Canada Thistle (Cirsium arvense) Identification and Control

Caitlin Henderson, Robert Schaeffer, and Corey Ransom

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Quick Facts

- Canada thistle originates from Europe and Asia.
- Seeds contribute invasion in new localities.
- Clonal growth contributes greatly to population spread and persistence.
- A single plant can produce over 100 yards (90 m) of roots in 18 weeks.

Introduction

Cirsium arvense (Figure 1) is an invasive perennial weed adaptable to a wide range of habitats. Since its arrival in North America in the 1600s, it has spread throughout much of the country. It has become prevalent in rangelands and disturbed areas in the Intermountain West, displacing native plant species, reducing crop yields, and affecting pasture quality.

Identification

Figure 1.*Canada Thistle*
Source: Mathews, 1902

Canada thistle is a clonal perennial broadleaf weed. It has an extensive root system with rhizomes and adventitious roots. Rosettes (Figure 2) emerge as the early growth stage of this weed, and plants can reach upwards of 1–4 feet (30–120 cm) tall at reproductive maturity. Canada thistle characteristics can differ slightly between genotypes, including flower color, leaf hairiness, spines, etc.

Leaves: Alternate leaves lack petioles and are oblong-shaped, with spines along the edge with irregular lobes.

Stems: Stems are usually smooth, but some have spines and/or fine hairs.

Flowers: Flowers are purple and pink (Figure 3), sometimes white. They have smaller flower heads than other thistles (e.g., musk thistle) and spineless bracts.

Seeds: Seeds are very small with a pappus (tuft of hairs) to aid in wind dispersal.

Figure 2.*Canada Thistle Rosette*

Figure 3.*Canada Thistle Flowers*

Distribution

Canada thistle is highly prevalent throughout the Intermountain West and is found in every county within the state of Utah. Canada thistle is declared a noxious and invasive weed not native to the state (Class 3 [Containment]) and is commonly found in crops and pastures, rangeland and natural areas, along streams and ditches, as well as roadsides and other disturbed areas (Figure 4). Control efforts aim to reduce or eliminate new or expanding weed populations. Known and established weed populations are managed using one or more approaches.

Figure 4.*Seeding Canada Thistle Population (Park City, Utah)*

Life Cycle

Cirsium arvense is a perennial plant that spreads via the seed cycle into new areas or via the vegetative cycle, allowing the plant to establish itself further and continually grow in an area. Vegetative growth refers to the species' continual horizontal root growth and subsequent shoot growth that helps the thistle spread. The vegetative cycle is the predominant cycle causing management concerns (Figure 5).

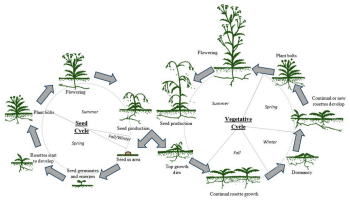


Figure 5. Circsium arvense *Life Cycle*
Source: adapted from Wilson, 2009

Management

Integrated Weed Management

Integrated weed management (IWM) combines the cultural, mechanical, biological, and chemical control methods described below.

Cultural Control

Cultural control methods are effective at controlling Canada thistle. The chosen control method used may be influenced by the size and location of the Canada thistle population, including topography, accessibility, and the presence of waterways. Some methods outlined below are more appropriate for a couple of plants or those found on slopes.

- ***Plant competition:*** Highly competitive plants or crops can compete with Canada thistle for light, nutrients, and water. Plants such as grasses and alfalfa are known to be good competitors against this species. Plants that can establish a dense canopy early on are particularly good at suppressing thistle emergence and development.
- ***Animal grazing:*** Animal grazing reduces seeding as animals feed on the shoots, preventing seeding if timed correctly. Grazing shoots can also stimulate new vegetative regrowth, exhausting root reserves in the process and decreasing the population size. Both the timing and duration of grazing can be an important consideration with respect to animal health. Mature sheep will immediately graze thistles after mowing, but when dry, they are no longer palatable. Goats and cows are also known to graze the plant but prefer younger ones. Grazing should occur before bolting every year to reduce the seed bank.

Mechanical Control

Mechanical control has been used particularly in agricultural systems in conjunction with seeding, planting, harvesting, etc. Repeated physical control is ideal to reduce population densities.

- ***Hand-pulling:*** Generally, hand-pulling is used for the occasional thistle shoot, but established plants will continue to grow from roots.
- ***Mowing:*** Mowing reduces root reserves from stimulated regrowth or buds being released from dormancy, forcing them to produce new shoots. Mowing has also been seen to increase *Puccinia punctiformis* (biological control agent) spread, especially if thistles are visibly infected. Repeated applications are required to reduce population densities, particularly before seeding and throughout mowing. Application over a several-year period will continually reduce populations.
- ***Tillage/cultivation:*** Mechanically breaking up the root system can cause the roots to use up their reserves through stimulated production of new shoots. Root fragments of less than 1 inch (3 cm) can produce new shoots; therefore, careful timing is needed to avoid increasing the population. The timing of this is generally when conditions are less favorable, such as at the end of fall when plants are preparing for overwintering and reserving resources in roots for spring.

Biological Control

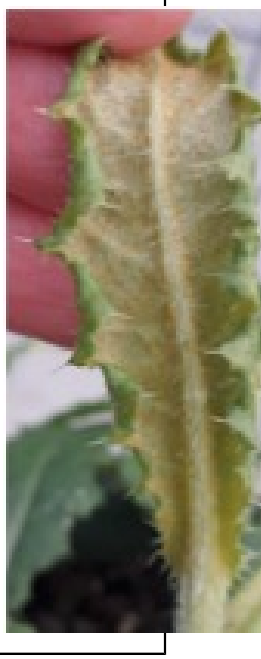
Biological control is controlling a pest by using its natural enemy. Generally, biological control organisms help reduce widespread weed populations but will not completely remove the host species from a site. Biological control agents can be ideal for areas that are more difficult to reach as they are self-perpetuating once established. Several studies into biological control for Canada thistle around the world involve insects, fungi, and bacteria (see Table 1).

Table 1.*Biological Control Agents Released in North America for Canada Thistle Management*

Scientific name	Type	Tested	Effect
Cassida rubiginosa	Insect - Green thistle beetle, tortoise beetle	MD, VA, eastern and central U.S.A.	Defoliates leaves.
Hadroplontus litura (=*Ceutorhynchus litura*)	Insect - Stem boring weevil	CA, CO, ID, MD, MT, NJ, OR, SD, UT, WA (public)	Bores into stem and disrupts carbohydrate movement from leaves to roots, damaging shoots and roots.
Larinus planus	Insect - Seedhead weevil	CA, CO, MD, NY, OH, OR, PA, WA	Infests seed heads and blooming flowers. Destroys a large proportion of leaves.
Orellia ruficauda	Insect - Seed predator (fly)	Throughout North America	Lays eggs in flower heads; larvae feed, reducing seed production and dispersal.
Rhinocyllus conicus	Insect - Flowerhead weevil	ID, MD, MT, OR, UT, WA	Lays eggs in flower heads. Damages plants and reduces flowering.
Urophora cardui	Insect - Gall fly	CO, ID, MT, OR, UT, WA, Canada (public)	Feeding in stem tissue produces gall, reducing thistle growth and

Scientific name	Type	Tested	Effect
			fitness.
Phoma macrostoma	Fungi - White tip disease	Registered bioherbicide in Canada and U.S.A.	Produces photobleaching and death in susceptible plants.
Puccinia punctiformis	Fungi - Canada thistle rust fungus	Naturally distributed (public)	Causes yellow, orange, or brown spores. Plants become chlorotic and stunted, leading to reduced shoot and root biomass

Scientific name	Type	Tested	Effect
			and death.



Chemical Control

Due to its extensive root system, chemical control (Table 2) is a common and effective method for thistle management. However, there are some limitations to chemical use, particularly around waterways and difficult-to-reach areas. Chemical control can also be used in conjunction with other control methods, but applicators should always follow directions on the herbicide label and be especially careful of site appropriateness of the applications.

Table 2.*Summary of Some Common Herbicides and Their Recommended Application for Canada Thistle Management*

Active ingredient	Applicatio	Plant stage	Timing	Comments
Glyphosate	Broadcast, spot	Actively growing plants, budding, flowering	Late spring/ summer, fall	Do not apply to desirable plants.
MCPA 2-methyl-4-chlorophenoxyacetic acid	Spot	Bud to early bloom,	Late spring/ early	Registered in some crops.

Active ingredient	Applicatio	Plant stage	Timing	Comments
		fall regrowth	summer, fall	
Clopyralid	Broadcast, spot	Rosette to bud	Spring/ early summer	Forage and manure restrictions apply.
Metsulfuron	Broadcast, spot	Budding to pre-seed production	Spring, fall	Includes waterway and residential warnings.
Aminopyralid	Broadcast, spot	Fully emerged to flowering	Spring, fall	Forage and manure restrictions apply.
Chlorsulfuron	Broadcast, spot	Pre-bloom to bloom, fall rosette	Spring, fall	Using an adjuvant is required.
Dicamba + 2,4-D	Broadcast, spot	Actively growing	Spring/ early summer, fall	Be aware of temperature restrictions.

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Authors

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