Managing Canada Thistle

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Canada thistle, sometimes called California thistle, creeping thistle, and field thistle, has been in the United States for more than 300 years. It is considered the most widespread of all thistle species, and its detrimental impact on the environment is more and more apparent. Its complex root system makes this weed very difficult to control. Canada thistle is considered a noxious weed throughout the western United States, including the state of Nevada.

Identification

Canada thistle (Cirsium arvense L.) is an erect perennial that forms a rosette with distinctive leaves the first year (Fig. 1), and in subsequent years its slender, green stems are freely branched growing from one to four feet tall. It has extensive creeping horizontal roots that can sprout new plants. Mature Canada thistle leaves above the stems are alternate, thorny, and deeply lobed along the several branching flower stalks. The leaf margins have prominent, yellowish spines.

Flowering heads are fairly small and form in clusters on the ends of branches (Fig. 1). The flowers vary in color from white to purple, but are usually pink.

Canada thistle is dioecious: it produces male or female plants. The female flowers give off a pleasant odor, attracting insects for pollination. Both male and female plants must be present for seeds to be produced. The average seed production is about 1,530 seeds per plant, and seeds can remain viable in soil up to 20 years.

Canada thistle also reproduces very successfully through vegetative spread from horizontal creeping roots. Horizontal root growth can be more than 19 feet in one season and may penetrate the soil as deep as 22 feet in time. After 18 weeks of growth, an untouched Canada thistle can produce 26 adventitious shoots, 154 adventitious root buds, and 364 feet of roots. The shoots surface mostly in the spring. Roots endure severe winters and, after the initial spring shoot growth, continue to generate shoots all year long. New shoots and roots can develop anywhere along the root.
system of established plants. Canada thistle can survive for an indefinite period through its root system.

Habitat

Canadian thistle is found in open areas with a moderate amount of moisture. It can grow on many different soil types including clay loam, sandy loam, sandy clay, and even sand dunes, but does poorly on wet soils lacking sufficient aeration. Canada thistle is found in practically every plant community disturbed by man, but it does not grow well in shaded conditions. It is common to roadsides, railway embankments, lawns, gardens, abandoned fields, sand dunes, agricultural fields, margins of forests, and along waterways.

Impact

Unmanaged Canada thistle will likely develop into a vast infestation. Vegetative reproduction by the root system allows this plant to spread rapidly and continuously. The roots of Canada thistle have an estimated life span of two years, but new roots immediately replace them.

Canada thistle may decrease forage and livestock production on rangeland. This weed also displaces desired forbs and grasses for both domestic animals and wildlife. It is an aggressive competitor for light, moisture, and nutrients, thus reducing crop yields. Its spiny leaves make Canada thistle inedible to most livestock and wild animals, and these spiny leaves also restrict the use of recreational areas. An infestation of this plant may reduce a property’s value and increase the costs of land management.

Weed Management Options

Canada thistle can recover from most control attempts because it stores nutrients in its roots. Therefore, it is important to stress the plant and force it to use this supply of nutrients before attempting a treatment to control it. Successful control of this weed involves a solid management plan implemented over several years.

Prevention: Canada thistle is widely spread through human activities. Its seeds are spread by means of contaminated crop seed, feed, manure, irrigation water, and wind. Prevention consists of planting crop seeds free of Canada thistle, cleaning equipment after being in an infested area, applying sanitation procedures, and controlling individual or small infestations.

We recommend that both private and public lands be monitored annually for Canada thistle invasions. Eliminate this plant where it is found, and then revisit the site each year to make sure there are no escapes. Back-packers must purge their animals before entering uninfested areas and use weed-free feeds while moving through Canada thistle-free lands. Always select and plant weed-free forage seed.

Mechanical Control: Hand-pulling or grubbing is not economically or physically effective in controlling established Canada thistle. Its extensive root system and carbohydrate reserve allows Canada thistle to endure through grubbing for many years.

Frequent cultivation can be effective in controlling Canada thistle, especially when the
plants are young. It is important to prevent carbohydrate storage in the root system by eliminating all shoots every time the land is cultivated.

Mowing repeatedly is effective in alfalfa and other forage crops. In some studies, mowing three or four times per year just about abolished Canada thistle after three years, as does mowing after four days of intense, rotational grazing. Other studies, however, have found that mowing restrained the weed, but did not eradicate it. Recent research that tested the combined effects of mowing with herbicides showed that mowing two or three times following applications of picloram, picloram with 2,4-D, clopyralid with 2,4-D, or dicamba enhanced the control of Canada thistle.

**Cultural Control:** Grasses and alfalfa can successfully compete with Canada thistle if good management supports their growth. However, alfalfa can only contend after it is established; alfalfa will not effectively establish in an extensive Canada thistle infestation. Maintaining fertility and moisture at an optimal level for the grass or alfalfa is necessary. Fertility needs can be determined easily through soil analysis. Even so, competition alone is rarely completely effective.

**Biological Control:** Canada thistle is not a very edible plant because of its spiny leaves, but thorough, repeated, intense pasture grazing may reduce its spread. The effects of grazing on established plants are not substantial, though and success is usually achieved with an integrated management that uses a combination of treatments.

Several biological control agents have been evaluated for Canada thistle, but many of those that are effective are also pests of important crop species. This hinders their use on commercial farms. The three insects, Canada thistle stem weevil, Canada thistle bud weevil, and thistle stem gall fly, are promising control agents and available commercially.

Canada thistle stem weevil (*Ceutorhynchus litura*) is a stem-boring beetle introduced into the United States in 1972. Its larvae feed on new leaf, stem, root crown, and root tissue as they surface in the spring, causing damage to the stems and root crown. The larvae will also chew an exit hole below the soil surface that increases the plant’s vulnerability. The effect of this beetle is generally most noticeable the following spring when the underground shoots have rotted.

Canada thistle bud weevil (*Larinus planus*) was unintentionally introduced to North America. Its larvae feed in the flower heads, and the adults feed on the foliage thus reducing seed production. It will also feed on other *Cirsium* species, as well as *Carduus, Onopordum*, and *Arctium* species, many of which are native thistles.

The thistle stem gall fly (*Urophora cardui*) is a stem and shoot gall fly introduced to the U.S. in 1977. As larvae develop within the thistle stem, a gall forms and disrupts nutrient flow in the plant. This reduces the plant’s strength, decreasing its competitiveness and making it more susceptible to attack by other insects or pathogens.

Two pathogenic rust fungi have been tested for control of Canada thistle as well. *Sclerotinia sclerotiorum* attacks the crown and roots, and has been observed causing 20% to 80% death of Canada thistle shoots. The negative aspect of this organism is that it is not host specific and may attack desirable broadleaf crops.

An obligate rust fungus parasite specific to Canada thistle, *Puccinia punctiformis*, has recently been found to effectively reduce flowering and vegetative reproduction, but has not yet been introduced into the United States.

**Chemical Control:** Chemical control research shows that single herbicide applications do not provide long-term control of Canada thistle because of the complexity in killing the root system. Several herbicides are registered for the control of Canada thistle in rangeland, but applying the product at the proper rate and at the correct time is critical. Herbicides used include 2,4-D, dicamba, clopyralid, MCPA, glyphosate, and picloram. Before using any of these herbicides, be sure to read and follow the labeled instructions.

2,4-D is a phenoxy acetic acid and is the herbicide used the most for control of Canada thistle. For best results, apply 2,4-D at a rate of 1.5 to 2.0 lb acid equivalent (ae)/acre before the
plant reaches the bud stage. MCPA, also a phenoxy acetic acid, is registered for use in rangelands as a low volatile ester formulation at a rate of 1.0 to 1.4 lb ae/acre. These herbicides are a good choice if grass is present or is to be seeded after treatment.

Dicamba is a growth regulator-type herbicide that can be applied during any stage of growth, but appears to be most effective when applied to Canada thistle during the late vegetative to bud stage or in the fall if Canada thistle has eight to twelve inches of regrowth. For broadcast applications dicamba should be applied at 2.0 lb ae/acre. Newly seeded areas may be seriously injured with rates above 0.5 lb ae/acre. Established grass that is growing under stress may be damaged by dicamba.

Clopyralid, another growth regulator-type herbicide, can be applied when Canada thistle is actively growing. Curtail®, a preformulated mixture of clopyralid with 2,4-D, should be applied at a rate of 1.2 to 1.8 lb ae/acre, the higher rate for dense infestations or treatments in bad growing conditions. Stinger® contains only clopyralid and can be used at a rate of 0.25 to 0.38 lb ae/acre. When applied at the rosette to prebud stage, use the lower application rate, and use the higher rate for treatments up to the bud stage or in the fall. These herbicides should not be applied on newly seeded areas.

Glyphosate, a nonselective herbicide, should be applied to Canada thistle at a rate of 2 to 3 lb active ingredient (ai)/acre when the plants are at or past the bud growth stage. This herbicide must be used with caution because it kills nearby desirable vegetation.

The recommended application rate for Picloram is 0.5 to 1.0 ai/acre. It is suggested that the lower use rate be tank-mixed with 2,4-D. A few studies have shown effective control of Canada thistle with the 1.0 lb ai/acre rate, but picloram can stay in the soil for several years and may have an effect on seeding grass or other broadleaf cover.

Conclusion

Canada thistle is a noxious weed that spreads very rapidly by seed and roots. Several methods of control are successful, but its extensive root system makes the treatments difficult and lengthy. It is necessary to integrate management strategies in order to achieve long-term management of Canada thistle. Combinations of mowing, grazing, and herbicides have been successful in reducing the populations of Canada thistle in pasture and rangeland conditions. We recommend that pulling, cutting, and careful spot herbicide treatment be used for small infestations. Implementation of these practices will make sustainable long-term management a success.

References


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