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Quick Facts...

Musk thistle is a biennial weed that reproduces only from seed.

The key to successful musk thistle control is to prevent seed production.

Apply herbicides such as Tordon, Banvel, or 2,4-D to musk thistle rosettes in spring or fall. Apply Ally or Telar up to the early flower growth stage.

Combine control methods into a management system for best results.

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Musk thistle

no. 3.102

by K. George Beck¹

Introduction

Musk thistle is an aggressive weed of foreign origin that occurs in pastures, rangeland, roadsides, and non-crop areas. It is a biennial weed, although occasionally is an annual. Since musk thistle reproduces solely from seed, the key for successful management is to prevent seed production.

Germination and seedling establishment are correlated with moisture and light. Thus, more seeds germinate and establish plants in open pastures and other degraded areas.

Vigorously growing grass competes with musk thistle and fewer thistles occur in pastures where grazing is deferred. However, musk thistle also can become a problem in pasture or rangeland that is in good condition.



Figure 1: Musk thistle (*Carduus nutans* L.)

Phenology

Seedlings normally emerge early in spring, develop into rosettes and spend the first season in this growth stage. Seedling emergence also can occur in fall. All seedlings grow into rosettes and overwinter in that stage. Rosettes are usually large and compact with a large, corky taproot that is hollow near the crown (Figure 1).

Early in spring of the second year, overwintered rosettes resume growth. Shoots begin to elongate (bolt) in late March through May depending on weather and altitude. Musk thistle flowers and starts to produce seed 45 to 55 days after it bolts.

Musk thistle dies after it sets seed. It spends approximately 90 percent of its life cycle in a vegetative growth stage. It is important to recognize that musk thistle's tolerance to most herbicides increases after it bolts.

Reproduction and Spread

Musk thistle is a prolific seed producer. A single plant can set up to 20,000 seeds. However, only one-third of the seeds are viable. Musk thistle produces many heads; the terminal, or tallest, shoots flower first then lateral shoots develop in leaf axils. A robust plant may produce 100 or more flowering heads.

Musk thistle flowers over a seven- to nine-week period and begins to disseminate seed from a head about two weeks after it first blooms. It is quite common to observe musk thistle with heads in several stages of floral development and senescence. Thus, musk thistle sets seed over an extended time period.

Integrating Control Methods

To combine chemical and biological control methods, apply herbicides at a time that does not interfere with insect development, that is, allow insects to complete their life cycle. Or, use herbicides in areas that aren't sensitive to their use and employ biological control in areas where herbicides are impractical or environmentally unsafe.

Cultural methods that favor desirable plant growth can be combined with chemical or biological control by superimposing proper grazing management and seeding.

The Colorado Department of Agriculture has established another weevil, *Trichosiromus horridus*. This weevil attacks the crown area of musk thistle rosettes and kills or weakens the plant before it bolts. This weevil is being redistributed throughout Colorado by the Department of Agriculture. It tends to be more effective than the seed head weevil.

¹K. George Beck, Colorado State University Cooperative Extension weed science specialist and associate professor, bioagricultural sciences and pest management.

Most seed is disseminated within the immediate vicinity of the parent plant. This leads to a clumped pattern of seedling development and results in intraspecific competition and mortality. Wind and water are good dissemination methods and with these methods seeds attach to animals, farm machinery and other vehicles. However, less than 5 percent of seed remains attached to the pappus when it breaks off the flowering head and floats away on wind currents.

Management

Cultural control. Maintaining pastures and rangeland in good condition is a primary factor for musk thistle management. To favor pasture and rangeland grass growth, do not over-graze and fertilize only when necessary, and according to soil testing recommendations. Prevent seed formation to successfully manage musk thistle.

Mechanical control. Musk thistle will not tolerate tillage and can be removed easily by severing its root below ground with a shovel or hoe. Mowing can effectively reduce seed output if plants are cut when the terminal head is in the late-flowering stage. Gather and burn mowed debris to destroy any seed that has developed.

Chemical control. Several herbicides are registered in pasture, rangeland and non-crop areas to control musk thistle. Tordon 22K (picloram), Curtail (clopyralid + 2,4-D), Banvel (dicamba), 2,4-D, or Banvel plus 2,4-D are commonly used. Apply these herbicides in spring or fall to musk thistle rosettes.

Apply Tordon at 0.5 to 1 pint per acre (A), Curtail at 2 quarts/A, Banvel at 0.5 to 2 quarts/A, 2,4-D at 1.5 to 2 quarts/A, or Banvel plus 2,4-D at 0.5 plus 1 quart/A. Cool temperatures (less than 50 degrees F), particularly in fall, may adversely affect 2,4-D control of musk thistle; therefore, use 2,4-D in spring. Tordon is largely unaffected by cool temperatures; however, Banvel can be adversely affected but less than 2,4-D. Banvel plus 2,4-D works well in spring or fall. Apply any of these herbicides before musk thistle bolts or seed production still will occur.

Ally-Escort (metsulfuron) or Telar (chlorsulfuron) can be used. Use Telar in non-crop only and Ally-Escort in pastures, rangeland or non-crop. Research from Colorado State University and the University of Nebraska shows Telar or Ally-Escort prevents or dramatically reduces viable seed formation when applied in spring, up to early flower growth stages. The latest time to apply these herbicides is when developed terminal flowers have opened up to the size of a dime or quarter.

Apply Telar at 1 ounce/A or Ally-Escort at 0.5 ounce/A. A good agricultural surfactant at 0.25 percent v/v should be added to Ally-Escort or Telar treatments or control is inadequate.

Biological control. The musk thistle seed head weevil, *Rhinocyllus conicus*, can be found throughout Colorado. The female deposits her eggs on the back of developing flowers and covers them with masticated leaf tissue. After eggs hatch, larvae bore into the flower and destroy developing seed. The seed head weevil reduces seed production by 50 percent on the average, but if used alone, is not an effective management tool. Certain herbicides or mowing can be combined with the seed head weevil if these are used during late flowering stages. This allows the weevils to complete their life cycles and ensures their presence in subsequent growing seasons.