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Invasive plants can thrive and aggressively spread beyond their natural range, disrupting ecosystems. The *Management of Invasive Plants in Wisconsin* series explains how to identify invasive plants and provides common management options. Management methods recommend specific timings for treatment, as well as expected effectiveness. For more information, go to: fyi.uwex.edu/weedsci/category/invasive-plants-of-wisconsin.

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Common buckthorn (*Rhamnus cathartica*)

Glossy buckthorn (*Frangula alnus*)

Buckthorn is an understory shrub or small tree 10–25' tall. Both species grow in shrub or tree form and possess prominent leaf scars in the winter. A cut branch exposes yellow sapwood and orange heartwood. **Common buckthorn** has brown to silver bark that is shiny when young and dark grey to black and scaly when mature. Buds are found in pairs at the end of branches, are covered in dark scales, and resemble a hoof. Twigs often end in stout thorns. **Glossy buckthorn** has gray to brown lenticels and lacks thorns. Buds lack scales, are hairy, and are found at the end of branches.

Legal classification in Wisconsin:

Restricted, including all cultivars except 'Asplenifolia' and 'Fineline' (Ron Williams).

Leaves: Ovate or elliptical, with prominent veins curving toward tip. Stay green late into fall. **Common buckthorn** has mostly opposite leaves, 1–2.5" long, with tiny teeth. **Glossy buckthorn** has mostly alternate leaves, 2–3" long, with entire margins, a glossy upper surface, and dull underside that can be hairy.

Flowers: Small and clustered where the leaf attaches to the stem (leaf axil). **Common buckthorn** has fragrant, greenish-yellow, four-petaled flowers that bloom from late spring. **Glossy buckthorn** has small, pale-yellow, five-petaled flowers that bloom from spring to first frost.

Fruits and seeds: Both species have abundant clusters of round, 0.25" diameter fruit. **Common buckthorn** is dioecious; thus only female trees have black fruit. **Glossy buckthorn** is monoecious and produces red fruit that turn to black when ripe.

Roots: Extensive fibrous root system extending from a woody crown.

Similar species: Alder buckthorn (*R. alnifolia*; native) is < 3' tall with thornless twigs. Lance-leaved buckthorn (*R. lanceolata*; native) is less than 6' tall, found in wet areas and on dry limestone slopes, and has alternate leaves, 2–6" long, gradually tapering to a point at the tip. Carolina buckthorn (*R. caroliniana*; native), found in the southern Midwest, is 10–30' tall with toothed, mostly alternate leaves, 2–3" long.

Ecological threat:

- **Common buckthorn** invades the understory of southern oak, oak-beech, maple, and riparian woods. It also invades prairies, savannas, hedgerows, pastures, old fields, roadsides, and rocky sites.
- **Glossy buckthorn** invades wetter sites with more organic soils than *R. cathartica*. Invades alder thickets, calcareous fens, wetlands, heath-oak woods, pine woods, spruce woods, pastures, fencerows, roadsides, slopes of ravines, wet prairies, marshes, sedge meadows, sphagnum bogs, and tamarack swamps.

- Both buckthorns are characterized by prolific reproduction by seed, long-distance dispersal ability, wide habitat tolerance, and high levels of phenotypic plasticity (i.e., adjusting physical appearance to maximize productivity across environmental conditions).
- Both leaf out very early and retain leaves late into the growing season, providing a longer growing season than native plants.

Non-chemical control

Removal

Effectiveness in season: 90–100%
Season after treatment: 70–90%

Plants ≤ 0.4 " diameter are easily pulled from moist soil. Larger diameters (0.5–1.5") can be dug or pulled. To prevent resprouting, remove above-ground growth and root crown. Dig before plant produces seeds.

Mowing

Effectiveness in season: 70–90%
Season after treatment: < 50%

Mowing removes above-ground growth of established plants and prevents additional seed production, but rarely kills plants. Established plants persist after mowing for many years. If possible, mow in the winter to avoid damaging desirable vegetation and compacting soil. If mowed material is mulched on the soil surface, it can reduce seedling recruitment. Pairing mowing with another technique, such as foliar spray of herbicide, increases effectiveness. Cutting before seed is produced in summer and again after the plant has resprouted in fall will reduce vigor of resprouts the following year, but will not kill plants. If seeds are present when removed, avoid movement off of the site unless material can be transported without spreading fruit to other locations.

Prescribed burning

Effectiveness in season: 50–70%
Season after treatment: < 50%

Spring burns can kill germinating seedlings and suppress above-ground growth of established plants, depending on fire intensity. After the fire, established plants will resprout; this management method is not recommended unless integrated with other techniques. Burning stimulates seedling germination, but 5–6 years of repeated burning will reduce buckthorn seedbank. A five-second application of flame with a propane torch around the stem will kill plants ≤ 2 " diameter.

Manipulation of the environment

Effectiveness in season: < 50%
Season after treatment: < 50%

Underplanting with a vigorous, shade-tolerant woody species, such as sugar maple, competes with buckthorn plants. This reduces the light level in the forest, reduces productivity of established buckthorn, and prevents seedling germination.

Chemical control

Pre-emergence

Apply herbicide directly to soil. These products will only damage plants that germinate after the herbicide has been applied. They will not damage established plants. Use lower rates on areas where less dense populations are expected and higher rates on areas where denser populations are expected.

napropamide*

Effectiveness in season: 70–90%
Season after treatment: < 50%

Common name: Devrinol 50-DF
Rate: 1.8–7.1 lb/A (0.9–3.6 lb a.i./A)

Timing: Apply prior to germination of seedlings. While spring applications will maximize control, fall or winter applications may also suppress seedlings, depending upon environmental conditions.

Remarks: Reduced efficacy can be expected if < 0.6 " of rainfall occurs within 2–3 days of application.

Caution: Do not apply directly to water or to areas where surface water is present. Do not apply more than once a year. Avoid using napropamide in areas where soils are composed of more than 10% organic matter. Napropamide remains in the soil for up to a year, depending on application. Maintenance of a vegetative buffer strip is required between the areas napropamide is applied and surface water features or sensitive terrestrial habitats. Overspray or drift to desirable plants should be avoided, since even minute quantities of the spray may cause severe injury to plants.

pendimethalin*

Effectiveness in season: 70–90%
Season after treatment: < 50%

Common name: Pendulum Aquacap
Rate: 90 fl oz/A (2.7 lb a.i./A)

Timing: Apply prior to germination of seedlings. While spring applications will maximize control, fall or winter applications may also suppress seedlings, depending upon environmental conditions.

Remarks: Reduced efficacy can be expected if < 0.5 " of rainfall occurs within 30 days of application.

Caution: Do not apply directly to water or to areas where surface water is present. Do not exceed applications of 67 fl oz/A on home lawns, parks, schools, and playgrounds. Overspray or drift to desirable plants should be avoided since even minute quantities of the spray may cause severe injury to plants.

*Active ingredient (a.i.)

Foliar

Apply directly to individual plants or broadcast across an infested area. Broadcast foliar applications are typically the most cost-effective treatment in dense infestations. Use lower rates on smaller plants and less dense populations and higher rates on larger plants and denser populations.

glyphosate*

Effectiveness in season: 50–70%
Season after treatment: < 50%

Common name: Roundup

Rate:

broadcast: 1.7–3.7 lb a.e./A

spot: For a 3 lb a.e./gal product:
 1.0–2.0% (0.03–0.06 lb a.e./gal)

Timing: Apply when target species is actively growing and fully leafed out.

Remarks: A wick application of a 33–75% solution (1.49–3.38 lb a.e./gal) of the product is effective on shorter plants that are taller than desirable species.

Caution: Use product labeled for aquatic use if potential exists for solution to contact surface waters. Applications can result in bare ground since glyphosate is not selective. Overspray or drift to desirable plants should be avoided, since even minute quantities of the spray may cause severe injury to plants.

triclopyr*

Effectiveness in season: 90–100%
Season after treatment: 90–100%

Common name: Garlon

Rate:

broadcast: 128–256 fl oz/A
 (4.0–8.0 lb a.e./A)

spot: 1.0–2.0% (0.04–0.08 lb a.e./gal)

Timing: Apply when target species is actively growing and fully leafed out.

Caution: Use product labeled for aquatic use if potential exists for solution to contact surface waters. Use of this chemical in areas where soils are permeable, particularly where the water table is shallow, may result in groundwater contamination. Overspray or drift to desirable plants should be avoided since even minute quantities of the spray may cause severe injury to plants.



*Active ingredient (a.i.)

Cut stump

Cut a stem of a plant near the base and apply herbicide to the cut surface that remains rooted in the ground. Apply as soon as possible after cutting, but no later than one hour after cutting. Do not use this method if there is heavy sap flow or snow covers the cut surface. Use lower rates on smaller plants and higher rates on larger plants.

glyphosate*
Effectiveness in season: 90–100%
Season after treatment: 50–70%

Common name: Roundup
Rate: For a 3 lb a.e./gal product: 20–50% (0.6–1.5 lb a.e./gal)
Timing: Apply any time of year.
Caution: Use product labeled for aquatic use if potential exists for solution to contact surface waters. Applications can result in bare ground since glyphosate is not selective. Overspray or drift to desirable plants should be avoided, since even minute quantities of the spray may cause severe injury to plants.

imazapyr*
Effectiveness in season: 90–100%
Season after treatment: 70–90%

Common name: Stalker
Rate: 6.0–9.0% in oil (0.1–0.2 lb a.e./gal)
Timing: Apply any time of year.
Remarks: Products containing this active ingredient can have different instructions for mixing. Labels will recommend mixing the product in a water- or oil-based carrier (e.g., basal bark oil). Consult the label to determine the appropriate carrier.
Caution: Use product labeled for aquatic use if potential exists for solution to contact surface waters. Applications can result in bare ground since imazapyr is not selective and can remain in the soil for several months to more than a year, depending on application rate. Overspray or drift to desirable plants should be avoided, since even minute quantities of the spray may cause severe injury to plants.

picloram*
Effectiveness in season: 90–100%
Season after treatment: 50–70%

Common name: Tordon K
 Some products containing picloram are restricted-use in Wisconsin.
Rate: 50–100% (1.0–2.0 lb a.e./gal)
Timing: Apply any time of year.
Caution: Do not apply directly to water or to areas where surface water is present. Use of this chemical in areas where soils are permeable, particularly where the water table is shallow, may result in groundwater contamination. Remains in the soil for more than one year, depending on application rate, and has the potential to contaminate surface runoff water during this timeframe. Maintenance of a vegetative buffer strip is recommended between the areas picloram is applied and surface water features. Overspray or drift to desirable plants should be avoided since even minute quantities of the spray may cause severe injury to plants. Do not compost treated plants since herbicide can persist through composting process.

triclopyr*
Effectiveness in season: 90–100%
Season after treatment: 90–100%

Common name: Garlon
Rate: 20–30% in oil (0.8–1.2 lb a.e./ gal)
Timing: Apply any time of year.
Remarks: Products containing this active ingredient can have different instructions for mixing. Labels will recommend mixing the product in a water- or oil-based carrier (e.g., basal bark oil). Consult the label to determine the appropriate carrier.
Caution: Use product labeled for aquatic use if potential exists for solution to contact surface waters. Use of this chemical in areas where soils are permeable, particularly where the water table is shallow, may result in groundwater contamination. Overspray or drift to desirable plants should be avoided since even minute quantities of the spray may cause severe injury to plants.



Hack-and-squirt

Using a hand axe, make cuts every 3–4" around the trunk 6–18" above the ground. Apply the herbicide solution into the cut area. Do not use this method if there is heavy sap flow. Use lower rates on smaller plants and higher rates on larger plants.

glyphosate*

Effectiveness in season: 50–70%
Season after treatment: 50–70%

Common name: Roundup

Rate: For a 3 lb a.e./gal product: 50–100% (1.5–3.0 lb a.e./gal)

Timing: Apply any time of year.

Caution: Use product labeled for aquatic use if potential exists for solution to contact surface waters. Applications can result in bare ground since glyphosate is not selective. Overspray or drift to desirable plants should be avoided, since even minute quantities of the spray may cause severe injury to plants.

imazapyr*

Effectiveness in season: 50–70%
Season after treatment: 70–90%

Common name: Stalker

Rate: 6.0–9.0% in oil (0.1–0.2 lb a.e./gal)

Timing: Apply any time of year.

Remarks: Products containing this active ingredient can have different instructions for mixing. Labels will recommend mixing the product in a water- or oil-based carrier (e.g., basal bark oil). Consult the label to determine the appropriate carrier.

Caution: Use product labeled for aquatic use if potential exists for solution to contact surface waters. Applications can result in bare ground since imazapyr is not selective and can remain in the soil for several months to more than a year, depending on application rate. Overspray or drift to desirable plants should be avoided, since even minute quantities of the spray may cause severe injury to plants.

picloram*

Effectiveness in season: 50–70%
Season after treatment: 70–90%

Common name: Tordon K

Some products containing picloram are restricted-use in Wisconsin.

Rate: 50% (1.0 lb a.e./gal)

Timing: Apply any time of year, except during drought conditions.

Caution: Do not apply directly to water or to areas where surface water is present. Use of this chemical in areas where soils are permeable, particularly where the water table is shallow, may result in groundwater contamination. Remains in the soil for more than one year, depending on application rate, and has the potential to contaminate surface runoff water during this timeframe. Maintenance of a vegetative buffer strip is recommended between the areas picloram is applied and surface water features. Overspray or drift to desirable plants should be avoided since even minute quantities of the spray may cause severe injury to plants. Do not compost treated plants since herbicide can persist through composting process.

picloram + 2,4-D*

Effectiveness in season: 50–70%
Season after treatment: 70–90%

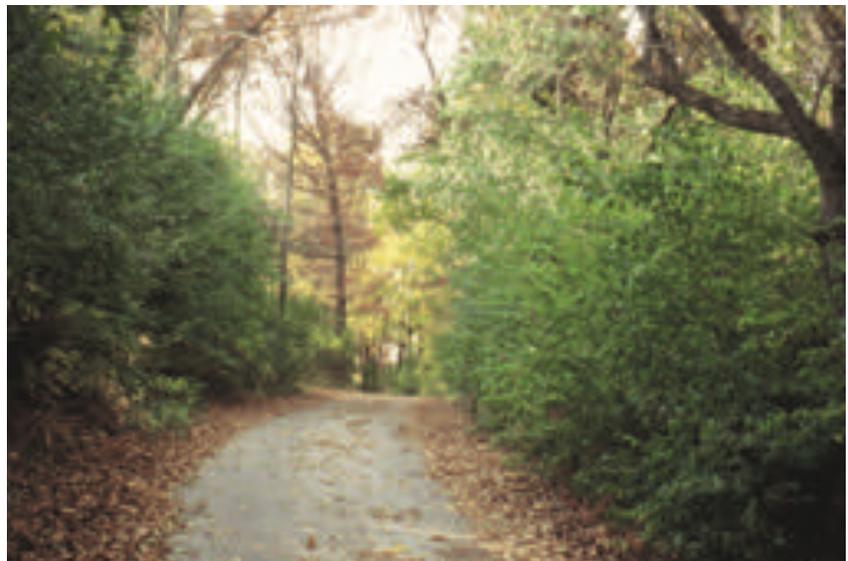
Common name: Pathway

Some products containing picloram are restricted-use in Wisconsin.

Rate: 100% (picloram: 3% + 2,4-D: 11.2%)

Timing: Apply any time of year.

Caution: Do not apply directly to water or to areas where surface water is present. Use of this chemical in areas where soils are permeable, particularly where the water table is shallow, may result in groundwater contamination. Remains in the soil for more than one year, depending on application rate, and has the potential to contaminate surface runoff water during this timeframe. Maintenance of a vegetative buffer strip is recommended between the areas this product is applied and surface water features. Overspray or drift to desirable plants should be avoided since even minute quantities of the spray may cause severe injury to plants. Do not compost treated plants since herbicide can persist through composting process.



Basal bark

Apply herbicide in a ring around the entire stem. Applications should be made at least 6" wide (6–18") to the base of a woody stem. Ideal for stems ≤ 6" in diameter. Use lower rates on smaller plants and higher rates on larger plants.

imazapyr*

Effectiveness in season: 50–70%
Season after treatment: 90–100%

Common name: Stalker

Rate: 6–12% in oil (0.1–0.25 lb a.e./gal)

Timing: Apply any time of year.

Remarks: Products containing this active ingredient can have different instructions for mixing. Labels will recommend mixing the product in a water- or oil-based carrier (e.g., basal bark oil). Consult the label to determine the appropriate carrier.

Caution: Use product labeled for aquatic use if potential exists for solution to contact surface waters. Applications can result in bare ground since imazapyr is not selective and can remain in the soil for several months to more than a year, depending on application rate. Overspray or drift to desirable plants should be avoided, since even minute quantities of the spray may cause severe injury to plants.

triclopyr*

Effectiveness in season: 50–70%
Season after treatment: 90–100%

Common name: Garlon

Rate: 1.0–5.0% in oil (0.04–0.2 lb a.e./gal)

Timing: Apply any time of year.

Remarks: Products containing this active ingredient can have different instructions for mixing. Labels will recommend mixing the product in a water- or oil-based carrier (e.g., basal bark oil). Consult the label to determine the appropriate carrier.

Caution: Use product labeled for aquatic use if potential exists for solution to contact surface waters. Use of this chemical in areas where soils are permeable, particularly where the water table is shallow, may result in groundwater contamination. Overspray or drift to desirable plants should be avoided since even minute quantities of the spray may cause severe injury to plants.



Herbicide information is based on label rates and reports by researchers and land managers. Products known to provide effective control or in common use are included. Those that do not provide sufficient control or lack information for effectiveness on target species have been omitted.

References to pesticide products in this publication are for your convenience and not an endorsement of one product instead of a similar product. You are responsible for using pesticides in accordance with the label directions. *Read the label before any application.*

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