed set and reduce vigor and spread. Foliar herbicide application is effective if applied before or during flowering. Triclopyr and glyphosate are commonly used. Follow label and be sure to use aquatic-safe herbicide formulations if applying near water. Manage prior to plants setting seed and avoid spreading seeds.



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JAPANESE KNOTWEED

Reynoutria japonica

- Forms dense stands that reach 10 feet tall.
- Leaves are 2 to 6 inches long and heart-shaped.
- Stems are bamboo-like (hollow), light green to purplish-red, smooth, and swollen at joints where leaves are attached.
- Small flowers are white to greenish-white in small sprays along small branches.

ORIGIN

Japan.

SIMILAR PLANTS

Redbud has similar leaf, but lobes at leaf base are rounded, where knotweed leaf base is flat. Redbud has a solid, woody twig.

DISTRIBUTION

Found throughout much of the U.S. and scattered across Kentucky. Grows along streams, home sites, low-lying areas, and rights of way.

THREAT

Dense thickets crowd native vegetation. Tolerates adverse growing conditions. Quickly expands in natural areas from cultivated sources. Poses a high threat to riparian areas.

CONTROL

Management must kill the plant's extensive root system. Typically, initial management involves foliar herbicide application for several years, applied late in the season. However, since knotweed can grow tall by the late summer, it may be beneficial to first cut or mow vegetation and then apply a foliar herbicide to new shoot growth later in the season. Glyphosate is commonly used but follow the label and ensure that an aquatic-safe herbicide is used in areas near water. Cutting alone will not be effective for management, however small plants may be hand pulled.



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LESSER CELANDINE

Ficaria verna

- A spring ephemeral with kidney- to heart-shaped glossy dark green leaves.
- Member of the buttercup family, flowers bright golden yellow with slightly darker centers.
- Plant grows low to the ground.
- Each plant produces abundant root tubers and bulbils in stem axils which readily form new plants.
- Toxic to humans and livestock if consumed.

ORIGIN

Europe.

SIMILAR PLANTS

Celandine poppy has yellow flowers with four petals, lobed gray green leaves.

DISTRIBUTION

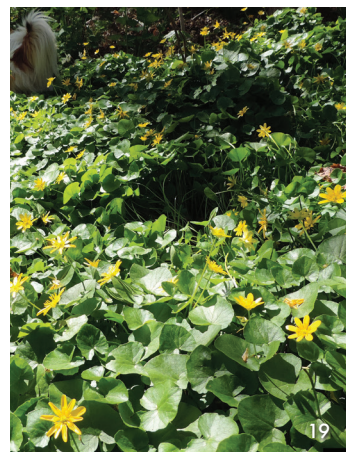
Known to be an invasive problem scattered throughout the U.S. in the Northeast, Mid-Atlantic, Midwest, Southeast, and Pacific Northwest.

THREAT

Prolific production of tubers and bulbils leads to displacement of other plants under a thick blanket in riparian areas, floodplains, and across forest floors. High degree of difficulty to completely control adds to threat level.

CONTROL

Foliar herbicide application is effective if applied for several seasons and a range of herbicides are used in different settings. Select the best herbicide for your work given any environmentally sensitive areas (e.g. aquatic safe herbicides) and/or non-target plant species. Adding a surfactant helps penetrate the waxy cuticle. Apply herbicide prior to flowering or early in flowering. Mowing and pulling are not recommended as it is easy to dislodge and leave small tubers or bulbils. Follow-up scouting and treatment will be needed for several seasons.



MUSK THISTLE

Carduus nutans

- Mature plants range from 1.5 to 6 feet tall with multi-branched spiny stems.
- Spiny leaves are dark green, coarsely lobed with a smooth waxy surface and a light-colored spine at the tip.
- Large, showy pink-purple disk-shaped flower heads contain hundreds of tiny individual flowers which emerge in May to August and occur at the tips of stems. The flower heads

will droop at a 90 degree angle from the stem when mature.

- Each plant can produce thousands of straw-colored seeds with plume-like hairs.
- Usually a biennial, a seedling emerges in mid- to late July and develops into a rosette the first year and begins to bolt in mid-March the following year.

Nodding Thistle

ORIGIN

Europe and Asia.



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DISTRIBUTION

Found throughout the continental U.S. except for Maine, Vermont, and Florida.

SIMILAR PLANTS

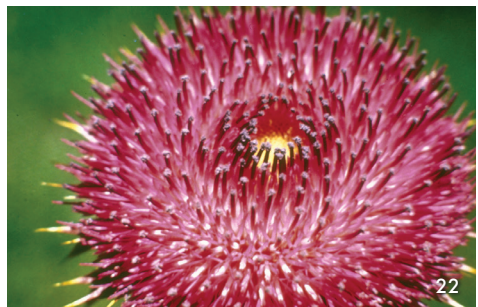
Resembles other thistle species, but nodding head is unmistakable. In addition, it has distinctive winged stems that are not present in other thistles.

CONTROL

Hand-pulling or mowing can be effective and should be done before seed production (although this can be conducted even after stems have bolted). Any flowers/seeds should be bagged and thrown away to reduce spread. Foliar herbicide application is typically conducted when plants are in the rosette stage prior to flowering, in the late fall or early spring. There are a range of herbicide options (follow the label).



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THREAT

Invades native grasslands and pastures. Can outcompete natives as grazing animals will not eat it. Plants can produce thousands of seeds and may colonize open soil areas that result from prescribed burning.

POISON HEMLOCK

Conium maculatum

- A biennial herbaceous species. Grows as a low basal rosette in its first year. Produces a tall flowering stalk in its second year.
- Small white flowers clustered in large compound umbels that are 1.5–2.5 inches wide.
- Hollow stems are purple mottled, erect, smooth, and between 2–10 feet tall.
- Fern-like leaves are alternate and basal, upper leaves progressively smaller.
- Leaves are 3–4 times pinnately divided. The enlarged petiole base sheaths the stem.

ORIGIN

Eurasia.

SIMILAR PLANTS

Cow parsnip (*Heracleum maximum*) has palmately compound leaves. Water hemlock (*Cicuta maculata*) has more delicate umbels and twice compound leaves. Flowers may resemble other members of the carrot family such as Queen Anne's lace.

DISTRIBUTION

Invades riparian areas, ditches, old fields, roadsides throughout most of North America.

THREAT

All parts of the plant are toxic to humans and animals when eaten. Prolific seed production, aggressive growth habits and tolerance of shade allow rapid spread that overwhelms native vegetative cover. Not valuable to wildlife as food or shelter.

CONTROL

Small infestations can be dug up, mowed, or cut back before flowering. Make sure to protect skin and eyes. Do not compost flowers, as they can go to seed. Foliar herbicide application of rosettes (in fall of first year or spring of second year) can be highly effective but should be done before plants bolt. Several herbicides are commonly used (e.g. glyphosate, 2,4-D). Follow label. Repeated scouting and follow-up treatment will be needed to deplete the seed bank.



PURPLE LOOSESTRIFE

Lythrum salicaria

- Erect perennial herb with opposite or whorled sessile leaves with heart-shaped bases.
- Showy spikes of purple-magenta flowers during the summer months.
- Grows four to eight feet tall and can have 30–50 stalks per root mass.
- Strong tap root.
- Stems become woody, persisting for up to two years.

ORIGIN

Eurasia.

SIMILAR PLANTS

Blue vervain (*Verbena hastata*), and blazing star (*Liatris spicata*), although their preferred habitats are considerably drier. The native winged loosestrife (*Lythrum alatum*) most closely resembles purple loosestrife but has alternate leaves, more widely spaced flowers, and is smaller in size.



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THREAT

Quickly invades natural and disturbed wetlands, overtaking native aquatic plants and forming large dense stands. Can displace native aquatic species and impact waterfowl dependent on these natives for food and cover. It is a prolific seed producer and plants can reach maturity within one year. Seeds can remain viable in soil for several years.

DISTRIBUTION

Widespread in the Northeast, Mid-Atlantic, and Midwest. Scattered throughout the rest of the U.S., reported in every state but Florida.

CONTROL

Small infestations and young plants can be hand-pulled, make sure to remove as much of the root as possible and bag plants, as they can resprout and continue to develop seeds if left on site. Larger infestations can be managed with foliar herbicide application. Glyphosate is commonly used. Make sure to read the label and use an aquatic-safe formulation when near water. Cutting and mowing are generally not effective options, as plants will vigorously resprout.



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SERICEA LESPEDEZA

Chinese lespedeza

Lespedeza cuneate

- Perennial herb in the pea family.
- Grows erect from 3–5.5 feet in height with alternate leaves.
- Each leaf is divided into three smaller leaflets about 0.5 to 1 inch long with awl-shaped spines.
- Leaflets are covered with densely

flattened hairs making them appear grayish-green or silver.

- Flowers are pea-like, white with purple markings and emerge singly or in clusters of 2–4 in the upper axils.
- Older stems are woody and fibrous.

ORIGIN

Eastern Asia.

DISTRIBUTION

Found in open areas throughout the eastern U.S. Introduced for erosion control, wildlife food, and as a forage crop.

THREAT

Invades bottomlands and burned grasslands, crowding out native plants and forming pure stands. Mature seeds may remain viable for up to 20 years. Seedlings may represent only 1% of the seeds actually available in the soil. High tannin content makes it undesirable to wildlife. Fruits are eaten and dispersed by animals and haying of infested fields disperses seed.

SIMILAR PLANTS

Can be confused with native slender bush clover, *Lespedeza virginica*, which has pink flowers.

CONTROL

Hand-pulling is typically impractical but mowing plants in the flower bud stage for two to three consecutive years can reduce vigor and control spread. Several different herbicides are commonly used for foliar applications including triclopyr (before bloom) and metasulfuron (late season), follow the label. Fire and grazing can also be incorporated into management plans (e.g. summer herbicide followed by fall burn). Fire also scarifies its seeds, promoting germination, which should be taken into account in management plans.



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YELLOW & WHITE SWEET CLOVER

Melilotus officinalis and *Melilotus alba*

- Typically biennial with plants being vegetative in their first year and flowering/producing seed in their second year.
- Mature plants have one to 10 upright flowering stems, 3–5 feet tall, and a long taproot.
- Leaves are alternate and divided into three serrated leaflets, middle on a stalk.
- Flowers are pea-like. Both species flower in June and July, yellow typically a few weeks before white.
- Fruit are small one- to two-seeded pods.



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ORIGIN

Europe and Western Asia.

SIMILAR PLANTS

Seedlings closely resemble those of alfalfa (*Medicago sativa*), but note the clover's absence of hairs on the underside of leaves and the bitter taste. Sweet clover is most easily identified when in flower.

DISTRIBUTION

Its use in agriculture and for soil stabilization has helped it to spread across the U.S., and it can be found in every state.

THREAT

Invades grasslands and outcompetes native plants for space and resources. A plant can produce 14,000–350,000 seeds. Seeds may remain viable in the soil for more than 20 years. Infested areas managed with prescribed fire can actually enhance germination rates and seedling establishment.

CONTROL

Plants can be hand-pulled, best in the fall of their first year or spring of second. Mowing in the late spring/early summer may reduce (but not prevent) seed set. Foliar herbicide application on young seedlings can be effective (2,4-D is commonly used). Repeated burning two or more years in a row, depending on infestation, can be effective. Burn early in the first year (before green-up) to stimulate germination. If plants are found that summer, burn the next year in late spring. If burn occurs before buds develop, plants will resprout.



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GRASSES



Common Reed

Photo by: Ohio State Weed Lab, The Ohio State University, Bugwood.org

Several different invasive grass species can cause problems in natural areas throughout the region. Invasive grasses can spread aggressively, both through seeds and rhizomes, and outcompete both native grasses and other native plants.

As with any invasive species, different invasive plants are more problematic in different systems and areas. For example, Japanese stiltgrass is present across the state, especially in disturbed areas along the sides of trails and logging roads, where its seeds are spread on equipment and boots. However, it is most problematic as an invasive species in wetter bottomland forests, where it can grow in a tall dense carpet. Others, like Johnson grass, are problematic in both natural grasslands and agricultural settings, although this guide focuses on natural areas.

CHINESE SILVERGRASS

Miscanthus sinensis

- Has tall stalks with loose plume-like heads of pale pink flowers that turn silver in the fall and persist through winter.
- Leaves arise from a large central clump with individual leaves 3–4 feet long and tapered to a point.
- Leaf margins are sharp and slightly serrated.
- Seeds are rough with a twisted bristle tip.
- Spreads through seeds as well as locally through rhizomes.

ORIGIN

Asia.

THREAT

Aggressive, may form colonies and produce a large number of airborne seeds. Can also resprout from pieces of rhizome. Highly flammable and poses a fire hazard as burning plants can have flame lengths of 30 feet.

SIMILAR PLANTS

Big bluestem (*Andropogon gerardii*) has a three-pronged flower spike resembling a turkey's foot. Sugarcane plume grass (*Saccharum giganteum*), is differentiated by its longer flower stalk (up to 12 feet) and shorter leaves (to 1.5 feet).



1

DISTRIBUTION

Can invade roadsides, old fields, shores of reservoirs, and forest openings following fires. Has spread throughout the eastern U.S. to Colorado and California.

CONTROL

Individual plants and small patches can be removed by digging, removing as much of the root as possible. For larger infestations, foliar herbicide application is effective, and glyphosate is commonly used (follow label). This can be assisted by first mowing in spring to remove past growth, spraying when grass has grown approximately 1–2 feet and then repeating as needed. Repeated mowing as low as possible several times during the growing season for several years can also be effective. Burning should typically be avoided, as it can promote plant growth but can be useful in site prep for future herbicide application.



2

COMMON REED

Phragmites australis

- Herbaceous perennial grass with hollow stout stems that can grow up to 15 feet.
- Lanceolate leaves up to 2 feet long.
- Large feathery plumes of flowers develop by mid-summer and are retained through the winter after seed-set.
- Purple/brown flowers turn tan or gray and seeds set through fall and winter.

ORIGIN

Eurasia.

SIMILAR PLANTS

There is a native *Phragmites*, but it is far less common and can be distinguished by a number of features including redder stem color, wider ligules, less persistent leaf sheaths, and less dense stand formation.



THREAT

Spreads rapidly by rhizomes and can quickly take over areas, creating a monoculture. Rhizomes can extend 30 feet in one year. Produces large quantities of seeds. Monocultures as large as 7,000 acres have been documented in other states.

DISTRIBUTION

Thrives in sunny wetland habitats. Occurs throughout the U.S.

CONTROL

Systemic herbicide application is the most common management approach with glyphosate and imazapyr commonly used, typically applied in mid- to late summer. There are many different techniques for applying this herbicide, including cut-stem application, using a wick or dauber, and spraying (backpack, boom or aerial.) Managers should research various options. Pre-herbicide mowing can also be helpful in site prep, typically conducted the preceding winter and taking care to minimize potential impacts on nesting birds. Be sure to consider environment and potential non-target damage in herbicide selection and use an aquatic-safe herbicide near water. Follow-up will likely be needed and prescribed fire, mowing, and water-level manipulation can all be incorporated into long-term management.



HAIRY JOINTGRASS

Arthraxon hispidus

- Creeping annual grass that can reach a height of 2.5 feet when growing with other vegetation in open, moist sites.
- Leaves ovate-lanceolate, ranging from 0.75-2.75 inches in length and approximately 0.5 inch in width, with hairs along the blade margins. Base of leaf blades encircles the stem.
- Flowers appear in September to October. Spikelets are arranged in multiple racemes and are approximately 1.5 inches long. They can be grayish-green to violet in color.
- Yellowish seeds are slender, 1/6 inch long. Can be dispersed through water.

ORIGIN

Eastern Asia (China, Japan, and Korea).

SIMILAR PLANTS

This species commonly occurs with Japanese stiltgrass, another highly invasive annual grass species. It can be distinguished from stiltgrass by its densely hairy leaf sheaths and perfoliate leaves.

DISTRIBUTION

Found across the eastern United States. In Kentucky, it is scattered throughout some areas of the state, with strong establishment in the south east. It favors moist habitats and partial sun, commonly found in pastures and woodlands and along stream banks and roads where soils remain moist.

THREAT

Can form dense stands, particularly along shorelines, which can threaten native riparian vegetation.

CONTROL

For small infestations, hand-pulling and mowing can be conducted before seed production in the late summer. Foliar herbicide application is effective, with glyphosate commonly used (follow label). Be sure to consider site and use an aquatic-safe herbicide if applying near water. Follow-up will be needed for several years to deplete the seed bank. Repeated applications are necessary.



JAPANESE STILTGRASS

Microstegium vimineum

Asian Stiltgrass, Nepalese Browntop

- Pale green lance-like thin leaves up to 3 inches long on thin stems. Silvery strip of reflective hairs at center of upper side of leaf.
- Size varies; can be up to 3 feet tall, but often 0.5 to 2 feet. Sometimes seen as a nearly mat-like cover where mowed.
- Plants come up or break off easily.

ORIGIN

Japan, Korea, China, Malaysia, and India.



THREAT

Adapted to shade, invades forests, forms dense patches that crowd out native plants in open and shaded sites. Spreads easily and can take over fields and forests quickly, especially moist, rich soils and wetlands. Seeds remain viable for three years and are easily spread by hay, soil on shoes, tires, and by water.



DISTRIBUTION

Observed along road sides, stream banks and trails, but also found deep in forests. Found throughout Kentucky and most of the eastern U.S.



CONTROL

For small infestations, hand-pulling can be conducted when plants are in bloom in the late summer. String trimming as low as possible just before plants produce seeds can be useful. Foliar herbicide application is effective, with glyphosate commonly used (follow label). Be sure to consider site and use an aquatic-safe herbicide if applying near water. Follow-up will be needed for several years to deplete the seed bank. When working in areas with a known seed-bank, a spring pre-emergent herbicide treatment may be beneficial.

JOHNSON GRASS

Sorghum halapense

- Perennial grass, culms (stems) can grow 7-8 feet tall.
- Propagates through large rhizomes and mass seed production.
- Flowers are in a purple-colored panicle.
- Leaves are 6-20 inches long with a white mid-vein.
- Stems are pink to red near the base.

ORIGIN

The Mediterranean region.

SIMILAR PLANTS

Eastern gamagrass (*Tripsacum dactyloides*), switchgrass (*Panicum virgatum*), and Indian grass (*Sorghastrum nutans*), may look similar.

DISTRIBUTION

Common across much of the U.S., problematic in both natural areas and agricultural fields. Introduced as a forage crop.

THREAT

Forms dense stands that outcompete native plants in pastures, fields, grasslands, riparian areas, roadsides, edges and disturbed areas. Produces a large number of seeds that remain viable in the soil for many years. Readily sprouts from fragmented rhizomes. Nutritious when young, but can be toxic in late summer.

CONTROL

Small infestations can be pulled up by hand, removing as much of the root system as possible. For larger infestations as well as individual plants, foliar herbicide is the preferred management approach. A range of herbicides are commonly used (e.g. glyphosate, sulfosulfuron); follow label. Repeated mowing and/or tillage over several seasons can be useful for site prep and used in combination with foliar herbicide application, as new plants will likely establish from the seed bank and should be managed early. Scouting and follow-up treatment is key given the long-lived seed bank.



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REFERENCES

Information and resources provided by TN & SE Exotic Pest Plant Councils (tneppc.org and se-eppc.org), Plant Conservation Alliance-Alien Plant Working Group, The Nature Conservancy, Southern Appalachian Man and the Biosphere Program (samab.org), TVA, The University of Tennessee, US Fish & Wildlife Service, and the USDA

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TREATMENT METHODS



There is no silver bullet for invasive plant management. Land managers should consider a broad range of treatment methods and develop the best plan for a given site, taking into account many factors including management goals, invasive species present, infestation level, site characteristics, and presence of desirable species.

There are many techniques in the toolbox when managing invasive plants including manual removal, mowing, grazing, prescribed fire, biological controls, and herbicides. Each of these has advantages and disadvantages that should be considered. Even the most effective management will likely require continued scouting and follow-up as new invasives will continue to arrive.

All herbicides should be applied in accordance with specific label instructions, which include personal protective equipment and storage requirements. While this section provides general recommendations, always read and defer to a herbicide's label.

FOLIAR TREATMENTS

Foliar herbicide application involves directly exposing the leaves of a plant to a herbicide. While this varies for different chemicals, formulations, and applications, this is typically a dilute solution, such as 2% active ingredient of glyphosate or triclopyr.

Timing of foliar herbicide treatment is critical for efficacy. The leaf-out period is a poor time for foliar herbicide application. Applicators should wait until leaves are fully expanded. Fall can be an excellent time for foliar herbicide application for many of our invasive shrubs (such as bush honeysuckle, autumn olive), since plants are pulling resources into their root systems and will be more likely to also take up the systemic herbicide applied then. In addition, many native plants lose their leaves earlier, so risk of non-target damage is reduced. However, foliar herbicide application should be conducted prior to any visible fall color in leaves. While temperatures must be warm enough to facilitate spraying (follow label), for some evergreen plants such as wintercreeper, winter presents a useful window for foliar herbicide application in natural areas, as other native plants will have lost their leaves.



There are many ways to apply foliar herbicide treatments. Low pressure (20-50 psi) backpack sprayers or similar hand-operated pump sprayers are commonly used, and there are different nozzle types to facilitate different types of spraying. For example, a flat spray tip may be better suited to treating a carpet of growth while cone nozzles may be easier for spot treating individual plants. In general, these sprayers should be used for low growing plants and shrubs and are not appropriate for taller vegetation due to potential risk to applicators and drift. Apply herbicide to the leaves and stems of target plants using a consistent back and forth motion. Herbicide should thoroughly cover foliage but not to the point of run-off. Pay attention to weather conditions and do not apply if conditions are overly windy or rain is likely before herbicide is able to dry and be absorbed.

In addition to backpack sprayers, many other techniques can be used for foliar herbicide application. Wicks may be used to paint herbicide onto plants. Mister/fogger units and larger mounted sprayers can be used to tackle larger infestations. In addition, aerial herbicide application (typically using helicopters and drones) is becoming increasingly common for managing invasive plants in natural areas.

In addition to the active ingredient, several other additives may improve the efficacy of foliar treatments. These should be assessed on a case-by-case basis, as some may interact poorly with particular herbicides or formulations. In general, a nonionic surfactant can be beneficial in reducing surface tension, ensuring complete foliar coverage and increasing the rate of



absorption through the leaf cuticle. In addition, adding a marking dye (e.g. blue color) can help the applicator monitor what has been treated in the field and alert them to any potential spills.

Make sure to follow all label specified instructions for applying herbicides and wearing personal protective equipment. Many times this includes eye protection, long sleeves and pants, and nitrile gloves but this varies by chemical and formulation. Allow herbicides sufficient time to dry and be absorbed by the plant. In areas that receive significant public use, it may be necessary to close off the treated area until the herbicide has completely dried.



BASAL BARK TREATMENTS

Basal bark herbicide application involves applying herbicide to the base of a plant's trunk in a formulation that uses an oil carrier to penetrate the tree's bark. There are many different herbicide formulations designed for this, generally using triclopyr ester as the active ingredient (% dilution depending on formulation used).

Basal bark treatments are effective for controlling woody vines, shrubs, and trees. Treatments can be made any time of year including the winter months except when snow or water prevent application to the base of the stem.

This application is typically conducted with a low-pressure backpack sprayer with a straight stream or flat fan tipped nozzle. To control vegetation with a basal stem diameter of less than 3 inches and thin bark, apply the specified herbicide-oil mixture on one side of the basal stem to a height of at least 6 inches from the base. For stems greater than 3 inches basal diameter, or with thick bark, treat both sides of the stem to a height of 1–2 feet from the base. Apply herbicide to the point of run off. Basal bark treatment is most effective for smaller diameter, thin-barked trees.

STEM TREATMENTS

There are a range of herbicide treatment methods that target individual stems directly, exposing them to smaller amounts of more concentrated herbicide than would be used for foliar herbicide applications. These include, but are not limited to, hack-and-squirt, frill, and cut-stump herbicide treatments. The main advantages of these methods are 1) they are economical, 2) they have minimal probability of non-target damage, 3) they are quick, 4) they can be conducted any time of year (other than sap flow/leaf out or when conditions are too cold), and 5) they are appropriate for some plants, like larger trees and shrubs, where foliar application would not be feasible. Backpack sprayers or spray bottles are typically used for these methods.

- **Hack-and-Squirt Method**

Using an axe or similar cutting tool, make uniformly spaced cuts around the stem, with approximately one cut (1–2 inches wide) for each inch diameter of the tree (e.g. a 6-inch diameter tree gets 6 cuts). The cuts should angle downward to hold herbicide and get through the bark into the living sapwood of the tree. Herbicide is then sprayed into each cut to fill it but not to overflow. Many different herbicides can be used for this at a more concentrated solution than would be used for foliar application. For example, triclopyr is commonly used at ~22%–44% active ingredient (1:1 or undiluted) but always read and follow the label.



- **Cut-Stump Method**

Horizontally cut stem at or near ground level, making sure that cuts are smooth, level, and free of debris. Immediately apply a herbicide to this cut stump. For larger trees, treat the outer 20% of the stump. For smaller stems, treat the whole stump. Don't delay in applying herbicide after cutting, as it will reduce its efficacy. Many different herbicides can be used for this at a more concentrated solution than would be used for foliar application. For example, glyphosate and triclopyr are commonly used at ~22%–44% active ingredient (1:1 or undiluted) but always read and follow the label.



MOWING AND CUTTING TREATMENTS

This method is appropriate for small initial populations or environmentally sensitive areas where herbicides cannot be used. Stems should be cut at least once per growing season as close to ground level as possible. Repeated mowing or cutting may be required for control. In addition, these practices may be beneficial in preparing a site for future herbicide application.

HAND PULLING TREATMENTS

Plants should be pulled as soon as they are large enough to grasp but before they produce seeds. This is typically easiest to do after a rain when the soil is loose. The entire root must be removed, since broken fragments may resprout. If plants have seed capsules present, they should be bagged and disposed of to prevent seed dispersal. Care should be taken to minimize soil disturbance, as this can facilitate reestablishment by invasive plants in the future.



Amur Honeysuckle

Photo by: Chris Evans, University of Illinois, Bugwood.org

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