



# Managing Nodding and Canada Thistle on Native Grassland



Canada Thistle

## Introduction

Canada thistle (*Cirsium arvense*) was introduced to North America from Europe in the early 1600s and has been considered one of the most tenacious and economically devastating agricultural weeds for many years. It grows best in northern regions where temperature and rainfall are moderate therefore doing extremely well within the climatic conditions of Canada. Only recently has Canada thistle been recognized as a problem in natural areas.

Nodding thistle (*Carduus nutans*), also a native species of Europe and Asia, was introduced to North America over a hundred years ago as a seed contaminant. Invasion of nodding thistle is particularly intense after cool, wet summers and falls when seed production and seedling establishment are high. Due to large amounts of seed

produced, nodding thistle is able to spread very quickly and has done so throughout much of Canada and the United States.

Nodding and Canada thistle will invade meadows, prairie, pastures, rangeland, roadsides, native grasslands and any areas that are subject to disturbance. Canada and nodding thistle compete effectively with native species for space, nutrients, water and light preventing the coexistence of other plant species through shading and the release of chemical toxins which are poisonous to other plants.

## The Problem

Native prairie is part of our natural history and is important as a grazing resource, wildlife habitat, and for soil and water conservation. With few to no natural enemies in their new habitat, many exotic species

have the ability to out compete many of the native plant species. Threats such as invasion of exotic species can degrade our prairie by excluding native species which reduces biodiversity, carrying capacity, habitat and the aesthetics of our prairie ecosystem.

Both nodding thistle and Canada thistle have many characteristics that allow them to out compete native grassland species:

- They begin their growth early in the spring which allows them access to available nutrients and surface moisture.
- Both types of thistle can grow to be quite tall. Nodding thistle can grow in an excess of 183 cm (6 feet) and Canada thistle can grow to be on average 61-91 cm (two to three feet).

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The height of these weeds enables them to effectively shade surrounding native species resulting in insufficient amounts of sunlight being received by native species.

- **Prolific seed production:** A single nodding thistle flower head may produce up to 1,200 seeds and a single plant can produce up to 20,000 seeds in favourable conditions. The seeds of both species can stay viable in the soil for an extended period of time (nodding thistle for over 10 years and Canada thistle for over 20 years).
- Canada thistle produces many bristly-plumed seeds that are easily dispersed by the wind and are able to germinate in 8-10 days.
- Nodding thistle can flower several times per year with a late fall bloom just prior to frost.
- Canada thistle has an extensive underground root system. Its roots can grow more than 3 meters (10 feet deep) and spread 4-5 meters (12-15 feet) laterally per year. These deep roots allow Canada thistle to access surface and soil moisture enabling it to be drought resistant.
- **Vegetative reproduction:** The root buds of Canada thistle occur randomly along the roots initiating new shoots. Root segments less than an inch can generate new shoot growth.
- They are unpalatable to cattle and wildlife.

## Control of Canada and Nodding Thistle

### 1. Prevention

Prevention is the most effective means of control. Nodding thistle reproduces only by seed therefore the key to success is to prevent flowering. Canada thistle spreads through seed and underground rhizomes so the top growth and the underground growth must be killed to control populations. Ensure that proper grazing management and rotation practices are being utilized. Grazing systems such as controlled or rotational grazing can be very effective in preventing thistle establishment. As well, caution should be taken when transporting manure, mowers, and other equipment from an infected area to an uninfected area. Ensure that all equipment and clothing is thoroughly cleaned after contact.

### 2. Containment or Eradication

When small thistle patches are detected they should be aggressively treated before they can spread and become established. Hand pulling prior to seed development is most effective for small populations. For larger populations an integrated approach combining two or more different management techniques like mowing and chemical control will be most effective and achieve the desired results.

### 3. Monitoring

Canada and nodding thistle cannot be controlled with a single treatment. Continuous monitoring and reapplication of the treatment will be required. Producers should

## Nodding Thistle



be prepared to be active in the control of thistle for several years. Management plans should be specific; land use and grazing management of native range, soils, climate, location and topography should all be taken into consideration. Depending on the response of the thistle, the treatment may need to be adapted from time to time. A few simple ways to monitor progress in thistle control is by mapping and tracking populations, taking photos and recording the number of plants cut each year. It is also helpful to record your management actions (timing, location, intensity, plant stage) as well as weather conditions and changes in the plant community. Management must be persistent and constantly adapted to effectively control thistle spread.

## Management Techniques

### Grazing

Due to the level of unpalatability of nodding thistle and Canada thistle to livestock, grazing is usually not considered to be a means of control. It has been suggested that horses will graze nodding thistle, but this as a control method has not been tested.

### Biological Control

#### 1. Nodding thistle

There are two weevils that have been used in the United States and Canada; the thistle head weevil and the thistle crown weevil. The larvae of the thistle head weevil (*Rhinocyllus conicus*) develop in flower heads of nodding thistle and feed on the seed as it develops. The thistle head weevil can cause significant reductions in seed production but are only attracted to early blooming flower heads. Late blooming flower heads are still able to produce seeds which are subject to very little weevil damage. Often this is enough to sustain the population. The thistle crown weevil (*Trichosiromus horridus*) feeds on the apical meristem (growing points of a plant where new cells are formed, such as the tips of the roots or stems) of rosettes and developing stems. These weevils cause multiple stems instead of one stem to be produced, which can be beneficial since the multiple stems produce small flowers with few seeds, especially if the thistle head weevil is present as well.

#### 2. Canada thistle

Several native European insects have been used in Canada with limited success.

The Canada thistle stem weevil (*Ceutorhynchus litura*) feeds on the stems of the plant and chews an escape hole below the soil surface. This weakens the plant and may result in winter kill as these holes allow for other organisms to enter the stem during the winter period. A drawback to this weevil is that it increases its population and spreads very slowly, therefore as a control agent; it is not very promising unless grouped with another. Another insect, called the stem thistle gall fly (*Urophora cardui*) produces meristematic galls that resemble a small crab apple in the stems of Canada thistle. This causes a decrease in plant vigour making the plant less able to compete, resist pathogens, and resist attacks by other insects. Often the stems above the galls are unable to produce flowers. As well, this insect has limited value as it usually only attacks after the majority of the thistle stand has completed 80 percent of its growth and by itself will not kill Canada thistle. Other common insects that have been used in the past are the stem weevil (*Hadroplontus litura*) and the leaf feeding beetle (*Lema cyanella*). Both of these insects have not yet shown significant impacts on the control of Canada thistle.

When using weevils to control nodding and Canada thistle:

- **Select sites that are appropriate for the weevils' habitat preferences. Choose a dense patch of thistle that will not be disturbed for a few months.**
- **Obtain starter colonies. Hand pick adult beetles in early**

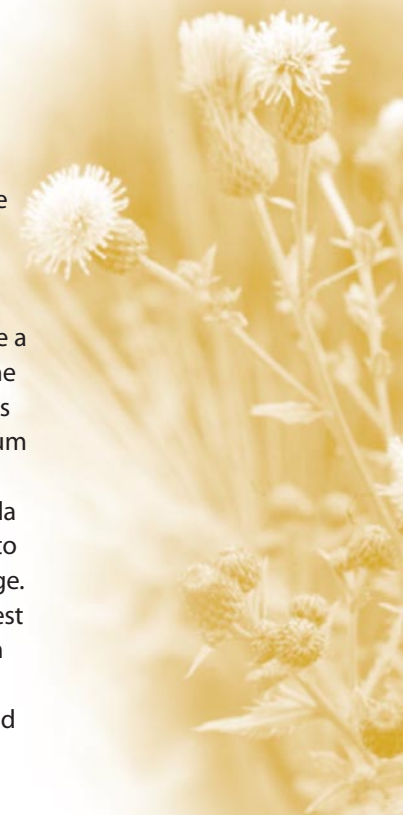
spring before plants have bolted (to stiffen upright or grow in length). Adults can also be collected by bending the upper portion of the plant over a sweep net or pillowcase and tapping it. The weevils will then need to be separated from other insects.

- **Store adult weevils in paper containers with tight fitting lids in a cool place (<27 degrees Celcius). Do not use plastic to store weevils, as condensation is a problem. With a sufficient supply of food, adult beetles may be stored up to one week.**
- **Release a minimum of 300-500 weevils per site. For larger infestations release weevils at a number of points. It is best to start colonies in thistle that has elongated (to lengthen or grow) and formed buds. Release weevils in the evening placing approximately 10 weevils on a plant.**
- **Monitor sites and make additional releases only if the weevils fail to become established.**

### Chemical Control

For controlling nodding and Canada thistle, herbicides are best applied in the fall to be most effective. Herbicides should be applied as late as possible in the fall but before a killing frost. This allows for the plant's rosette size to be at its maximum as well as maximum number of seedlings to emerge. Nodding and Canada thistle are most susceptible to herbicides in the rosette stage. For spring application the best time to apply herbicides is in the early bud growth stage. Picloram is most effective and can be mixed with 2, 4-D for broad-spectrum control. The

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combination of these two or the use of Picloram alone gives the best late season control. Several years of annual re-treatment will be required to suppress thistle growth; 2, 4-D alone applied in spring (10-14 days before bolting) can also be used to suppress thistle spread. For foliar spraying use a two percent solution of glyphosate or triclopyr and water plus a half percent non-ionic surfactant, wetting all leaves and stems. Treatments should be applied in the rosette stage or prior to flowering. Glyphosate is a non-selective systematic herbicide that can kill non-target species; triclopyr is selective to broadleaf species and is the better choice if native grasses are present. It is important to note that the effectiveness of chemical control is dependant on weather and the stage of plant growth. Targeted applications of glyphosate can be used but repeated applications are usually necessary due to the long life of seeds stored in the soil. Refer to the Crop Protection Guide published by Saskatchewan Agriculture, Food, and Rural Revitalization for application rates and procedures.

#### **Mechanical**

Repeat mowing will prevent seed production and reduce infestations (more so for nodding thistle). First mowing should be done in the spring when plants are in the very

early bud stage. Several more will likely be required due to the varying of plant age. Cutting should be at onset of blooming after first anthesis (the flowering period, when the flower is fully expanded and functioning) but before seed set. Mowing must be repeated over a period of years, until the starch reserves in the root are exhausted in order to be effective.

#### **Using Combinations of Management Techniques**

##### **Burning and Chemical control/Mowing**

Fire has not been an effective method for directly controlling Canada thistle but when used prior to herbicide application it can be effective. Spring burning will enhance the growth of native herbaceous species. It should then be followed with cutting or spot treating when it is in its late bud or early bloom stage. Shoot growth must be prevented for at least two years to deplete roots and kill Canada thistle.

##### **Chemical Control and Mowing**

Control may be improved if thistles are cut in late July and then treated when resprouting occurs with glyphosate about four weeks later. Mowing thistle in the growing season will weaken the plants and stimulate even re-growth making herbicide application more effective.

## Summary

Nodding and Canada thistle are extremely competitive species that have the ability to invade and out compete desirable species in native grasslands, rangeland, pastures and other disturbed areas. Controlling thistle is best achieved using an integrated approach combining biological, mowing and chemical techniques. Management must be persistent and constantly monitored to achieve long-term control of thistle infestations.

### For Further Information

A bibliography of the resources used to prepare this factsheet is available from the Saskatchewan Watershed Authority. Factsheets on other species and topics are also available.

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