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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.

Spotted knapweed

(*Centaurea stoebe*)

Spotted knapweed is an herbaceous, short-lived perennial. It grows 2–4' tall and persists as a rosette for 1–4 years before bolting. Flowering plants usually have 1–6 stems, but may have up to 20.

CAUTION: Can cause skin irritation in some people. Wear gloves, long sleeves, and pants when handling.

Legal classification in Wisconsin:
Restricted

Leaves: Gray-green, covered in rough hairs, and deeply divided. Rosette leaves grow up to 6" long. Stem leaves alternate with lower stem leaves resembling rosette leaves and becoming small (1–3" long) and linear on the upper stem.

Flowers: Midsummer to fall. Thistle-like, pink to purple flower heads, rarely white. Flower heads are 0.3–0.6" in diameter and have stiff bracts tipped with black, fringed hairs.

Fruits and seeds: Seeds are 0.25", brownish in color, and have a small tuft of bristles at one end.

Roots: Perennial taproot. It can also produce a shallow mat of fibrous roots extending from the plant for several feet.

Similar species: There are a number of other knapweeds (all non-native in Wisconsin) that look similar, but spotted knapweed is easily distinguished by the black tips of the bracts surrounding the flower.

Ecological threat:

- Invades dunes, sandy ridges, prairies, barrens, and roadsides.
- Its roots have been reported to exude allelopathic chemicals that inhibit the growth of other plants.
- It is not palatable as a forage plant and is typically avoided by both livestock and native grazers.
- Infestations cause increased soil erosion on sloped terrain, runoff and stream or lake sedimentation, and decreased water-holding capacity in soil.

Non-chemical control Removal

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

Pulling plants is an effective individual plant treatment if soil conditions allow for the removal of the top 3" of the taproot. For hand cutting, cut through the entire taproot with a sharp shovel or spade 3" below the surface and remove plant and attached root. If flowers are present, bag material and dispose of it in a landfill to avoid potential for seed spread. Pulling or cutting will rarely control large populations, but is recommended for small establishing infestations in sensitive areas or when integrated with other management activities.

Mowing

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

Mow once annually at the flowering stage for three years to suppress populations. Mow as low as possible. Plants may resprout, but it is unlikely that they will be able to produce viable seed. Monitor populations and repeat mowing if concerned about seed production. While mowing has been reported as an effective means of suppression, there is no data on how many years of mowing are required to control a population.

Prescribed burning

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

Spring burns can kill germinating seedlings and can suppress above-ground growth of established plants, depending on fire intensity. Summer burning, when knapweed has begun to flower, is the most effective timing for suppressing knapweed. However, summer burning can adversely affect desirable species. At least three years of annual burning are needed for the suppression of established knapweed populations. Fire may benefit other species well-adapted to this management (e.g., prairie grasses), resulting in improved competition with knapweed. A handheld propane torch can be effective for treating seedlings.

Grazing

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

Grazing with sheep or goats can suppress populations if done twice a year. For best results, initiate grazing when rosettes are present and repeat when plants have regrown and are in the bolting to bud stage. Spring applications of herbicides can reduce the population of unpalatable adult plants and increase the effectiveness of grazing.

Biological control

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

There are 13 common agents for biological control of knapweed. Commonly recommended agents are *Agapeta zoegana* (root mining moth), *Cyphocleonus achates* (root mining weevil), *Urophora affinis*, *U. quadrifasciata* (seed head flies), *Larinus minutus*, and *L. obtusus* (seed head weevils). A successful biological control program should include at least one seed head agent and one root mining agent. To release biological control agents in Wisconsin, contact the Wisconsin Department of Agriculture, Transportation, and Consumer Protection for the required permit

Chemical control

Foliar

Apply directly to individual plants or broadcast across an infested area. Broadcasted 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.

2,4-D*

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

Common name: Many

Rate:

broadcast: 1.0–2.0 lb a.e./A
spot: For a 3.8 lb a.e./gal product: 1–2% (0.04–0.08 lb a.e./gal)

Timing: Apply to rosettes in fall or spring or to plants in the bolting stage.

Remarks: This herbicide offers moderate control when used as the only control method, but can be useful when paired with other control methods. This herbicide will not provide any residual control of germinating spotted knapweed.

Caution: Use aquatically labeled product if potential exists for solution to contact surface water. 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.

aminocyclopyrachlor + chlorsulfuron*

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

Common name: Perspective

Rate:

broadcast: 4.75–8.0 oz/A
 (aminocyclopyrachlor: 1.9–3.15 oz a.i./A + chlorsulfuron: 0.75–1.25 oz a.i./A)
spot: 0.2–0.3 oz/gal
 (aminocyclopyrachlor: 0.08–0.12 oz a.i./A + chlorsulfuron: 0.03–0.05 oz a.i./A)

Timing: Apply to rosettes in fall or spring or to plants in the bolting stage.

Caution: Do not apply directly to water or to areas where surface water is present. Avoid using Perspective in areas where soils are permeable, particularly where the water table is shallow, since groundwater contamination may result. Perspective remains in the soil for months, depending on application rate, and has the potential to contaminate surface runoff water, especially on poorly draining soils or areas with shallow ground water. Maintenance of a vegetative buffer strip is recommended between the areas Perspective 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.



*Active ingredient (a.i.)

aminocyclopyrachlor + metsulfuron*

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

Common name: Streamline

Rate:

broadcast: 4.75–7.6 oz/A
 (aminocyclopyrachlor: 1.9–3.0 oz a.i./A +
 metsulfuron: 0.6–1.0 oz a.i./A)
spot: 0.2–0.4 oz/gal
 (aminocyclopyrachlor: 0.08–0.16 oz a.i./
 gal + metsulfuron: 0.03–0.05 oz a.i./gal)

Timing: Apply to rosettes in fall or spring
 or to plants in the bolting stage.

Caution: Do not apply directly to water
 or to areas where surface water is
 present. Avoid using Streamline in areas
 where soils are permeable, particularly
 where the water table is shallow, since
 ground water contamination may
 result. Streamline remains in the soil for
 months, depending on application rate,
 and has the potential to contaminate
 surface runoff water, especially on
 poorly draining soils or areas with
 shallow ground water. Maintenance of a
 vegetative buffer strip is recommended
 between the areas Streamline 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.

aminopyralid*

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

Common name: Milestone

Rate:

broadcast: 5–7 fl oz/A
 (0.08–0.1 lb a.e./A)
spot: Equivalent to broadcast rates.

Timing: Applications to rosettes in fall or
 spring or to plants in the bolting stage
 are the most effective, but applications
 can control plants that are in the flower
 bud stages.

Remarks: 14 fl oz/A can be used as long
 as less than half of the area is treated.
 Depending on the volume of solution
 applied per acre, typical mixtures for
 spot treatments are 2–8 mL Milestone
 per gallon of water. This herbicide can
 provide residual control of germinated
 spotted knapweed seedlings. Length
 of residual control is dependent on
 site-specific factors, such as amount
 and timing of precipitation, regrowth of
 desired plants, and the rate applied.

Caution: Do not apply directly to water
 or to areas where surface water is
 present. Remains in soil for up to one
 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. Do not compost treated
 plants since herbicide can persist
 through composting process.

clopyralid*

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

Common name: Transline

Rate:

broadcast: 10–16 fl oz/A
 (0.25–0.4 lb a.e./A)
spot: 0.2–0.4% (0.005–0.01 lb a.e./gal)

Timing: Applications to rosettes in fall or
 spring or to plants in the bolting stage
 are the most effective, but applications
 can control plants that are in the flower
 bud stages.

Remarks: This herbicide can provide
 residual control of germinated spotted
 knapweed seedlings. Length of residual
 control is dependent on site-specific
 factors, such as amount and timing
 of precipitation, regrowth of desired
 plants, and the rate applied.

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 soil for up to one 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. Do not
 compost treated plants since herbicide
 can persist through composting process.

dicamba*

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

Common name: Banvel

Rate:

broadcast: 16–32 fl oz/A
 (0.5–1.0 lb a.e./A)
spot: Equivalent to broadcast rates.

Timing: Apply to rosettes in fall or spring
 or to plants in the bolting stage.

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. Overspray
 or drift to desirable plants should be
 avoided since even minute quantities
 of the spray may cause severe injury
 to plants. Rates > 16oz/A (0.5 lb a.e./A)
 may cause stunting and discoloration of
 sensitive grasses, such as smooth brome.

dicamba + 2,4-D*

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

Common name: Weedmaster

Rate:

broadcast: 64–96 fl oz/A (dicamba: 0.5–
 0.8 lb a.e./A + 2,4-D: 0.7–1.1 lb a.e./A)
spot: 0.8% (dicamba: 0.009 lb a.e./gal +
 2,4-D: 0.011 lb a.e./gal)

Timing: Apply to rosettes in fall or spring
 or to plants in the bolting stage.

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. Overspray
 or drift to desirable plants should be
 avoided since even minute quantities
 of the spray may cause severe injury
 to plants. Rates > 16oz/A (0.5 lb a.e./A)
 may cause stunting and discoloration of
 sensitive grasses, such as smooth brome.

*Active ingredient (a.i.)

dicamba + diflufenzopyr*

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

Common name: Overdrive

Rate:

broadcast: 6–8 oz/A
 (dicamba: 0.02–0.03 lb a.e./A +
 diflufenzopyr 0.01–0.012 oz a.e./A)
spot: Equivalent to broadcast rates.

Timing: Apply to rosettes in fall or spring or to plants in the bolting stage.

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. Overspray or drift to desirable plants should be avoided since even minute quantities of the spray may cause severe injury to plants. Rates > 16oz/A (0.5 lb a.e./A) may cause stunting and discoloration of sensitive grasses, such as smooth brome.

glyphosate*

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

Common name: Roundup

Rate:

broadcast: 0.5–1.5 lb a.e./A
spot: For a 3 lb a.e./gal product: 1–2%
 (0.03–0.06 lb a.e./gal)

Timing: Apply to rosettes in fall or spring or to plants in the bolting stage.

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: 70–90%
Season after treatment: 50–70%

Common name: Arsenal

Rate:

broadcast: 64–96 fl oz/A
 (1.0–1.5 lb a.e./A)
spot: 0.5–1% (0.01–0.02 lb a.e./gal)

Timing: Apply to rosettes in fall or spring or to plants in the bolting stage.

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: 70–90%

Common name: Tordon K

Some products containing picloram are restricted-use in Wisconsin.

Rate: broadcast: 10–32 fl oz/A
 (0.15–0.5 lb a.e./A)

spot: Equivalent to broadcast rates.

Timing: Applications to rosettes in fall or spring or to plants in the bolting stage are the most effective, but applications can control plants that are in the flower bud stages.

Remarks: This herbicide can provide residual control of germinated spotted knapweed seedlings. Length of residual control is dependent on site-specific factors such as amount and timing of precipitation, regrowth of desired plants, and the rate applied.

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.

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