

Weed Biology & Management

Biology and Management of Canada Thistle (*Cirsium arvense*) in Christmas Tree Production



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Canada thistle is native to Europe. It was most likely brought to North America with agricultural seed shipments in the 1600s (Minnesota Department of Agriculture, 2021). It is now broadly distributed throughout the United States and Canada. Canada thistle is a rhizomatous and perennial weed. It is a member of the Asteraceae family, which is one of the largest families of plants with more than 24,000 species. Other weeds in this family include bull thistle (*Cirsium vulgare*), dandelion (*Taraxacum officinale*), and common yarrow (*Achillea millefolium*) (Michigan State University, Department of Crop and Soil Sciences, 2021). Canada thistle is a major problematic weed species in Michigan Christmas tree production. Canada thistle spreads extremely quickly through its extensive root system and seed production. It can spread 10-12 feet in a single season (Washington State Noxious Weed Control Board, 2021). In this article, readers will learn how to identify Canada thistle and possible management strategies to regulate this weed species in their production systems.

Biology of Canada thistle

Canada thistle can be found growing in many disturbed areas including roadsides, trails, fields, pastures, forests, field margins, mining locations, waste areas, and unmaintained gravel pits. This weed species can establish rapidly following new road construction, housing development, overgrazing of pastures, forestry clear-cuts, and flooding events (Minnesota Department of Agriculture, 2021). Canada thistle has a rosette

growth habit which bolts when it flowers. It can grow and spread through rhizomes.

Cotyledons are oval to oblong, around 0.2-0.5 inch (5–14 mm) long. They are thick, joined at the base, and smooth or somewhat glandular. The midvein on the ventral surface is shiny. The first true leaves are alternate to each other on the stem. The edges of the first leaves are wavy to unevenly toothed. The leaves are coated in tough hairs, but lower parts are frequently covered

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sporadically with soft, netlike, hairs. The rosettes of seedlings are poorly developed (Fig. 1) (University of California IPM, 2021).

Canada thistle has both vertical roots and creeping horizontal rhizomes. While most roots occur in the top 18 inches (45 cm) of the soil, vertical roots 77-118 inches (2-3 m) deep are normal (University of California IPM, 2021). The root system can spread 10-12 feet in a single growing season (Washington State Noxious Weed Control Board, 2021). Stems are slim and hairless. Leaves are oblong to lance shaped, mostly 2-8 inches (5-20 cm) long (Fig 2). The leaves are prickly and are alternate to each other on the stem. Occasionally leaf bases extend along the stem joints as prickly wings that are 0.4 inch (1 cm) long. Leaf edges vary from nearly smooth to shallow lobed and toothed. The top of the leaf is almost hairless, and the bottom of the leaf is occasionally slightly woolly. There may be presence of a few rosette leaves (University of California IPM, 2021).

Flowers bloom from June all the way through October. The flowers can be white, purple, or pink. Inflorescence is cylindrical or narrowly egg to bell shaped with a diameter of 0.2- 1 inch (0.5-2 cm) (Fig 3). The flowers are made of numerous overlapping rows of spiny bracts. Male and female flowers are borne on separate plants (The Ohio State University College of Food, Agricultural, and Environmental Sciences, 2021; University of California IPM, 2021). The fruits are single seeded, egg to football shaped, tan in color, 0.08- 0.2 inch (2-4 mm) long, and end in a prolonged cluster of fluffy bristles that are 0.5- 0.8 inch (12-20 mm) long (University of California IPM, 2021). The seeds are around 0.2 inch (4 mm) long and have tufts of bristles to help them in dispersal. An average plant will produce 1500 seeds but can produce up to 5300 seeds per plant (Washington State Noxious Weed Control Board, 2021). Seeds can survive in the soil for up to 22 years, providing for a long-lived seed bank (Beck, 2013).

Propagation:

Canada thistle can propagate through both seeds and vegetatively via rhizomes. The plant tends to put more energy into propagation by rhizome. New shoots may emerge from anywhere on the extensive root system. Tillage encourages new shoot formation from the segmented root pieces. The root segments can survive up to 100 days without photosynthetic energy (Beck, 2013).



Figure 1. Close view of Canada thistle seedling. Photo credits: Purdue University.



Figure 2. Mature leaves of Canada thistle. Photo credits: Washington State Noxious Weed Control Board.



Figure 3. Close view of flowers of Canada thistle. Photo credits: Clemson University, College of Agriculture, Forestry and Life Sciences.



Similar Species:

It can be difficult to tell the difference between Canada thistle and bull thistle (*Cirsium vulgare*). Bull thistle is a biennial weed, it forms a rosette in the first year of growth and creates a flowering system in the second year. Bull thistle stems have



spiny wings while Canada thistle does not (The Ohio State University College of Food, Agricultural, and Environmental Sciences, 2021; University of California IPM, 2021).

Other invasive thistles that are easy to confuse with Canada thistle are as follows: Scotch thistle (*Onopordum acanthium*)

has stems that appear to have wings and the floral bracts are coated in spines. Plumeless thistle (*Carduus acanthoides*) has floral bracts that are covered with sharp spines. Musk thistle (*Carduus nutans*) has floral bracts that are wide and have prickly tips. There are also some native thistles that can be confused with Canada thistle. Wavyleaf thistle (*Cirsium undulatum*) has flower bracts that often have a prominent white glandular dorsal ridge. Leafy thistle (*Cirsium foliosum*) has leaves bordering the terminal flowers that are pink to white. Yellow spine thistle (*Cirsium ochrocentrum*) has flower bracts that are wrapped with hairs and have a spreading yellow spine at the tip (Colorado Weed Management Association, 2021).



Management of Canada Thistle:

Non-chemical control: An important step in non-chemical control for Canada thistle is to mow or cut the stem each year in late June before flowering. Canada thistle will continue flowering after it is mowed so it must be continuously mowed throughout the mid to late summer. It is also imperative that equipment used in fields with Canada thistle is carefully inspected and cleaned before being moved to other fields (Minnesota Department of Agriculture, 2021).

Chemical control:

Preemergence control: There are few preemergence herbicides that will control Canada thistle in Christmas trees. Some

herbicides that may provide control include flumioxazin (Sureguard 51WDG), hexazinone (Velpar 2L), and flazasulfuron (Mission 25 WG). Growers must check the labels and application timing of these preemergence herbicides to avoid potential phytotoxicity to their Christmas trees.

Postemergence control: Postemergence herbicides that provide control of Canada thistle in Christmas trees consist of 2,4-D (Defy Amine 4 and Turret 5.5 L), triclopyr (Garlon 3A), glyphosate (Roundup Ultra 4L), and clopyralid (Stinger 3L). These herbicides will not cause much damage to the root system of Canada thistle and therefore do not act as long-term control. It is most often recommended to apply spot treatments directly to the thistle to avoid damage to Christmas trees. Growers need to be cautious with the application timings of these postemergence herbicides so that they prevent possible damage to Christmas trees. In general, conifers will be most susceptible to phytotoxicity if they are exposed during active shoot growth phase (early- to mid- summer).

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