



COLORADO STATE PARKS  
BEST MANAGEMENT PRACTICES  
WEED PROFILE



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Parks Affected: Many

Musk thistle  
*Carduus nutans* L. subsp. *Macrolepsis*  
(Peterman) Kazmi



**Family:** *Asteraceae* (Sunflower)

**Other Names:** nodding thistle, nodding plumeless thistle

**USDA Code:** CANUM2

**Legal Status:** Colorado Noxious List B (top ten worst)

**Identification**

**Growth form:** Biennial, or sometimes winter annual forb.

**Flower:** Flower heads are terminal, solitary, 1.5 to 3 inches in diameter, and usually nodding. Flowers are deep rose, violet or purple, occasionally white. Flowers are subtended by broad, spine-tipped bracts.

**Seeds/Fruit:** One-seeded oblong fruit (achene) about 0.2 inches long, shiny, yellowish-brown with a plume (pappus) of white hair-like bristles.

**Leaves:** Leaves are alternate, dark green, deeply lobed, and spiny margined. The leaf margins are often white. The leaves extend onto the stem giving a winged appearance (Whitson et al. 1996). Basal rosettes are well developed, leaves elliptical to lanceolate, 6-14 inches, smooth to densely hairy.

**Stems:** Mature plants can grow as tall as 6 feet. It can appear solitarily or with several stems from one base, and is highly branched above.

**Roots:** Fleshy taproot.

**Seedling:** No information available.

**Similar Species**

**Exotics:** Musk thistle is similar to plumeless thistle (*Carduus acanthoides*). Rosettes of plumeless thistle are distinguished from those of musk thistle by having leaves that are deeply serrate (saw-toothed) almost to the midrib.

**Natives:** There are many native thistle species (in the genus *Cirsium*). The natives generally do not have leaves clasping the stem all the way from node to node (strongly decurrent leaves), and many have hairy upper and lower leaf surfaces and are blue-green or gray in color.

**Impacts**

**Agricultural:** Likely to infest pastures, and is unpalatable to livestock.

**Ecological:** Musk thistle is a highly competitive weed which invades disturbed areas, pasture, rangeland, forest land, cropland, and waste areas throughout most of the United States. Musk thistle spreads rapidly and forms extensive stands, which force out desirable vegetation

**Keys to Identification:**

- Musk thistle can be identified by the broad, spine-tipped bracts located under the flower.
- Flowering heads are terminal, solitary and usually nodding.



(Rutledge and McLendon, 1998). Musk thistle may produce allelopathic chemicals that inhibit desirable plants beyond the spread of the rosettes (Wardle et al. 1993).

### **Habitat and Distribution**

**General requirements:** Musk thistle does not appear to have any specific climatic requirements other than a cool period of vernalization for flowering (Butterfield et al. 1996). It occurs in areas with as little as 10 inches of annual precipitation (FEIS 1996). Musk thistle establishes best on bare soil, and small shallow cracks are ideal for seedling establishment (FEIS 1996). Musk thistle grows in all soil textures, but the soils must be well-drained (Butterfield et al. 1996) It occurs on soils with a pH range of 6.0 to 8.9 (Butterfield et al. 1996).

**Distribution:** In Colorado, musk thistle is found up to approximately 10,000 feet in elevation (Beck 1999). It is found throughout North America.

**Historical:** Native to Eurasia.

### **Biology/Ecology**

**Life cycle:** Seeds germinate in the fall, forming a rosette of leaves. Typically, musk thistle overwinters as a rosette and bolts the following spring between April-June. Flowering begins in late May or early June and continues through mid-July (Butterfield et al. 1996). Seeds mature and are dispersed 1 to 3 weeks after flowering. Seedlings establish only on bare soils and grow less when shaded by neighboring plants (Beck 1999).

**Mode of reproduction:** Musk thistle reproduces solely by seed.

**Seed production:** Musk thistle is a prolific seed producer Average productivity is approximately 10,000 seeds/plant, however, a single plant can produce up to 100,000 seeds (Beck 1999).

**Seed bank:** Musk thistle seeds appear to remain viable for at least 10 years.

**Dispersal:** Seed dispersal is by wind water, wildlife and livestock (Beck 1999).

**Hybridization:** May hybridize with plumeless thistle (*Carduus acanthoides*).

### **Control**

**Biocontrol:** A number of insects have been used to help control musk thistle. The Division of Plant Industry's Biological Pest Control Section has two species, *Rhinocyllus conicus*, and *Trichosirocalus horridus*, that may be available for redistribution. The most widely released insect is the weevil *Rhinocyllus conicus* (Butterfield et al. 1996). In the spring, adults will feed on the leaves, mate, and deposit eggs on the bracts (Butterfield et al. 1996). When the eggs hatch the larvae begin to bore into the flowerhead, reducing the ability of the plants to produce viable seed. In some cases the weevil has reduced musk thistle populations to less than 10% pre-release levels (Rutledge and McLendon, 1998). However, this weevil will attack native thistles, including rare species (Louda et al. 1997).

**Mechanical:** Repeated mowing, hand pulling, or cutting can be used to stop the spread of musk thistle. Mowing or hand-chopping after flowering, but before seed set, prevents seed development and dispersal (Heidel 1987). When pulling musk thistle, it is important to completely remove the crown so that the plant does not simply re-bolt and produce seeds. Repeated visits at weekly intervals over the 4-7 week flowering period is necessary because not all plants flower at the same time (Heidel 1987). Cut plants should be deeply buried or burned because seeds can mature and become viable after cutting (Rutledge and McLendon, 1998).

**Fire:** No information available.

**Herbicides:** Musk thistle is most often controlled with herbicides. The most effective chemical control occurs when musk thistle is still in the rosette stage, and quickly decreases once the plant has bolted (Butterfield et al. 1996). 2,4-D, clopyralid at 0.25 lb., or dicamba at 1 lb. ai/acre are effective when applied 10-14 days prior to bolting. A combination of 2,4-D plus dicamba provided 97% control in an experiment in Minnesota (Butterfield et al. 1996). Fall application of picloram at

#### **Keys to Control:**

- Managing rangeland to minimize the amount of bare soil is essential to long-term control.
- Hand chopping at ground level just before flowering, or cutting and bagging seed heads before dispersal can be used to eliminate seed production.
- Repeated treatments over the course of several years can eliminate a musk thistle infestation.

0.25 lb. ai/acre to rosettes when other plants are dormant is often effective and has less impact on non-target species (Butterfield et al. 1996). Metsulfuron and chlorsulfuron are effective on bolted plants (Beck 1999).

**Cultural/Preventive:** Prevent the establishment of new infestations by minimizing disturbance and seed dispersal, eliminating seed production and maintaining healthy native communities.

### **Integrated Management Summary**

The key to managing musk thistle is to prevent seed production. Most control methods will have a detrimental effect on other plants and may cause a disturbance that will favor re-invasion by other exotic species (Rutledge and McLendon, 1998). Dense musk thistle stands along roadsides and in degraded areas can be treated by spot use of herbicides, and in high-quality areas by a persistent program of pulling or cutting (Rutledge and McLendon, 1998). Due to the long seed viability of musk thistle, up to 10 years, control methods may have to be repeated for many years to completely eliminate a stand.

One integrated approach to musk thistle management involves 1) managing livestock grazing to increase grass vigor and reduce bare ground; 2) spray rosettes with clopyralid or 2,4-D; 3) re-seed treated ground with competitive desirable plants in the fall after spraying; 4) follow-up with spot cutting of entire plants when first flowers appear annually for several years to deplete the seed bank in the soil.

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