

INVASIVE PLANTS  
IN WISCONSIN

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**I**nvasive 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](http://fyi.uwex.edu/weedsci/category/invasive-plants-of-wisconsin).

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# Biennial thistles

## (bull, European marsh, musk, and plumeless)

**B**iennial thistles grow vegetatively the first year after germination, forming a basal rosette 4–18" wide. Plants produce one to several flowering stalks (bolt) in subsequent years (typically second). European marsh, musk, and plumeless normally bolt in late May, with bull bolting 2–3 weeks later. Plumeless and bull range from 1–5' tall, European marsh usually reaches 6', and musk can reach 7'.

### Legal classification in Wisconsin:

- Bull thistle (*Cirsium vulgare*): Not regulated
- European marsh thistle (*Cirsium palustre*): Prohibited/restricted
- Musk thistle (*Carduus nutans*): Restricted
- Plumeless thistle (*Carduus acanthoides*): Restricted

**Leaves:** Leaves are long near base of plant and diminish in length as they ascend the plant.

- **Bull** thistle: Very hairy (coarse on top, soft on the underside), deeply lobed with narrow teeth, and each lobe is tipped with a sharp spine. Leaves extend onto stem forming "wings."
- **European marsh** thistle: 6–8" long, deeply lobed basal leaves with hair on underside and spines along edges. Leaves on stem are alternate and extend onto stem forming "wings." Often, leaves have white midrib and edges are red to purple.
- **Musk** thistle: Silvery midrib and edges, coarsely lobed, with a smooth, waxy surface and a prominent spine at the tip of each lobe. Clasp stem.

- **Plumeless** thistle: Wavy leaf with hair on underside. Many leaf-like spines on stem.

**Flowers:** Purple flowers bloom spring through early fall. Bull thistle flowers 2–3 weeks after other thistles.

- Bull thistle: 1–2" wide, gumdrop shape, each bract is tipped with long, stiff spine.
- European marsh thistle: Occur at the top of the flowering stalk. 0.4–0.6" wide, spiny flower head.
- Musk thistle: 1–3" wide, nodding, disk-shaped flower heads. Very large bracts.
- Plumeless thistle: 0.3–1" wide, erect, small bracts with sharp spines.

**Fruits and seeds:** Small seeds (about 0.12") inside of a thin-walled fruit (achene). Loosely attached to feathery tuft of hair.

**Roots:** Taproot. European marsh also has a network of fibrous roots near soil surface.

**Left to right: Bull, musk, and plumeless**



**Similar species:** The biennial thistles will most often be confused with Canada thistle, which is distinguished from the biennial thistles by creeping lateral roots that form dense clones and by its small dioecious flower heads. There are also a number of native thistles in Wisconsin. European marsh occupies the same type of habitat as swamp thistle (*Cirsium muticum*; native). The native thistle does not have spines on the stem and has less spiny-looking flowers. Be sure of identification before beginning any management activities.

**Ecological threat:**

- Invades open natural areas such as prairies, savannas, dunes, stream banks, sedge meadows, and forest openings. It also invades croplands, pastures, forest openings, lawns and gardens, roadsides, ditches, and waste sites. In addition, European marsh invades all types of wetlands and is also common in coastal communities.

## Non-chemical control

### Removal

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

Pulling, digging, and cutting the root from the stem are effective individual plant control techniques. Pull or dig if soil conditions allow for the removal of the taproot. Alternately, cut the entire taproot with a sharp shovel or spade 1–2" below the surface. If flowers are present, bag material and dispose of it in a landfill to avoid potential for seed spread.



### Mowing

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

Mowing as close to the ground as possible can be effective if timed just after the emergence of flower heads, but before seeds enlarge. Plants may resprout and still flower, but rarely produce viable seed. Monitor populations and repeat mowing if concerned about seed production. Do not mow when mature seeds could be present since this will spread the seed. European marsh thistle should be suppressed after 3–4 years of this treatment. While mowing has been reported as an effective means of suppression for the other biennial thistles, 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. After the fire, established plants will quickly resprout and reinvade areas; this management method is not recommended unless integrated with other techniques. Fire may benefit other species well-adapted to this management (e.g., prairie grasses), resulting in improved competition with thistles. A handheld propane torch can be effective for treating seedlings.

### Grazing

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

The optimal time for grazing is similar to hand pulling. Sheep, goats, and cattle may graze thistles before bud stage to reduce flower production, but grazing is more effective when plants are treated with salt or when animals are trained to eat these spiny plants. High-intensity, short-duration grazing of plants for 2–3 years in grass-based pastures can reduce stem densities to low levels. Avoid overgrazing a site since it can suppress other vegetation competing with biennial thistles and enhance populations. European marsh thistle densities increase on grazed lands. Densities are highest on lightly grazed lands and are dramatically reduced when grazing ceases.

### Biological control

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

In the 1970s, a weevil that attacks musk was released in Wisconsin; while the weevil has spread throughout the state, it has not greatly affected the musk population. Because of concerns that the weevil would attack native thistles, additional weevils have not been released in Wisconsin. To release biological control agents in Wisconsin, contact the Wisconsin Department of Agriculture, Transportation, and Consumer Protection for required permit.

### Manipulation of the environment

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

Interseeding with competitive grasses can suppress thistles, if grasses successfully establish. This method is most effective when combined with other control measures.

# 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. Spring fertilization of desirable plants present can increase suppression after an herbicide application.

### 2,4-D\*

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

**Common name:** Many

**Rate:**

**broadcast:** 1.0–2.0 lb a.e./A

**spot:** Equivalent to broadcast rates.

**Timing:** In spring, apply to rosettes, to bolting plants, or to flowering plants; in fall, apply to rosettes as long as leaves are green. Applications to rosettes in the spring or fall are most effective.

**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 spray may cause severe injury to plants.

### aminopyralid\*

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

**Common name:** Milestone

**Rate:**

**broadcast:** 3–5 fl oz/A

(0.05–0.08 lb a.e./A)

**spot:** Equivalent to broadcast rates.

**Timing:** In spring, apply to rosettes, to bolting plants, or to flowering plants; in fall, apply to rosettes as long as leaves are green.

**Remarks:** Depending on the volume of solution applied per acre, typical mixtures for spot treatments are 2–4 mL Milestone per gallon of water.

**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.

### chlorsulfuron\*

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

**Common name:** Telar

**Rate:**

**broadcast:** 0.5–2.0 oz/A

(0.40–1.5 oz a.i./A)

**spot:** 0.04 oz/gal (0.03 oz a.i./ gal)

**Timing:** In spring, apply to rosettes, to bolting plants, or to flowering plants; in fall, apply to rosettes as long as leaves are green.

**Remarks:** Use 1.5–2.0 oz/A for flowering bull thistle. Musk and plumeless thistle can be controlled with 0.5–1.0 oz/A.

**Caution:** Do not apply directly to water or to areas where surface water is present. Can remain in the soil for months, 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.

### Musk



\*Active ingredient (a.i.)



**clpyralid\***

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

**Common name:** Transline

**Rate:**

**broadcast:** 8–11 fl oz/A

(0.2–0.25 lb a.e./A)

**spot:** 0.2–0.4% (0.005–0.01 lb a.e./gal)

**Timing:** In spring, apply to rosettes, to bolting plants, or to flowering plants; in fall, apply to rosettes as long as leaves are green.

**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: 90–100%**  
**Season after treatment: 70–90%**

**Common name:** Banvel

**Rate:**

**broadcast:** 8–32 fl oz/A

(0.25–1.0 lb a.e./A)

**spot:** Equivalent to broadcast rates.

**Timing:** In spring, apply to rosettes, to bolting plants, or to flowering plants; in fall, apply to rosettes as long as leaves are green.

**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:** 0.75–1.5 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:** In spring, apply to rosettes, to bolting plants, or to flowering plants; in fall, apply to rosettes as long as leaves are green.

**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 spray may cause severe injury to plants.

**imazapyr\***

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

**Common name:** Arsenal

**Rate:**

**broadcast:** 8–16 fl oz/A

(0.13–0.25 lb a.e./A)

**spot:** 0.5–5.0% (0.01–0.1 lb a.e./gal)

**Timing:** In spring, apply to rosettes, to bolting plants, or to flowering plants; in fall, apply to rosettes as long as leaves are green.

**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.

**Plumeless**



**metsulfuron\***

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

**Common name:** Escort

**Rate:**

**broadcast:** 0.25–1.0 oz/A  
(0.15–0.6 oz a.i./A)

**spot:** 0.04 oz/gal (0.02 oz a.i./gal)

**Timing:** In spring, apply to rosettes, to bolting plants, or to flowering plants; in fall, apply to rosettes as long as leaves are green.

**Caution:** Do not apply directly to water or to areas where surface water is present. Remains in the soil for months, 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: 90–100%**

**Common name:** Tordon K

In Wisconsin, some products containing picloram are restricted-use.

**Rate:**

**broadcast:** 8–16 fl oz/A  
(0.13–0.25 lb a.e./A)

**spot:** Equivalent to broadcast rates.

**Timing:** In spring, apply to rosettes, to bolting plants, or to flowering plants; in fall, apply to rosettes as long as leaves are green. Applications to rosettes in the spring or fall are most effective.

**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: 70–90%**

**Common name:** Garlon 4

**Rate:**

**broadcast:** 16–32 fl oz/A  
(0.5–1.0 lb a.e./A)

**spot:** 1–2% (0.04–0.08 lb a.e./gal)

**Timing:** In spring, apply to rosettes, to bolting plants, or to flowering plants; in fall, apply to rosettes as long as leaves are green.

**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.

**triclopyr + 2,4-D\***

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

**Common name:** Crossbow

**Rate:**

**broadcast:** 192 fl oz/A (triclopyr: 1.5 lb a.e./A + 2,4-D: 3.0 lb a.e./A)

**spot:** 1–1.5% (triclopyr: 0.01–0.02 lb a.e./gal + 2,4-D: 0.02–0.03 lb a.e./gal)

**Timing:** In spring, apply to rosettes, to bolting plants, or to flowering plants; in fall, apply to rosettes as long as leaves are green. Applications to rosettes in the spring or fall are most effective.

**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.

**Plumeless**




Musk

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.*

Plumeless



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