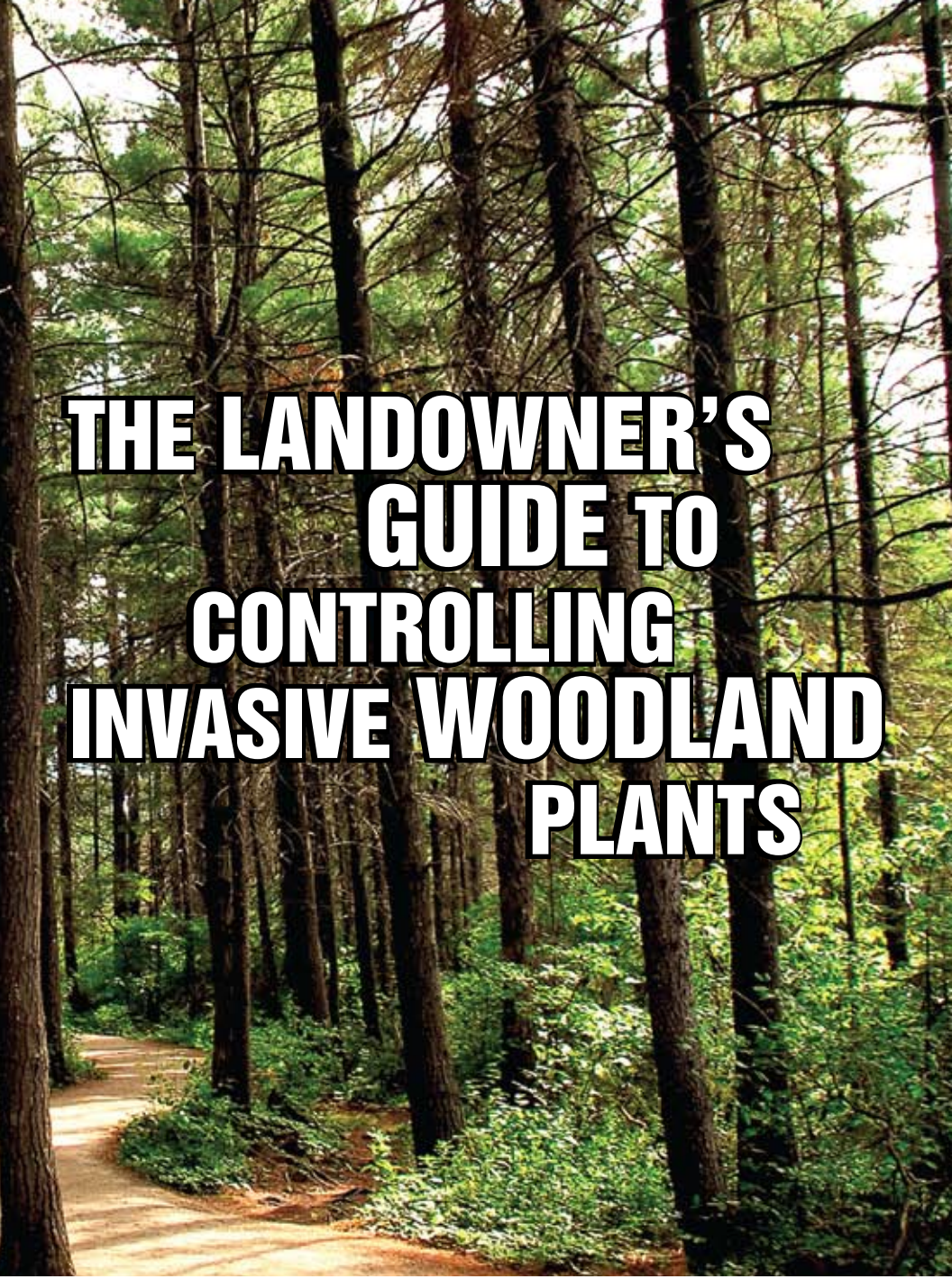

THE LANDOWNER'S GUIDE TO CONTROLLING INVASIVE WOODLAND PLANTS

Ontario Federation of Anglers and Hunters

Ontario Invasive Plant Council

Oak Ridges Moraine Foundation

Victoria Land & Water Stewardship Council

Ontario

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THE LANDOWNER'S GUIDE TO CONTROLLING INVASIVE WOODLAND PLANTS

DEFINITIONS

Alien species *(also known as exotic or introduced species)*

Species of plants, animals, and microorganisms introduced by human action outside their natural past or present distribution.

Invasive species

Harmful alien organisms whose introduction or spread threatens the environment, the economy, or society.

Definitions taken from "An Invasive Alien Species Strategy for Canada"[1]

An invasive plant is one that has been moved from its native habitat to a new area (possibly for garden/domestic use), and reproduces so aggressively that it displaces species within native plant communities, the result being economic, ecological or social disruption. In a forest ecosystem, an invasive plant can be a tree, shrub, or herbaceous plant. Some particularly persistent invasive plants found in Ontario woodlots include **common and glossy buckthorn** (*Rhamnus cathartica, R. frangula)*, **dog-strangling vine/ swallowwort** (*Cynanchum louiseae [Vincetoxicum nigrum], C. rossicum*),

1 Government of Canada, 2004. Invasive Alien Species Strategy for Canada. Environment Canada.

garlic mustard (*Alliara petiolata),* and **Norway maple** (*Acer platanoides*). This guide deals with these four established species and some others which landowners should be aware.

Invasive plants are a major issue emerging over the last decade, and a significant threat to Ontario's biodiversity and forest health. Collaborative efforts to prevent introductions and manage invasive plants are now being organized by the Ontario Ministry of Natural Resources, conservation authorities, stewardship councils, and organizations such as the Ontario Federation of Anglers and Hunters, and the Ontario Invasive Plant Council.

Most imported plants are unable to reproduce or survive away from the urban garden. However, some exotic plants are invasive (such as the plants listed in this guide) and can become established in natural habitats, outcompeting native species and overwhelming certain habitats. It has been reported that approximately 700 plant species (27% of the total flora) growing in Ontario are alien (Haber, 1998)[2]. Most invasives are exotic plants and shrubs that have been transported into Canada from Europe and Asia. The largest factor contributing to the success of invasive alien plants is the fact that few natural "controls" exist here for that plant. In a plant's native habitat, natural controls such as climate, animals, insects, fungi, and other plants restrict them to a certain habitat niche within their range. Invasive plants have the potential to displace native vegetation such as trilliums, or interfere with the natural regeneration of forest tree species. If the habitat is very unique or rare, some flora and fauna may become locally endangered.

A critical first step in the control of invasive species is knowledge. When landowners understand the scope of the problem, how to identify invasive plants, and become familiar with options for control, successful action becomes possible. All gardeners should strive to utilize native plants and be aware of plants from unknown origins that "*are suited to our climate zone and will grow on a wide variety of sites*", as this is an indication of a potential invader.

The economic impacts of invasive species can be immense. The cost of the damage caused by invasive alien species affecting forestry and agriculture in Canada has been estimated to be $7.5 billion annually[3]. Their impact on native ecosystems and species is often severe and seemingly irreversible. It has been estimated that approximately 24% of the species at risk in Canada may be threatened with extinction by invasive alien species[4]. The only way of reducing these costs is to prevent new introductions and to detect and control invasions in the early stages. If landowners and communities can collaborate with control and eradication efforts for **common and glossy buckthorn**, **dog-strangling vine**, **garlic mustard**, and **Norway maple** on their own properties, we can all help to reduce their impact.

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2 Haber, 1998. Impact of Invasive Plants on Species and Habitats at Risk in Canada. Canadian Wildlife Service, Environment Canada.

3 Dawson, Marcel. 2002. Plant Quarantine: Preventing the introduction and spread of alien species harmful to plants, pages 243-252 in Alien Invaders in Canada's Waters, Wetlands, and Forests. Canadian Forest Service, Natural Resources Canada.

4. Stronen, Astrid Vik. 2002. Impacts on Canadian Species at Risk from Invasive Alien Species. Canadian Wildlife Service, Environment Canada.

Common buckthorn leaves and berries
(Rhamnus cathartica)
Photo Credit: Greg Bales

COMMON BUCKTHORN
(Rhamnus cathartica)
and
GLOSSY BUCKTHORN
(Rhamnus frangula)

Description and Life History

Common and glossy buckthorn are native to Europe. In Canada, they have naturalized from Nova Scotia to Saskatchewan, and were likely introduced in the late 1700's, but did not become widespread until the early 1900's. Over their lifespan, common and glossy buckthorn trees generally reach 6-7m (20-25ft) in height and 25cm (10in) in diameter. They generally grow in a large shrub growth form, with a few to several stems. On previously cut buckthorn there can be upward of 15 stems. The shrubs have low, wide-spreading, and loosely -branched crowns.

Common buckthorn has dark green, shiny leaves that are oppositely arranged on the twig. The finely-toothed, egg-shaped leaves have distinct veins that are curved toward the leaf tip. The twigs on common buckthorn often end in pointed, stout thorns that become very sharp on dead twigs. Glossy buckthorn leaves are oval shaped, smooth-edged, and alternately arranged, and there is no thorn on the tip of twig. Both species leaf out early in the spring and stay green late into the fall, thereby shading out native species.

On young trees of both species, the smooth and shiny bark is brown-gray in color with prominent small lenticels (dash-like greyish markings). The bark becomes rough textured with corky projections when the trees mature. When cut, the inner bark is yellow and the heartwood is orange.

Glossy buckthorn trees are hermaphroditic (the flowers have both male and female parts), and common buckthorn is dioecious (separate male and female plants). On glossy buckthorn and female common buckthorn, the pollinated flowers eventually become clusters of small, rounded, green fruits, which ripen to plump 0.5cm (1/4in) black berries by late summer, and persist on the tree until late winter. Most of the fruit falls directly beneath the parent plant, creating the dense stand of seedlings typical of common buckthorn. Birds and mice eat the fruit of both species, generally in late winter, as other food becomes scarce. The severe laxative effect of the fruit on birds helps distribute the seeds widely.

Distribution and Habitat

Common buckthorn is both drought and shade tolerant, and can grow in a variety of habitats including open woods, thickets on exposed rocky sites, in fencerows,

abandoned fields and road edges. It is found on well-drained sands, clays, and poorly-drained soils, but prefers neutral to alkaline soils. Glossy buckthorn prefers wetter, less shaded areas and has become a problem in wetland sites as varied as sphagnum bogs, calcareous fens, sedge meadows and tamarack swamps.

Buckthorn is noted for prolific reproduction by seed. Under full sun conditions, it can produce seed a few years after establishment. Seedlings establish best in high light conditions, but can also germinate and grow in the shade. The seedlings have very rapid growth rates and resprout vigorously after cutting. Buckthorn seed germination is reduced under shading by mature shrubs; however, a carpet of germinating buckthorn seedlings usually appears after mature shrubs are removed.

Ecological Impact

Common and glossy buckthorns' popularity for use as shrubs in hedges resulted in widespread planting across the country, and their invasion of a variety of natural areas. Once established they can spread very quickly, creating a thick cover that will shade out native shrubs and plants. Dense even-aged buckthorn stands will prevent natural regeneration of native trees and shrubs. Buckthorn may also be allelopathic (e.g. its root-exuded chemicals can harm other species and prevent them from growing nearby), which means that once established, natural areas can contain almost exclusively buckthorn.

Common buckthorn concerned the agricultural community in years past because it is the alternate host of oat

Common buckthorn stand *(Rhamnus cathartica)*
Photo Credit: Patrick Hodge

rust, landing it a spot on the Ontario noxious weed list and leading to eradication programs in the 1970's. As oat varieties with resistance to oat rust were developed, and land of lesser productivity was abandoned for agricultural uses, buckthorn flourished. More recent concerns are related to the soybean aphids, which lay their eggs on buckthorn and use it as an overwintering host plant.

Control Recommendations

There are a variety of different control measures for buckthorn, both physical and chemical, with contradictory results. Buckthorn is most effectively controlled by recognizing isolated young plants early, and removing them before they can produce seed. With large infestations and limited time, the work required can seem daunting. It is important to develop a feasible, long-term strategy with the following considerations: 1) try to remove the most prolific seed-producers first – identify the fruit bearing trees in late autumn when they retain green leaves after other trees are dormant; 2) concentrate on high priority areas such as the most productive area of your woodlot or your favorite natural area; 3) consider dedicating a certain time each year – involve friends, family or make it a joint effort with a neighbor; and 4) buckthorn seeds in the soil can remain viable for up to five years. Follow-up control of seedlings that emerge after initial control efforts is important on all sites. With no follow-up control, buckthorn will undoubtedly return.

Common buckthorn leaves and flowers
(Rhamnus cathartica)
Photo Credit: Credit Valley Conservation Authority

Mechanical Control Options

Fire: Fire can be an effective tool where feasible (e.g. where there are natural fire barriers around a plant community that is almost totally buckthorn). Regular prescribed fire will kill seedlings and shrubs of these species in fire-adapted upland and wetland sites (e.g. fens, sedge meadows, marshes). Some control will usually be evident after the first burn; however, for complete control in established stands of buckthorn, burning yearly or every other year may be required for five to six years or more. Fire should not be used to control buckthorn if the ecological integrity of the site will be adversely affected (e.g. some bog communities). If landowners are considering fire as a control option, they must contact their municipality for permits, and remember to always follow safe burning practices.

Flooding: In wetlands, where the water table has been artificially lowered, restoration of water levels will often kill glossy buckthorn. Care should be taken not to flood sensitive plant communities by raising water levels higher than occurred historically.

Pulling: When the soil is moist, small plants up to 0.5m (2 ft) in height can often be pulled as you take regular walks through your property – as buckthorn grows, it puts down a deep root system very quickly. Larger plants can be dug or pulled using a weed wrench. Caution should be taken, as pulling buckthorn often results in coppicing or sprouting and, unless other measures (such as herbicides or fire) are used, this can worsen the problem dramatically (i.e. population can quintuple in five years).

Grazing: Livestock usually find buckthorn seedlings succulent and tasty, and will successfully control new regeneration in pastured areas once fence-line shrubs have been removed.

Mowing: Mowing can be a control option, but will need to be carried out in early and late summer for at least two to three consecutive years. Mowing will reduce stem numbers and vigor, leading to eventual mortality for most stems; however, mowing will also inhibit the development of other natural vegetation.

Cutting/Girdling: Cutting or girdling (a cut groove all of the way around the stem) are also control options. To be effective, cutting or girdling must be followed by an immediate application of herbicide to fresh stumps or girdled bands to prevent resprouting. A precise application of herbicide (e.g. from a small hand-pump bottle) allows this method to be employed at any time of the year, although the most effective time is generally considered to be late spring/early summer, near the end of the flowering period. The control of resprouts in the following year should be expected[5].

Caution: Take care when removing buckthorn branches and stems. The small thorns are quite flexible when alive, but significantly harden and can inflict painful wounds when the plant dries out. It is best to pile the shrubs for burning when the plant material is still green, even if the burning is done at some time in the future. Check with your municipality for a burn permit.

Chemical Control Options

The use of herbicide is considered to be the most effective tool for controlling buckthorn. Herbicides containing the active ingredient triclopyr* are recommended, as many commercial brands containing triclopyr have both buckthorn species listed on the label.

Foliar (directly on the leaves) application of herbicides is recommended from the time that the shrub leafs out until mid-July. If concerned about adjacent plants, herbicide can be used late in the growing season when buckthorns are still actively growing, while most native plants have already lost their leaves and are dormant. The buckthorn green leaves will provide easy recognition and allow for a thorough

5 Vegetation Management Guideline, Exotic Buckthorns, Common buckthorn (*Rhamnus cathartica* L.), Glossy buckthorn (*Rhamnus frangula* L.) and Dahurian buckthorn (*Rhamnus davurica* Pall.), Vol. 1, No. 5 Approved 02/06/90 by Randy Heidorn, Illinois Department of Conservation, 110 James Road, Spring Grove, Illinois 60081

treatment, lessening the risk of affecting nontarget species with a nonselective herbicide. Consider using a backpack sprayer, or a small ATV mounted sprayer for larger areas.

Basal bark treatment can be used for smaller stems at any time of the year, but preferably during the growing season, with the herbicide painted or sprayed on the base of the trunk.

Cutting stems of larger shrubs near ground level with a chain saw and treating them with herbicide successfully curbs sprouting. Herbicide must be applied to the stumps within 24 hours after cutting. Resprouts need to be cut and treated again, or sprayed by a hand sprayer directly on the foliage.

*** Herbicide use disclaimer: Regulation 63/09 to Ontario's Pesticides Act came into effect on April 22, 2009. This regulation brings many changes to how herbicides may be used. Under the new regulation, triclopyr is listed as a class 9 herbicide, meaning that it is banned for use in Ontario unless the use is excepted. There are exceptions for agricultural or forestry use as well as provisions for natural resource management, including invasive plant control, under certain circumstances. Refer to the websites listed at the end of this guide or contact the Ontario Ministry of the Environment or the Ministry of Natural Resources for more information.**

Glossy buckthorn leaves and berries *(Rhamnus frangula)*
Photo Credit: Bill McIlveen

Garlic mustard flowers *(Alliara petiolata)*
Photo Credit: Ken Towle

GARLIC MUSTARD

(Alliara petiolata)

Description and Life History

Garlic mustard is native to Europe and was introduced to North America in the late 1800's by early settlers. It is a cool-season biennial herb, with all plants that survive the winter producing flowers and seeds in the second year. The new leaves emit the distinctive odour of garlic when crushed; however, this scent fades as the plant matures. Garlic mustard was historically eaten as a potherb green, especially during winter and early spring. It was considered useful for medicinal purposes, such as treating gangrene, ulcers, and was utilized for its high vitamin A and C content.

In the first year of its life cycle, the plant consists of a basal rosette (cluster of three or four leaves) of dark green and kidney-shaped leaves, 6-10cm (2-4in) diameter. In the second year, the plant has triangular and sharply-toothed leaves, 3-8cm (1-3in) diameter, alternately arranged along the stem. Several white flowers (four petals per flower) are clustered at the top of the second-year plant stems. Adult garlic mustard grows up to 1m (3ft) in height, and is the only plant of this height in our woodlands with white flowers in May. The fruits are slender, 2-6cm (.5-2in) long, capsules that hold 10-20 oblong, black seeds. Garlic mustard spreads entirely by seed, producing hundreds of seeds per plant. In southern Ontario, seed may remain viable in the soil for up to thirty years.

Distribution and Habitat

Garlic mustard is now found in Quebec and Ontario, south to North Carolina and Kentucky, and in isolated populations in British Columbia, Nova Scotia, Prince Edward Island and New Brunswick[6] (WDNR, 2003). It grows in upland and floodplain forests, savannas, yards, and along roadsides. It thrives in shady conditions, but can also be found in full sun, and occurs in a wide variety of soils. The invasion of woodlands usually begins along trails or woodland edges where it can quickly invade any disturbed site, usually after seeds have been transported on boots or within the treads of vehicle tires.

Ecological Impacts

This invasive plant has become established in many areas. It can enter and establish itself within a stable, healthy forest site. Garlic mustard produces hundreds of seeds (per plant), with clumps producing more than 62,000 seeds per square metre.

6 http://dnr.wi.gov/invasives/fact/garlic.htm

It is a major threat to native woodland flora and the wildlife that depend on it. Garlic mustard is able to self-pollinate; a single plant can propagate a large population in a few years. It begins growing early in the spring while native plants are still dormant in the ground. Once established, garlic mustard populations double in size every four years, and can displace native woodland wildflowers such as trilliums and trout lilies within ten years. Garlic mustard produces several phytotoxic chemicals that may affect the health of nearby native plants. The roots contain sinigrin that may interfere with the function of the mycorrhizae (beneficial root fungi) necessary for the long-term survival and health of many native plants.

Control Recommendations

Cooperation with surrounding landowners is required to prevent established garlic mustard colonies from spreading into new areas. Think about limiting your travel through infested areas to established trails. Take the trouble to remove seeds from your boots and clothes, pets, bicycle and other equipment when coming out of infested areas, as the seeds can remain viable for many years and could start new populations where you travel. Logging equipment and other machinery should be power-washed before moving from one site to another.

Two basic monitoring/control measures are effective for garlic mustard. The first is to focus on identifying and eradicating new (or satellite) infestations before a seed bank is established. Monitoring for this plant should be focused along trails, roadways and field edges, particularly in public and recreational areas. The second measure is the more difficult task of eradicating longer, established "invasion fronts". Garlic mustard can easily invade disturbed sites; disturbances should be minimized to soil and vegetation found near these invasion fronts. As garlic mustard areas are treated, new garlic mustard plants germinating from the seeds present in the soil must be controlled for several years (seeds can remain viable for at least five years).

Garlic mustard basal rosettes *(Alliara petiolata)*
Photos Credit: Ken Towle

Options

Cutting: Garlic mustard control will produce better results if the plant is removed before it sets seed. Cutting the flowering plants at ground level may be effective in killing the plant and removing the future seed source, whereas cutting above the ground allows some of the plants to survive and release seed. However, resprouts may occur, so it is best to wait until just before the plant goes to seed, usually in June, to ensure that the cut garlic mustard won't resprout. Cutting with weed-whip equipment is effective as long as care is taken to cut the plant stems at ground level.

Pulling: Small patches may also be pulled (especially in sandy soils), but take care to shake the attached soil from the roots

and tamp the disturbed soil after pulling the plant or you may get tenfold increases in seed germination the next year. Pulling garlic mustard from heavier soils (e.g. clay and clay loams) may cause the plant to snap off at or below the root crown, allowing it to send up new flower stalks. Take care when pulling garlic mustard, the best time to pull is when they have just started flowering, but before the seeds have been produced.

NOTE: The cut or pulled flower stems can still form viable seeds if left laying on the ground; therefore, they **must be removed from the site and disposed of properly**. Proper disposal may include placing the plants carefully in garbage bags and closing them tightly to be sent to the landfill. Never put garlic mustard in your compost pile, as it could continue to grow. Check with your municipality for disposal advice, as some may have programs in place to collect and dispose of garlic mustard.

Chemical: Chemical control using herbicide* is effective when applied in the fall or early spring to the dormant garlic mustard rosettes (first year plants). NOTE: Garlic mustard seedlings that appear after an application will not be affected by the herbicide. The fall is the preferred season for control – most native plants are dormant and applications of herbicide can continue until the first frost.

*** Herbicide use disclaimer: Regulation 63/09 to Ontario's Pesticides Act came into effect on April 22, 2009. This regulation brings many changes to how herbicides may be used. There are exceptions for agricultural or forestry use as well as provisions for natural resource management, including invasive plant control, under certain circumstances. Refer to the websites listed at the end of this guide or contact the Ontario Ministry of the Environment or the Ministry of Natural Resources for more information.**

Biological: The search for biological controls is ongoing, with several insects that feed on it in its natural range being studied. However, before any biological controls can be used, it must be determined that any potential insect introduced to North America will feed only on garlic mustard, and will not become invasive itself.

Native Species/Soil Modification: If possible, plant a combination of early season wildflowers (e.g. bloodroot - *Sanguinaria canadensis*) and large leaved species (e.g. mayapple - *Podophylum peltatum*) to out compete garlic mustard. In older infestations, you will likely need to restore mycorrhizae (beneficial root fungi) and plant these species at a higher density of 10-12 plants/m^2; in newer infestations (less than five years), no mycorrhizae may be needed and planting densities can be lower (5-9 plants/m^2).

Garlic mustard seed pods *(Alliara petiolata)*
Photo Credit: Bill McIlveen

Dog-strangling vine flowers *(Cynanchum louiseae [Vincetoxicum nigrum], rossicum)*
Photo Credit: Ken Towle

DOG-STRANGLING VINE

(Cynanchum louiseae [Vincetoxicum nigrum], C. rossicum)

Description and Life History

Dog-strangling vine, also known as swallowwort, describes two invasive plant species (black swallowwort -*Cynanchum louiseae [Vincetoxicum nigrum]* and pale swallowwort -*Cynanchum [Vincetoxicum] rossicum*) from Eurasia that are members of the milkweed family. For the purpose of this guide, both of the plants will collectively be called dog-strangling vine. These herbaceous perennial vines can grow from 1-2m (3-6.5ft) in height by twining onto trees and other plants. In open areas these plants tend to twine around each other, forming dense colonies that appear to "strangle" other plants and small trees. Their leaves are yellowish-green to dark green, oppositely arranged, oval to oblong in shape, and 5-10cm long with rounded bases and pointed tips. Flowering begins late June and produces small pink to maroon (*C. rossicum*) or purple-brown to dark purple flowers (*C. louiseae*) located in small clusters at the tips of stems and leaf axils. The fruit are thin 4-6cm (1.5-2.5in) long pods that split open in late August, releasing numerous fluffy white seeds similar to our native milkweed. Thick infestations in full sunlight can produce up to 30,000 seeds per square metre. These species have extensive rooting systems that allow them to resprout after cutting above ground shoots.

Distribution and Habitat

Dog-strangling vine can grow in a wide range of habitats; it prefers open sunny areas, but will grow very well in filtered shade, especially *C. rossicum* (e.g. within pine plantations or forest understories). It grows in ravines, hillsides, waste areas, fence lines, and travel and utility corridors. It is a perennial plant that reproduces by seed.

The earliest records indicate that this plant was introduced to the northeastern United States in the mid-1800's. It may have been introduced to Ontario from the Experimental Farm in Ottawa, where the fluffy white seeds were being tested as possible life-jacket filler. It has been present in the Toronto area for many decades, and continues to spread at an increasing rate throughout southern and central Ontario.

Ecological Impact

Both species of dog-strangling vine form dense colonies that compete and overwhelm ground vegetation in open and semi-open habitats. Many environments, including prairies, alvars, shorelines, conifer plantations and natural forests are being affected.

The spread of these two species is expected to increase across Canada (and North America), expanding rapidly into new areas as more colonies are established. Dog-strangling vine may have a harmful effect on Monarch butterfly populations. Monarchs may lay their eggs on dog-strangling vine, resulting in the death of the larvae (although how much egg deposition occurs on these plants is still unclear).

Dog-strangling vine leaves & seed pods
(Cynanchum Louiseae [Vincetoxicum nigrum], rossicum)
Photo Credit: Greg Bales

Control Recommendations

Landowners should learn to identify dog-strangling vine and monitor their property and adjacent lands in cooperation with neighboring landowners to prevent this plant from becoming established. As seed dispersal is by wind, there is an increased need to be vigilant and survey property, especially in the late summer when these plants are easiest to identify (the plants turn a bright yellow and seed pods are easily seen). Think about limiting your travel through areas infested with dog-strangling vine during seed dispersal. Take the trouble to remove seeds from your boots and clothes, pets, bicycle and other equipment when coming out of infested areas, as they may remain viable for up to five years and could start new populations where you travel. Logging equipment and other machinery should be power-washed before moving from one site to another.

Options

Chemical: Larger infestations can be controlled by applying herbicide twice during the growing season: at the onset of flowering, and again later in the season. Follow-up treatments may be required for three or more years to eliminate surviving plants and new seedlings. Retreatments alternating with different herbicides are recommended, as the surviving plants may build a resistance to any single herbicide. Currently, the only herbicides recommended for dog-strangling vine and having it listed on the label are those containing imazapyr*.

Dog-strangling vine *(Cynanchum louiseae [Vincetoxicum nigrum], rossicum)*
Photo Credit: Hayley Anderson

*** Herbicide use disclaimer: Regulation 63/09 to Ontario's Pesticides Act came into effect on April 22, 2009. This regulation brings many changes to how herbicides may be used. Under the new regulation, Imazapyr is listed as a class 9 herbicide, meaning it is banned for use in Ontario unless the use is excepted. There are exceptions for agricultural or forestry use as well as provisions for natural resource management, including invasive plant control, under certain circumstances. Refer to the websites listed at the end of this guide or contact the Ontario Ministry of the Environment or the Ministry of Natural Resources for more information.**

Mowing/Cutting: Mowing/cutting and burning are generally ineffective; however, persistent mowing before it goes to seed may help limit its spread if conducted over several years. If plants are mowed, covering the area with competitive mulch may restrict the plant from resprouting, but is not very aesthetically pleasing.

Pulling/Digging: Gardeners can either control dog-strangling vine by digging it out or pulling it out. Digging up the entire plant, roots and all, may result in the eradication of the plant if it is in the first year of establishment. Care must be taken as the plant can resprout from buds on the rootstock if any are left in the ground. By the second year, manually pulling or digging the plant becomes more difficult because the roots become stronger and larger. Seed spread can be controlled if the plant is cut back or pulled before it goes to seed. To be the most effective, dog-strangling vine needs to be cut/pulled before the seed pods are well-developed; you will need to do this more than once during a season, as the plants can regrow and produce more pods. If you wait until just before the seeds shed, the plant material must be bagged and removed.

Dog-Strangling Vine *(Cynanchum louiseae [Vincetoxicum nigrum], rossicum)*
Photo Credit: Greg Bales

Biological: There are currently biological controls such as insects and diseases being investigated for dog-strangling vine; however, none have yet been approved for wide-scale use. Before biological controls are released, it must be proven that they will not affect other species, and will not become invasive themselves.

Dog-strangling vine is a plant that is difficult to control, with no single method or combination of methods able to completely eradicate this forest invader. The hope for the future is that various biological control agents, including insects and diseases, can be found and introduced that will slow the spread and limit the invasiveness of this plant. It may take several years before any such biological controls can be released.

NORWAY MAPLE

(*Acer platanoides*)

Description and Life History

Norway maple (which has many cultivars) is a small to medium sized deciduous tree with a broad, rounded crown. It can readily be distinguished from other maples because the leaves and twigs ooze milky sap when cut or torn. Norway maple can be 15-18m (50-60ft) in height, with a branch spread often equal to its height when growing in the open. Young bark is smooth and gray-brown in color, with mature bark having firm, tight, intersecting ridges. Twigs are stout, brown, with green buds and overlapping bud scales. Norway maple has dark green leaves with five to seven lobes, with the leaves being wider than they are long. Sugar maple leaves have three to five lobes and are generally

Norway maple leaves *(Acer platanoides)*
Photo Credit: Credit Valley Conservation Authority

longer than wide. Leaves remain green until early November when they will turn a bright yellow; although some cultivars, such as Crimson King, are a rich maroon color all summer. In mid to late-April as the leaves are expanding, the yellowish-green flowers of Norway maple appear in stalked clusters. The fruit of the Norway maple is a double samara; wings are at a conspicuously wider angle (diverging at nearly 180 degrees) than sugar maple. The seeds mature in September and are dispersed by wind. They germinate readily, even in dense shade, and seedlings grow quickly.

Distribution and Habitat

Norway maple was first introduced to North America from Europe in the mid-1700's for cultivation as an ornamental tree, and has become one of the most popular trees for city plantings. It was used widely across North America as a replacement for the thousands of street trees lost to Dutch elm disease in the 1930's and 40's. It is a fast-growing species that is adaptable to a wide variety of urban sites and more tolerant to urban stresses than many native trees. Many cultivars have been developed, including purple-leaved and columnar forms.

Ecological Impacts

The ability of Norway maple to grow in deep shade makes it particularly threatening to native forest habitats. It commonly invades natural areas in cities (some Toronto ravines are now infested), because of its general landscaping use by homeowners and municipalities. In fact, Norway maples have become so good at establishing themselves, the outskirts of many New England cities and large towns have stands of this species and little else[7]. Seedlings from Norway maple can form a thick mat and will choke out the natural regeneration of other native tree species. The tree is very efficient in using water and nutrients. Since few species of

Norway maple milky sap *(Acer platanoides)*
Photo Credit: Credit Valley Conservation Authority

Norway maple seeds (Double samaras)
Photo Credit: Bill McIlveen

7 http://www.unh.edu/neeg/normape.html

herbaceous plants can exist underneath the solid canopy of a mature Norway maple stand, the soil beneath the trees tends to be bare and subject to erosion. There are indications that this tree also has allelopathic properties that inhibit the growth of other species in its proximity.

Control Recommendations

Mechanical: The use of a weed wrench to pull young trees out of the ground is effective, or small saplings may be pulled by hand. Larger saplings can be dug out, ensuring that all root systems are removed as well. Cutting may be effective, provided resprouts are also controlled.

Chemical: Girdling the trunk followed by the use of herbicide will also kill Norway maples. Cutting the tree at the base and applying herbicide to the stump will discourage resprouting.

*** Herbicide use disclaimer: Regulation 63/09 to Ontario's Pesticides Act came into effect on April 22, 2009. This regulation brings many changes to how herbicides may be used. There are exceptions for agricultural or forestry use as well as provisions for natural resource management, including invasive plant control, under certain circumstances. Refer to the websites listed at the end of this guide or contact the Ontario Ministry of the Environment or the Ministry of Natural Resources for more information.**

The best long-term control method is to phase out the use of Norway maple as a street and garden tree, and substitute native trees such as sugar or red maple.

Difference between Norway maple (left) and Sugar maple (right) leaves
Photo Credit: Ken Towle

Giant hogweed flower umbels
(Heracleum mantegazzianum)
Photo Credit: Karen Rimmer

GIANT HOGWEED

(Heracleum mantegazzianum)

Giant hogweed (also known as giant cow parsnip) is a garden ornamental, originating from southwestern Asia that is naturalizing in North America, and becoming more common in southern Ontario. It is a very large perennial member of the parsley family that grows up to 5m (16ft) in height, with a purple-spotted, hollow green bristly stem. It has dark green, coarsely-toothed leaves that can exceed 2.5m (8ft) in length at the base of the plant. It also has large, umbrella shaped clusters, called umbels, (up to 0.75m across) of small white flowers. A single plant can produce over 100,000 seeds. The seeds can remain viable in the soil for up to seven years. Giant hogweed looks very similar to our native plant species cow parsnip and Angelica. The best way to tell the difference is by size (both native species are much smaller), and the purple splotches or spots on the stem of giant hogweed.

Giant hogweed's clear, watery sap contains toxins that cause photodermatitis (skin becomes extremely sensitive to sunlight). Skin contact, followed by exposure to sunlight, produces painful, burning blisters that can cause severe irritation, dermatitis, and develop into purplish or blackened scars. It can also cause temporary or permanent blindness following eye contact[8]. If you accidentally come in contact with giant hogweed sap, wash the area immediately with soap and water, avoid sunlight exposure to that area, and seek medical attention.

Control Recommendations

Control methods involve cutting and proper disposal of the plant (taking care to avoid contact with the sap) or the use of herbicide. Use EXTREME CARE when attempting to control this plant. It is suggested that anyone working to control giant hogweed wear eye protection, waterproof gloves, and protective clothing (long sleeves, long pants, closed-toe shoes). A weed-whacker should never be used to control giant hogweed, as the sap may splatter when the stems are cut. A long sharp serrated knife is the best tool to use. It should be noted that mowing does not control established giant hogweed; it simply causes resprouts to appear from the rootstalk. However, mowing may

8 http://dnr.metrokc.gov/wlr/LANDS/weeds/hogweed.html

be effective in controlling seedlings, which will sprout after the removal of mature plants[9].

When controlling giant hogweed, ensure you have several trash bags ready for disposing of the plant; the use of clear bags and "solarization" (leaving the bagged plants in direct sunlight for a week or more) are suggested. First, the flower heads should be removed and placed carefully in the trash bags, making sure not to drop any seeds. The bags should be sealed tightly and left to "solarize" to destroy the seed viability. If the infestation is small, the stems can be dug out (roots and all) and dried thoroughly before disposing them.

Another control option for smaller infestations is to cut the stems at ground level and cover them with black plastic to keep them from regrowing, and to discourage new growth. The site should be monitored to ensure that the seedlings are not poking through the plastic. Infestations may require several years of follow-up control to exhaust the seed bank[10].

Giant hogweed leaves *(Heracleum mantegazzianum)*
Photo Credit: John Benham

Giant hogweed mature plant
(Heracleum mantegazzianum)
Photo Credit: John Benham

9 http://dnr.metrokc.gov/wlr/LANDS/weeds/pdf/hogweed-control.pdf
10 http://www.hort.uconn.edu/cipwg/hogctrlw.html

Japanese knotweed flowers *(Polygonum cuspidatum)*
Photo Credit: S.Brinker (OMNR)

JAPANESE KNOTWEED

(Polygonum cuspidatum)

Japanese knotweed was initially introduced as an ornamental in the late 19th century and has since become an aggressive invader that can be found growing in southern and central Ontario. It is a semi-woody perennial plant that grows in large clumps, reaching heights of 1-3 m (3-10 ft). The hollow stems, reddish brown, with swollen nodes that give them a bamboo appearance, die back each fall leaving thick layers of stems and leaves, mulching out competitors. This plant requires a sunny environment and grows in a wide variety of soil types and moisture regimes – commonly growing on roadsides, rail-beds, stream-banks, old homesteads, and woodland edges. This is an aggressive plant that forms dense thickets; it displaces native species and threatens habitat, and the shoots and roots have been known to break through asphalt and concrete.

Control Recommendations

This plant is aggressive and persistent, with no single known method for completely controlling it. It has been reported that repetitive cutting of the shoots as they appear may work over a period of several years[11]; it must be done two to three times per growing season for as long as 10 years. Application of herbicide to cut stems is reported to be most effective. Japanese knotweed appears on the label of several glyphosate*-based herbicides.

*** Herbicide use disclaimer: Regulation 63/09 to Ontario's Pesticides Act came into effect on April 22, 2009. This regulation brings many changes to how herbicides may be used. Glyphosate (depending on the concentration) is listed as either a class 7 or class 8 herbicide, meaning that it is either banned unless the use is excepted or under controlled sale. There are exceptions for agricultural or forestry use as well as provisions for natural resource management, including invasive plant control, under certain circumstances. Refer to the websites listed at the end of this guide or contact the Ontario Ministry of the Environment or the Ministry of Natural Resources for more information.**

Another control method to consider is the use of heavy black plastic after cutting the plants to ground level. This plastic can also be put down before winter to control the plants before they start growing again in the spring. The plastic must be held down with bricks or other heavy materials, as the

11 http://www.uofguelph.ca/pdc/Factshets/PDFs/123JapaneseKnotweed.pdf

Japanese knotweed stand *(Polygonum cuspidatum)*
Photo Credit: Francine MacDonald

Japanese knotweed bamboo–like stems *(Polygonum cuspidatum)*
Photo Credit: Credit Valley Conservation Authority

knotweed will still start to grow and poke against the tarps[12]. The old growth will need to be cleared away before tarps are used, since the canes can become sharp like knives when they're dried and broken. Cut stems or new shoots must be disposed of properly (i.e. similar to the disposal measures suggested for garlic mustard). If they are left on the ground, they may resprout and begin to grow again. Another control technique is to dig out the rhizome clumps; this is best used in conjunction with another control method, since the plants will still grow from any rhizome fragment left in the soil[13].

AMUR, MORROW and TATARIAN HONEYSUCKLES

(Lonicera maackii, L. morrowii, L. tatarica)

These deciduous shrubs from Korea, China and Japan, grow 2-4.5m (6-15ft) tall and are commonly called "exotic bush honeysuckles."

The short-stalked 2-6.5cm (1-2½in), egg-shaped leaves are oppositely arranged along the stem. Mature stems are often hollow. Pairs of fragrant, tubular flowers less than an inch long are borne along the stem in the leaf axils. Flower color varies from creamy white to pink or crimson in some varieties of Tatarian honeysuckle. Flowering generally occurs from early to late spring, but varies for each species. The fruits are red to orange, with many-seeded berries. It is possible to confuse native bush honeysuckles with these exotic species and cultivars - proper identification is necessary. Unlike the exotics, most of our native bush honeysuckles have solid stems.

Exotic bush honeysuckles can rapidly invade and overtake a site, forming a dense shrub layer that crowds and shades out native plant species. They alter habitats by decreasing light availability, by depleting soil moisture and nutrients, and possibly by releasing toxic chemicals that prevent other plant species from growing in the vicinity. Exotic bush honeysuckles may compete with native bush honeysuckles for pollinators, resulting in reduced seed

Honeysuckle leaves and berries *(Lonicera spp.)*
Photo Credit: Bill McIlveen

12 http://www.gardeninglife.ca/articles/article/how-control-japanese-knotweed/
13. http://landscaping.about.com/cs/weedsdiseases/a/knotweed.htm

Amur Honeysuckle *(Lonicera maackii)*
Photo Credit: S. Brinker (OMNR)

Tatarian Honeysuckle *(Lonicera tatarica)*
Photo Credit: W.D. Bakowsky, (OMNR)

set for native species. In addition, the fruits of exotic bush honeysuckles, while abundant and rich in carbohydrates, do not offer migrating birds the high-fat, nutrient-rich food sources that are supplied by native plant species and needed for long flights.

Control Recommendations

The primary controls for exotic bush honeysuckles are: mechanical (pulling or cutting), and chemical.

Summary - Landowner Strategies

Controlling invasive species is a daunting task; however, with a strategy in place, a landowner can, over time, control invasive species on their property. Landowners must keep in mind that with seed sources on neighboring properties, large infestations, or with a large seed bank already established, a longer community strategy would be required, so discuss these species with your neighbors, and ask about what has worked for them on their properties. Control strategies are continuing to be developed for these species – if you do research (the web is a good place) and experiment, you will find out what works best on your property. Unfortunately, the list of species that continue to escape from our gardens and become invasive needs to be updated regularly.

Chemical Usage Disclaimer: Herbicide use disclaimer: Regulation 63/09 to Ontario's Pesticides Act came into effect on April 22, 2009. This regulation brings many changes to how herbicides may be used. There are exceptions for agricultural or forestry use as well as provisions for natural resource management, including invasive plant control, under certain circumstances. Refer to the websites listed below or contact the Ontario Ministry of the Environment or the Ministry of Natural Resources for more information.

The Ontario Pesticide Ban Information

http://www.ene.gov.on.ca/en/land/pesticides/factsheets/fs-landowners.pdf – Information for landowners
http://www.Ontario.ca/pesticideban
http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_90p11_e.html

Other General Invasive Species Sites:

Invading Species Awareness Program: www.invadingspecies.com
Ontario Invasive Plant Council: www.ontarioinvasiveplants.ca
Society for Ecological Restoration – Ontario Chapter: http://www.serontario.org/
Ontario Ministry of Agriculture, Food and Rural Affairs: www.omafra.gov.on.ca
The Nature Conservancy Centre for Invasive Species and Ecosystem Health: www.invasive.org
Environment Canada: www.ec.gc.ca/eee-ias
Midwest Invasive Plant Network: www.mipn.org

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