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BULLETIN
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Dr. James R. Fazio, Editor • $3.00

Help Fight Invasive Trees

No one can argue that our world is shrinking. With modern trade and transportation systems, 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 and take action to keep invasives under control.

We venture into dangerous territory with the topic of this 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 that tree is transported outside its natural range that it can sometimes become troublesome.

There is also the challenge of unlearning long-standing information. For example, autumn olive trees (*Elaeagnus umbellata*) were once touted by natural resource professors and managers as the thing to plant to help wildlife. This species was introduced into the United States around 1830 and until recently was promoted as a way to improve wildlife habitat and control soil erosion. Unfortunately, for the reasons discussed on page 4, 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* sp.) and young walnut trees (*Juglans*) 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*.

Despite these difficulties, there are enough bad actors among trees and disastrous ecological consequences that the topic warrants the attention of tree boards, urban foresters and land owners. 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 one foot in a day. These and other plants require action, too, but because of space limitations we focus primarily on trees in this issue.

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Invasive buckthorn is taking over a wooded area in Minnesota. This invasive species leafs out early and retains its leaves into the fall, creating dense shade that out-competes native vegetation.

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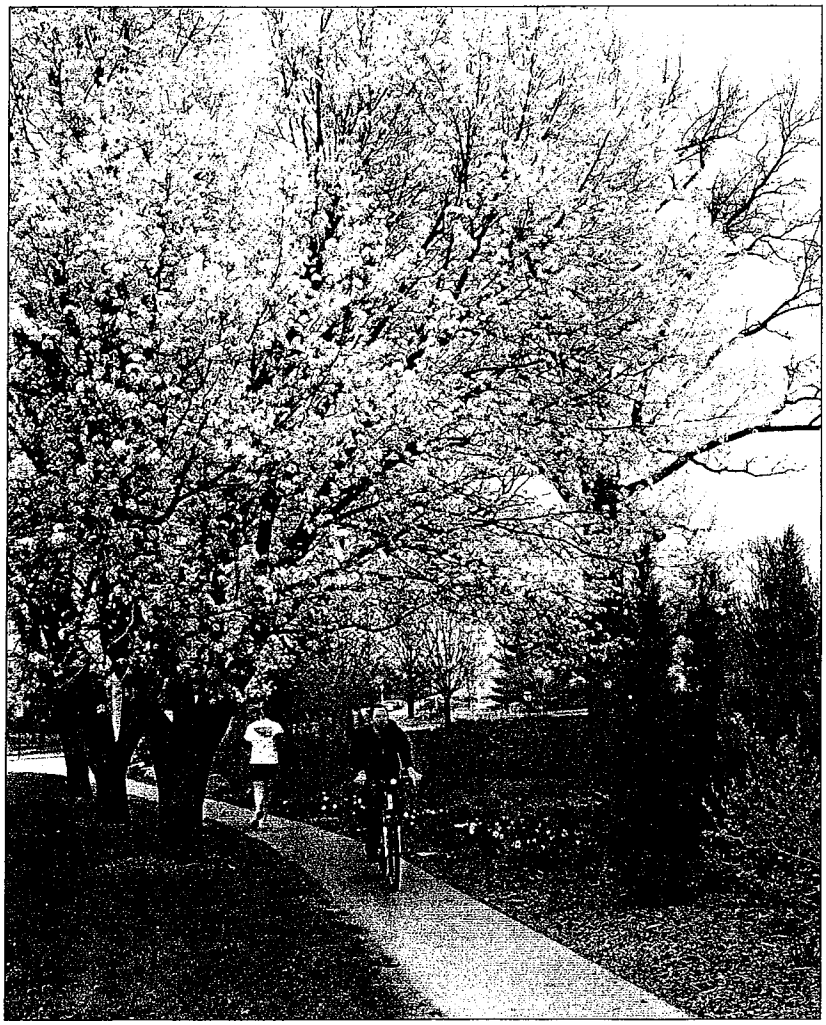
Fundamentals of Invasive Trees

Definitions

The following are adapted from the Natural Resources Conservation Service. The term "exotic" is used instead of "introduction" by Morton Arboretum and some other organizations.

Introduction:	The intentional or unintentional escape, release, dissemination or placement of a species into an ecosystem as a result of human activity. ("Introduction" is not synonymous with "invasive" as there are many beneficial and harmless introduced trees and other plants.)
Native Species:	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.
Non-native Species:	Within a particular ecosystem, any species – including its seeds or spores or other biological material capable of propagating that species – that is not native to that ecosystem.
Invasive Species:	Those species whose introduction does, or is likely to, cause economic or environmental harm or harm to human health. (In the legal sense, for a species to be considered "invasive," it must occur on a federal or state list developed by a department of agriculture. See page 8 for contact information.)

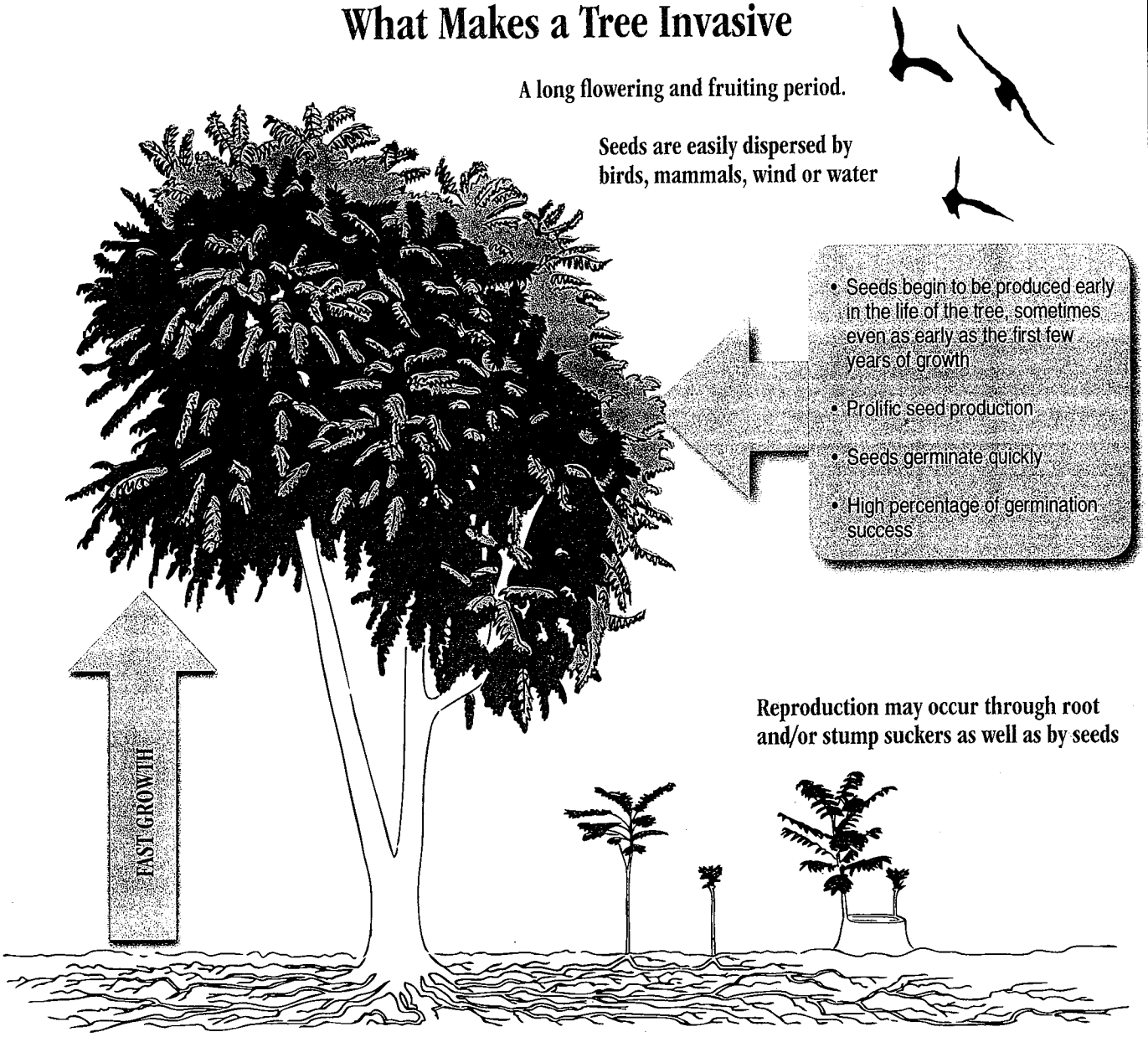


The Native vs. Non-Native Debate

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, assure 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



Results of Aggressive 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 list on these pages is adapted from the website of Morton Arboretum and used with permission. A few trees have been added from other lists. In some cases, a tree may be invasive in one location and not in another, and some serious invaders are omitted here due to space. For example, boxelder is not invasive in places such as Utah, and tamarisk is a serious threat in much of the West. In all cases, state lists of invasive plants should be consulted and many communities also have prohibited species that may not be invasives. Visit *arborday.org/bulletins* for direct links to key sites.

Common and Botanical Name (Alphabetical by botanical name)	*Description*	*Origin*	*Reproductive Capacity*	*Invasive Potential*
Amur Maple *Acer ginnala*	A small (20') tree with double-tooth edged 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 *Acer negundo*	Large (30-50') tree adaptable to wet or dry soils. Leaves have 3-5 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 *Acer platanoides*	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 other natives. Its dense canopy limits wildflowers and understory herbaceous growth.
Tree-of-Heaven *Ailanthus altissima*	Can reach 80' in height. Compound leaves 1-3' in length with 10-41 leaflets 3-5" long. Margins smooth except for 1-2 teeth on lower margin. Smooth, gray or light brown bark. Small flowers in large, terminal clusters and yellowish to greenish.	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 *Elaeagnus umbellata*	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 *Euonymus alatus*	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 *Ligustrum vulgare*	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 (Alphabetical by botanical name)	Description	Origin	Reproductive Capacity	Invasive Potential
Amur Honeysuckle *Lonicera maackii*	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.	Native to Asia and introduced into North America in 1896. Illinois is one of the states where it has been most invasive.	In addition to being a vigorous, aggressive grower, amur honeysuckle seeds are widely spread by birds.	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.
White Mulberry *Morus alba*	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.	Native to China. It was imported by early settlers in Jamestown, Virginia, for the silkworm industry.	Seeds spread by birds and mammals. Establishes itself in woodlands and along streams.	Rarely a problem in undisturbed woodlands but it naturalizes in disturbed woodlands and along railroads, back alleys, floodplains, and open lots.
Amur Corktree *Phellodendron amurense*	A medium-sized shade tree 30- 45' tall with an equal or greater spread. Its compound leaves are 10-15" long and include 5-11 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.	Native to Asia and introduced to the U.S. in 1856.	Seeds spread by birds. Establishes itself in woodlands and along streams.	Female plants produce seed and should be avoided. Seedless male selections are becoming available in the nursery trade.
Common Buckthorn *Rhamnus cathartica*	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 that ripen to black in August and may persist for much of the winter.	Native to Europe and Asia, these plants were introduced during the 1800s as ornamental hedgerows.	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.	Can grow in a variety of habitats including gardens, fencerows, pastures, and roadsides. Once established, this plant quickly develops dense thickets that out- compete other plants. In woodlands, it can completely replace existing understory plants, including spring wildflowers.
Glossy Buckthorn *Rhamnus frangula*	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 that ripen to black in August and may persist through the winter. It is much less shade tolerant than common buckthorn.	Native to Europe and Asia, this plant was introduced during the 1800s as ornamental hedgerows.	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.	Once established, this plant quickly develops dense thickets that outcompete 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.
Black Locust *Robinia pseudoacacia*	This fast-growing tree reaches 30-80' tall. Its blue-green leaves are 6-14" long with 7-21 leaflets. In May to early June, the tree has fragrant, white flowers in large, drooping racemes. Later, shiny, flat, 2- 4" long seedpods develop.	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.	Black locust creates expansive, dense stands through seed germination and suckering.	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.
Siberian Elm *Ulmus pumila*	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.	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.	Wind blown seeds germinate prolifically, often forming thickets of hundreds of seedlings.	This tree can dominate prairie habitat in a few years. It also invades roadsides, pastures, streambeds, and sand prairies.

Fighting Back

It may not be possible to eradicate invasive trees, but control is a reality. Here are three examples of the kind of efforts being made in communities throughout the country.

Pittsburgh's Parks

Gaining public understanding of invasive trees and other vegetation is an important and difficult first step. Pittsburgh Parks Conservancy, a nonprofit partner of the City of Pittsburgh, is doing a good job of that. This organization has gained financial and volunteer support for invasive tree control in the city's parks and is going about it in a systematic manner. The bad actors in Pittsburgh are Norway maple, tree-of-heaven (known locally as Pittsburgh's palm!), and Siberian elm. City crews and volunteers are fighting the invasives based on a strategy developed by the Conservancy:

- First, the parks' wooded areas were surveyed and mapped by tree cover type. The areas were then divided into those most and least impacted by invasives. Considering the budget available, a kind of triage followed. Eradication efforts have been directed at the most pristine sites.
- With each capital project in the parks, such as reconstruction of a deteriorating group picnic building, invasive trees are removed as part of the project.
- When a capital project is near a pristine area, invasive control is applied between the two so the improved areas coalesce into a larger area free of invasives.

In all cases, removing invasive trees that serve as seed sources is an important part of the work, as is replanting with appropriate species. The invasion of emerald ash borers and oak wilt disease has made the restoration efforts more complicated. However, the lesson here is:

(1) know what is on the ground,

(2) have a plan and resources to deal with the invasives, and

(3) manage the restored sites for the future.

"There are varying degrees of goodness to green. There are consequences. Getting people to understand this is not easy. We try to get residents and city council on the same page."

– Phil Gruszka, Pittsburgh Parks Conservancy.

Pasadena's Projects

Blue gum, a member of the Eucalyptus group, and Mexican fan palms are the plague of Pasadena – at least to those who understand ecology. According to Darya Barar, program coordinator in the city's forestry section, when some invasive trees were removed from the city's rights-of-way in 2009, there was a public outcry. Now residents are more actively involved in the planning process for the city's streetscapes and parks. Education has been part of this effort and a weighted scale of 15 factors (shade value, lack of volatile organic compound production, drought tolerance and others) has been used to screen out inappropriate trees. This has resulted in better understanding of the process followed to make sure the right trees are planted in the right places. It has also led to the elimination of specific trees from seven master plan areas.

Another effort in Pasadena has been directed toward its large Arroyo Seco park near the Rose Bowl. Invasives there are controlled on a regular basis. To prevent disturbance of soil on the steep slopes of this watershed, chemicals are used instead of digging. Tree planting grants have then been used to re-establish appropriate species.

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Although beautiful in the eyes of some and promoted as a cold hardy palm, the Mexican fan palm aggresively invades wet areas. When not pruned, as shown here, they can harbor rats and snakes and present a fire hazard.

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.
- reduces birdlife diversity.
- produces messy berries that stain cars, decks and other facilities while having little nutritional value for birds.
- makes nesting birds more prone to predation.
- is an alternate host for crop pests.
- has thorns and grows densely, making it a safety hazard to children and park users.
- is difficult to control and requires persistent effort.

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," says Karen Solas, Stewardship Coordinator for Friends of the Mississippi River. "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."

Methods of Control

In all cases, eradication of the root system is important. Searching for and destroying seed sources in and near the area of control is also essential.

Cindy Lueth, Minnesota Department of Natural Resources

Chemical controls include applications of herbicides on foliage and stumps. This method leaves soil physically undisturbed, requires less labor and is usually most cost effective. Local foresters and extension offices are the best source of information on effective chemicals and application methods.

© Austin Parks Foundation

Removing invasives by hand can include use of a Weed Wrench on saplings. Other methods are hand pulling of saplings less than 3/8 inch, digging and cutting. All are labor intensive but feasible if willing volunteers or community-service help is available.

Courtesy of Friends of the Mississippi River

Volunteers prepare to tackle the task of eradicating buckthorns in the Twin Cities area of Minnesota. Autumn projects make it easier to distinguish buckthorns from look-alikes. This is because buckthorns, like many invasive trees, give themselves an advantage by breaking dormancy earlier and holding their leaves longer than desirable native species such as oaks, basswoods and wild cherries.

What You Can Do

Educate yourself and others about invasive trees. Caution local nurseries that might be selling any listed species.

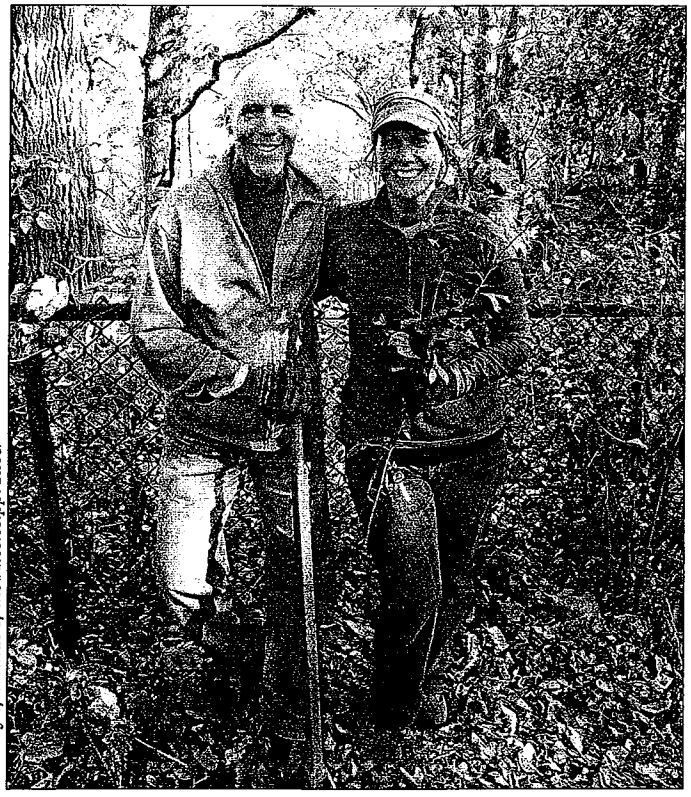
Cooperate with your city forester, park supervisors and groups such as garden clubs with environmental interests.

Support ordinances that prohibit invasive species.

Monitor on your own or as part of First Detector groups (See Bulletin No. 56).

Control or eradicate on your own property and by helping with community-wide or park projects.

> **...invasive species management becomes a concept like safety; it is part of everybody's job. Everybody has a role and responsibility. It's not just the weed specialists or the bug specialists.**
>
> – Mike Ielmini,
> Invasive Species Program Manager, U.S. Forest Service



Courtesy of Friends of the Mississippi River

Volunteer Steve Phillips and Stewardship Events Coordinator Karen Solas of Friends of the Mississippi River know that control of invasive trees and other plants requires understanding, determination and persistence. The results are a natural heritage for future generations.

For More Information

For additional sources of information, including links to pertinent websites, please visit **arborday.org/bulletins** and click on No. 62.

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