Woodland Invasive Plant Species of Knox County, IN

Produced by the Knox County Cooperative Invasive Species Management Area (CISMA)

Knox County
Cooperative **I**nvasive
Species **M**anagement **A**rea

(This page is left intentionally blank.)

Invasive Plant Species of Knox County, Indiana

Produced by the Knox County Cooperative Invasive Species Management Area (CISMA)

March 2019

Complied and Edited by

Will Drews

Knox County Soil & Water Conservation District

Valerie Clingerman

Purdue Extension, Knox County

Production

Ewing Printing

Photos: All pictures in the guide were taken by Will Drews.

(This page is left intentionally blank.)

Table of Contents

Table of Contents cont.

Introduction

Invasive species are species that are exotic and cause or are likely to cause economic harm, ecological harm, or harm to human health. It is estimated that invasive species cost the United States around $120 billion every year in economic, ecological, and health damages. In Knox County, it is common to see more invasive plant species driving along the road than it is to see native plants.

The purpose for the field guide is to help landowners recognize and be able to control invasive plants on their properties. This particular guide covers some of the more common woodland invasive plants.

* indicate need to follow herbicide label

Red text indicates words defined in glossary

What is the Knox County Cooperative Invasive Species Management Area?

Knox County Cooperative Invasive Species Management Area (CISMA) is a local 501(c)(3) nonprofit organization, whose mission is to minimize the impact of invasive plant species in Knox County by educating the public, monitoring and removing invasive plants, and promoting and protecting native plants.

2019 CISMA Officers:

- President—Dave Deem
- Vice President—Denise Egel
- Treasurer—Dorothy McDowell
- Secretary—Larry Sutterer

Callery Pear

Pyrus calleryana

Callery Pear

Pyrus calleryana

Rose Family (Rosaceae)

Description: Callery Pear is a small tree that can grow up to 30-40 ft. tall. It has alternate, simple, ovate leaves that are sometimes wavy with toothed margins, and escaped trees can have sharp spurs. The leaves turn a deep red during fall. Callery Pears are known for having lots of conspicuous 5-petaled white flowers that appear in early spring, before other tree species. These flowers are also foul smelling. Its bark has lots of shallow fissures that develop into a small blocky pattern as it matures.

Habitat: Roadsides, old fields, open areas, forest edges, interior forests, and other disturbed areas

The Threat: All Callery Pear cultivars (cultivated varieties) are engineered to be sterile. Common examples include 'Bradford' Pear and 'Cleveland Select' Pear. However, different cultivars can cross-pollinate and produce viable seed. This seed is unfortunately consumed by many species of birds and spread far and wide. In addition, seed-produced Callery Pears often have large, sharp spurs on their branches, so dense infestations of Callery Pear can become impenetrable thickets.

Control Methods:

Manual: Small individuals can be pulled, and small sized trees (up to 3 in. diameter) can be removed with a leverage device, such as a Pullerbear™. A large patch can be initially cleared by brush mowing methods, but resprouts will need to be addressed.

Chemical: Foliar herbicide applications of glyphosate* or triclopyr* work well for seedlings or small trees. A basal bark herbicide application with triclopyr* can be used for most larger trees. Cut stump treatments or frilling with glyphosate* or triclopyr* are also very effective.

Mimosa

Albizia julibrissin

Mimosa

Albizia julibrissin

Legume Family (Fabaceae)

Description: Mimosa is a woody perennial tree in the Legume Family that can grow up to 50 ft. tall. It has alternate, bipinnately compound leaves (ranging from 20 to 60 pinnula per pinnae) and pink, puffy flowers that bloom in early to mid summer. These flowers develop into flat, green to brown seedpods (legumes). Mimosa has a very decurrent growth habitat and is often multi-stemmed with thin, smooth bark.

Habitat: Woodland edges, ditches, stream banks, fallow fields, roadsides, and other disturbed areas

The Threat: Mimosa can reproduce via seed and vegetatively through new sprouts, especially after being cut. One study showed a Mimosa tree could produce approximately 8,000 seeds/year. In addition, Mimosa is a nitrogen fixer, giving it another competitive advantage over other plants, especially in degraded habitats. Dense patches of Mimosas can shade out native vegetation.

Control Methods:

Manual: Pulling can work on small seedlings but care must be taken to ensure all of the roots are removed. Larger trees can be controlled by girdling but may need follow up cutting or chemical control.

Chemical: Large trees can be cut stump treated with glyphosate* or basal bark treated with triclopyr*. Patches of small Mimosas can be treated with a foliar application of glyphosate* or triclopyr* plus a non-ionic surfactant.

Tree of Heaven

Ailanthus altissima

Tree of Heaven

Ailanthus altissima

Quassia Family (Simaroubaceae)

Description: Tree of Heaven is a large tree that can grow up to 80 ft. tall or more. It has alternate, compound leaves that have 11-41 leaflets; these leaves have a very foul smell when crushed. Tree of Heaven has large clusters of seeds (similar to maple samaras) that persist throughout the winter. Tree of Heaven has slight, vertical fissures ubiquitous on the bark of young trees. The bark of mature trees is usually more sparsely fissured. Tree of Heaven twigs have a brown, spongy pith and broad, shield-shaped leaf scars (scar where leaves drop in deciduous trees).

Habitat: Disturbed areas, right-of-ways, woods, urban areas, and along ditches

The Threat: Tree of Heaven is a prolific seed producer, and these seeds are wind dispersed. In addition, Tree of Heaven can vigorously re-sprout after being cut. Also, Tree of Heaven is allelopathic both with its roots and leaf litter. All of these traits lead to the formation of dense stands in woods and urban areas.

Control Methods:

Manual: **Do not try to cut Tree of Heaven!** It will re-sprout multiple times!

Chemical: Foliar herbicide applications with glyphosate* are fine for seedlings, but not recommended for large trees. A basal bark herbicide application during the summer, fall, or winter with triclopyr* is the preferred method for mature trees.

White Mulberry

Morus alba

White Mulberry

Morus alba

Mulberry Family (Moraceae)

Description: White Mulberry is a medium tree that can grow up to 40 ft. tall or so. It has alternate, irregular leaves that range from entire to many lobed. The leaves often tend to be glossy on the top. White Mulberry is normally dioecious, or has separate male and female trees. Both male and female tree produced small clusters of flowers called catkins, but only the female catkins will produce fruit. White Mulberry's fruit ranges from white to red to black.

Habitat: Disturbed areas, right-of-ways, fallow fields, woods, forest edges, hedgerows, yards

The Threat: Female White Mulberry trees produce a copious amount of fruit that is spread by all kinds of wildlife. New individuals pop up anywhere. In addition, White Mulberry is a fast growing tree and can outcompete native species. Lastly, White Mulberry has been found to hybridize with the native Red Mulberry (*Morus rubra*), and since White Mulberry is more common than Red Mulberry, it threatens the native species' genetic integrity.

Control Methods:

Manual: Pulling up young individuals can be effective. Using a leverage pulling tool, like the Pullerbear™, can help.

Chemical: A foliar application of glyphosate* is generally effective on large patches of young individuals. Cut stump applications of glyphosate* are also very effective on medium to large trees. A basal bark application with triclopyr* can also be effective.

Amur Honeysuckle

Lonicera maackii

Amur Honeysuckle

Lonicera maackii

Honeysuckle Family (Caprifoliaceae)

Description: Amur Honeysuckle is a large, perennial woody shrub that can grow up to 20 ft. tall. It has opposite, ovate leaves, white axillary flowers, and red berries. The bark starts as a light tan to reddish color and turns to a tan/gray color and peels with age. Amur Honeysuckle, like most other invasive bush honeysuckles, can be distinguished by having a hollow pith.

Habitat: Roadsides, old fields, open areas, forest edges, interior forest and other disturbed areas

The Threat: Amur Honeysuckle produces many berries, which are spread readily by birds and small mammals. Besides high productive potential and dispersal, Amur Honeysuckle can tolerate a wide variety of environmental conditions, ranging from low light to full sun and moist to dry soil conditions. Amur Honeysuckle also tends to grow quite tall and has a multi-stem, arching growth habit. This, plus its early leaf out and late leaf fall, allows Amur Honeysuckle to shade out native species. In addition to shading out native vegetation, Amur Honeysuckle has been shown to have allelopathic chemicals that can further inhibit other plants' germination and flowering/seed production.

Control Methods:

Manual: Pulling up young individuals is quite effective since they have shallow root systems. Larger individuals up to a 2-3 in. diameter stem can be removed with a leverage pulling tool, like the Pullerbear™.

Chemical: A foliar application of glyphosate* is generally effective. The addition of a conditioning adjuvant like AMS -Supreme can increase efficacy. Cut stump applications of glyphosate* are also very effective on larger shrubs. Lastly, shrubs can be cut back in spring, and the regrowth can be treated a couple weeks later with a foliar application of glyphosate*.

Autumn Olive

Elaeagnus umbellata

Autumn Olive

Elaeagnus umbellata

Oleaster Family (Elaeagnaceae)

Description: Autumn Olive is a large, perennial woody shrub that can grow up to 30 ft. tall. It has alternate, oblong leaves, white-yellow axillary flowers, and reddish berries. The bark starts as smooth, red to light gray and turns to a darker gray with fissures as it ages. One of the most distinguishing characteristics of Autumn Olive is the silvery underside of its leaves. In addition, Autumn Olive develops sharp spurs/thorns on its stems.

Habitat: Roadsides, old fields, open areas, forest edges, interior forest and other disturbed areas

The Threat: Autumn Olive produces many berries, which are spread readily by birds and small mammals. Autumn Olive also has nodules on its roots with nitrogen fixing bacteria, giving it a competitive advantage over other plant species. Autumn Olive grows densely, inhibiting native species.

Control Methods:

Manual: Pulling up young individuals can be effective. Larger individuals up to a 2-3 in. diameter stem can be removed with a leverage pulling tool, like the Pullerbear™.

Chemical: A foliar application of glyphosate* or triclopyr* is generally effective. Cut stump applications of glyphosate* are also very effective on larger shrubs. Shrubs can be cut back in spring, and the regrowth can be treated a couple weeks later with a foliar application of glyphosate* or triclopyr*. Lastly, basal bark application with triclopyr* can also be effective.

Border Privet

Ligustrum obtusilfolium

Border Privet

Ligustrum obtusifolium

Olive Family (Oleaceae)

Description: Border Privet is a woody perennial shrub that grow up to 15 ft. tall. Border Privet has small opposite leaves with rounded edges, white flowers in early summer, and clusters of blue-black fruits in the fall. Border Privet tends to have a dense, multi-stemmed growth habit. The stems can be slightly hairy (especially newer growth) and can have spurs. Young stems can have a reddish color but turn to gray as the shrub matures.

Habitat: Woodlands, riparian areas, floodplains, roadsides, ditches, old fields, and fencerows

The Threat: Border Privet can form thick, dense stands that outcompete native vegetation. It is spread primarily by the fruit, which is consumed by wildlife and deposited elsewhere. In addition, its foliage may have a chemical defense against herbivory (the consuming of plants) by insects and mammals.

Control Methods:

Manual: For small individuals, hand pulling is effective. A weed wrench can also be used to pull out larger individuals. Be sure to remove all of the roots because resprouts can occur from root fragments.

Chemical: There are several effective methods of chemical control for Privets. Cut stump treating large shrubs is very effective with an herbicide like glyphosate*. Basal bark application with triclopyr* can also be effective. Large, short stature patches can also be controlled with a foliar application of an herbicide like glyphosate* or triclopyr*.

Burning Bush

Euonymus alatus

Burning Bush

Euonymus alatus

Staff-vine Family (Celastraceae)

Description: Burning Bush is a perennial woody shrub that can grow up to 20 ft. tall and has small, opposite leaves with fine teeth that turn bright red in the fall (depending on the amount sunlight). Burning Bush produces small, greenish/yellow flowers in the spring that develop into red fruit enclosed by a smooth maroon capsule by early fall. Certain individuals can also have pronounced "winged" stems.

Habitat: Disturbed areas, woods, and floodplains.

The Threat: Burning Bush can form dense stands in interior woods or woodland edges, outcompeting native plants. Birds disperse seeds, leading to wide proliferation. Besides seed dispersal, Burning Bush can also reproduce vegetatively via layering, which occurs when a stem comes in contact with the soil and produces a new plant at that point.

Control Methods:

Manual: For small individuals, hand pulling is effective. A leverage device (like a Pullerbear™) can also be used to pull out larger individuals.

Chemical: Cut stump treating large shrubs is very effective with an herbicide like glyphosate*, or spraying groups of smaller individuals with a foliar application of glyphosate*. In addition, a basal bark application with triclopyr works effectively.

Japanese Barberry

Berberis thunbergii

Japanese Barberry

Berberis thunbergii

Barberry Family (Berberidaceae)

Description: Japanese Barberry is a small, perennial woody shrub that can grow up to 6 ft. tall. It has alternate leaves, yellow axillary flowers, and red berries. The spatulate leaves are borne singly or in a group along the stem and a sharp thorn occurs underneath them. The inner roots and wood are bright yellow.

Habitat: Roadsides, pastures, forest edges, woodlands, thickets, etc.

The Threat: Japanese Barberry produces many berries, which are spread readily by birds. It can even produce seeds at low light levels, and its seeds also have a high germination rate. In addition, Japanese Barberry can tolerate a wide variety of environmental conditions, ranging from medium shade to full sun and moist to dry soil conditions. Japanese Barberry can also reproduce vegetatively by tip layering, when the tip of a branch is forced into the ground and roots. Japanese Barberry tends to create dense thickets that suppress native species. Japanese Barberry infestations have been shown to be correlated with increased blacklegged tick populations.

Control Methods:

Manual: Pulling up young individuals is quite effective since they have shallow root systems. Larger individuals up to a 2-3 in. diameter stem can be removed with a leverage pulling tool, like the Pullerbear™. Be careful to get all of the major roots as Japanese Barberry can resprout from root fragments. Propane torches have been demonstrated to be effective, but take all fire safety precautions first.

Chemical: A foliar application of glyphosate or triclopyr* is generally effective. Cut stump applications of glyphosate* are also very effective on larger shrubs. Lastly, shrubs can be cut back in spring, and the regrowth can be treated a couple weeks later with a foliar application of glyphosate* or triclopyr*. This last method can increase mortality rate.

Multiflora Rose

Rosa multiflora

Multiflora Rose

Rosa multiflora

Rose Family (Rosaceae)

Description: Multiflora Rose is a woody, climbing shrub that has alternate compound leaves, five-petaled white flowers, and red fruit (rose hips). Multiflora Rose tends to have 5-9 small leaflets with toothed margins per leaf. Branches and stems have prickles. A good way to distinguish Multiflora Rose from native roses is by its winged stipules.

Habitat: Woods, wood edges, prairies, pastureland, fallow fields, and roadsides

The Threat: Multiflora Rose grows very densely, forming almost impenetrable thickets. It is a climbing shrub, so it can outcompete small trees and shrubs as well as put more weight on mature trees. In addition, a single shrub can produce up to a million seeds that can persist in the soil up to 20 years. Lots of wildlife eat the rose hips and spread them all over.

Control Methods:

Manual: Small individuals can be pulled by hand (with heavy leather gloves) or dug up.

Chemical: Foliar application of herbicide to the leaves is effective, as well as cut stump treating the large shrubs. Metsulfuron-methyl* and glyphosate* can be used for foliar applications. Glyphosate* can be used for cut stump treatments.

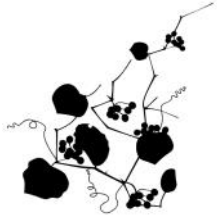
English Ivy

Hedera helix

English Ivy

Hedera helix

Ginseng Family (Araliaceae)



Description: English Ivy is a perennial woody vine that forms groundcover and can climb up large trees. English Ivy has small to medium, alternate, waxy, evergreen leaves that usually have three to five lobes (but can be unlobed as well, especially when it starts to climb trees). Mature climbing vines can produce clusters of blue-black fruit. In addition, Vines can grow to be quite large with similar diameters to small trees and can get rather hairy.

Habitat: Roadsides, forests, forest edges, and hedgerows

The Threat: English Ivy can form dense groundcover in interior woods, outcompeting native plants. Climbing vines can inhibit large trees by covering them completely and preventing them from getting sunlight. The vines can also encircle the entire tree and promote development of fungi and diseases. The large mass of vines also increases weight on limbs and can cause branches to break off during storms. Both the berries and leaves are slightly toxic; however, there are some species of birds that eat (and thus spread) the berries.

Control Methods:

Manual: Most manual methods are not effective, except for very small patches that can be pulled.

Chemical: Cut stump treating* large vines is effective. Foliar herbicide applications have had varying degrees of success. Dormant season foliar applications can minimize collateral damage to native plants, but these dormant treatments can have less efficacy and require favorable weather conditions. Using a broadleaf specific herbicide like triclopyr* (with a surfactant) in the spring on new growth can be more effective.



Japanese Honeysuckle

Lonicera japonica




Japanese Honeysuckle

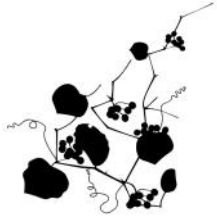
Lonicera japonica

Honeysuckle Family (Caprifoliaceae)

Description: Japanese Honeysuckle is a perennial woody vine that can form groundcover and can climb up large trees. Japanese Honeysuckle has small, opposite, semi-evergreen leaves that are usually entire (but can lobed as well). Japanese Honeysuckle has white tubular flowers that yellow with age, located in leaf axils. These flowers develop into black, round berries in the fall.

Habitat: Roadsides, disturbed woods, forest edges, forest openings, open fields, and hedgerows

The Threat: Japanese Honeysuckle can form a sprawling groundcover along wood edges and open areas, outcompeting native plants. Its vines will shade out small trees, shrubs, and over ground covers. Japanese Honeysuckle vines can also girdle small trees and shrubs, eventually killing them. Some wildlife do use different parts of Japanese Honeysuckle as a food source, and birds are the primary widespread vectors of Japanese Honeysuckle by dispersing its berries. Besides berry dispersal, Japanese Honeysuckle also spreads by rhizomes.



Control Methods:

Manual: Most manual methods are not very effective for complete control, except for very small, young patches that can be pulled. Be careful when pulling because root fragments left in ground can resprout. Mowing can be used to limit climbing but can also lead to an increase in stem density.

Chemical: Cut stump treating* large vines is effective but tedious for large patches. Dormant season foliar applications can be very effective and can minimize collateral damage to native plants. Using glyphosate (with a surfactant)* is very effective. The addition of a conditioning adjuvant like AMS -Supreme can increase efficacy.

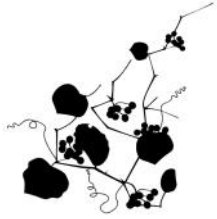
Oriental Bittersweet

Celastrus orbiculatus

Oriental Bittersweet

Celastrus orbiculatus

Staff-vine Family (Celastraceae)



Description: Oriental Bittersweet is a perennial woody vine that has alternate, roundish leaves; small greenish-yellow flowers; and yellow capsules that open to reveal orange/red fruits (seeds covered with a fleshy aril). The clusters of fruit are located in the leaf axils all along the branches. The leaves of Oriental Bittersweet are variable but generally tend to be roundish. Vines can grow to be quite large with similar diameters to small trees and have rough, slightly peeling bark when mature.

Habitat: Roadsides, forests, forest edges, and open fields

The Threat: Oriental Bittersweet can climb over shrubs and trees and can smother or girdle them. It thrives in forest openings and edges but can also survive low light conditions. In addition, it hybridizes with American Bittersweet (*Celastrus scandens*) and threatens the native Bittersweet's genetic integrity. (American Bittersweet can identified by its less rounded leaf shape and fruit that occur in terminal clusters, not throughout in the leaf axils.)

Control Methods:

Manual: Cutting the vines close to the ground multiple times a growing season for consecutive years can control these vines. Young plants can be pulled.

Chemical: Cut stump treating the large vines is effective. Use either glyphosate* or triclopyr* for this method. Cutting and treating resprouts with a foliar application of either herbicide* can also be effective.

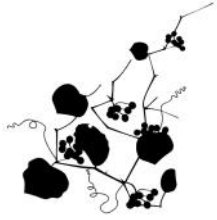
Periwinkle

Vinca minor

Periwinkle

Vinca minor

Dogbane Family (Apocynaceae)



Description: Periwinkle is a perennial herbaceous vine that forms a dense groundcover. Periwinkle has small, entire, opposite leaves that are evergreen and waxy. Periwinkle has blue-purple flowers with 5 connected petals that flower in the spring. It rarely produces seeds.

Habitat: Woods, ditches, hillsides, urban areas, gardens, and yards

The Threat: Periwinkle can form dense groundcover in interior woods, outcompeting native plants and trees. Also, it provides little to no wildlife value because the seeds (if produced) are too small and leaves are toxic to herbivores (animals that eat plants). Periwinkle mostly spreads vegetatively via rhizomes.

Control Methods:

Manual: Most manual methods are not effective, except for very small patches that can be pulled.

Chemical: Foliar herbicide applications are the best strategy for large patches. Use a herbicide like glyphosate* or triclopyr* plus a surfactant (sticking agent). To avoid affecting other desirable plants, Periwinkle can be treated from late fall to early spring.

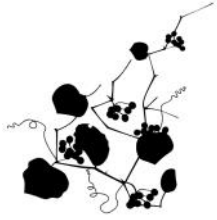
Sweet Autumn Clematis

Clematis terniflora

Sweet Autumn Clematis

Clematis terniflora

Buttercup Family (Ranunculaceae)



Description: Sweet Autumn Clematis is a perennial, semi-evergreen vine that can grow up to 30 ft. tall and has clusters of 4-petaled white flowers with an intoxicatingly sweet smell. Sweet Autumn Clematis has opposite, compound leaves with 3 -5 entire (not toothed) leaflets. The seeds that develop are borne in clusters with silvery hairs.

Habitat: Right-of-ways, disturbed woods, forest edges, gardens and yards

The Threat: Sweet Autumn Clematis can climb up to 30 feet, overtopping other vegetation. Its vigorous growth shades out the vegetation underneath.

Control Methods:

Manual: Repeated cutting or pulling small individuals can be effective. Make sure to remove as much of the root system as possible since new sprouts may occur from roots and root fragments left.

Chemical: Applying foliar glyphosate or triclopyr* to the leaves when the plant is flowering. For a mass of climbing individuals, the vines can be cut near the ground, and then a cut-stump concentration of glyphosate* can be applied to the cut surface.

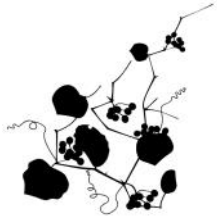
Wintercreeper

Euonymus fortunei

Wintercreeper

Euonymus fortunei

Staff-vine Family (Celastraceae)



Description: Wintercreeper is a perennial woody vine (or subshrub) that forms groundcover and can climb up trees as high as 70 ft. Wintercreeper has small to medium, finely-toothed, opposite leaves that are evergreen. Exposed leaves can turn a reddish-purple color during the dormant season. It also has small green/white flowers in the summer that develop into clusters of red fruit (seeds enclosed in red aril) that are enclosed in whitish capsules in the fall.

Habitat: Disturbed areas, right-of-ways, hedgerows, woods, ditches, gardens, and yards

The Threat: Wintercreeper can form dense groundcover in interior woods, outcompeting native plants and trees. Birds disperse seeds, leading to wide proliferation. Climbing vines can inhibit large trees as well as smother small trees and shrubs.

Control Methods:

Manual: Most manual methods are not effective, except for very small patches that can be pulled. Be sure to allow vines to dry completely as they can readily reroot in the right conditions.

Chemical: Cut stump treating large vines with glyphosate* is very effective. Foliar herbicide applications have had varying degrees of success. Triclopyr* with the addition of a surfactant and/or seed oil is the most effective.




Beefsteak Plant

Perilla frutescens




Beefsteak Plant

Perilla frutescens

Mint Family (Lamiaceae)

Description: Beefsteak Plant is an annual herbaceous flowering plant in the Mint family that can grow up to 3 ft. tall. It has opposite, coarsely-toothed leaves; pink, small flowers; and reddish/purple square stems. Different varieties of Beefsteak Plant can have greenish-purple to deep purple undersides of leaves and green with purple veins to complete purple upper surface of the leaves. The spikes of small pink flowers elongate and develop into seed capsules with several seeds per capsule. Beefsteak Plant also has a very exotic and distinct mint smell that can be identified by crushing or rubbing the leaves, stems, or flowering/fruiting spikes, even long after the plant has senesced.

Habitat: Wood edges, interior woods, old fields, ditches, riparian areas, and roadsides

The Threat: Beefsteak Plant can form very dense stands and outcompete native species. It is a very prolific seed producer. In addition, it is toxic to grazers and is presumed to be allelopathic.

Control Methods:

Manual: Small individuals can be hand pulled. This is most effective for small, young patches in mid to late summer.

Chemical: Herbicide applications are the most effective method for large infestations. Glyphosate* can be application in mid-late summer at a foliar concentration. If chemically treating, make sure to spray before the seeds start developing!

Garlic Mustard

Alliaria petiolata

Garlic Mustard

Alliaria petiolata

Mustard Family (Brassicaceae)

Description: Garlic Mustard is a biennial, herbaceous plant. First year basal rosettes have kidney shaped leaves with large, coarse teeth. Second year plants have alternate leaves and white, four-petaled flowers that develop into long, slender seed pods (siliques). A pungent, garlic-like odor from leaves is released when crushed .

Habitat: Disturbed areas, roadsides, flood plains, riparian areas, and open woods.

The Threat: Garlic Mustard is a prolific seed producer, and these seeds remain viable for many years. In addition, Garlic Mustard uses allelopathic chemicals to inhibit other plants. Garlic Mustard is also detrimental to Virginia White butterflies. The butterflies sometimes lay their eggs on Garlic Mustard, but the caterpillars that feed on Garlic Mustard's leaves will perish.

Control Methods:

Manual: Can be relatively easy to pull or grub out with a garden tool, but want to make sure you get the entire taproot. (Optimal time to pull is before the plant flowers. If it's flowering or has seed pods, you'll need to bag it.)

Chemical: Foliar herbicide applications are recommended for large patches of Garlic Mustard. A foliar spray with glyphosate* or triclopyr* works well for this. (Want to also spray before the plant flowers, definitely before it has siliques.)

Star-of-Bethlehem

Ornithogalum umbellatum

Star-of-Bethlehem

Ornithogalum umbellatum

Lily Family (Liliaceae)

Description: Star-of-Bethlehem is a small perennial herbaceous plant in the Lily Family that grows from bulbs. Star of Bethlehem has small, linear, grass-like leaves and showy, six-petaled white flowers. The linear leaves are identifiable by a whitish midrib. Three-celled seed capsules sometimes develop from the flowers.

Habitat: Moist to wet habitats such as floodplains, riparian areas, mesic woods, disturbed woods, fallow and disturbed fields, forest edges, gardens and yards

The Threat: Star-of-Bethlehem reproduces mainly by new bulb offsets, and it can form dense ground cover and outcompete native plants. Damage to the bulbs does not prevent reproduction. The waxy foliage of Star-of-Bethlehem can be resistant to several common herbicides, making management of this species quite difficult. In addition, the foliage and leaves are poisonous to livestock and other grazing animals.

Control Methods:

Manual: Bulbs can be dug up and disposed of properly; however, some of them can be fairly deep in the ground.

Chemical: Chemical control is difficult because Star-of-Bethlehem is resistant to several herbicides. One of the only herbicides demonstrated to be effective is bromoxynil*, which could be applied with a foliar application in late spring.

Japanese Stiltgrass

Microstegium vimineum

Japanese Stiltgrass

Microstegium vimineum

Grass Family (Poaceae)

Description: Japanese Stiltgrass is an annual grass that can grow up to 6 ft. tall and has alternate leaves with a silvery midrib and small seed heads. The leaves are linear to narrowly elliptical with cuneate leaf bases. The leaf sheaths can be hairy, especially along the margins, but the nodes on the stems are smooth and lack hairs.

Habitat: Right-of-ways, forest edges and interior woods, floodplains, early successional areas, and riparian corridors

The Threat: Japanese Stiltgrass is a warm season grass but does not require as much sunlight as most warm season grasses. Thus, it outcompetes the cool season grasses that normally occur in forest understories. In addition, a single Japanese Stiltgrass seed head can contain up to a thousand seeds, helping it create dense mats and spread rapidly.

Control Methods:

Manual: For small clumps, hand pulling is effective. Mowing can be used for larger flat infestations before the grass goes to seed, but Japanese Stiltgrass can produce new seed spikes, if mowed too early in the season.

Chemical: Applying a dilute formulation (for annual species) of grass-specific herbicide (e.g. sethoxydim* or clethodim*) to the leaves before the grass develops its seed heads. A dilute formulation of glyphosate* can also be used but is not as selective.

(This page is left intentionally blank.)

Other Invasive Plant Species that could be found in Knox County Woodlands

Amur Corktree (*Phellodendron amurense*)

Chinese Wisteria *(Wisteria sinensis)*

Golden Rain Tree *(Koelreuteria paniculata)*

Japanese Chaff Flower (*Achranthyes japonica*)

Japanese Hops *(Humulus japonicus)*

Kudzu *(Pueraria montana)*

Moneywort *(Lysimachia nummularia)*

Norway Maple *(Acer plantanoides)*

Princess Tree *(Paulownia tomentosa)*

Siberian Elm *(Ulmus pumila)*

Yellow Groove Bamboo *(Phyllostachys aureosulcata)*

If you are dealing with any of these species and need help, reach out to the Knox County CISMA.

Herbicide Information*

Active Ingredient	Formulations	Examples of Brands	Translocating or Contact	Selectivity	Mode of Action	Residual?
2,4-D	Ester or amine salt	Amine 400, Weedone	Translocating	Broadleaf specific	Auxin mimic	No
Bromoxynil		Buctril, Moxy	Contact	Broadleaf specific	Photosynthesis inhibitor	No
Clethodim		Arrow, Clethodim 2E	Translocating	Grass specific	Lipid inhibitor	No
Glyphosate		GlyStar, Roundup, Rodeo, AquaMaster	Translocating	Nonselective	Amino acid inhibitor	No
Imazapyr		Arsenal, Habitat, Polaris	Translocating	Nonselective	Amino acid inhibitor	Yes
Metsulfuron methyl		Escort	Translocating	Mostly broadleaf specific	Cell division inhibitor	Yes
Sethoxydim		Poast	Translocating	Grass specific	Lipid inhibitor	No
Triclopyr	Ester or amine salt	Garlon, Remedy	Translocating	Broadleaf specific	Auxin mimic	No

If you need technical assistance with herbicide applications, reach out to the Knox County CISMA.

**Always follow herbicide label directions. Failure to do so is against the law.*

Herbicide Application Techniques

Foliar Spray Application:

Mix the herbicide to a foliar application concentration, making sure to follow herbicide label requirements*. Adding a surfactant ("sticking agent") is recommended to improve efficacy. Also, the addition of marking dye can helpful to keep track of what has been sprayed. Thoroughly cover all leaf surfaces, but not to the point of dripping off.

Cut Stump Application:

Cut the undesirable shrubs or trees near the base. Try to make the cut as level as possible to the ground. Soon after making the cut (no more than 10 minutes), apply an herbicide (like Glyphosate*) at a cut stump concentration* on the cut surface.

The addition of marking dye can be helpful to keep track of what has been sprayed. For small stems, the herbicide can be sprayed over the entire surface. For larger shrubs and trees, the herbicide can just be applied to the outer ring of the stump, which contains the vascular tissue. Thoroughly coat, but not to the point of puddling on the ground.

Basal Bark Application:

Mix an oil soluble herbicide (like triclopyr ester*) with a basal oil carrier according to herbicide label directions*. With a backpack or handheld sprayer, apply the oil herbicide solution around the circumference of the undesired shrub or tree, 1.5 ft. above the ground. Make sure to thoroughly cover the area, but not to the point of puddling at the base.

If you need technical assistance with herbicide applications, reach out to the Knox County CISMA.

**Always follow herbicide label directions. Failure to do so is against the law.*

Glossary

Adjuvant – an additive that increases the efficacy of a herbicide

Allelopathy – the biochemical inhibition of a species by another

Annual – a plant that takes one growing season to complete its lifecycle

Aril – a fleshy seed coating that often aids in dispersal

Axillary – occurring where the leaf meets the stem

Basal Rosette – the initial stage of a biennial plant that consists of a clump of leaves near the ground

Biennial – a plant that takes two growing seasons to complete its lifecycle

Bipinnate – twice divided leaves

Bulb – an underground storage organ present in some plants that is characterized by scales

Catkins – a spike-like flowering structure present in some plants

Compound – leaves that have multiple leaflets per leaf

Contact – an herbicide type that only affects the part of the plant it touches

Cuneate – a leaf base that is wedge shaped

Deciduous – trees that lose their leaves during the dormant season

Decurrent – spreading form

Dioecious – plants that have separate male and female individuals

Entire – a leaf without lobes

Forb – a non woody (or herbaceous), flowering plant that is not a grass or grass-like plant

Frilling – a woody plant control technique involving a series of downward cuts followed by an herbicide application

Girdle – the act of removing the bark all around the stem of a woody plant. Or the constriction of the bark and vascular tissue of one woody plant by another.

Herbaceous – plants that are not woody

Lobe – a clefted leaf shape

Nodules – a knob-like growth generally occurring on roots of certain plants

Oblong – a leaf shape that is rectangular with rounded edges

Ovate – an oval leaf shape that is wider near the leaf base

Perennial – a plant that lives more than two growing seasons

Petiole – the stem that connects a leaf to the branch or central stem of a plant

Pinnae – the first division in a bipinnately compound leaf

Pinnule – the secondary division in a bipinnately compound leaf, i.e. smallest leaflet

Pith – the tissue in the center of vascular plant stems

Prickles – the thorny protrusions from the epidermis of certain species

Residual – an herbicide with lingering soil activity after being applied

Rhizome – an underground horizontal stem that holds storage reserves for the plant

Samara – a winged seed structure

Senesce – the deterioration of a plant with age

Selectivity – with regards to herbicides, the types of plants affected by a certain herbicide, nonselective meaning all plants are affected

Silique – a long slender seedpod with a central partition

Spatulate – a leaf shape where the leaf is broadest near the tip and tapers to the base

Spur – a modified, shortened stem produced on some woody plant species

Stipule – the leaf like structures at the end of the petiole

Surfactant – a sticking agent sometimes added to herbicide mixes

Terminal – occurring at the end of a branch or stem

Translocating – an herbicide type that is absorbed by the plant and translocates throughout to kill the entire plant, not just where it is applied

Vegetative – asexual, or clonal, reproduction

References

Apsley, David K. and Annemarie Smith. 2011. Controlling Non-Native Invasive Plants in Ohio Forests: Japanese Stiltgrass. Web.

Cippolini, K; Titus, K; Wagner, C, 2012. Allelopathic effects of invasive species (*Alliaria petiolata*, *Lonicera maackii*, *Ranunculus ficaria*) in the Mid-western United States. *Allelopathy Journal*, 29(1):63-76.

Davis, S, and D. Cipollini, 2014. Do mothers always know best? Oviposition mistakes and resulting larval failure of *Pieris virginiensis* on *Alliaria petiolata*, a novel, toxic host. Biological Invasions, 16:1941-1950.

Gage, Karla. nd. Management of Invasive Plants of Southern Illinois. River to River Cooperative Weed Management Area. http: // www.rtrcwma.org/Management_SILinvasiveplants.pdf

Hilty, John. "Amur Honeysuckle." Illinois Wildflowers, 20 Dec. 2017. http:// www.illinoiswildflowers.info/trees/plants/amur_hs.htm.

Hilty, John. "Japanese Barberry." Illinois Wildflowers, 20 Dec. 2017. http:// www.illinoiswildflowers.info/trees/plants/jp_barberry.htm.

Hilty, John. "Japanese Honeysuckle." Illinois Wildflowers, 20 Dec. 2017, http:// www.illinoiswildflowers.info/weeds/plants/jp_honeysuckle.htm.

Hilty, John. "Star-of-Bethlehem." Illinois Wildflowers, 20 Dec. 2017, http:// www.illinoiswildflowers.info/weeds/plants/starbeth.htm.

Hilty, John. "White Mulberry." Illinois Wildflowers, 20 Dec. 2017, http:// www.illinoiswildflowers.info/trees/plants/wh_mulberry.htm.

IPSAWG. 2006. "Invasive Plant Species Factsheet: Blunt-leaved Privet." http:// www.in.gov/dnr/files/Blunt_Leaved_Privet.pdf.

IPSAWG. 2006. "Invasive Species Factsheet: Japanese Honeysuckle." https:// www.in.gov/dnr/files/Japanese_Honeysuckle.pdf.

Kaufman, Sylvan R. and Wallace Kaufman. 2012. *Invasive Plants*. Mechan-icsburg, PA: Stackpole Books. Print.

Kleczewski, Nathan et al. 2011. An Introduction to Microstegium vimineum (Japanese stiltgrass/Nepalese browntop) an Emerging Invasive Grass in the Eastern United States. Purdue Extension Weed Science. Web.

Luken, JO; Thieret, JW. 1996. Amur Honeysuckle, Its Fall from Grace. *BioSci-ence*, 46(1):18-24.

Maddox, Victor et al. "Identification and control of Invasive Privets (Ligustrum spp.) in the Middle Southern United States." Invasive Plant Science and Management, no. 3, 2010, pp. 482-488.

Main, Christopher L. et al. 2004. "Star-of-Bethlehem (Ornithogalum umbella-tum) Control with Postemergence Herbicides in Dormant Bermu-dagrass (Cynodon dactylon) Turf." Weed Technology, vol. 18, no. 4, pp. 1117-1119.

Meyer, Rachelle. 2010. Albizia julibrissin. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: https://www.fs.fed.us/database/feis/plants/tree/albjul/ all.html [2018, July 7].

Pennsylvania DCNR. "Invasive Plants in Pennsylvania: Mimosa." Pennsylvania Department of Conservation and Natural Resources. http://

www.docs.dcnr.pa.gov/cs/groups/public/documents/document/dcnr_010248.pdf.

Pennsylvania DCNR. “Invasive Plants of Pennsylvania: Privets.” Pennsylvania Department of Conservation and Natural Resources. http://www.docs.dcnr.pa.gov/cs/groups/public/documents/document/dcnr_010226.pdf.

Pennsylvania DCNR. “Invasive Plants of Pennsylvania: Star-of-Bethlehem.” Pennsylvania Department of Conservation and Natural Resources. http://www.docs.dcnr.pa.gov/cs/groups/public/documents/document/dcnr_010226.pdf.

Pimentel, D; Zuniga, R; Morrison, D. 2005. Update on the environmental and economic costs associated with alien-invasive species in the United States. *Ecological Economics*, 52(3):273-288.

Schulz, KE; Vaughan, A; Remelius, E. 2009. Physiologically based control of invasive Asiatic shrub honeysuckle. *Transactions of the Illinois State Academy of Science*, 102(1/2):21-32.

Silander, J and D. Klepeis. 1999. The invasion ecology of Japanese barberry (Berberis thunbergii) in the New England landscape. Biological Invasions, 1:189-201.

Steckel, Lawrence E. and M. Angela McClure. 2015. “Oh, Beautiful Star-of-Bethlehem (Ornithogalum umbellatum).” Weed Technology, vol. 29, no. 4, pp. 874-877.

Swearingen, Jil M. and Sandra Diedrich. 2006. “Factsheet: English Ivy.” Plant Conservation Alliance. https://www.invasive.org/weedcd/pdfs/wgw/englishivy.pdf.

Swearingen, J., B. Slattery, K. Reshetiloff, and S. Zwicker. 2010. Plant Invaders of Mid-Atlantic Natural Areas, 4th ed. National Park Service and U.S. Fish and Wildlife Service. Washington, DC. Print. 168pp.

University of Florida. “Albizia julibrissin.” Center for Aquatic and Invasive Plants, [Online]. https://plants.ifas.ufl.edu/plant-directory/albizia-julibrissin/.

University of Florida. “Clematis terniflora.” Center for Aquatic and Invasive Plants, [Online]. http://plants.ifas.ufl.edu/plant-directory/clematis-terniflora/.

USDA. PLANTS Database, [Online]. https://plants.sc.egov.usda.gov

Ward, J; Worthley, T; and S. Williams. 2009. Controlling Japanese barberry (Berberis thunbergii DC) in southern New England, USA. Forest Ecology and Management, 257:561-566.

Williams, S; et al. 2009. Managing Japanese Barberry (Ranunculales: Berberidaceae) Infestations Reduces Blacklegged Tick (Acari: Ixodidae) Abundance and Infection Prevalence With Borrelia burgdorferi (Spirochaetales: Spirochaetaceae). Community and Ecosystem Ecology, 38(4):977-984.

Reporting Invasive Plants

Please report invasive plant species populations using EDDMapS (**E**arly **D**etection & **D**istribution **Map**ping **S**ystem). Indiana's version can be found at https://www.eddmaps.org/indiana/.