



Help Stop the Invasion of Unwanted Trees

TREE CITY USA®
BULLETIN

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Staff and volunteers work to control invasive trees and shrubs in an effort to restore natural conditions in Seattle, Washington's parks and other areas of the urban forest.

Like it or not, our world is shrinking. With modern trade systems, daily international transportation, and a climatic warming trend, environmental change is inevitable. The spread of plants beyond their natural range is one of these changes. Unfortunately, in many cases this is detrimental or even disastrous to the local ecosystems where the plants are introduced. We cannot turn back the hands of time or stop the invasion of alien plants. However, we can and should recognize the problems they create and take action to keep invasives under control.

We venture into controversial territory with the topic in this issue of the bulletin. One problem is that a tree considered as an invasive to one person may be highly valued by another. It is somewhat analogous to “one person’s trash is another person’s treasure.” Another thing that makes this topic difficult is that a tree in its natural habitat most likely is harmless and fills an ecological niche. It is when it is transported outside its natural range that it can become troublesome.

There is also the challenge of unlearning long-standing information. For example, autumn olive trees (*Elaeagnus umbellata*) were once touted by college professors and natural resource managers as the thing to plant to help wildlife. They were introduced into the United States around 1830 and were long promoted as a way to improve wildlife habitat and control soil erosion. Unfortunately, this small tree has the ability to create dense shade, crowd out native vegetation, interfere with natural plant succession, and disrupt nutrient cycling. In short, it alters the ecosystem — and not in a beneficial way.

Still another challenge is that some invasive trees, like invasive insects, have look-alikes that are perfectly harmless and in many cases beneficial. Native sumac species (*Rhus* spp.) and young walnut trees (*Juglans* spp.) can easily be confused with the invasive tree of heaven (*Ailanthus altissima*). Finally, there is sometimes name confusion. For example, the common name goldenraintree is used both with the benign shade tree *Koelreuteria paniculata* and its invasive cousin, *Koelreuteria elegans*.

Vines, too, can be villainous in the landscape. The smothering effects of white bryonia and English ivy are well-known, and the infamous kudzu is said to sometimes elongate a foot in a day, covering all in its path. These and other plants require action, too, but because of space limitations, we focus primarily on trees in this issue.

Despite the daunting challenges, invasive trees warrant the attention of tree boards, urban foresters, and all property owners.



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Fundamentals of Invasive Trees

Definitions

Like almost any concept, exact definitions vary. The following is from Federal Executive Order 13751, amended by Executive Order 13751 (2016), 'Safeguarding the Nation from the Impacts of Invasive Species'.

ALIEN SPECIES means, with respect to a particular ecosystem, any species, including its seeds, eggs, spores, or other biological material capable of propagating that species, that is not native to that ecosystem.

INTRODUCTION means the intentional or unintentional escape, release, dissemination, or placement of a species into an ecosystem as a result of human activity.

INVASIVE SPECIES means an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health.

NATIVE SPECIES means, with respect to a particular ecosystem, a species that, other than as a result of an introduction, historically occurred or currently occurs in that ecosystem.

THE NATIVE VS. NON-NATIVE DEBATE

There are some who are passionate about avoiding non-native trees in planting programs. Non-natives should not be confused with invasive trees. The fact is that some are and some are not. Where planting natives can be done and the trees provide the needed service such as shade, windbreak, or a landscape aesthetic, then natives are likely to be well-suited to the climate and possibly the planting site. Planting natives then makes good sense. However, many communities in the Midwest and West would have few trees from which to select and little diversity in the urban forest without the help of non-natives. A planting plan should look at all characteristics of trees under consideration and selections should be made to meet local needs, ensure longevity and diversity, and exclude any invasive species.

While every effort should be made to avoid planting species that are on a federal or state list of invasive species, many communities would be deprived of useful trees if only native species were planted.



What Makes a Tree Invasive?

A LONG FLOWERING AND FRUITING PERIOD.



SEEDS ARE EASILY DISPERSED BY BIRDS, MAMMALS, WIND, OR WATER

- Seeds begin to be produced early in the life of the tree, sometimes even as early as the first few years of growth.
- Prolific seed production.
- Seeds germinate quickly.
- High percentage of germination success.



REPRODUCTION MAY OCCUR THROUGH ROOT AND/OR STUMP SUCKERS AS WELL AS BY SEEDS



HIGHLY ADAPTABLE TO A WIDE RANGE OF SOIL AND GROWING CONDITIONS









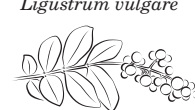
FAST GROWTH




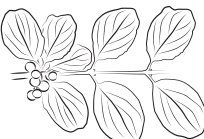
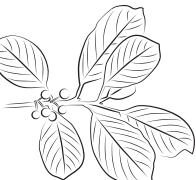


Results of Invasive Trees

- Native species, which often can grow only on specific, sometimes limited sites, are displaced.
- Plant diversity is reduced, changing the ecosystem processes, including animal life that may depend on the displaced native plants.
- Invasives can sometimes hybridize with native plants, changing the genetic makeup of their offspring.
- Local economic uses of native trees or plants may be negatively impacted.
- Non-native animals and pathogens may be introduced.

Some Common Invasive Trees & Shrubs

The following list is adapted from a list compiled by the Morton Arboretum. A few trees have been added from other lists. In some cases, a tree may be invasive in one location and not in another. For example, black locust may not be considered invasive in its natural range in the Appalachians and Ozarks. Also, many highly invasive species are omitted due to lack of space. State lists should be consulted, and many communities also have lists of prohibited species that may or may not be invasive.

COMMON AND BOTANICAL NAME <small>(Alphabetical by botanical name)</small>	DESCRIPTION	ORIGIN	REPRODUCTIVE CAPACITY	INVASIVE POTENTIAL
AMUR MAPLE <i>Acer ginnala</i> 	A small 20' tree with double-toothed leaves that have shallow lobes. In spring, small, fragrant, pale yellow flowers appear as leaves unfold. Two-winged, inch-long seeds mature in late summer.	Native of Eastern Asia. Introduced into U.S. and Canada in the 1860s.	One tree can produce more than 5,000 two-winged seeds that are widely spread by wind.	In open woods, it displaces native shrubs and understory trees. In prairies and open fields, it can shade out native species.
BOXELDER <i>Acer negundo</i> 	Large 30'-50' tree adaptable to wet or dry soils. Leaves have three to five leaflets opposite each other on the stem. Female trees produce many two-winged seeds. New stems are a waxy gray-blue, turning green when rubbed.	Native to U.S., particularly along riverbanks and floodplains, except in the extreme South and West.	It can spread by suckers, root shoots, and a prolific number of wind-borne seeds. It readily establishes in disturbed areas, including fencelines, near buildings, abandoned roads, railroad beds, dumps, and farm fields.	It quickly establishes thickets that shade out smaller, more desirable plants.
NORWAY MAPLE <i>Acer platanoides</i> 	A 40'-50' tree with a leaf shape like its cousin the sugar maple. Norway maple leaves have a milky sap when broken, and their fall color is limited to yellow (except for the maroon-leaved varieties).	Native to Europe, this tree was introduced in Philadelphia in 1792 as an ornamental street tree. Today, it is the most commonly planted street tree in the U.S.	It spreads by prolific production of wind-borne, two-winged seeds.	It is easily established in open woodlands and fields. Shade-tolerant and as an efficient user of water and nutrients, it can out-compete natives. Its dense canopy limits wildflowers and understory herbaceous growth.
TREE OF HEAVEN <i>Ailanthus altissima</i> 	Can reach 80' in height. Compound leaves 1'-3' in length with anywhere from 10-41 leaflets 3"-5" long. Margins smooth except for 1 or 2 teeth on lower margin. Smooth, gray or light brown bark. Small yellowish/greenish flowers in large, terminal clusters.	Native of eastern Asia and introduced to U.S. in 1784. Very common on urban sites.	Reproduces by seeds, root sprouts, and stump sprouts. Male and female trees are separate; female may produce 325,000 seeds per year.	Fast-growing and a prolific seeder. It can survive just about any place and takes over from native plants, sometimes forming dense thickets. Roots can damage sewer systems and foundations.
AUTUMN OLIVE <i>Elaeagnus umbellata</i> 	This shrub or small tree can grow to 20' high and wide. Its gray-green leaves are shorter than Russian Olive (also often considered invasive). It has fragrant yellow flowers that emerge after the leaves in spring and mature into bunches of red fruits in fall.	Native to Asia, this plant was introduced in 1917. Valued for its use as a forage plant in wildlife areas, this vigorous shrub now dominates many untended areas from fencerows to meadows to open woods, sand dunes, and railroad rights of way.	Just one shrub can produce up to 200,000 seeds a season. These are widely distributed by birds.	This shrub grows rapidly into a dense thicket, choking out native plants.
BURNING BUSH <i>Euonymus alatus</i> 	Burning bush is often 12' tall and can reach 15'-20' high and wide. It's identified easily by four corky "wings" on the stems and its brilliant red fall color.	Native to northeast Asia, this plant was introduced in the 1860s for its ornamental value.	Spread by birds that eat the seeds. It can tolerate many conditions, from full sun to nearly full shade and from very dry to moist soils.	This shrub has begun invading open woodlands, mature second-growth forest ravines, and hill prairies. Rarely a problem in urban landscapes.
EUROPEAN PRIVET <i>Ligustrum vulgare</i> 	This deciduous shrub grows 12'-15' high and wide. It is densely branched, irregularly shaped, and most easily identified by its clusters of fragrant small white flowers. Its lustrous black fruit ripens in fall and remains until the following spring.	Native to Europe and introduced into the U.S. around 1850. It has been widely used for hedges.	Birds spread the seeds of this prolific producer. The plant also suckers aggressively.	It is extremely aggressive, crowding out native plants along natural areas including river bottoms and open woods, as well as in fencerows, vacant lots, old fields, and roadsides.

COMMON AND BOTANICAL NAME	DESCRIPTION	ORIGIN	REPRODUCTIVE CAPACITY	INVASIVE POTENTIAL
AMUR HONEYSUCKLE <i>Lonicera maackii</i> 	<p>This upright, spreading, deciduous shrub grows 12'-15' tall and wide. It can best be differentiated from native species because it leafs out several weeks earlier in spring and holds its leaves longer in fall. It has white flowers that turn yellow, and red berries that ripen in October.</p>	<p>Native to Asia and introduced into North America in 1896. Illinois is one of the states where it has been most invasive.</p>	<p>In addition to being a vigorous, aggressive grower, amur honeysuckle seeds are widely spread by birds.</p>	<p>Amur honeysuckle colonizes a wide variety of habitats, turning prairies into scrub and reducing the plant diversity and density of woody seedlings in the ground layers of woodlands. Because it leafs out early, it shades out spring-blooming woodland wildflowers.</p>
WHITE MULBERRY <i>Morus alba</i> 	<p>Deciduous tree growing 30'-50' tall and wide. Its extremely dense, rounded form is composed of tight-knit slender branches, often developing witches' brooms. In summer, it develops fruits resembling blackberries.</p>	<p>Native to China. It was imported by early settlers in Jamestown, Virginia, for the silkworm industry.</p>	<p>Seeds spread by birds and mammals. Establishes itself in woodlands and along streams.</p>	<p>Rarely a problem in undisturbed woodlands but it naturalizes in disturbed woodlands and along railroads, back alleys, floodplains, and open lots.</p>
AMUR CORKTREE <i>Phellodendron amurense</i> 	<p>A medium-sized shade tree 30'-45' tall with an equal or greater spread. Its compound leaves are 10"-15" long and include five to 11 leaflets. The bark of older trees is gray-brown and cork-like in texture. Yellow-green flowers appear in late spring followed by ½" black fruits.</p>	<p>Native to Asia and introduced to the U.S. in 1856.</p>	<p>Seeds spread by birds. Establishes itself in woodlands and along streams.</p>	<p>Female plants produce seed and should be avoided. Seedless male selections are becoming available in the nursery trade.</p>
COMMON BUCKTHORN <i>Rhamnus cathartica</i> 	<p>A tall shrub or small tree that can grow to 20' tall. The leaves, which appear earlier than most natives in spring and persist beyond most natives in fall, are a dull green and elliptical. Twigs often have thorn-like spurs. Female plants bear dark blue fruits in May, which ripen to black in August and may persist for much of the winter.</p>	<p>Native to Europe and Asia, these plants were introduced during the 1800s as ornamental hedgerows.</p>	<p>Birds widely disperse its seeds, which have a high germination rate. It grows rapidly in a variety of conditions, from full sun to shaded understory, and resprouts vigorously when cut back.</p>	<p>Can grow in a variety of habitats including gardens, fencerows, pastures, and roadsides. Once established, this plant quickly develops dense thickets that outcompete other plants. In woodlands, it can completely replace existing understory plants, including spring wildflowers.</p>
GLOSSY BUCKTHORN <i>Rhamnus frangula</i> 	<p>A multi-stemmed shrub or small tree. It can grow 10'-15' tall. The elliptical leaves, which appear earlier than most natives in spring and persist beyond most natives in fall, are glossy green on top and somewhat hairy underneath. Female plants bear red fruits in May, which ripen to black in August and may persist through the winter. It is much less shade-tolerant than common buckthorn.</p>	<p>Native to Europe and Asia, this plant was introduced during the 1800s as ornamental hedgerows.</p>	<p>Birds disperse its seeds, which have a high germination rate. Although it favors wetlands, it can also become established on dry sites. It grows rapidly in a variety of conditions, from full sun to shaded understory, and resprouts vigorously when cut back.</p>	<p>Once established, this plant quickly develops dense thickets that out-compete other species. It can thrive in a variety of habitats including bogs, marshes, river banks, pond margins, gardens, fencerows, pastures, prairies, roadsides, and abandoned farm fields.</p>
BLACK LOCUST <i>Robinia pseudoacacia</i> 	<p>This fast-growing tree reaches 30'-80' tall. Its blue-green leaves are 6"-14" long with seven to 21 leaflets. In May to early June, the tree has fragrant, white flowers in large, drooping racemes. Later, shiny, flat, 2"- 4" long seedpods develop.</p>	<p>A native to the eastern U.S. Its rapid growth, ability to grow on poor soils, high fuel value, and flowers that provide an attractive food source for bees are among the reasons it has been widely planted.</p>	<p>Black locust creates expansive, dense stands through seed germination and suckering.</p>	<p>Outside its natural range this tree can out-compete native species in most dry, disturbed environments including upland forests, savannas, pastures, and roadsides. Its seeds, leaves, and bark are toxic to humans and animals.</p>
SIBERIAN ELM <i>Ulmus pumila</i> 	<p>Another fast-growing tree that is 50'-70' tall with a round, open crown. It has small, elliptical leaves, usually less than 2 inches long. Greenish flowers appear in small, drooping clusters before the leaves unfurl in spring. Later, the one-seeded, winged fruits hang in clusters.</p>	<p>A native of Asia and introduced to the U.S. in the 1860s. It was valued for its rapid growth and ability to adapt to a variety of conditions, including drought and poor soils.</p>	<p>Windblown seeds germinate prolifically, often forming thickets of hundreds of seedlings.</p>	<p>This tree can dominate prairie habitat in a few years. It also invades roadsides, pastures, streambeds, and sand prairies.</p>

Fighting the Good Fight

It may not be possible to completely eradicate invasive trees, but control is a reality. It is also something being gallantly carried on by volunteer groups as well as park and municipal agencies. But the issue is complex, and there is no silver bullet in this fight. Here are just a few of the hundreds of efforts being made nationwide to combat invasive trees.

Buckthorn Bustin' in Minneapolis

Buckthorn could well be the poster child of invasive trees. In the woodlands of Minnesota, this shrub or small tree from Europe and Asia is taking over the remnants of natural areas that remain at the edges of agriculture and urban development. Buckthorn...

- Out-competes native vegetation.
- Creates a dark, dense understory with no herbaceous layer.
- Degrades water quality by suppressing native groundcover plants.
- Reduces birdlife diversity, provides little nutritional value, and makes nesting birds more prone to predation.
- Alters habitat suitability for many wildlife species, including deer.
- Disrupts embryo development and prevents hatching of amphibians.
- Contributes to forest decline and decreases forests' ability to store carbon.
- Is an alternate host for crop pests.
- Produces messy berries that stain cars, decks, and other facilities.
- Has thorns, making it a safety hazard to children and park users.

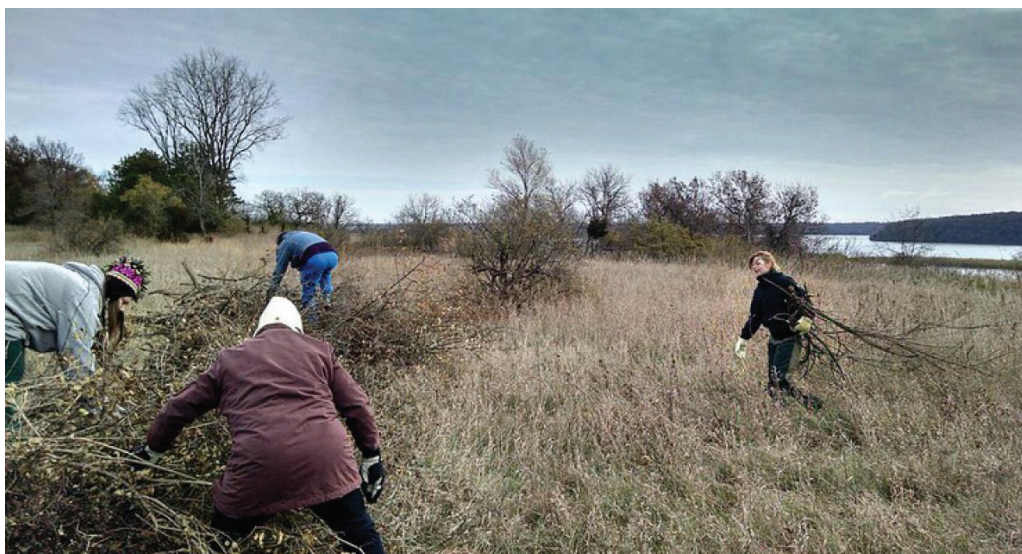
The invasion of buckthorn is particularly disheartening in the Mississippi River Gorge in the Twin Cities area. This is a natural oasis of limestone bluffs, natural springs, and hardwood

forests and a place highly popular with birders and other nature enthusiasts. Organized efforts using volunteers are making a difference in the fight against this weed tree. For example, eradication events are organized by the nonprofit organization Friends of the Mississippi River with help from volunteers called Gorge Stewards. Sometimes park crews or contractors do the heavier cutting with volunteers stacking and carrying out the brush to be chipped or hauled away. Other helpers pull or "Weed Wrench" smaller buckthorns. Ecologists oversee the projects, flagging native look-alikes such as wild black cherry. In some cases site restoration also includes planting native species.

Is it working? "Yes," said Karen Solas, a long-time member of Friends of the Mississippi River, and its former stewardship coordinator. "We pick away at it every year and we've got to the point where the land is again beautiful," she says. "Now we are expanding the buckthorn-free areas and targeting other invasive species. We are even seeing bird species we had not seen before."



Buckthorn bustin' events are held regularly to rally volunteers for the ongoing challenge of removing the invasive buckthorn and other invasive plants. No expertise is necessary as Friends of the Mississippi staff members provide instructions. They have also developed a series of cards like the one shown below. These help volunteers identify the various invasives and provide tips on what they might do in their own backyards to help with the problem.



Nearly 5,000 residents of the greater Minneapolis area turn out annually to help Friends of the Mississippi River control buckthorn and carry out its mission to protect, restore, and enhance the Mississippi River and its watershed in the Twin Cities region.

A DIFFERENT PERSPECTIVE

Every day we learn and respond. If we receive new information and don't react to it, we won't be effective.

— Phil Gruszka, Director of Horticulture and Forestry, Pittsburgh Parks Conservancy

The nonprofit Pittsburgh Parks Conservancy has been as aggressive as any organization in the fight against invasive trees. However, according to ecology-minded Phil Gruszka, “We have largely backed off from what we used to do to combat invasive tree species. I call it adaptive management.”

Phil and his team found that as invasive Norway maples, trees of- heaven, and other non-natives were removed, the new trees seeding in naturally were primarily white and green ashes. This was just ahead of the arrival of emerald ash borers in the Pittsburgh area! Phil says, “At first we thought, ‘hooray, natives.’ But then the thinking was that if invasive insects and diseases are going to get our natives, it is better to have a canopy of Norway maples than no forest at all. We won't plant Norway maples, but we aren't attempting to remove them all, either.”

The approach to restoration in Pittsburgh's parks is now more sophisticated. Where concentrations of invasive trees exist in parklands, volunteers and staff still attempt to remove them. However, specific native trees will then be purposefully planted, with about 80% of them being early succession trees that grow quickly and, hopefully, will shade out invasive species. A diverse palette of trees is selected for planting depending on site features such as slope and exposure. For example, birch trees might be planted at the base of a slope and tulip poplars higher up.

The Parks Conservancy works closely with Pittsburgh's city forester and staff in the city's Public Works Department in the continuing fight against invasive tree species.



Wild grapes being cut by an Urban EcoSteward volunteer in one of Pittsburgh's parks.

Goats Join the Fight

Along with various volunteer organizations that help with the labor of clearing and planting, another ally is a small herd of hungry goats. Each spring and fall an area infested with invasive vines or the troublesome Japanese knotweed shrub is surrounded by a portable electric fence in which the goats are placed to feed. An orange fence is added beyond the electric fence to keep back curious onlookers.

In three or four weeks, roughly an acre of parkland is cleared of the invasive vegetation. According to Phil, the goats bring an added benefit of strong public attention and interest, providing an opportunity for education about invasive vegetation. Grant money is used to fund the project.



Goats owned by Steel City Grazers are especially effective on steep or other difficult sites. Pittsburgh's parks have been pesticide-free for the past four years and the mission of this partnership aligns with the goal of providing an environmentally friendly alternative to herbicides and fossil-fueled machinery.

WHEN NATIVE TREES DIE

As can be seen in the Pittsburgh example, invasive vegetation can gain a foothold when fire, storms, or insect epidemics kill the natural overstory. This has been a concern in California where the California Invasive Plant Council (Cal-IPC) is working to control a Pandora's box of invasive plants that spread into areas of extensive tree mortality. Disturbed areas everywhere provide a potential foothold for invasive plants. In the natural areas of the Sierra Mountains, this threat is especially important. In response, Cal-IPC maintains an inventory of plants that threaten California's natural areas and works with state and federal land management agencies to prioritize control work. Cal-IPC also provides public education about invasive plants and best management practices for effective control.

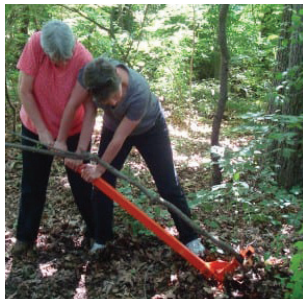
Directory of Control Methods

The following is condensed and modified from material provided by the Wisconsin Department of Natural Resources. A direct link to more information about the following methods of control is provided at this bulletin's Supplemental Resources webpage at arborday.org/bulletins. In all cases, local experts should be consulted for guidance. In the case of a new outbreak, or the concentration of an invasive species, work should begin at the farthest edges of the invasion and proceed inward.

MANUAL CONTROL

These methods can be used in small areas and include digging/hand-pulling, smothering with mulch, and in some cases, flooding.

Hand-pulling is especially difficult on saplings with a circumference wider than $\frac{3}{8}$ inch. Larger stems can be pulled out by the roots using a levering device such as the commercially available Uprooter or Weed Wrench. They are available in various sizes.



MECHANICAL CONTROL

On larger areas, mowing (prior to seed formation), chopping, hoeing, and girdling can be effective. Girdling is removal of the bark and inner bark in a 1"-8" wide ring (depending on diameter) around the trunk of the tree. Herbicide can be applied in the cut for greater effectiveness.

PRESCRIBED FIRE

This method is for use in plant communities that have evolved with fire such as oak woodlands, prairies, savannas, and sedge meadows. For expert use only and always when following local burning rules.

CHEMICAL CONTROL

With some invasives, there is little or no alternative than to use a herbicide. In all cases, it is best to engage a licensed applicator. Methods of application (and always following label instructions!) include basal bark treatment (on the lowest 6 inches or more of the trunk), cut-stump treatment (as the name implies, placing the herbicide on a stump), and foliar spraying.

An advantage of the careful use of herbicides is that it leaves the soil undisturbed, requires less labor than some other methods, and is usually the most cost effective.

BIOLOGICAL CONTROL

For vegetation control, this usually means the use of goats, sheep, or cattle.

CULTURAL CONTROL

This is the manipulation of forest structure and composition to control invasives, or maintaining a closed canopy.

CONSIDER DISPOSAL

When planning for the eradication of invasive species, don't overlook how the plants will be disposed without spreading seeds. Some methods include burning, burying, or placing in a labeled bag for a sanitary landfill or transfer station. Use common sense and follow local rules.

What You Can Do

Learn more about invasive trees in your area and share information with others.

Control or eradicate invasives on your own property or by helping neighbors.

Volunteer to do control work with a group or contact your city forester or park supervisor to offer your help.

Support ordinances that prohibit invasive species.

FOR MORE INFORMATION

Quick links have been provided for more information about the organizations and methods described in this bulletin. These can be found at the Supplemental Resources pages of arborday.org/bulletins.

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