Colorado State Parks

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COLORADO STATE PARKS BEST MANAGEMENT PRACTICES WEED PROFILE

Canada thistle

Cirsium arvense **(L.) Scop.;**

Breea arvensis **(L.) Lessing**

BMPs

Family: ***Asteraceae*** (Sunflower)
Other Names: field thistle, Californian thistle
USDA Code: CIAR4
Legal Status: Colorado Noxious List B (top ten worst).

Keys to Identification:

- Purple flowers form in clusters of 1-5 per branch.
- The floral bracts of Canada thistle are spineless.
- Small heads, vanilla scent

Identification

Growth form: Perennial forb.
Flower: Flower heads are white to purple and borne in clusters of 1-5 per branch, with a strong vanilla scent. Heads are only about 1cm in diameter.
Seeds/Fruit: One-seeded fruits (achenes) are straw or light brown in color, straight or slightly curved (Moore 1975).
Leaves: Leaves are spiny, alternate, oblong or lance-shaped, with the base leaves stalkless and clasping, or extended down along the stem.
Stems: Mature plants range from 2-4 feet in height.
Roots: Canada thistle has two types of roots, horizontal and vertical. The horizontal roots produce numerous shoots, while vertical roots store water and nutrients in their many small branches.
Seedling: Early spring growth appears as rosettes with spiny-tipped, wavy leaves.
Other: The floral bracts of Canada thistle are spineless.

Similar Species

Exotics: Bull thistle (*Cirsium vulgare*); flower bracts are somewhat tapered and covered with spines. Scotch thistle (*Onopordum acanthium*); stems appear the have wings, floral bracts are covered with spines. Plumeless thistle (*Carduus acanthoides*); floral bracts are covered with sharp spines. Musk thistle (*Carduus nutans*); floral bracts are broad with spiny tips. Russian knapweed and Canada thistle are often confused.
Natives: Wavyleaf thistle (*Cirsium undulatum*): flower bracts often have a prominent white glandular dorsal ridge (often sticky to touch) and minutely hairy margins (Whitson et al. 1996). Leafy thistle (*Cirsium foliosum*): the leaves surrounding the terminal flowers are pink to white. Yellowspine thistle (*Cirsium ochrocentrum*): flower bracts are covered with cobweb-like hairs and have a spreading yellow spine at the tip. The tall biotype of Colorado thistle *(Cirsium coloradense)* and *Cirsium traceyi* are also similar. Most native thistles are more hairy and lighter green/blue in color. Canada thistle is comparatively darker green.

Impacts

Agricultural: Canada thistle is an aggressive, creeping, perennial weed. It infests crops, pastures, rangelands, roadsides, and riparian areas (Beck 1996).

Ecological: Canada thistle spreads rapidly through horizontal roots, which give rise to shoots (Moore 1975). Its root system can be extensive, growing horizontally as much as 18 feet in one season (Nuzzo 1998). Most Canada thistle patches spread at a rate of 3-6 feet/year, crowding out more desirable species and creating thistle monocultures.

Human: Spiny thickets of Canada thistle can restrict recreational access to infested areas.

Habitat and Distribution

General requirements: Canada thistle thrives in the Northern Temperature Zone due to its day length response and a high temperature limitation on growth (Haderlie et al. 1991). Although Canada thistle mainly invades disturbed areas, it does invade native plant communities, open meadows (including wetlands), and ponderosa pine savanna (Rutledge and McLendon 1998). Canada thistle is adapted to a wide range of soil types and environmental conditions (FEIS 1996). It is best adapted to rich, heavy loam, clay loam, and sandy loam, with an optimum soil depth of 20 inches (FEIS 1996, Rutledge and McLendon 1998). Canada thistle can tolerate saline soils (up to 2% salt) and wet or dry soil (Rutledge and McLendon 1998). However, it does not tolerate waterlogged or poorly aerated soils. Canada thistle usually occurs in 17-35 inch annual precipitation zones or where supplemental soil moisture is available (Beck 1996). Canada thistle is also somewhat shade intolerant. It can grow along the edge of forested areas, but is rarely found within forests.

Distribution: Canada thistle is common found along roadsides, fields, pastures, meadows, and other disturbed areas statewide in Colorado (FEIS 1996, Rutledge and McLendon 1998). In Colorado, Canada thistle is typically found from 4,000-9,500 feet. Canada thistle is found throughout the northern half of the United States and lower portions of Canada.

Historical: Canada thistle is a native of southeastern Eurasia. It was introduced to Canada as a contaminant of crop seed as early as the late 18th century. Since its introduction, it has spread throughout North America (Whitson et al. 1996).

Biology/Ecology

Life cycle: Over-wintering roots develop new underground roots and shoots in January and begin to elongate in February (Nuzzo 1998). Shoots emerge between March and May, when mean weekly temperatures reach 5° C, and form rosettes (Nuzzo 1998). Early in the spring, plants remain near the soil surface until long days (over 14 hours of light) trigger flowering and stem elongation (Haderlie et al. 1991, FEIS 1996). Canada thistle is dioecious (male and female flowers are produced on separate plants). Female flowers can be readily distinguished from male flowers by the absence of pollen (abundant in male flowers) and presence of a distinct vanilla-like fragrance. Flowering occurs from June to October in Colorado (Rutledge and McLendon 1998). Seeds mature July to October.

Mode of reproduction: Canada thistle reproduces primarily vegetatively through creeping horizontal roots, and can quickly form dense stands. Every piece of the root system is capable of forming a new plant (Rutledge and McLendon 1998). This allows dense monocultures of Canada thistle to form even without seed production. Canada thistle growth is limited or stopped when temperatures exceed 30° C for extended periods of time.

Seed production: A female Canada thistle plant can produce up to 5,200 seeds in a season, but the average is about 1,500 seeds/plant (Rutledge and McLendon 1998).

Seed bank: Mature seeds germinate most readily in mid-spring. Seeds that do not germinate may remain dormant for several years but most studies indicate that the majority of seeds do not remain viable after three years of burial (Rutledge and McLendon 1998).

Dispersal: Seeds are distributed by wind.

Hybridization: No information available.

Keys to Control:

- Eliminate seed production.
- Reduce the plant's nutrient reserves through persistent management.

Control

Biocontrol: Currently, there is no single biological control agent that effectively controls Canada thistle. However, there are several agents that have been reported to provide very

limited control. One species, *Urophora cardui* (a gall fly), may be available for redistribution from the Division of Plant Industry's Biological Pest Control Section.

Mechanical: Mowing pastures and hay meadows can be an effective control if it is repeated at about one-month intervals throughout the growing season. Combining mowing with herbicides will further enhance control of Canada thistle. However, a recent study (Beck and Sebastian 2000) found that mowing or mowing+herbicide was only effective where the root system of Canada thistle is restricted by a high water table, such as near rivers or sub-irrigated meadows.

Fire: Prescribed burning in the spring has been proposed as a means of slowing the spread of Canada thistle. Such fires could reduce the number of mature plants, decrease seed production, and stimulate the growth of native grasses (FEIS 1996).

Herbicides: Chemical control of Canada thistle should be conducted in the spring or fall depending on local environmental conditions. In general, fall treatments are more effective as herbicide absorption is enhanced in the late summer and fall when shoot to root translocation is the greatest. However, translocation of the herbicide is dependent on moist soil conditions. If fall is a dry period in your area, a spring application around the flower bud stage (early June), when root carbohydrate reserves are at their lowest, is recommended. Clopyralid + 2,4-D (commonly sold as Curtail®) applied at a rate of 2-3 quarts/acre will effectively control Canada thistle. Curtail should either be applied in the late spring (when Canada thistle plants are entering the bud growth stage) or in the fall (October) when Canada thistle roots are actively growing. The performance of Curtail can be improved when proceeded by two or three mowings under conditions when the root systems are restricted (Beck 1996, Beck and Sebastian 2000). Begin mowing when Canada thistle is 12-15 inches tall and repeat at about one month intervals (Beck 1996). Apply Curtail in October or about one month after the last mowing. Clopyralid alone can be applied at a rate of 2/3 to 1 pint/acre in the spring or fall. Spring applications should be timed to the rosette to bud growth stages. 2,4-D or picloram are effective when applied at a rate of 1 lb. ai/acre in the spring when Canada thistle is in the pre-bud to early bud growth stages (about 10-15 inches tall). For increased control, retreat with dicamba (1 lb. ai/acre) in the fall to prevent regrowth of plants.

Cultural/Preventive: Reduce the spread of Canada thistle seeds by always purchasing "weed free" seeds. Quickly eliminate new seedlings before they have a chance to form a well-developed root system.

Integrated Management Summary

The tendency of this species to grow in wet areas may restrict the use of certain herbicides. Control efforts should target Canada thistle plants in high-quality areas first (typically areas that contain mostly native species and few undesirable species), and then work on controlling lower quality areas (areas that are already infested with undesirable species and have fewer desirable species present). Management strategies should be adjusted to reflect weather conditions (Nuzzo 1998). For example, drought stress reduces the effectiveness of most herbicides, but increases the effectiveness of mechanical controls (e.g., mowing or burning). It takes at least two years of control to determine whether a particular method is effective. Several studies have recorded a temporary decline in Canada thistle in the first year of control followed by a return to the pre-treatment conditions the second growing season (Nuzzo 1998).

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