

# NODDING THISTLE

*Carduus nutans* L. spp. *leiophyllis* (Petrovic) Stoj. & Stef.

**Family:** Asteraceae (Sunflower).

**Other Scientific Names:** None.

**Other Common Names:** Musk thistle, nodding plumeless thistle.

**Legal Status:** Not categorized.



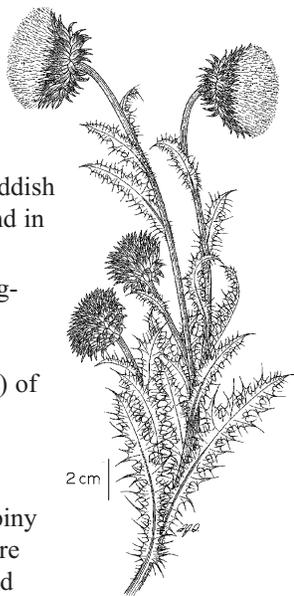
## Identification

**Growth form:** Biennial forb.

**Flower:** Flower heads are terminal, solitary, 2.5–5.0 cm in diameter, nodding. Flowers are deep reddish purple. Flower head bracts end in sharp, spiny tips.

**Seeds/Fruit:** One-seeded, egg-shaped fruit (achene) about 5 mm long, shiny, yellowish brown, with a plume (pappus) of white hair-like bristles.

**Leaves:** Stem leaves are alternate, dark green, deeply lobed or pinnately cut, and spiny margined. The leaf margins are often white. The leaves extend onto the stem, giving a winged appearance (Whitson et al. 1996).



**Stems:** The smooth, non-spiny stems grow 0.3–2.4 m tall (Douglas et al. 1998). It can appear as a solitary stem or with several highly branched stems from one base.

**Roots:** Fleshy taproot.

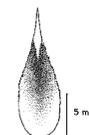
**Seedling:** No information available.



## Similar Species

**Exotics:** Similar to plumeless thistle (*Carduus acanthoides*). Rosettes of plumeless thistle are distinguished from those of nodding 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). Many have hairy upper and lower leaf surfaces and are blue-green or grey in colour.



## Impacts

**Agricultural:** Reduces pasture production and is unpalatable to livestock.

**Ecological:** A highly competitive weed that invades pasture, rangeland, forestland, cropland, and disturbed areas, where it spreads rapidly and forms extensive

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

**Human:** No information available.

## Habitat and Ecology

**General requirements:** Found along dry roadsides and disturbed habitats at mid-elevations. Nodding thistle does not appear to have any specific climatic requirements other than a cool period before flowering (Butterfield et al. 1996). It occurs in areas with as little as 25 cm of annual precipitation and establishes best in

bare soil (FEIS 1996). Nodding thistle grows on all soil textures, but the soils must be well-drained and have a pH range of 6.0–8.9 (Butterfield et al. 1996).

**Distribution:** Found throughout North America. Nodding thistle occurs in isolated pockets in the Chilcotin, Thompson, Nicola, Kootenay, Okanagan,

Similkameen, Boundary, and Bulkley Valley areas of BC (Powell et al. 1994; Douglas et al. 1998).

**Historical:** Introduced from Eurasia or North Africa.

**Life cycle:** Seeds germinate in the autumn, forming a rosette of leaves. Typically, nodding thistle overwinters as a rosette and bolts the following spring between April and June. Flowering begins in late May or early June and continues through mid-July (Butterfield et al. 1996). Seeds mature and are dispersed 1–3 weeks after flowering. Seedlings establish only on bare soils and do not establish well under shaded conditions (Beck 1999).

## Management

**Biocontrol:** *Rhinocyllus conicus* (weevil), *Trichosirocalus horridus* (weevil), and *Urophora solstitialis* (fly) have been released in BC (Powell et al. 1994). Adult *Rhinocyllus* feed on the leaves in spring, mate, and deposit eggs on the bracts (Butterfield et al. 1996). When the eggs hatch, the larvae begin to bore into the flower head, reducing the ability of the plants to produce viable seed. In some cases the weevil has reduced nodding thistle populations to less than 10% of pre-release levels (Rutledge and McLendon. Undated). This weevil is not entirely host-specific, however, and will complete its life cycle on native thistles (Louda et al. 1997).

**Mechanical:** Repeated mowing, hand-pulling, or cutting can be used to stop the spread of nodding thistle. Mowing or hand-cutting after flowering, but before seed-set, prevents seed development and dispersal (Heidel 1987). When pulling nodding 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 are 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. Undated).

**Fire:** No information available.

**Herbicides:** Nodding thistle is usually controlled with herbicides. Chemical control is most effective at the rosette stage, and quickly decreases once the plant has bolted (Butterfield et al. 1996). Clopyralid, 2,4-D, and dicamba are all effective before the plant bolts. A

**Mode of reproduction:** By seed.

**Seed production:** Average productivity is approximately 10,000 seeds/plant, but a single plant can produce up to 100,000 seeds (Beck 1999).

**Seed bank:** Seeds can remain viable for at least 10 years.

**Dispersal:** By wind, water, wildlife, and livestock (Beck 1999).

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

combination of 2,4-D and dicamba provided 97% control in an experiment in Minnesota (Butterfield et al. 1996). Butterfield et al. (1996) found that a autumn application of picloram to rosettes, when other plants were dormant, was effective and had less impact on non-target species. Metsulfuron is effective on bolted plants (Beck 1999). Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations.

**Before applying herbicides, read the label for full use and precautionary instructions.**

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

### Integrated Management Summary

The key to managing nodding thistle is to prevent seed production. Dense nodding thistle stands can be spot-treated with herbicides or by pulling or cutting (Rutledge and McLendon. Undated). Control methods may have to be repeated for many years to completely eliminate a stand because seeds can remain in the seed bank for up to 10 years. Most infestations in BC are so severely stressed by insect agents that other methods of control are seldom required.

## References

---

- Beck, K. G. 1999. Biennial thistles. In R. L. Sheley and J. K. Petroff, eds. *Biology and Management of Noxious Rangeland Weeds*. Corvallis: Oregon State University Press.
- Butterfield, C., J. Stubbendieck, and J. Stumpf. 1996. Species abstracts of highly disruptive exotic plants. Jamestown, ND: Northern Prairie Wildlife Research Center Home Page.  
<http://www.npwrc.usgs.gov/resource/othrdata/exoticab/exoticab.html> [16 Jul 97].
- Desrochers, A. M., J. F. Bain, and S. I. Warwick. 1988. The biology of Canadian weeds. *Carduus nutans* L. and *Carduus acanthoides* L. *Canadian Journal of Plant Science* 68: 1053–1068.
- Douglas, G. W., G. B. Straley, D. Meidinger, and J. Pojar, eds. 1998. *Illustrated Flora of British Columbia*. Vol. 1: *Gymnosperms and Dicotyledons (Aceraceae through Asteraceae)*. Province of British Columbia. FEIS—Fire Effects Information System. 1996. Prescribed Fire and Fire Effects Research Work Unit, Rocky Mountain Research Station (producer). US Forest Service, <http://www.fs.fed.us/database/feis/> [12 Mar 98].
- Heidel, B. 1987. Element stewardship abstract for *Carduus nutans*, musk thistle. The Nature Conservancy, Wildland Weeds Management and Research Program. <http://tncweeds.ucdavis.edu/esadocs/documnts/cardnut.html> [30 Jul 98].
- Louda, S. M., D. Kendall, J. Connor, and D. Simberloff. 1997. Ecological effects of an insect introduced for the biological control of weeds. *Science* 277: 1088–1090.
- Powell, G. W., A. Sturko, B. M. Wikeem, and P. Harris. 1994. *Field Guide to the Biological Control of Weeds in British Columbia*. Land Management Handbook No. 27. BC Ministry of Forests.
- Rutledge, C. R., and T. McLendon. Undated. An assessment of exotic plant species of Rocky Mountain National Parks. Department of Rangeland Ecosystem Science, Colorado State University. Northern Prairie Wildlife Research Center Home Page. <http://www.npwrc.usgs.gov/resource/othrdata/Explant/explant.htm> [15 Dec 98].
- Wardle, D. A., K. S. Nicholson, and A. Rahman. 1993. Influence of plant age on the allelopathic potential of nodding thistle (*Carduus nutans*) against pasture grasses and legumes. *Weed Research* 33: 69–78.
- Whitson, T. D. (ed.), L. C. Burrill, S. A. Dewey, D. W. Cudney, B. E. Nelson, R. D. Lee, R. Parker. 1996. Musk thistle. *Weeds of the West*. Western Society of Weed Science, in cooperation with the Western United States Land Grant Universities Cooperative Extension Services, Newark, CA.

