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Canada thistle: biology and management in pastures and rangeland

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Quick Facts

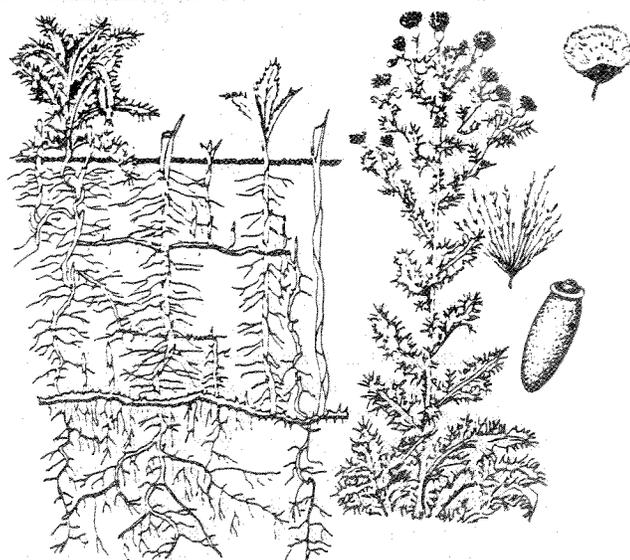
- Canada thistle is a creeping perennial that reproduces from vegetative buds in its root system and from seed.
- It is very difficult to control because its extensive root system has vast nutrient stores that allow it to recover from control attempts.
- Combining control methods is the best form of Canada thistle management.
- Persistence in control efforts is imperative so the weed is continually stressed, forcing it to exhaust root nutrient stores and eventually die.

Canada thistle is an aggressive, creeping perennial weed that infests crops, pastures, rangeland, roadsides, and non-crop areas. It is a weed of 27 crops in 37 countries, worldwide. Generally, infestations start on disturbed ground including ditch banks, overgrazed pastures, tilled fields, or open waste places. Canada thistle reduces forage consumption in pastures and rangeland because cattle will not graze near infestations.

One plant can colonize an area 3 feet to 6 feet in diameter in one or two years. Canada thistle grows in a variety of soils and can tolerate up to 2 percent salt content. It is most competitive in deep, well-aerated, productive, cool soils. Canada thistle usually occurs in 17-inch to 35-inch annual precipitation zones or where soil moisture is adequate. It is less common in light, dry soils.

Phenology

Emergence. Canada thistle develops from seed or vegetative buds in its root system. Horizontal roots may extend 15 feet or more and vertical roots may grow 6-feet to 15-feet deep. Canada thistle emerges from its root system in middle to late spring (late April through May) and forms rosettes. The greatest



flush of root-derived plants occurs in spring, but another flush occurs in fall. A flush can occur any-time during the growing season when moisture is adequate. This is particularly a problem when Canada thistle growth is disturbed by tillage or herbicides. This factor of Canada thistle's biology can be manipulated to the land manager's advantage.

Plants that germinate from seed do so at about the same time as root-derived shoots. Seedlings grow slowly and are sensitive to competition, particularly if shaded. Canada thistle seedlings develop a perennial habit, the ability to reproduce for their root systems, at seven to eight weeks of age.

Reproduction and spread. Canada thistle begins to flower in late spring to early summer (mid June through July) in response to 18-hour days. Plants are either male or female (dioecious) and grow in circular patches that often are one clone and sex. Female flowers produce a sweet odor and insects readily pollinate different sexed patches up to 200 feet apart. Canada thistle develops seed sparingly. It may produce 1000 to 1500 seeds per plant. Generally, vegetative reproduction from its root system contributes to local spread and seed to long distance dispersal. Seed may be transported long distances by

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water, or attached to animals, clothing, farm equipment and other vehicles, and in contaminated crop seed. Also, wind may help disseminate seed, but most often, the feathery pappus breaks off leaving the seed attached to the parent plant to be disseminated by other means. Seed can remain viable in soil up to 20 years and deep burial promotes survival longevity.

Canada thistle allocates most of its reproductive energy into vegetative propagation. New shoots and roots can form most anywhere along the root system of established plants. Tillage breaks up roots and stimulates new plants to develop. Shoots emerge from root and shoot pieces about 15 days after disturbance by tillage. Small root pieces, 0.25 inch long by 0.125 inch in diameter, have enough stored energy to develop new plants. Also, these small roots can survive at least 100 days without nutrient replenishment from photosynthesis.

Management

Like all weeds, Canada thistle is managed best through an integrated system that combines cultural, mechanical, chemical, and whenever possible, biological control. Cultural and chemical methods can be integrated in most environments where Canada thistle is a problem. Mechanical methods can be easily combined with cultural and chemical techniques in most cropping situations including pastures and hay meadows.

The key principle to Canada thistle control or any creeping perennial is to stress the plant. This forces it to use stored root nutrients, which exhausts the supply and eventually causes plant death. Canada thistle has the capacity to recover from most any stress, including control attempts, because of root nutrient stores. Therefore, returning infested land to a productive state occurs only over time. It is essential to develop a sound management plan to implement over several years to realize success.

Cultural control. Grasses and alfalfa can effectively compete with Canada thistle if desirable plant growth is favored by good management. Maintain fertility and, if possible, moisture at optimum levels to favor grass or alfalfa growth. Soil analysis can easily determine fertility needs. These are essential management steps to assure optimum desirable plant growth and competition. However, competition alone seldom is effective against Canada thistle.

Chemical control. There are several good herbicides registered for Canada thistle control that may be used in pasture, rangeland and non-crop areas. Before using any herbicide, be sure to read the label thoroughly and follow all directions and use precautions. Research at Colorado State University shows that picloram (Tordon 22K), dicamba (Banvel), 2,4-D, and chlorsulfuron (Telar) are effective against Canada thistle. However, the effectiveness of these herbicides is best when combined with cultural and or mechanical control. Banvel and 2,4-D may be used in pastures, rangeland, and non-crop; Tordon may be applied in permanent grass pastures, rangeland, and non-crop; Telar may be applied in non-crop only. Colorado State University data indicates that Banvel or Telar are effective when combined with 2,4-D as a

split-season application. Apply 2,4-D (2.0 pounds ai/A) in spring when Canada thistle is 10 inches to 15 inches tall, pre-bud to early bud growth stages; then re-treat in fall with Banvel (2.0 pounds ai/A) or Telar (0.75 ounces ai/A) to re-growth. Use a surfactant (0.25 percent to 0.5 percent v/v) with Telar for adequate control. Banvel also may be applied in early spring at 2.0 pounds ai/A when Canada thistle is in the rosette stage. Tordon (0.5 pound to 1.0 pound ai/A) is effective whenever Canada thistle is actively growing. However, fall applications are especially effective.

Mechanical control. Mowing hay meadows can be effective tools if combined with herbicide treatments. Mowing alone is not effective unless conducted at two-week intervals over several growing seasons. Always combine mowing with cultural and chemical control. Mowing at hay cutting stimulates new Canada thistle shoots to develop from its root system. In grass hay meadows, fall herbicide treatments that follow mowing can be an effective management system because more Canada thistle foliage is present after cutting to intercept herbicide. Additionally, root nutrient stores decrease after mowing because the plant draws on them to develop new shoots.

If a Canada thistle infestation exists in a field to be rotated to alfalfa, it is best to control the weed before seeding alfalfa. Alfalfa is an effective competitor only after it is established and will not adequately establish in a well-developed Canada thistle infestation. A Canada thistle management system can be initiated with crop or grass competition combined with herbicides with the plan to rotate to alfalfa at the plan's end.

Biological control. *Ceutorhyncus litura* is a weevil currently used as a biocontrol agent in Colorado. The female lays eggs underneath the Canada thistle leaves in early spring. Larvae bore into the main leaf vein then down into the plant's crown area. If the population is high enough, plant death can occur, otherwise Canada thistle is stressed and less vigorous. *Ceutorhyncus* alone will not effectively control Canada thistle. Therefore, it must be combined with other methods to be successful. At present, the weevil should be combined with cultural techniques that allow for maximum desirable plant competition with Canada thistle. Research to combine *Ceutorhyncus* with herbicides or mowing has not been conducted. Research has shown that biological and chemical control are compatible for musk thistle and most likely will occur for Canada thistle. *Ceutorhyncus litura* is available commercially and soon will be available through the Colorado Department of Agriculture. Re-distribution will occur as the insect becomes available.