Invasive Common (European) Buckthorn

(Rhamnus cathartica)

Best Management Practices in Ontario

ontario.ca/invasivespecies

Invasive Species Centre

Ontario Invasive Plant Council

Ontario

Foreword

These Best Management Practices (BMPs) are designed to provide guidance for managing invasive Common Buckthorn (*Rhamnus cathartica*) in Ontario. Funding and leadership in the development of this document was provided by the Canada/Ontario Invasive Species Centre. They were developed by the Ontario Invasive Plant Council (OIPC), its partners and the Ontario Ministry of Natural Resources (OMNR). These guidelines were created to complement the invasive plant control initiatives of organizations and individuals concerned with the protection of biodiversity, agricultural lands, crops and natural lands.

These BMPs are based on the most effective and environmentally safe control practices known from research and experience. They reflect current provincial and federal legislation regarding pesticide usage, habitat disturbance and species at risk protection. These BMPs are subject to change as legislation is updated or new research findings emerge. They are not intended to provide legal advice, and interested parties are advised to refer to the applicable legislation to address specific circumstances. Check the website of the Ontario Invasive Plant Council (www.ontarioinvasiveplants.ca) or Ontario Ministry of Natural Resources (www.ontario.ca/invasivespecies) for updates.

Anderson, Hayley. 2012. Invasive Common (European) Buckthorn (*Rhamnus cathartica*): Best Management Practices in Ontario. Ontario Invasive Plant Council, Peterborough, ON.

Printed April 2012
Peterborough, Ontario

ISBN: (to be confirmed)

This document was prepared for the Canada/Ontario Invasive Species Centre and the Ontario Ministry of Natural Resources by the Ontario Invasive Plant Council.

Support for the production and publication of this document has been provided by the:
Canada/Ontario Invasive Species Centre
Ontario Ministry of Natural Resources

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For more information on invasive plants in Ontario, visit www.ontario.ca/invasivespecies, www.ontarioinvasiveplants.ca, www.invadingspecies.com or www.invasivespeciescentre.ca

Cover photo courtesy of Central Lake Ontario Conservation Authority.

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Photo courtesy of Hayley Anderson.

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Photo courtesy of Central Lake Ontario Conservation Authority.

Introduction

Common Buckthorn is native to Europe and is also known as European Buckthorn. In Canada, it is found from Nova Scotia to Saskatchewan. It was likely introduced around the 1880s, becoming widespread in the early 1900s. This species was often used in hedgerows and windbreaks, and was widely planted across the country. Common Buckthorn is of concern to the agricultural community because it can host oat crown rust and soybean aphid, both of which reduce crop yields.

Common Buckthorn is shade and drought tolerant. It is now found throughout southern Ontario and grows in a wide range of habitats, spreading rapidly along roadsides, fence lines, woodland edges, and in pastures and abandoned fields. Buckthorn fruit has a laxative effect on wildlife which helps to widely distribute the seeds.

Common Buckthorn invasions can harm the economy and the environment. It out-competes native plants, reduces biodiversity, degrades the quality of wildlife habitat, and impacts a wide range of industries. Common Buckthorn is listed as a noxious weed in Ontario's Weed Control Act.

Description

Description of Common Buckthorn

Common Buckthorn is closely related to two other buckthorn species, Glossy Buckthorn *(Frangula alnus)* a non-native invasive species also present within Ontario, and Alderleaf Buckthorn *(Rhamnus alnifolia)*, a species that is native and widespread in southern Ontario. For the purpose of this document, the focus will be on Common Buckthorn *(Rhamnus cathartica)* with Glossy Buckthorn information included where necessary.

Height:

Common Buckthorn is a woody plant that ranges in size from a shrub to small tree; reaching heights of 6 - 7 m. Old and large tree specimens can have trunks up to 25 cm in diameter.

Common Buckthorn often grows as a mid-size (height) tree.

Photo courtesy of Patrick Hodge.

Stems:

The stems of Common Buckthorn are very dark grey to black with prominent small lenticels (lines), similar to birch. The bark is smooth and shiny with a metallic sheen when young, and rough textured when mature. When the bark is scratched or removed, the under layers are yellow-green and the cambium layer (directly under the bark) is orange.

Lenticels on the bark of a young Common Buckthorn.

Photo courtesy of Matt Smith.

The cambium layer (directly under the bark) of Common Buckthorn is orange.

Photo courtesy of Chris Evans.

Buds/Twigs:

On many twigs there are small thorn-like tips, which are generally located at the end of the twig. The buds are pointed and hug the stem.

Common Buckthorn has a thorn-like tip.

Photo courtesy of Matt Smith.

The buds of Common Buckthorn are pointed and hug the stem.

Photo courtesy of Central Lake Ontario Conservation Authority.

Leaves:

Leaves are opposite to sub-opposite, and occasionally alternate. They have sharp tips, and are pointed, curved or folded. The margins are somewhat finely toothed with rounded tips on the teeth. There are 3-5 strongly curved prominent veins per side which arch towards the tip of the leaf.

Common Buckthorn leaves have prominent, curved veins.

Photo courtesy of Central Lake Ontario Conservation Authority.

Common Buckthorn leaves are opposite to sub-opposite.

Photo courtesy of Ontario Federation of Anglers and Hunters.

Opposite to sub-opposite leaves.

Photo courtesy of Paul Wray, Iowa State University.

Flowers:

Common Buckthorn has inconspicuous four-petal flowers that are greenish-yellow, 6 mm across, and appear in early June on short threadlike stalks.

Fruit:

In late July and August, black fruits are produced on the female trees, and are found in dense clusters in the leaf axils (where the leaf attaches to the stem). Each fruit contains 3-4 seeds and has deep narrow grooves on the back. The fruits remain on the plant well into the winter.

Common Buckthorn has greenish-yellow inconspicuous flowers.

Photo courtesy of Leslie J. Mehrhoff, University of Connecticut.

Immature Common Buckthorn fruit.

Photo courtesy of Central Lake Ontario Conservation Authority.

Flowers are borne on short stalks.

Photo courtesy of Scott Sampson.

Common Buckthorn has black fruits in dense clusters.

Photo courtesy of Freyja Forsyth.

Description of Common Buckthorn and its look-a-likes

The table below lists the main features of Common Buckthorn in comparison to its invasive relative, Glossy Buckthorn *(Frangula alnus)* and the native Alderleaf Buckthorn *(Rhamnus alnifolia)*. For details of other species often mistaken for Common Buckthorn, see Appendix 1.

	Common (European) Buckthorn (invasive) *R. cathartica*	**Glossy Buckthorn (invasive)** *R. frangula*	**Alderleaf Buckthorn (native)** *R. alnifolia*
Leaves	• opposite to sub-opposite, occasionally alternate • sharp, pointed, curved or folded • somewhat finely rounded teeth • 3-5 strongly curved veins per side. Very obvious/strong on the underside, arch towards the tip of the leaf • petiole (stalk attaching leaf to stem) is grooved	• alternate • smooth wavy edges • shiny, oval, widest above the middle • not toothed • 5-10 fairly straight veins per side, very obvious/strong on the underside • petiole ¼ to ½ inch long	• alternate • tip of blade flat, tip of leaf acute point, smaller leaves more rounded • toothed edges • can be up to 10 cm long, 5 cm wide • mainly straight, conspicuous veins • deep green, paler grey-green below • petiole grooved
Flowers	• greenish yellow • 6 mm across • on short threadlike stalks • in dense clusters • appear in early June • 4 stamens, 4 petals, 4 sepals	• greenish white to greenish-yellow • 6 mm • solitary or in groups of 2-8 • 5 stamens, 5 petals, 5 sepals	• greenish yellow • 3 mm diameter • on short stalks, solitary at base of leaf stem • very inconspicuous • 5 stamens, 5 petals 5 sepals

Description of Common Buckthorn and its look-a-likes (continued...)

	Common (European) Buckthorn (invasive) *R. cathartica*	**Glossy Buckthorn (invasive)** *R. frangula*	**Alderleaf Buckthorn (native)** *R. alnifolia*
Fruit	• black when mature, green when immature • dense clusters, in leaf axils • 3-4 seeds, with deep narrow groove on back	• Red-brown turning black • solitary or in clusters in leaf axils • tend to have fruit in varying stages of ripeness • 2-3 seeds	• purplish-black • in small clusters • slightly longer than wide • 1-3 seeds, flat on back, scarcely grooved
Bud	• scaly, almost black • lies close to twig • some dwarf shoots end in a thorn • opposite, sometimes alternate	• no scales • no thorn	• dark smooth scales • up to 7 mm long • terminal bud absent • no thorn
Bark	• greyish brown • prominent small lenticels • smooth and shiny when young, rough textured when mature • under layers are yellow-green and heartwood is orange	• greyish brown • prominent small lenticels • under layers are yellow-green	• grey • branches purplish-red to grey • finely ridged
Branchlets or twigs	• terminal spine • no hairs	• no terminal spine • greying • minutely hairy	• no spines • grey-brown • minutely hairy
Form	• shrub or tree	• shrub or tree	• small low shrub
Size	• 6-7 m and 25 cm diameter	• 6-7 m and 25 cm diameter	• usually less than 1 m in height

Biology and Life Cycle

Common Buckthorn is a shade-tolerant plant that forms dense thickets. It is one of the first trees to leaf in early spring, getting a head start on growing when other shrubs and trees are leafless. It also retains its green leaves well into the fall (November in some areas) when nearly all other accompanying species are leafless or have changed colour. Its dense thickets suppress shade-intolerant species – the end result being a Common Buckthorn monoculture.

Common Buckthorn in the fall, still green while other species have changed colour.

Photo courtesy of Wasyl Bakowsky.

Common Buckthorn is dioecious, meaning individual trees have either male flowers or female flowers, but not both. Only female trees produce seed. Common Buckthorn will flower prolifically in the early spring, often unnoticed because of the small flower size. It sets seed rapidly and in great quantity from late July to August and berries persist into the winter. Fallen seeds can produce a seedling in as little as 28 days. Seeds may also be dropped in the water and carried downstream.

Common Buckthorn berries.

Photo courtesy of Greg Bales.

Common Buckthorn berries are often one of the only berries that last into the winter. The seeds are spread after being eaten by birds and mammals. They move through the animal's digestive system quickly, and the animal then excretes the seeds away from the parent shrub, further enabling its widespread invasion. These seeds can remain in the soil for up to 5 years resulting in a need for long term management.

Common Buckthorn seedling.

Photo courtesy of Matt Smith.

Common Buckthorn is commonly found along forest edges
Photo courtesy of Cody Hough.

Habitat

Common Buckthorn is native to Europe and north-western parts of Asia where it can be found in the understory of oak, oak-beech and ash woods, fens, open areas, disturbed sites and along forest edges. It was introduced in Ontario as an ornamental and windbreak plant in the 1800s after a period of deforestation in the province caused by settlement and development. Common Buckthorn has also been used for erosion control and stream bank stabilization.

Common Buckthorn is found in both dry and moist habitats and in almost any type of soil but has a preference for neutral to alkaline pH. It does well in sunny or partly shaded areas but can be limited by deep shade. The other two buckthorn species are found on more moist grounds, with the native Alderleaf Buckthorn tolerating wetlands, sphagnum bogs and cedar swamps. Glossy Buckthorn can also be found in these same more moist/wet areas with lower pH soils.

Common Buckthorn is found both west and east of the Canadian Shield in southern Ontario but is rare north of the shield. In some buckthorn control sites, Glossy Buckthorn is becoming more of a problem as Common Buckthorn is removed, especially in Ottawa-area wetlands where it is considered to be one of the most aggressive alien species. Some land managers have noted that Glossy Buckthorn can often be found growing alongside Common Buckthorn, and it is not restricted to moist areas.

Impacts

Impacts to Biodiversity

Common Buckthorn can harm biodiversity in a number of ways, affecting soil quality, plant communities, and wildlife.

It can change the nitrogen composition of soil making it harder for other species to survive. These changes can have long-lasting effects even after Common Buckthorn has been removed. For example, native species such as Chokecherry and Pincherry with fruits that are beneficial to wildlife (i.e. not laxative like Common Buckthorn) may not survive even in the right conditions, due to soil changes.

Common Buckthorn seems to have a direct impact on understory plant communities and vegetation types, though no formal studies have been completed. There may be several reasons for lower numbers of native plant species in an area with Common Buckthorn, such as preferential deer browse and alterations in the soil composition and leaf layer caused by non-native earthworm populations. Common Buckthorn may also encourage non-native earthworm establishment, which would facilitate the destruction of leaf layers.

Sites invaded by Common Buckthorn often show a lower species richness count, and a higher concentration of weedy and exotic species, including invasive honeysuckle species (*Lonicera* spp).

Common Buckthorn has been shown to negatively affect some native songbird populations. Robins (*Turdus migratorius*) nesting in buckthorn are more susceptible to predators because of the low branch heights and lack of protective thorns (like those found on hawthorns and native rose species).

The berries are eaten by thrushes (Turdidae), waxwings (Bombycilla), White-throated Sparrows *(Zonotrichia albicollis)*, European Starlings *(Sturnus vulgaris)*, jays (Corvidae) and small mammals. The laxative properties of the seeds ensure they are spread widely and rapidly. Seedlings will begin to sprout under perch trees, and along fence lines and woodland edges. The seeds are also long-lived five years and will rapidly colonize a site if space becomes available. Under conditions of full sun, favourable soil conditions (especially disturbed soils) and no competition, Common Buckthorn can mature and produce seed in a few years.

Site invaded by Common Buckthorn and exotic honeysuckle. Buckthorn on left, honeysuckle on right.
Photo courtesy of Paul Evans.

Impacts to Forestry

Land managers of wooded or open areas in southern Ontario are likely familiar with Common Buckthorn due to its aggressive spread by seed and prolific growth. Common Buckthorn forms dense, even-aged stands that can tolerate shade and suppress other vegetation because of its long growing season. The growth of hundreds of buckthorn seedlings across the forest floor prevents other species, including native plants, from growing and surviving. Its greatest impact can be in somewhat disturbed sites, especially if in full sun. Once established on the edge of a forest, plants will spread into the interior.

In southern Ontario, Common Buckthorn is found along forest edges and as a dominant part of the forest understory. It aggressively invades hardwood (deciduous) and softwood (coniferous) forests and can harm the surrounding soil similarly to aggressive allelopathic[1] invaders, such as Garlic Mustard *(Alliaria petiolata)*. In North America, Common Buckthorn develops its leaves weeks before native species and loses them weeks after, effectively outcompeting native species for sunlight. These traits make it particularly harmful to hardwood forests and make it hard for land managers to promote healthy forest growth and succession.

Common Buckthorn invading a pine plantation.
Photo courtesy of Greg Bales.

Impacts to Agriculture

Common Buckthorn is host to the Soybean Aphid *(Aphis glycines)*, and the fungus that causes Oat Crown Rust *(Puccinia coronata* spp. *avenae)*. As a result it is listed as a provincially noxious weed in Ontario's *Weed Control Act*. Common Buckthorn and Ontario's native Alderleaf Buckthorn can act as overwintering hosts for the Soybean Aphid, which can harm the production of soybean and vegetable crops. The Soybean Aphid may have also has facilitated an increase in populations of the exotic Multi-coloured Asian Lady Beetle *(Harmonia axyridis)* (preys upon the Soybean Aphid), leading to the decline of several native lady beetle species.

1 Allelopathy is the release of chemicals from the root of a plant in to the soil to discourage other plants from growing nearby

Impacts on Recreation

Common Buckthorn can inhibit recreational activities in areas where it has become established. Its dense stands can make it difficult to walk along established trails. Common Buckthorn also harms the aesthetic value of natural areas by reducing the abundance and variety of native species such as wildflowers.

Common Buckthorn in a natural area.

Photo courtesy of Central Lake Ontario Conservation Authority.

Regulatory tools

Provincial - Weed Control Act

Common Buckthorn is listed as a provincially noxious weed in the Weed Control Act. The act was created to reduce the impact of noxious weeds and weed seeds on agricultural or horticulture land. Landowners whose property contains noxious weeds and weed seeds that negatively affect agricultural lands are responsible for weed control and associated costs.

Best Management Practices

Controlling Common Buckthorn before it becomes well established will reduce its impacts on biodiversity, the economy and society.

Once Common Buckthorn has been confirmed at a location, a control plan should be developed based on population size, accessibility, potential for spread and the risk of environmental, economic or social impacts. Early action can significantly reduce the cost of control.

With large infestations and limited time and resources, control work 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, both the male (non-fruit bearing) and female Common Buckthorn will retain green leaves after other trees have gone dormant.

2) Concentrate on high-priority areas such as the most productive or sensitive part of a woodlot or a favourite natural area.

3) Consider dedicating a certain time each year to control efforts, and make it a joint effort with neighbouring landowners/land managers.

4) Plan to replant native tree and shrub species once the Common Buckthorn population is eradicated or under control. If dealing with a large infestation, it is best to remove the buckthorn and re-plant in phases to avoid opening the canopy to other invasive species. Re-planting with native species will help jump-start natural succession and increase biodiversity in the area.

Common Buckthorn seeds can remain viable in the soil for up to five years. Follow-up monitoring is essential to remove future seedlings. A number of natural resource considerations, such as species at risk and habitat disruption, should be assessed before creating a control plan.

Natural Resource Considerations

You are responsible for ensuring that your project follows all relevant laws, including the Endangered Species Act (ESA).

Prior to implementing control actions, a site assessment for species or habitat protected under the ESA is required. Your local MNR office can provide existing knowledge of protected species and or their habitat at or near your site, as well as provide existing species at risk survey protocols. Details on additional sources to consult for this information are available in the ESA Submission Standards for Activity Review.

If protected species or habitats are present, an assessment of the potential effects of the control project is required. Consult with your local MNR district office as early in your control plans as possible for advice on alternatives that may avoid or minimize adverse effects, and to determine if your control activities require authorization under the ESA.

Control Measures

Mechanical control

Pulling:

When the soil is moist, small plants up to 1 m (3ft) in height can be pulled. As Common Buckthorn grows, it puts down a deep root system very quickly (dependent on soil conditions) and sends out lateral roots that can be as long as 2 - 3 m which will also need to be removed. Larger plants can be dug out, or pulled out using a weed wrench tool. Re-sprouting can occur unless all the roots are removed or other measures like fire or chemical control are used. Re-sprouting can worsen the problem dramatically (i.e. population can quintuple in five years) if appropriate measures are not taken. However, some land managers have reported success using only pulling as a control method.

If pulling takes place in the fall, care should be taken to remove and contain branches with berries prior to pulling. Because of the thorns, it is recommended that volunteers or staff wear personal protective equipment, such as gloves and safety glasses when performing mechanical control of Common Buckthorn. As with any control method, follow up monitoring/ maintenance is crucial. Pulling is extremely difficult in clay soils. It works best in fresh-moist loamy sites or when the soil is moist or wet.

To limit disturbance and reduce impact on surrounding vegetation, it is recommended that pulling take place from mid-October to mid-November.

Benefits of pulling in the fall/winter season (before the ground freezes) include the following:

- Common Buckthorn leaves stay green longer and remain on the stem longer than our native trees and shrubs. This makes identification easier and reduces the potential of pulling look-a-like species; especially if you are using volunteers to help with the control.
- Most of the ground vegetation has gone dormant at this time, reducing the disturbance to surrounding plants that may arise while pulling shrubs and walking through the site.

Removal using a weed wrench tool can be effective for stems up to 5cm in diameter. For larger trees (greater than 5cm in diameter) some organizations have reported success using a tractor to pull plants, however this leaves a large hole which will need to be re-planted. If not re-planting immediately, an annual cover crop can be used until planting takes place.

Removal using a weed wrench tool.

Photo courtesy of Matt Smith.

Cutting/Girdling:

Cutting or girdling (a cut groove down to the heartwood all the way around the stem) are also feasible control options. However, herbicide must be applied to fresh stumps or girdled areas to prevent re-sprouting. Immediate application of herbicide to a fresh cut allows for better absorption and may reduce the need for repeat applications. A precise application of herbicide from a small hand-pump bottle can be done at any time of the year, although late spring/early summer is the most effective time. See "chemical control" section for additional information on the use of pesticides, including herbicides. The site must be monitored for the next few seasons to ensure control of seedlings or re-sprouts.

Girdling can weaken larger Common Buckthorn shrubs that can't be pulled by hand or by mechanical means. This makes the shrub easier to remove mechanically the following year. Cutting the shrub down to a stump will cause sprouting and make stump removal very difficult. Sprouting will still occur with girdling but won't be as vigorous as with cutting. Over time (1-2 years, girdling may need to be repeated after the first year) the canopy will begin to die, the roots will die back and the shrub will become easier to pull out. When girdling, the band should be at least 3" wide to prevent wound closure and the recovery of the shrub.

A cut buckthorn stump will re-sprout unless treated.
Photo courtesy of Chris Hargreaves.

Mowing:

Mowing will reduce stem numbers and vigour, and will eventually kill off most seedlings. It needs to be carried out in early and late summer for at least 2 – 3 consecutive years and is recommended for stems that are less than 2 years old. Mowing will also prevent growth of native vegetation so should only be used in areas with dense buckthorn seedlings where restoration will occur.

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. Because livestock can also graze or trample nearby native vegetation grazing is not recommended for high quality natural areas.

Fire:

Fire can be an effective tool where feasible (e.g. where there are natural fire barriers around a plant community that is almost entirely Common Buckthorn). Regular prescribed fire or the use of a propane torch will control seedlings and shrubs of this species in fire-adapted upland and wetland sites (e.g. fens, sedge meadows, marshes). Some control will be evident after the first burn. For complete control in established stands, burning yearly or every other year may be required for 5 to 6 years or more.

The success of using prescribed burning to control Common Buckthorn depends on the intensity of the fire. Generally, Common Buckthorn shrubs over 5cm in diameter may require additional control, such as pulling or chemicals. To use fire as a control option you must contact the municipality for a burn permit. 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 Common Buckthorn. Care should be taken not to damage sensitive plant communities by raising water levels higher than occurred historically. Regulating water levels may require permits or approvals from both federal (Fisheries and Oceans Canada) and provincial governments (Ministry of Natural Resources and Ministry of Environment). Before undertaking work contact these agencies for more information.

Disposal:

Common Buckthorn branches can be piled and burned on site (check with your municipality for a burn permit). Pile branches before they dry, as dry buckthorn thorns harden and can inflict painful and long-lasting wounds. If you are going to dispose of buckthorn in green waste (compost) or by chipping, ensure that you have removed all fruit or are only doing so with the male trees. Common Buckthorn has been noted to take more time than most other species to break down in to compost. Fruits should be removed and placed in the trash. Disposal at municipal compost waste facilities is an option if they have the ability to heat the seeds to a high enough temperature, check with your municipality for disposal options.

Chemical Control

The Ontario Pesticides Act and Ontario Regulation 63/09 provides natural resources, forestry and agricultural exceptions which may enable chemical control of invasive plants on your property. Other exceptions under the Act include golf courses, and for the promotion of public health and safety.

Natural Resources Exception

A 'natural resources' exception exists for the use of prohibited pesticides to manage, protect, establish or restore a natural resource. This exception allows the use of prohibited herbicides for control of invasive plants on your property provided your project meets specific conditions and you obtain the necessary approvals.

If your project meets the natural resources criteria specified in section 33 of Ontario Regulation 63/09 and includes the use of pesticides in accordance with Integrated Pest Management principles outlined in the BMP guide you will need to contact the Ontario Ministry of Natural Resources (www.ontario.ca) to obtain a written letter of opinion from the MNR Regional or Branch Director.

Forestry Exception

If Common Buckthorn is within a forest*, chemical control may fall under the exception for forest management, and a letter of opinion may not be required. Class 9 pesticides can be used under the forestry* exception to protect trees from pests and to control competing vegetation.

*O. Reg. 63/09 defines "forestry" and "forest" as:

"Forestry means activities relating to any of the following: harvesting, renewing, maintaining or establishing a forest, protecting forest resources derived from a forest, and accessing a forest for these purposes."

"Forest means a treed area of land that is one hectare in size or larger and is not used for producing an agricultural crop as part of an agricultural operation."

Refer also to the Ministry of Environment's factsheet titled "Pesticides Act and Ontario Regulation 63/09 Private Land and Woodlot Owners April 2011" http://www.ene.gov.on.ca/stdprodconsume/groups/lr/@ene/@resources/documents/resource/stdprod_085367.pdf

Agriculture Exception

There is an exception for the use of Class 9 pesticides for uses related to agriculture by a farmer. This exception may apply to the control of Common Buckthorn in agricultural fields or near farm operations.

A farmer is an individual who owns or operates an agricultural operation.

An agricultural operation is an agricultural, aquacultural or horticultural operation and includes:

- Growing, producing or raising farm animals
- Production of crops, including greenhouse crops, maple syrup, mushrooms, nursery stock, tobacco, trees and turf grass, and any additional agricultural crops
- Activities that are part of an agricultural operation such as maintenance of a shelterbelt for the purposes of the agricultural operation

- The production of wood from a farm woodlot, if at least one of the activities described earlier is carried out on the property where the farm woodlot is located.

Refer also to the Ministry of the Environment's factsheet titled "Pesticides Act and Ontario Regulation 63/09 Agriculture May 2011" http://www.ene.gov.on.ca/stdprodconsume/groups/lr/@ene/@resources/documents/resource/stdprod_080128.pdf

Herbicide Application

Herbicides must be applied in accordance with all label directions and only for the control of specified pests. For an up-to-date list of herbicides labelled for Common Buckthorn control, visit the Pest Management Regulatory Agency's web site at www.pmra-arla.gc.ca. The Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA)'s Publication 75, Guide to Weed Control is an excellent reference for all aspects of weed control, and includes a section on invasive plant management. It is regularly updated and includes herbicides currently registered for specific weeds, including Common Buckthorn. To determine if a federally registered herbicide is also classified for use in Ontario, visit http://app.ene.gov.on.ca/pepsis/.

Anyone using a pesticide is responsible for complying with all federal and provincial legislation. Most non-domestic (i.e. commercial, restricted etc.) herbicides can only be applied by licensed exterminators. For more information, refer to the Ontario Pesticides Act and Ontario Regulation 63/09 (available on http://www.elaws.gov.on.ca), or contact the Ontario Ministry of the Environment (http://www.ene.gov.on.ca/environment).

Biological Control

Since 2001, research has been on-going to identify potential bio-control agents using a predator, disease or other natural control to fight Common buckthorn. Over the past 10 years, nine species have been studied and discarded because they may have impacts on other non-target species (lack of host-specificity). Testing for Common Buckthorn is ongoing using two psyllids (sap-sucking lice) and a seed-feeding midge that have shown host-specificity in early trials. Research in to the relationship between soil organisms and pathogens and Common Buckthorn will also be conducted in the future.

Removing a cut stump
Photo courtesy of Iola Price.

Preventing the Spread

Everyone can help prevent the spread of Common Buckthorn by following these tips:

☑ Report it.

If you think you see Common Buckthorn, take a picture, record the location and contact the Invading Species Hotline to report it. For more information and guidance contact the Invading Species Hotline at **1-800-563-7711** or visit www.invadingspecies.com or www.ontarioinvasiveplants.ca. Because it is included in the Weed Control Act you can also contact county and regional weed inspectors regarding Common Buckthorn infestations.

☑ Watch for it.

Monitor hedges, property boundaries, fence lines and trails. Early detection of invasive plants can increase the success of control and removal efforts.

☑ Stay on trails.

Avoid traveling off-trail and in areas known to have Common Buckthorn or other invasive species.

☑ Stop the spread.

Inspect, clean and remove mud, seeds and plant parts from clothing, pets (and horses), vehicles (including bicycles), and equipment such as mowers and tools. Clean vehicles and equipment in an area where plant seeds or parts aren't likely to spread (e.g., wash vehicles in a driveway or at a car wash) before travelling to a new area.

☑ Keep it natural.

Try to avoid disturbing soil and never remove native plants from natural areas. This leaves the soil bare and vulnerable to invasive species.

☑ Use native species.

Try to use local native species in your garden. Never use Common Buckthorn in your garden or hedgerows. Encourage your local garden centre to sell non-invasive or native plants.

Help track the Spread of Common Buckthorn

Common Buckthorn is assumed to be widespread in Ontario, however the extent of populations is not well known. You can help track the spread of this invasive species by using one of these tools:

1) The Invasives Tracking System is an on-line reporting tool that allows users to view existing sightings of Common Buckthorn and other invasive species in Ontario and document their sighting reports utilizing satellite imagery. The website (www.invasivestrackingsystem.ca) is free to use for both the public and professionals.

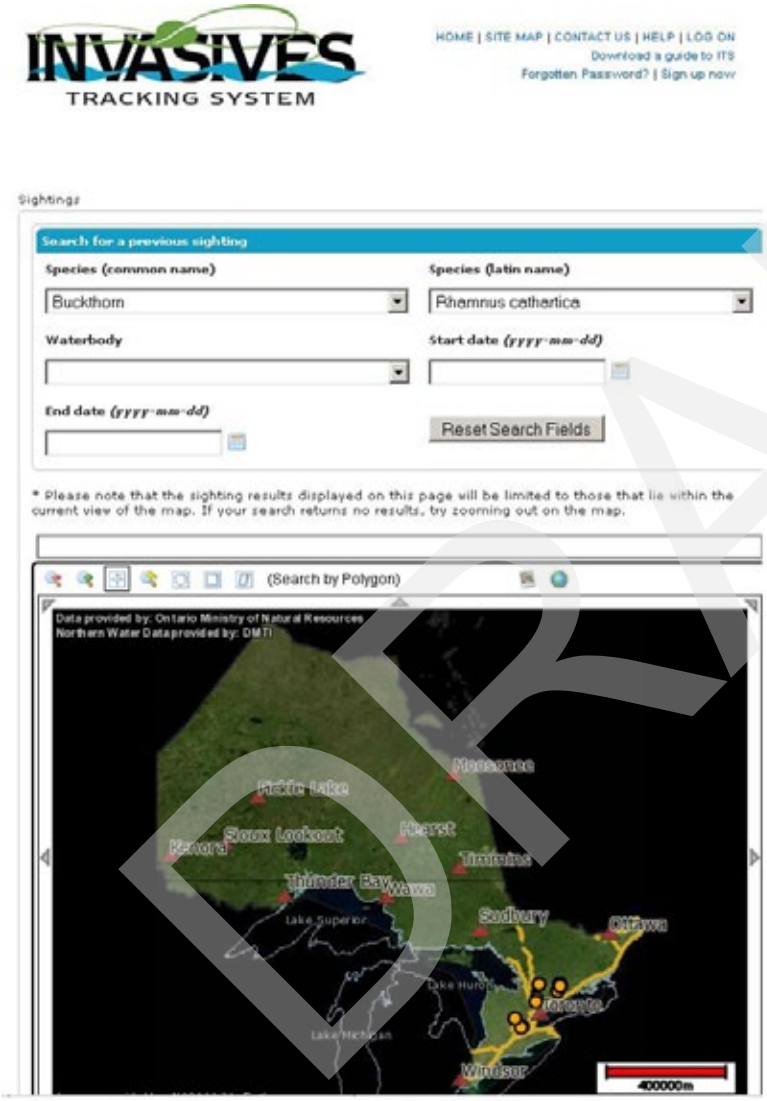

Photo courtesy of OFAH.

2) The toll-free Invading Species Hotline (**1-800-563-7711**) and website (www.invadingspecies.com) can be used to report sightings verbally or on-line.

If you think you have Common Buckthorn on your property or see it in your community, please report it. You will be asked to send in the sighting location along with photos of the leaf, stem and, flowers or berries (if present) for identification.

Literature and Other Resources

The Ministry of Natural Resources, the Ontario Invasive Plant Council and their partners have produced outreach materials which can be shared with the public and provide information on the identification, control and management of Common Buckthorn. These materials (including this BMP document) can be found on-line at www.ontario.ca/invasivespecies, www.invadingspecies.com and www.ontarioinvasiveplants.ca or by contacting the Invading Species Hotline at **1-800-563-7711**.

Additional materials and resources can be found at:

Fact Sheet on the Ontario Pesticides Act and Ontario Regulation 63/09 for Private Land and Woodlot Owners
http://www.ene.gov.on.ca/stdprodconsume/groups/lr/@ene/@resources/documents/resource/stdprod_085367.pdf

Credit Valley Conservation Authority
www.creditvalleyca.ca/invasives

Canadian Botanical Conservation Network
http://archive.rbg.ca/cbcn/en/projects/invasives/invade1.html

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Appendix 1 – Additional Species which may be confused with Buckthorn

	Choke Cherry (native) *Prunus virginiana*	**Pin Cherry (native)** *Prunus pensylvanica*	**Sandcherry (native)** *Prunus pumila*
Leaves	• alternate • widest above the middle • longer than wide • slightly hairy beneath • may have tufts of hair at vein axils • toothed/serrated edges and teeth not incurved • petiole with 1-3 glands at base of blade	• alternate • 2x longer than wide • long pointed tip • margins (edges) have fine inward-curved teeth • upper surface shiny green, under surface slightly paler and smooth • petiole usually has a small gland at the base of leaf	• opposite or alternate • can be long and narrow, often crowded at end of branch • sharply toothed but usually missing teeth along bottom 1/3 of leaf • blunt, bright olive green above, paler below, • prominent veins curving forward • When broken, held together by veins
Flowers	• thick, white cylindrical clusters on one stalk • appear before the leaves open • 5 petals • 10-25 flowers grouped at end of stem	• tiny, white in flat-topped clusters of 2-4 flowers on pedicels (stem that attaches flower) • 5 petals • appear when leaves half open	• white, in clusters of 2-6 • 5 petals
Fruit	• red to purple • one seed • many fruit clustered on one stalk • ripen in August to September	• red, pea-sized • one seed • 1 fruit per stalk on longer stalks but in clusters of stalks • ripen late July to early September	• purple to blackish • astringent • singly or in small clusters, like Choke Cherry

Appendix 1 – Additional Species which may be confused with Buckthorn (continued)

	Choke Cherry (native) *Prunus virginiana*	**Pin Cherry (native)** *Prunus pensylvanica*	**Sandcherry (native)** *Prunus pumila*
Bud	• 3-4 mm long • sharp pointed scales • dark brown with pale edges	• 1-2 mm long • rounded • terminal and several lateral buds clustered at end of twig	• less than 4 mm long • blunt to slightly sharp • uniformly reddish-brown • clustered toward tip of twig
Branchlets or twigs	• can have thorns • twig has disagreeable odour when broken	• can have thorns	• new twigs are bright red, slender, smooth
Form	• Shrub or tree-like	• Single-stemmed tree	• Prostrate shrub (branches lay along the ground)
Size	• 10-30 ft • trunk can be 3-4 inches in diameter	• 12-20 ft • trunk 4-15 inches in diameter	• 1-5 ft but usually 2 ft high

*Glossy Buckthorn also looks very similar to Chokecherry

Appendix 1 – Additional Species which may be confused with Buckthorn (continued)

	Serviceberry (native) *Amelanchier* spp.	**Dogwood (mostly native)** *Cornus* spp.	**Nannyberry (native)** *Viburnum lentago*
Leaves	• alternate • oval to almost round • veins tend to be straight and parallel • about 10 per side • small teeth on edges • often toothless toward the stalk	• opposite or alternate • often crowded at end of branch • not toothed • can be long and narrow • prominent veins curving forward • Alternate-leafed Dogwood has pointed tip • When broken, held together by veins	• opposite • finely toothed • 5-10 cm long • tip slender and sharp • deep green above, paler below • tiny dark brown spots beneath petioles grooved with winglike margins that are an extension of the leaf
Flowers	• white, conspicuous • 5 petals appear before or with leaves	• small, white, • in compact terminal clusters • often appear before leaves • some are surrounded by floral bracts that resemble petals	• sweet-scented white flowers • in sessile (no stalk) clusters • up to 5-10 cm across
Fruit	• 5-10 hard seeds • red to dark blue or purple • ripen late July-early August	• one seed - sometimes 2 • berries are white, blue, red	• open cluster of blue-black nearly round to ellipsoid berries

Appendix 1 – Additional Species which may be confused with Buckthorn (continued)

	Serviceberry (native) *Amelanchier* spp.	**Dogwood (mostly native)** *Cornus* spp.	**Nannyberry (native)** *Viburnum lentago*
Bark	• smooth, grey • marked by slightly twisted network of darker vertical lines • when older, bark is rough and scaly	• thin, reddish or grey	• greyish brown with small irregular scales • mature bark rough and scaly
Bud	• narrow, ovoid • 8-12 mm long • pressed tightly against twig • red, purple or red and green	• terminal (at end of stem) • often a large, globular and swollen flower bud • slender leaf buds	• terminal • elongated and pointed • flower bud twice as long with bulbous base
Branchlets or twigs	• slender stems • unarmed • may be somewhat hairy when young	• round-leafed dogwood streaked with purple • other species ranging from light brown to bright red to dark purple	• slender, smooth • light brown • unpleasant odour when bruised
Form	• Shrub or small tree	• Shrub or tree-like	• Shrub or tree-like

Appendix 2

Are the leaves: scalloped or wavy-edged (lobed)? split into three sections (like clover)? many smaller leaflets on one stem (like sumac)? Do the leaves have: sharp and irregular or jagged teeth along edges? irregular wavy edges? curving edges all the way around (undulate)?	**YES →** It's NOT Common Buckthorn		
NO ↓			
Do the leaves have yellow dots (glands) on both sides? Does the leaf underside have round brown scales?	**YES →** It's NOT Common Buckthorn (might be Bayberry or Buffaloberry)		
NO ↓			
Are the leaves opposite or sub opposite (Are they across or almost exactly across from each other along the stem)?	**YES →** Are there small thorns at the end of the twigs? Are there greenish yellow flowers?	**YES →** It's probably **COMMON BUCKTHORN**	
NO ↓	**NO** ↓		
↓	Are the edges (margins) of the leaf toothed?	**YES →** Is the tip of the leaf long and pointy? Does it have sharply toothed edges with a fringe of short hairs? Does it have yellow or orange/red flowers?	**YES →** It's NOT Common Buckthorn (might be Bush Honeysuckle)
↓	**NO** ↓	**NO** ↓	

Alder Leaved Buckthorn

Common Buckthorn

Glossy Buckthorn

Notes:

To use this chart, you will need to have a sample or photos of the leaf and branch. It will also be helpful to have a sample or photo of the flowers. This means keeping an eye on the plant during the Spring to note when it is in flower and collecting your sample or taking a photo.

Appendix 2 (continued)

↓	↓	Is the tip of the leaf shorter (not long tapering)? Are some of the edges toothed?	**YES →** Are the flowers greenish-yellow and hard to see, in clusters where lower leaves attach to twigs?	**YES →** It's probably **COMMON BUCKTHORN**
↓	**NO** ↓	**NO** ←	**NO** ↓	
	↓		Are the flowers white, conspicuous and in clusters at the end of twigs?	**YES →** It's NOT Common Buckthorn (might be Nannyberry)
↓	Are the flowers in bunches (clusters) of many flowers?	**YES →** Are the flowers white? On shrubs?	**YES →** It's NOT Common Buckthorn (might be Dogwood)	
↓	**NO** ↓	**NO** ↓		
↓	↓	Are the flowers yellow or reddish? On vines or shrubs?	**YES →** It's NOT Common Buckthorn (might be a variety of Honeysuckle. Some Honeysuckle is an invasive species.)	
↓	Are the flowers found in pairs on the axils of the leaves (where the leaves join the stem)?	**YES →** It's NOT Common Buckthorn (might be Honeysuckle. Some Honeysuckle is an invasive species.)		
NO ↓				
Are the leaves alternate (staggered along the stem, not across from each other)?	**YES →** Is it a plant with long thorns or some spine-tipped shoots?	**YES →** Does it have long thorns and sharply toothed leaf edges?	**YES →** It's NOT Common Buckthorn (might be Long-spur Hawthorn)	
	NO ↓	**NO** ↓		
		Does it have spine-tipped shoots and do the leaf edges have blunt teeth with tiny dots (glands) on the tips of them?	**YES →** It's NOT Common Buckthorn (might be Canada Plum)	

Appendix 2 (continued)

NO
↓

Are the edges of the leaf smooth? (Not toothed)

YES →
Is the petiole (small stem attaching leaf to twig) less than 3mm, in winter are the buds hairy and dark brown, do pale yellow flowers bloom in early Spring before the leaves?

YES →
It's NOT Common Buckthorn (might be Leatherwood)

NO
↓

NO
↓

↓

Is the petiole (leaf stem) more than 3mm? Are the tiny scales covering the buds not hairy or are there no scales on the buds? Do yellowish flowers bloom later in the spring?

YES →
Are the leaf stems (petioles) thin and purplish, with bud scales in the winter, and flowers appearing in late May? Does it have purplish to crimson fruit?

YES →
It's NOT Common Buckthorn (might be a type of Holly)

↓

NO
↓
Are leaf stems thin and greenish, no scales on the winter buds, flowers from June onwards and purplish-black fruit?

YES →
It's probably **GLOSSY BUCKTHORN**, an invasive species similar to Common Buckthorn.

Are the plant's buds covered by a single hood-shaped scale? Are the flowers catkins (shaped like tiny tubes)?

YES →
It's NOT Common Buckthorn (probably a type of Willow)

NO
↓

Do the buds have 2 or more scales or no scales and are the flowers not in catkins?

YES →
Are the small branches ridged or angled? (Grooves in the branchlets)

YES →

YES →
Are flowers scattered along the branch attached where the leaves join the stem? Are the fruits red or orange?

YES →
It's NOT Common Buckthorn (probably Winterberry)

NO
↓

NO
↓

↓

Are the flowers in a long bunch at the end of branches and is the fruit a long-lasting capsule?

YES →
It's NOT Common Buckthorn (probably a type of Spirea)

Appendix 2 (continued)

Do the edges of the leaf have a few teeth and are the leaf stems (petioles) purplish in colour?

YES →
It's NOT Common Buckthorn (might be a type of Holly)

NO
↓

Do the leaf edges have many teeth?

YES →
Do the leaves have stems (stalks) that have one or more dots (glands) near the base of the leaf?

YES →
Are the leaves long and narrow with a lance shape? Are the leaf edges finely and irregularly toothed? Are the teeth rounded with dots (glands) on the tips? Are the flowers in clusters of 2 to 6 at ends of branches? Does the bark have large and noticeable horizontal lines (lenticels)?

YES →
It's NOT Common Buckthorn (probably Pin Cherry)

NO
↓

NO
↓

↓

Are the leaves oval or elliptic shaped? Are the leaf edges finely toothed with sharp pointed teeth? Are the flowers in long clusters of 10-25 at the ends of branches? Are there small narrow lines on the bark?

YES →
It's NOT Common Buckthorn (probably Chokecherry)

Is the leaf's midrib (main central vein) on the top of the leaf with a row of dark hair-like glands? Do the leaf's edges have gland (dot) tipped teeth?

YES →
It's NOT Common Buckthorn (probably Chokeberry)

NO
↓

Are the leaf edges finely or coarsely toothed and are the flowers white, conspicuous and bigger than 3mm across?

YES →
It's NOT Common Buckthorn (probably Serviceberry)

NO
↓

Are the edges of the leaf rounded with blunt teeth? Are the flowers small and greenish/ yellow and about 3mm across?

YES →
It's probably **ALDERLEAF BUCKTHORN.** This is a native species and is NOT invasive.