

HOW TO WIN

THE WAR ON

May 2008



The Enemy



Signs



Solutions

TIPS FOR PASTURE MANAGERS

CANADA THIS YEAR



Pasture with large Canada thistle patches established from its creeping root system.

DID YOU KNOW?

CT roots normally spread 1-2 m per year, but can extend 6 m.

CT root fragments as small as half a cm long can produce viable plants of this weed, making it very hard to control with cultivation.



UNDERSTANDING THE ENEMY

Canada Thistle

is a common perennial weed. Although a prolific seed producer, much of its reproduction is from its large, creeping root system, enabling it to tolerate a high degree of disturbance.

Under the guidelines of the Alberta Weed Control Act, CT is listed provincially as a noxious weed, indicating that where present, this species must be controlled, including preventing its spread.

CT is considered by livestock producers to be the most problematic pasture weed throughout the prairie provinces.



Rosette



Bolting



Early Bud



Flowering

Life stages of Canada Thistle



Well managed pasture with no Canada thistle.

DID YOU KNOW?

In the absence of weed control, the practice of fertilization within infested pastures can increase CT biomass by 21%, making the weed problem worse and leading to a waste of economic inputs.



Pasture heavily infested with Canada thistle north of Edmonton.

WHY BATTLE CANADA THISTLE?

Canada Thistle

is an aggressively growing species, capable of robbing forage plants of light, water and nutrients within the pasture.

Significant yield losses have been found across many sites of central Alberta, with forage yield losses peaking at 2:1. Thus, every 1 lb/acre of CT biomass was associated with the loss of 2 lbs/acre of forage (See Fig. 1).

Control of CT from these stands improved pasture yield in direct proportion to the amount of CT removed.

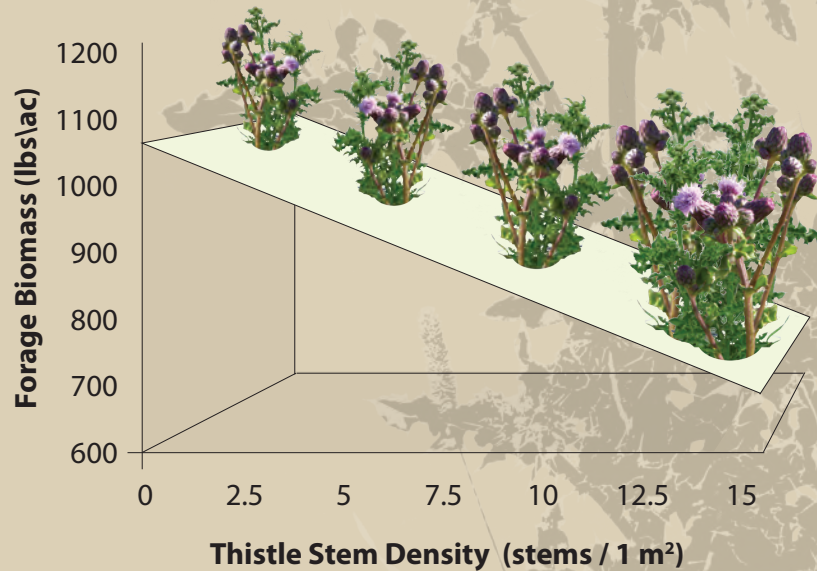


Figure 1: Typical pasture forage yield loss associated with increasing CT abundance.



Seed Dispersal



DID YOU KNOW?

Active pasture treatments to control CT should be timed to the early bud stage of growth, when flowers are just starting to develop, to cause the greatest long-term damage to the weed.



Table 1: Cost benefit comparison of herbicide application for CT control.

Herbicide Treatment	Application Rate (L/ac)	Cost* (\$/ac)	Value of Forage Return (\$/ac)**		Net 1-Year Return (\$/ac)	
			Unfert.	Fert.	Unfert.	Fert.***
2,4-D (Ester 700)	1.00	17.13	31.85	132.27	14.72	55.14
Dyvel-DS	1.30	21.48	45.01	137.52	23.53	56.04
Lontrel	0.24	44.15	26.25	134.33	-17.90	30.18
Grazon	1.50	27.34	51.28	141.75	23.94	55.14

* Includes herbicide + \$6/ac custom spraying cost.

** Returns based on \$0.035/lb of incremental forage yield.

*** Includes a cost of ~\$60/ac for fertilization (100 lb/ac of 100-45-10-15).



TOOLS PRODUCERS HAVE IN THEIR ARSENAL

Integrated Weed Management

strives to simultaneously combine several methods of control to achieve greater overall reductions in weed populations.

Broadcast Spraying

Where CT is an existing problem, herbicides can be used to knock back weeds and kick-start the process of pasture recovery. Combining fertilization with herbicide application can further meet this objective.

The following is a summary of key research results evaluating CT control on Alberta pastures:

1. While all herbicides (Dyvel DS, Lontrel, Grazon P+D, and 2,4-D) reduced CT the year of application, the greatest long-term reductions (up to the third year) occurred with systemic herbicides containing picloram (Grazon) and clopyralid (Lontrel) (See Fig. 2).
2. The inclusion of annual pasture fertilization with herbicides greatly enhanced CT control in the second and third years (See Fig. 2).
3. Greater CT control was partly due to increases in forage biomass of up to 27% following suppression of the competing weed (See Fig. 3).

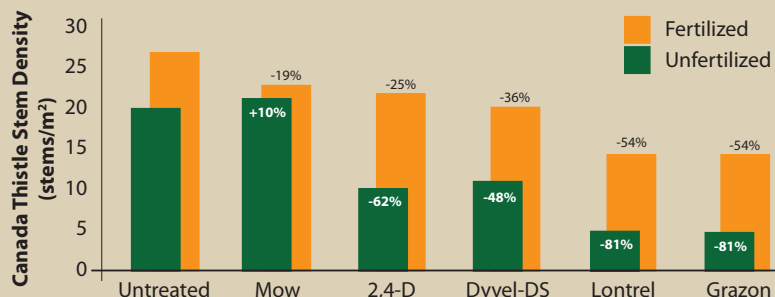


Figure 2: Comparison of CT stem densities 2 years after a single treatment.

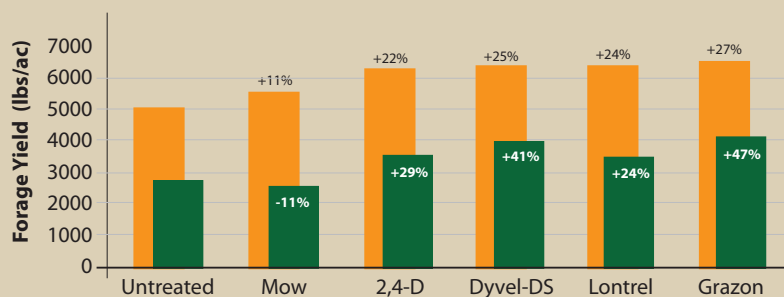


Figure 3: Comparison of forage yields 1 year after treatment.

4. In the absence of weed control, fertilization increased CT biomass and stem density (See Fig. 2).
5. Herbicides consistently generated a net positive economic return based on the value of added forage one year after treatment and the cost of the herbicide including its application (See Table 1).
6. While one-time mowing prevented seed production in the year of treatment, CT stem densities promptly increased, with mowing not having any long-term benefits. Mowing is only effective if repeated several times annually over several years.



DID YOU KNOW?

Weed wipers are often available from your local Agricultural Service Board.



Use of a weed wiper to control CT.

Selective Herbicide Application with Wiping Technology

Another option for CT control is the use of weed wipers, which strive to selectively apply concentrated herbicide to weeds taller than the forage stand. Wipers are thought to both reduce herbicide use, as well as environmental impacts by limiting herbicide exposure to non-target forage plants (eg. legumes).

Wipers come in a range of models and sizes, and can be used manually, or with quads and tractors.

Recent wiping trials in central Alberta indicate :

1. Wiping with a 33% concentration of glyphosate reduced CT biomass and stem density, but also resulted in the loss of forage biomass of up to 31% (See Fig. 4).
2. Wiping with broadleaf herbicides at cost equivalent concentrations ranging from 2-24% led to similar or better reductions in CT, but also maintained forage yields (See Fig. 4).

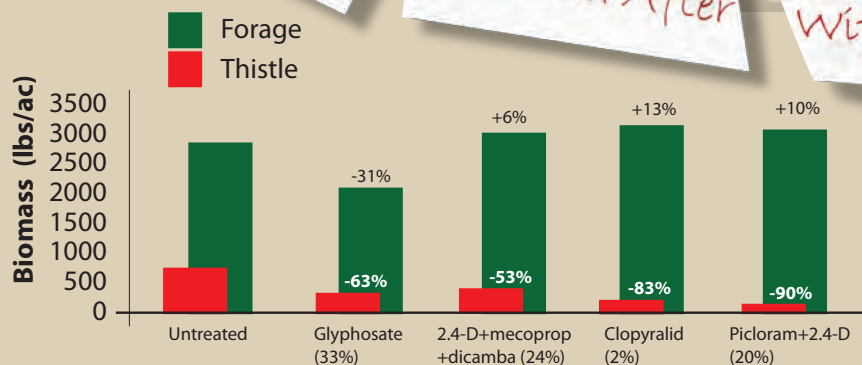


Figure 4: Comparison of forage and CT biomass 1 year after wiping. (rates based on v/v % solutions of commercial formulation with water)



Cattle under rotational grazing using portable electric fencing.

DID YOU KNOW?

A healthy competitive forage stand may be the best defense against pasture weeds, and reduce the need for other forms of weed control.



Biological Control of CT Using Grazing

Classical biocontrol on CT using insects and disease has had limited success in Canada.

However, pasture weed control also entails the proactive control of weeds like CT by maximizing competition from healthy forage plants. Deferring grazing until late summer increases forage production, which in turn, increases competition against and the suppression of, CT.

Where grazing during the growing season is necessary, healthy pasture stands occur when levels of forage removal are balanced with forage tolerance to leaf loss and subsequent pasture recovery. Grazing systems are a basic tool that producers have to control the impact of grazing animals on pasture vegetation, including unpalatable plants like CT.

In particular, rotational grazing systems involve the movement of livestock among a number of pastures throughout the grazing/growing season, which allows for intermittent recovery from the stress of defoliation.

Consider the following:

1. Maximum season-long accumulated forage yields in the Parkland of Alberta occur with HILF (high intensity - low frequency) defoliation, typified by a short period of intense defoliation and a prolonged recovery period of ~6 weeks. Continuous defoliation resulted in the lowest pasture forage yields (See Fig. 5).
2. Trends in CT weed abundance were opposite to those of forage yields, being greatest in the continuous treatment, and lowest with HILF or deferred defoliation, highlighting the importance of controlled defoliation for increasing forage growth and suppressing weeds like CT (See Fig. 5).
3. Maximum forage yields were more closely tied to long recovery (i.e. rest) periods following defoliation events rather than the intensity of defoliation.
4. Field studies with cattle indicate that livestock can be a highly effective tool for controlling CT. The high stocking densities

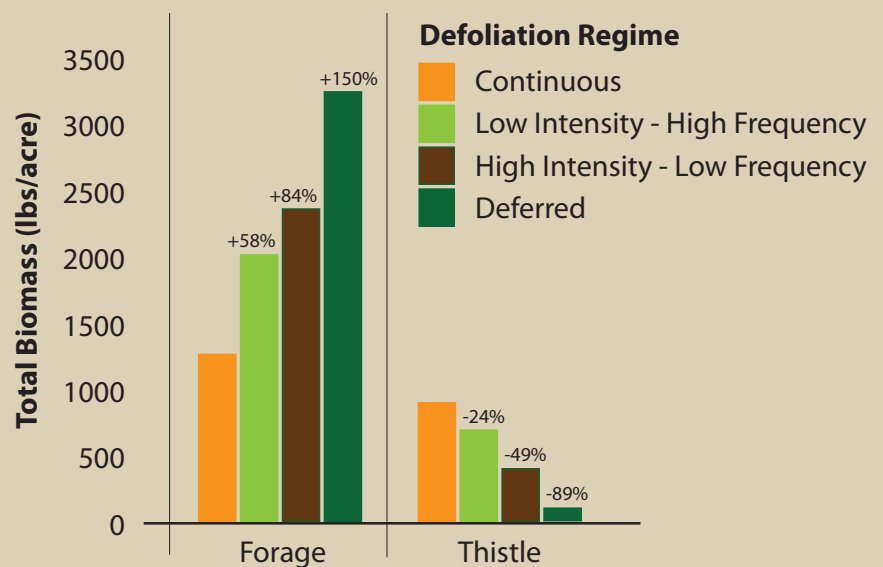


Figure 5: Changes in forage yield and CT biomass under different defoliation regimes compared to continuous defoliation in central Alberta.



DID YOU KNOW?

Rotational grazing systems are highly effective at retaining desirable forage plants in the stand (like alfalfa), and maintaining pasture condition and productivity.



Comparison of HILF (left) and continuous (right) grazing treatments near Rimbey, Alberta.

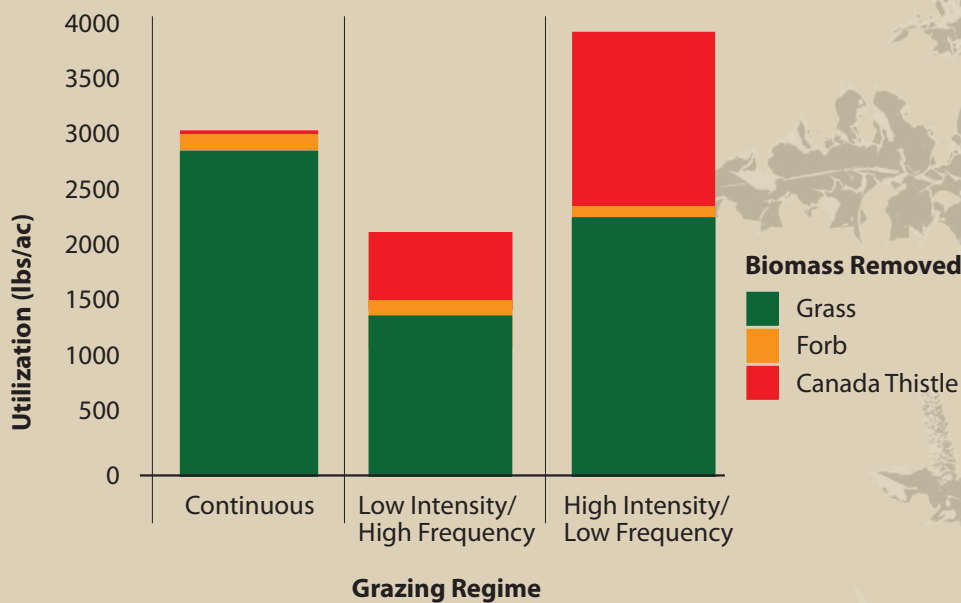
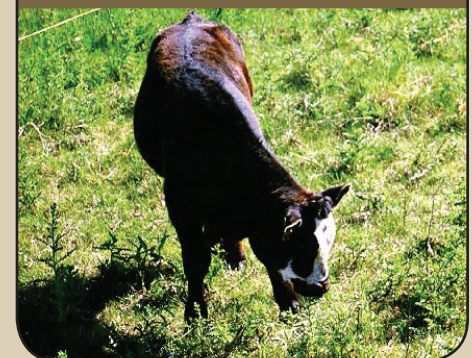


Figure 6: Comparison of total forage and CT biomass removed by cattle under various grazing systems in central Alberta.

- of animals associated with rotational grazing systems encourage cattle to damage CT, in part due to defoliation.
5. Cattle were willing to consume up to 1390 lbs/ac of CT biomass under an HILF grazing system, but hardly touched CT under a free-choice, continuous system (See Fig. 6).
6. Cattle also prevented the weed from flowering and producing seed, restricting the potential for future weed spread.
7. Cattle were so effective at reducing CT after 3 years, that little regrowth of the weed was evident following the removal of HILF grazing (See picture above).

DID YOU KNOW?

The forage quality of CT plants in the rosette stage is high, with crude protein levels at 18.6%, and total digestible nutrients of 83%.



SOLUTIONS TOOLBOX

Biocontrol using rotational cattle grazing



Selective herbicide application using wiping technology



Enhanced plant competition through fertilization



Broadcast herbicide application for wide-spread infestations



Integrated CT Control

CAN CANADA THISTLE BE DEFEATED?

There are many tools that producers can use to control thistle. Where this weed is an existing problem, herbicides, either broadcast in conjunction with fertilization, or wiped, can be effective in controlling thistle and boosting forage yields. Similarly, changing from a continuous to a rotational grazing system can reduce thistle abundance, as well as increase accumulated forage yields. Although weeds such as Canada thistle will likely never be eliminated, the integrated use of many beneficial management practices, including herbicides, fertilization and rotational grazing systems, can work together to minimize their impact on pasture and livestock production.



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