

Buckthorn Control Methods

Upper Thames River Conservation Authority



Common Buckthorn leaves and berries



Glossy Buckthorn leaves and berries

Alien Invaders

Common or European Buckthorn (*Rhamnus cathartica*) and Glossy Buckthorn (*R. frangula*) are non-native shrubs that are so invasive that they pose a serious threat to natural areas throughout eastern North America. These shrubs can form monocultures, taking over areas that once supported a large range of native plants.

Land managers across North America have studied these shrubs and experimented with ways to control them. This factsheet summarizes some of the literature in terms of what does and does not work at controlling buckthorn species.

Description & Natural History

Common and Glossy Buckthorn are tall shrubs or small trees reaching 2-7 m (6-25 ft) in height, and 25 cm (10 in) in diameter. They usually have a few to several stems or trunks and spreading, loosely-branched crowns. The bark is grey to brown with prominent lighter-coloured lines.

Common Buckthorn has dull green, oval leaves with tiny teeth along the edge, and are often pointed or folded at the tip. Glossy Buckthorn has thin, glossy, oval leaves with a shiny upper surface. The leaves are larger than the Common Buckthorn leaves and are not toothed.

Common and Glossy Buckthorn are native to Europe and western Asia where they were used for producing a fine quality charcoal for gunpowder and as a laxative in herbal medicine. Buckthorns were introduced to North America in the late 1800s as part of windbreak and wildlife plantings. They have spread naturally across this continent, invading a range of habitats. Buckthorns now extend from Nova Scotia to Saskatchewan, south to Missouri and east to Virginia.

Common Buckthorn is dioecious, meaning that each plant produces only male or female flowers and fruiting trees are always female. Both buckthorns reach seed bearing age quickly. Common Buckthorn berries stay on the plant longer

than Glossy Buckthorn berries, and are more visible. The fruit is eaten by birds and mice and has a severe laxative effect, helping distribute seeds far away.

A large percentage of the seeds will germinate quickly. This fact may mean that seeds do not remain viable for long, if left in the soil for many years (Miller 2005).

Buckthorns have long growing seasons, rapid growth rate, and re-sprout vigorously even if the entire shrub is cut down near the ground. They leaf out prior to most native deciduous plants and retain their green leaves to November.

Glossy Buckthorns rapidly form dense, even-aged thickets. In an open site, buckthorn establishment is followed by lateral crown spread, which continues until branches touch adjacent shrubs. The large leaves and continuous canopy create dense shade. North American insects do not readily feed on buckthorn, probably because of the modin (laxative).



Glossy Buckthorn (left) and Common Buckthorn (right) leaves.

Control Methods

Many control methods have been used on Common and Glossy Buckthorn including mechanical, biological and chemical techniques. Generally, mechanical methods are used in cases where the infestation is small or where the presence of rare species or habitats prevents the use of



A dense buckthorn thicket.

herbicides. Chemical methods are used when the infestation is great, resources are limited, and other methods have failed to control the problem. Converse (1984) provides a detailed bibliography of buckthorn control research.

The goal of buckthorn control is to reduce their numbers in order to provide a regeneration ‘window’ for native species to grow.

Biological Control Methods

The best hope for a long-term management strategy may be the release of a biological control agent (e.g. host-specific insect). The Minnesota Department of Natural Resources initiated research for the two buckthorn species. The research is being conducted by the Centre for Applied Bioscience International (CABI) in Switzerland. Several insect species show promise and the research continues (www.mda.state.mn.us/plants/thicket/volume1no1/buckthorn.htm).

Mechanical Control Methods

A variety of mechanical control methods can be used to kill or remove buckthorn and other non-native plants.

Cutting/Mowing

Cutting buckthorn shrubs has limited effectiveness as the plant resprouts. Even when cut in late September, Glossy Buckthorn can resprout before winter (Andreas 1983). Recutting within several hours does not kill Common Buckthorn (Coenen 1983).

Lovely (1983) found that cutting Glossy Buckthorn in early June and again in late August for three successive years resulted in fewer and shorter stems than a control site. Thus, with enough labour, re-cutting may be effective at eventually weakening the root and killing the plant. Buckthorn resprouts from buds at the base of stems so it is critical to cut to ground level. Covering cut stems with aluminum cans or black plastic prevents resprouting.

Girdling

Girdling involves cutting the phloem (inner bark) but leaving the xylem (sapwood) intact. The roots nourish the top, but the top sends no nourishment back to the roots, which die out. Girdling is most effective in late spring or early summer (DNR WI). The shrub takes a year or two to die (Packard 1997).

A saw can be used to cut a 2-3 cm wide band around the base of each shrub, completely encircling each stem. Alternatively, a five second flame torch application around the stem has been shown to kill the cambium (living part of stem) of small stems less than 4.5 cm in diameter (Reed 1983).



Buckthorn resprouts from the base of stems.

Pulling and Excavation

Seedlings or small plants may be hand pulled or removed with a grubbing hoe and will not resprout (DNR MN). Pulling is best done when the soil is moist.

Larger plants (1-6 cm in diameter) may be pulled out with heavy equipment or a Weed Wrench™. The Weed Wrench uses leverage to pull the shrub out of the ground and can take considerable effort. Disturbed soil will result from these techniques and should be tamped down to minimize exposing new buckthorn seeds (DNR WI). This technique may be most useful to control invasion at low densities, or along trails and woodland edges.



Hand-pulling buckthorn seedlings.

Burning

Land managers have had mixed results with the use of prescribed fire to control buckthorn species. Fire does not spread readily through buckthorn thickets and the buckthorn resprouts following burns, especially if moisture is available. Fire is only appropriate in vegetation communities adapted to fire, such as oak savannas and tallgrass prairies.

Underplanting

Underplanting disturbed woods with native woody species is potentially effective to prevent primary invasion or re-invasion of buckthorns. However, Ware (1983) found that planted Sugar Maple seedlings did not grow well under the buckthorn canopy.

Restoring Water Levels

In wetlands, restoring water levels to historic conditions can control buckthorns.

Chemical Control Methods

Chemicals should be used only when their benefits exceed their risks. Chemical control methods are best done during the fall or winter when most native plants are dormant yet buckthorns are still actively growing. This lessens the risk of affecting non-target plants. There are several methods available that minimize the amount of chemical used and the risk of killing non-target plants. A pesticide licence is required for the application of many types of herbicides.

With large infestations, the largest seed-producing plants should be removed first. Isolated plants should also be removed or killed before they produce seed. Table 1 summarizes the technical aspects of herbicide application.

In wetlands, herbicides can be applied only during dry periods when there is no standing water.

Stump Application

Applying chemical (e.g. Garlon 4, glyphosate) to a recently cut stump is usually quite effective at killing buckthorns and minimizes the amount of chemical used. Shrubs can be cut using hand tools, chain saws or brush cutters and should be cut close to the ground.

Chemical must be applied to freshly cut stumps to be effective. The chemical can be applied by paint brush or squirt bottle. Some chemicals must be applied to the remaining bark as well. Stump treatment can be carried out throughout the growing and dormant season. Dye should be added to mark the treated stumps.

Basal Bark Application

Basal bark treatment is a method that applies chemical on the bark of a standing tree/shrub. The chemical and its binding agent are absorbed through the bark into the plant, where it kills the living cambium.

For stems less than 5 cm diameter, chemical is applied to one side; for larger stems, the chemical is applied all the way around in a 30 cm (1 ft) high strip. Basal bark application can be carried out in all seasons. A paint brush or ultra-low volume sprayer can be used to apply the chemical to the bark.

Buckthorn treated in this fashion can be left standing or cut at a later date. Higher concentrations of chemical may be needed for large (tree sized) buckthorns.



Painting a freshly-cut stump with herbicide.

Frilling

Frilling involves killing a standing tree by applying herbicide to a gash cut in the bark. The tree is gashed with an axe or chain saw and the herbicide is applied directly in the gash, killing the tree immediately. While this method requires a little more time than basal bark treatment, it is generally more effective as the chemical is applied directly to the growing parts of the standing trunk. This technique may be the most effective method to kill large buckthorn trees.

Foliar

Foliar treatment refers to the application of chemical to the leaves of the target plant. Herbicide application to buckthorn seedlings has been shown to be effective. This method is only appropriate for degraded sites as the chemical can drift to non-target plants. The best time to spray the foliage is before native plants leaf out.

Ongoing Treatment

Once begun, control methods may be needed for many years. Buckthorn seeds in the soil can remain viable for three to five years. It is important to control seedlings that emerge after initial control efforts. With no follow up control, buckthorn will come back. Sites may require replanting of desirable tree, shrub and herbaceous species after buckthorns have been removed.

Table 1. Sample of Chemical Trials that Successfully Controlled Buckthorn

Method	Chemical	Timing
Cut Stump Application	20 - 25% glyphosate (diluted in water)	August or September
	10% glyphosate	August
	12.5% tricolopyr (form for oil dilution)	Summer or winter
	Garlon 4 (1:3 of Garlon 4:oil/diluent)	
	4% ester with diesel	
	AMS, aqueous concentrated	Year round
	25% Picloram + 75% 2,4-D	Summer
Frilling	25% Picloram + 75% 2,4-D	Growing season
	Garlon 4	
Basal Bark Application	2-4% ester 2,4-D in diesel fuel	Early summer
	12.5% 2,4-D	
	2.5-3% glyphosate	May to June
	10-20% Garlon in diesel fuel	Fall
Foliar	4% fosamine	Actively growing
	Glyphosate (e.g. Roundup)	Actively growing

Note: Some trade name chemicals are not available in Canada.

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