Controlling Invasive Plants

Dog-strangling Vine along the Don Valley Parkway, Toronto. ***City of Toronto.***

Invasive Plant Traits

Invasive plants are typically non-native plants that aggressively out-compete other vegetation. While all invasive plants can be considered weeds, not all weeds are equally invasive. Many "weeds" and non-native plants do not detrimentally affect native plant communities. Some aggressive native plants can act in an invasive manner in disturbed environments. When invasive, non-native species grow outside of their natural range they are not controlled by the natural interactions of predators, parasites, diseases and competition from other plants. These plants have aggressive reproductive qualities such as rapid growth, abundant seed production, widespread seed dispersal and vigorous vegetative spreading. Invasive plants are highly adaptable and are able to tolerate a wide range of habitat conditions.

Invasive plants are a problem in Toronto due to the high level of disturbance to the landscape. Increasing human impacts, such as pollution, development, soil compaction and erosion causes the deterioration of natural habitats. Invasive plants are able to take advantage of these disturbed areas while our native vegetation cannot compete. This has led to a considerable loss of biodiversity locally and globally.

Invasive Plants Introduction and Spread

Many invasive plants were introduced to North America during European settlement. These plants were introduced intentionally for aesthetics and food value, however, others were introduced unintentionally along with crop seeds or in ship ballasts. Invasive plants continue to be introduced today through the horticultural trade and by spreading from established communities.

The spread of invasive plants is continuing to threaten the integrity of our natural areas. Invasive plants on private properties find their way into parklands by wind; flooding; seeding by wildlife; tracking in seeds caught on pets, clothing and shoes; and the dumping of fill, garden waste and compost.

Preventing Invasive Plant Invasions

The City of Toronto Urban Forestry Services is currently working to control established populations of invasive plants in natural parklands. Landowners can help prevent new infestations of invasive species into natural areas from their properties. This is especially relevant for people whose property border natural areas, however, invasive plant seed can still be transported longer distances by the methods discussed above.

Prevention can be accomplished by:

- Planting native plants instead of non-native varieties (Please see Forestry Facts #2).
- Avoiding use of invasive species in landscaping, examples include Norway Maple (*Acer platanoides*), White Poplar (*Populus alba*), Siberian Elm (*Ulmus pumila*), European Highbush Cranberry (*Viburnum opulus*), Asiatic Bittersweet (*Celastrus orbiculatus*), Tartarian Honeysuckle (*Lonicera tatarica*), English Ivy (*Hedera helix*), Periwinkle (*Vinca minor*) and Himalayan Balsam (*Impatiens glandulifera*).
- Learning to identify and control invasive plants on your own property.
- Properly disposing of garden waste and compost material from your property. Do not dump this waste in parklands and natural areas.
- Determining the source of topsoil or other fill material to ensure they do not become a source of invasive seeds.
- Minimizing soil disturbance on your own property by digging and tilling as little as possible. This helps to prevent weeds in the seed bank from germinating.
- Minimizing soil disturbance in natural areas by remaining on designated trails and keeping pets on a leash.

Controlling Invasive Plants

Invasive plants should be controlled to reduce competition to plantings and prevent spread into natural areas. Control methods for invasive plants are selected for individual species based on their growth habits (see table below) and to minimize the amount of disturbance or harm to the environment. Most species should be targeted at the time of flowering to help deplete plants' resources and prevent seeding. Care should be taken to properly dispose of any material that may contain seeds.

Landowners should be able to use manual methods of control if the invasive infestations are relatively small and newly established. **Manual methods** include cutting, pulling, digging, smothering, and girdling. Cutting is an extremely effective method of controlling annual or biennial weeds that spread by seed. These plants should be cut when they are flowering, as close to the base of the plant. This may need to be repeated in subsequent years if there is a seed bank of weeds.

Pulling or digging out plants by their roots is recommended for removing small patches of perennial weeds or young saplings. It is important that their roots are removed as these plants will resprout if you only remove the above ground portion of the plant. Because of the soil disturbance associated with this method, it may activate the seed bank; it may also exacerbate erosion problems and is not recommended for controlling large infestations on steep slopes. Disturbance may be minimized by using these methods when the soil is moist and plant roots are easily loosened.

Small patches of invasive plants can also be smothered by using mulch or securing black plastic sheeting over the patches. You may have to wait an entire growing season to effectively smother some invasive weeds.

More about Herbicide Selection

City of Toronto Urban Forestry currently uses a glyphosate based herbicide to treat invasive plants in parks across the City. Glyphosate has been chosen because it is a relatively non-toxic chemical that does not persist in the environment. Glyphosate binds to soil particles upon contact, rendering it chemically inert. Soil microorganisms then break it down into carbon dioxide, water, nitrogen and phosphorus. It is also a highly effective chemical, which kills plants by inhibiting an enzyme required for plant growth. The product must be applied to green leaves and stems of actively growing plants, where it can be absorbed and moves within the plant to the root system. Glyphosate is non-selective, meaning that it will kill all green plants. Care must be taken during application to minimize effects to surrounding desirable vegetation. Glyphosate is now classified as a Class 9 pesticide in the Pesticide Act that requires proper licensing and can only be applied under exceptions to the Act including Health or Safety, Forestry, Arboriculture and Natural Resource Management.

If you live in an area of the city where tree bylaws exist to protect trees, such as ravines, you will be required to apply for a permit to remove or injure invasive tree species on your property. Large trees and shrubs can be girdled by removing a thin strip of bark all the way around the tree. This method should not be considered for unstable trees or large trees that are overhanging property boundaries or pathways due to hazards that may be created. If your site requires multiple invasive tree or shrub removals, consider doing it in phases to avoid problems with soil erosion or weed germination caused by the sudden canopy opening. Removal of mature trees may require the services of a professional arborist.

Chemical control methods such as the use of herbicides may be required for larger infestations of invasive species that are encouraged by manual methods and species with extensive root systems. The Ontario Ministry of the Environment **Cosmetic Pesticide Ban** now limits the use of pesticides by homeowners for cosmetic uses. There are exceptions under the ban for forestry management, arboriculture, health & safety and natural resource management. Application of pesticides under these exceptions will require the services of a licensed exterminator. Please see more information in the references at the end of this fact sheet.

Tips on Effective Herbicide Application

- Combine manual methods with herbicide application to minimize the amount of herbicide used and to increase the success of control
- Limit pesticide use and non-target plant damage by sponging,wiping or using a paintbrush to apply product to leaves or cut stumps
- Dye can be added to herbicide to increase visibility of product and ensure proper coverage

Chemical Control: Picture shows City staff carefully applying Roundup with absorbent car wash mitt to Dog-strangling Vine. ***City of Toronto.***

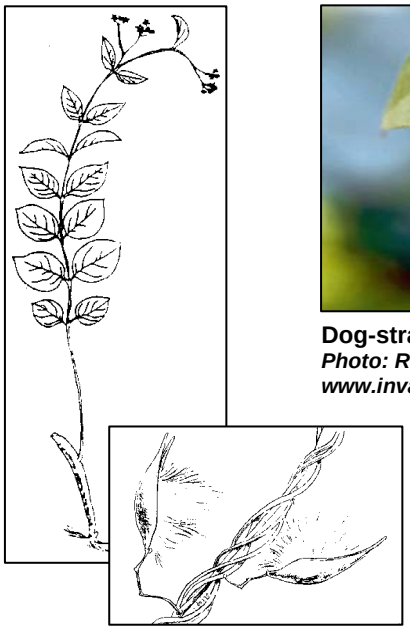
Control Methods for Different Plant Types

Type of Plant	Control Method	Examples of Invasive Species
Herbaceous Annual or Biennial	**Manual** – hand pull or cut plants close to the base when flowering **Chemical** – should not be necessary for this type of plant; herbicide application should only be considered for very large infestations where manual control methods are not possible.	Garlic Mustard, Himalayan Balsam, Tall Sweet White Clover, Burdock
Herbaceous Perennial	**Manual** – hand pull or dig out roots; cut repeatedly to deplete root systems; smother (i.e. with black plastic) **Chemical** – apply herbicide to leaves of the plant using spray bottle or sponge wipe; apply herbicide to cut stems of large plants in order to minimize the amount of herbicide used.	Dog Strangling Vine, Periwinkle, Japanese Knotweed, Goutweed
Woody (i.e. tree, shrub, vine)	**Manual** – hand pull or dig up smaller stems; larger vines should be cut at the base; girdle larger stems of trees and shrubs; cutting alone may invigorate sprouting and may have to be done repeatedly **Chemical** – cut stems and apply herbicide to stump	Norway Maple, Manitoba Maple, White Mulberry, Siberian Elm, White Poplar, Common Buckthorn, Tartarian Honeysuckle, Burning Bush, Asiatic Bittersweet, Riverbank Grape

Invasive Plant Species Profiles

Five widespread invasive plants in Toronto are Norway Maple, Manitoba Maple, Common Buckthorn, Dog-strangling Vine and Garlic Mustard. Norway Maple, Manitoba Maple and Common Buckthorn have been widely used in horticultural landscapes and are still available from commercial nurseries. Garlic Mustard was also intentionally introduced for its use as a culinary and medicinal herb.

Learning these five invasive plants will allow homeowners to begin to monitor invasive species problems on their own property. It is important to learn their identification before they invade. Invasive plants are much easier to control before they become well established since their root systems are not as extensive. There are many more invasive plants that can be identified using field guides or consulting the resources listed at the end of this fact sheet.



Dog-strangling Vine identified by oval leaves (left) and fluffy seed (right). ***Source: Ontario Weeds, Ministry of Agriculture, Food and Rural Affairs. 1998.***

Dog-strangling Vine Seed Pod
Photo: Richard A. Casagrande www.invasive.org

Dog-strangling Vine (*Vincetoxicum rossicum and V. nigrum*)

Description: Dog-strangling vine, also known as Swallowwort, is a non-native herbaceous perennial from Eurasia. The vines form dense colonies, smothering short plants and can grow over small shrubs and trees causing deformities and possibly death.

Identification: Leaves are oval, dark-green and glossy. Fruits are pod-shaped which begin as purple flowers. The fluffy seeds are similar to milkweed and spread by wind. The plant can grow up to two meters in height by twining on other plants or structures.

Habitat: Dog-strangling Vine can grow in a variety of habitats but prefers open sunny areas. It does not flower or grow aggressively in full shade.

Recommended Methods of Control: Dog Strangling Vine should be targeted once it is in full flower. Newly established plants and single stems can be dug out of the ground, taking care to remove as much root as possible and minimizing soil disturbance. Pulling is not effective, as the stems tend to break, leaving the roots intact to resprout. Seed spread in larger patches can be controlled by frequent mowing or seed pod removal. In forest management or natural resource applications treat established colonies with a herbicide in order to kill the roots.

Garlic Mustard (*Allaria petiolata*)

Description: Garlic Mustard is a biennial European species that spreads from seeds. It competes with other woodland species by flowering and setting seed early in the spring before many of our native plants begin to grow. The shading effect causes many native woodland plants to lose vigour.

Identification: Garlic Mustard's most obvious characteristic is the distinct garlic odour when the leaves are crushed. Garlic Mustard is biennial meaning that is produces a low growing rosette in its first year of establishment and forms a tall flowering stalk in the second year that produces seeds. The flowering stalk has alternate heart-shaped leaves and white flowers.

Habitat: Garlic Mustard grows in a variety of habitats including deciduous woods, floodplain forests and gardens. It prefers areas that provide some shade with moist, rich soils.

Recommended Methods of Control: The plant should be controlled by pulling or cutting the plant at the base once it is in full flower, but before it sets seed (mid-late May). Removal may need to be repeated for several years to target the next generation of plants and to deplete the seed bank.

Garlic Mustard Identification: Left: #1 arrow points to 1st year rosette, #2 points to flowering stalk. Right: picture of flowering Garlic Mustard. ***Photos: Erich Haber***

Manitoba Maple *(Acer negundo)*

Manitoba Maple Leaf Detail ***Photo: Paul Wray www.forestryimage.org***

Description: Manitoba Maple is native to the prairie provinces in Canada but it is not native to Ontario. It is also known by the common name Boxelder. It forms dense stands, spreading by seeds and roots.

Identification: Like all maples, Manitoba Maple has opposite leaves and maple keys. It is easily distinguished from other maples as it is the only one with compound leaves. It has 3 to 9 leaflets with light green colour above and greyish green below. The leaves are shallowly lobed or coarsely toothed. The bark is light grey and smooth but it darkens and develops firm ridges as it matures. The stout twigs are purplish with a whitish bloom.

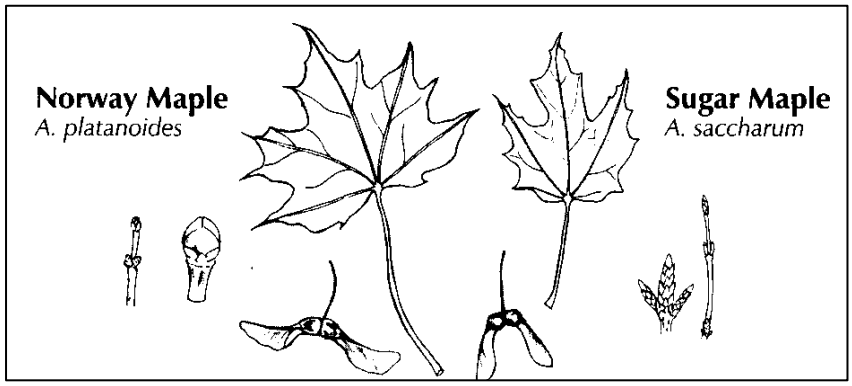
Habitat: Manitoba Maple prefers moist bottomland sites but the seeds are able to establish in any open area and can tolerate a wide variety of soils.

Recommended Methods of Control: Manitoba Maple seedlings may be dug out of the ground. Cut small saplings at the base of the stem using hand pruners or loppers. Small to medium sized trunks can be girdled. To cut larger trees down please consult local tree removal experts. Manitoba Maples resprout vigorously from remaining stumps and will need to be repeatedly cut. Cut stumps should be treated with a herbicide in larger colonies under approved conditions.

Norway Maple (*Acer platanoides*)

Description: Norway Maple is a European tree species that looks similar to our native Sugar Maple. It is a common street tree as it is tolerant of urban conditions. Norway Maple displaces other tree species and ground layer vegetation by producing abundant seedlings, deep shade and releasing chemicals that discourage plant growth (known as phytotoxic chemicals). The resulting bare ground causes problems such as soil erosion and soil compaction. There are many cultivated varieties including Crimson King, Emerald Queen, Royal Red, Schwedler and Deborah Maple.

Norway Maple leaf. ***Photo: Paul Wray, www.invasive.org***



Identification of non-native Norway Maple vs. native Sugar Maple by leaves, keys and buds. ***Source: Native Plant Resource Guide for Ontario 2001-2002.***

Norway Maple Identification: The Norway Maple has maple shaped leaves that range from dark green to dark red. Norway Maples drop their leaves much later in the fall than native maples. The bark is very dark with intersecting ridges. Norway Maple is easily confused with Sugar Maple, however Norway Maple has a milky sap when you break off a leaf, the keys are shaped like an upside down T and the buds are purple, plump and oval. Whereas Sugar Maple has a watery sap, the keys are U shaped and the buds are pointed.

Habitat: Norway Maple tolerates harsh conditions such as shade and dry soils. It thrives in disturbed habitats but can move into any habitat. The seeds from street trees readily blow into adjacent natural areas.

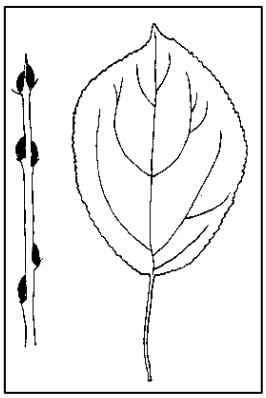
Recommended Methods of Control: Norway Maple seedlings may be dug out of the ground. Cut small saplings at the base using hand pruners or loppers. Small to medium sized trunks can be girdled. Local tree removal experts should be consulted for larger tree removals. Cut stumps should be treated with a herbicide in larger colonies under approved conditions.

Common Buckthorn (*Rhamnus cathartica*)

Description: Common Buckthorn is a European shrub that excludes other understorey species by shading and possibly by releasing phytotoxic chemicals. The seed is spread by birds and other wildlife that eat the berries.

Identification: The most obvious features are the small thorns or spines that occur on the ends of the twigs. The oval leaves are mostly opposite and stand out in the fall, as they stay green much longer than on native trees and shrubs. The female trees bear clusters of dark purple berries. The bark is similar to Cherry trees and is greyish-brown and somewhat shiny.

Habitat: Common Buckthorn invades many habitats including open woods, thickets, hedgerows and roadsides. It is less vigorous in full shade.



Common Buckthorn Leaf and Twig.
Photo: University of Minnesota Extension Service

Female Buckthorn with berries.
Photo: Malcolm Leith, Fletcher Wildlife Garden.

Recommended Methods of Control: Buckthorn can be controlled at any time of year, preferably before female plants produce berries late in the season. Buckthorn seedlings can possibly be hand-pulled or dug out of the ground. Small to medium sized trunks can be girdled, while smaller saplings can be cut close to the base of the trunk. Buckthorn will resprout vigorously from remaining stumps and these will have to be repeatedly cut. Cut stumps should be treated with a herbicide in larger colonies under approved conditions. In large areas of infestation you may wish to begin with the selective removal of seed bearing female plants, to prevent further spread of the species.

Additional Resources:

Invasive Plant Management:

Ontario Invasive Plant Council (OIPC)
Highlights:

- Best Management Practices in Ontario
- Landowner's Guide to Controlling Invasive Woodland Plants
- Identification & Control of Exotic Invasive Species in Ontario's Hardwood Forests
- Ontario's Most Un-wanted Invasive Plant Fact Sheets
- Garden Smart in Ontario and Grow Me Instead

www.ontarioinvasiveplants.ca

Credit Valley Conservation Authority
Invasive Species Program
Tools & Resources

- Landowner's Guide to Controlling Invasive Plants

http://www.creditvalleyca.ca/watershed-science/plants-animals-communities/invasive-species/resources

Ontario Federation of Anglers and Hunters
Invading Species Awareness Program
www.invadingspecies.com
Hotline: 1-800-563-7711

Society for Ecological Restoration
Ontario Chapter
'Sustaining Biodiversity' booklet
www.serontario.org

Norway Maple: Reassessing the threat to natural areas, John Ambrose*. The Urban Outback – Wetlands for Wildlife: A Guide to Wetland Restoration and Frog - Friendly Backyards.*
www.torontozoo.com/adoptapond/urbanoutback/part35.html

Center for Invasive Species and Ecosystem Health
Bugwoodimages Project, University of Georgia
www.invasive.org/control/index.cfm

Biodiversity and Education Awareness Network (BEAN)
Garlic Mustard Removal Protocol
http://biodiversityeducation.ca/files/

Invasive Plant Identification:

Guide books & fact sheets on Ontario Invasive Plant Council link above

Identification Guide – Invasive Plants & their Native Look-Alikes
www.nybg.org/files/scientists/rnaczi/Mistaken_Identity_Final.pdf

Pesticide Use in Ontario:

Ontario Ministry of the Environment (MOE) Cosmetic Pesticide Ban – Ontario Regulation 63/09, Pesticide Act
Technical Guidance Fact Sheets – Homeowners, Forestry, Landscape exterminators, Arboriculture, Natural Resource
Public Information Centre: 1-800-565-4923 or 416-325-4000
www.ene.gov.on.ca/environment/en/category/pesticides/index.htm

Ontario Ministry of Natural Resources
What you Need to Know to Protect Natural Resources
http://www.mnr.gov.on.ca/en/Business/Biodiversity/2ColumnSubPage/270465.html

Health Canada – Homeowner Guidelines for Using Pesticides
http://hc-sc.gc.ca/cps-spc/pubs/pest/_fact-fiche/home-maison/index-eng.php

Native Plant Selection & Sources in Ontario *(See also Forestry Facts # 2 for more information):*

Canadian Wildlife Federation
Wild About Gardening
www.cwf-fcf.org

Evergreen
www.evergreen.ca

North American Native Plant Society (NANPS)
www.nanps.org

Ontario Trees & Shrubs
www.ontariotrees.com

Toronto and Region Conservation Authority
Healthy Yards Program
www.trca.on.ca/yards/

This fact sheet summarizes the most recent control methods used by field practitioners. (Revised 2013)