

UNIVERSITY OF WYOMING

Cooperative Extension Service
College of Agriculture
Big Horn Mountain Extension Area
Johnson County Office

762 W. Fetterman
Buffalo, WY 82834
Phone: 307-684-7522
Fax: 307-684-7522 (call ahead)
bhorn@uwyo.edu

LAND & LIVESTOCK

Blaine E. Horn, Ph.D., CPRM
University Senior Extension Educator
Rangeland & Forage Management

Herbicide Affect on Canada thistle in an Irrigated Cool Season Grass Hay Field – Daly Ranch

Due to the presence of Canada thistle in the cool season grass hay plots at the Daly Ranch herbicides were applied to the plots on 17 June 2004, 6 June 2005, and 1 June 2006. Herbicide treatments were none (Check), Overdrive @ 8 oz/ac, Plateau @ 12 oz/ac, Redeem @ 2 qt/ac, and Tordon 22K @ 1 qt/ac. All were applied with methylated seed oil (MSO) @ 1 qt/ac, except for Tordon 22K. In 2006 an LV 6 2,4-D @ 2 qt/ac was applied instead of Plateau because of its apparent lack of effectiveness. Note: it is not recommended for Canada thistle control. Location of each herbicide across the grass plots was randomly selected within the four replications.

Observations – 2004 and 2005

By 17 June 2004 Canada thistle plants had bolted and seed heads developing. It would not be advisable to wait until this growth stage before applying an herbicide. However, the following visual observations were made on 2 July, two weeks after application and just

prior to hay harvest. Plants in the non-herbicide (Check) areas were beginning to flower. Whereas the stems of plants sprayed with Overdrive, Redeem, and Tordon 22K had curled, plants were yellowing, and with regard to Tordon 22K some had even turned brown. Plateau had little effect.

In 2005 the Canada thistle plants were just beginning to bolt on 6 June the day herbicides were applied. Height of the grasses was two feet or better and stem elongation on most species was underway. Application of the herbicides probably should have occurred a week to ten days earlier. However, within four days of application Canada thistle plants were showing signs of herbicide injury for all herbicides, except Plateau. However, by 28 June plants treated with Plateau did show some signs of injury – some yellowing and stunting of seed stalks. Plateau also had a negative effect on grass growth. By 20 June all grasses were stunted due to inhibition of

stem elongation. Thus hay yields of the areas treated with Plateau were probably reduced. Redeem also had a negative effect on some of the grasses. By 10 June – four days after application – leaves of Bozoisky Russian wildrye were badly burned and this condition was still present on the 20th but by the 28th – three weeks after application – the grass appeared to be recovering. As a result of this leaf injury hay yields were probably reduced. Luna and Mandan pubescent wheatgrass and NewHy hybrid wheatgrass leaves were slightly burned on the 10th but grew out of it quickly and thus there probably was not a reduction in hay yield for them.

Canada thistle plants per acre – 2006/2007

Initially the plan was to obtain grass hay yields from each herbicide x grass sub-plot to determine if there were production differences among the treatments. This was done in 2004 a week after herbicide application. Thus, as would be expected, there were no differences in grass hay yields among the herbicide treatments. Because of the amount of time it took to clip grass from within a sampling hoop from this many sub-plots (180) hay yields for each were not determined thereafter. However, some type of data was needed to be collected to determine if the herbicides were having an effect on the Canada thistle. Thus counting the number of Canada thistle plants found within two 0.5 m² sampling hoops per sub-plot was done in 2006 and 2007. Because a baseline of Canada thistle plants per acre was not established for 2004 it can only be speculated that any differences in plant numbers among herbicide treatments in 2006 was due to the treatments.

On 26 May 2006 the number of Canada thistle plants per acre was estimated for each herbicide x grass sub-plot. Number of Canada thistle plants per acre for each herbicide is an average over all grasses and the number for each grass is an average over all herbicides.

<u>Herbicide</u>	<u>Plants/acre</u>
Check	44,897
Overdrive	14,704
Plateau	70,712
Redeem	5,837
Tordon 22K	2,694
<u>Grass</u>	<u>Plants/acre</u>
Bozoisky RWR ¹	18,789
Hycrest CWG	32,124
Luna PWG	12,122
Mandan PWG	18,587
NewHy HWG	22,224
Critana TWG	44,650
Rosana WWG	21,012
Manchar SBG	33,740
Regar MBG	46,670

¹RWR – Russian wildrye; CWG – Crested wheatgrass; PWG – Pubescent wheatgrass; HWG – Hybrid wheatgrass; TWG – Thickspike wheatgrass; WWG – Western wheatgrass; SBG – Smooth brome grass; MBG – Meadow brome grass

Plateau had little effect on Canada thistle with plant density possibly increasing under this treatment. The number of Canada thistle plants in the Overdrive, Redeem and Tordon 22K treatments was significantly less ($P < 0.05$) compared to the Check treatment. Whether Canada thistle plants increased in density within the Plateau treatment and decreased within the other three herbicide treatments between 2004 and 2006 is not known but can only be assumed.

The possible reason that Canada thistle plant numbers were highest within the Regar meadow brome grass and Critana thickspike wheatgrass plots was that stands of these two grasses were not as thick compared to the other grasses due to seed flow problems at time of planting in 2003.

Number of Canada thistle plants per acre was again estimated for each herbicide x grass sub-plot on 12 June 2007.

<u>Herbicide</u>	<u>Plants/acre</u>	<u>Change from 06</u>
Check	33,785	-11,112
Overdrive	8,306	-6,398
Plateau/2,4-D	29,295	-41,417
Redeem	3,816	-2,020
Tordon 22K	1,122	-1,571
<u>Grass</u>	<u>Plants/acre</u>	<u>Change from 06</u>
Bozoisky RWR ¹	14,950	-3,839
Hycrest CWG	15,355	-16,769
Luna PWG	9,496	-2,626
Mandan PWG	13,536	-5,051
NewHy HWG	11,314	-10,910
Critana TWG	18,183	-26,467
Rosana WWG	15,143	-5,859
Manchar SBG	16,567	-17,173
Regar MBG	22,830	-23,840

Application of a low volatile (LV) ester 2,4-D instead of Plateau in 2006 apparently had a significant negative effect on Canada thistle as plants per acre declined by over 41,000 from 2006. However, numbers also declined within the Check treatment by an average of just over 11,000 plants per acre. Some of the differences may be attributed to not placing the sampling hoop in the exact location as the previous year as well as grass stands thickening and being more competitive, especially that of Regar meadow brome grass and Critana thickspike wheatgrass.

Summary

Three contiguous years of Tordon 22K herbicide application appeared to have provided the best control of Canada thistle followed by Redeem. Overdrive was effective but not to the same degree as Tordon 22K and Redeem. Plateau apparently was not effective in reducing Canada thistle following two years of use but a single application of a LV ester 2,4-D appeared to significantly reduce Canada thistle. What is not known, however, is whether or not the previous applications of

Plateau contributed to the decline in Canada thistle between 2006 and 2007. In addition, it is also not known what level of control would have been obtained by 2006 and 2007 if the herbicides had been applied only in 2004. And how many Canada thistle plants there would have been in 2007 if herbicide application had not been done in 2006. Multiple year herbicide applications can be expensive and prohibitive. To justify such benefits, as in a substantial increase in crop (hay) yields, have to outweigh the costs.

January 2008 prices per acre from North Dakota Weed Control Guide @ applied rates: Overdrive \$20; Plateau \$25.30; Redeem \$28; Tordon 22K \$30; LV ester 2,4-D \$11.50; and MSO \$3.75. Thus total treatment costs, not including application costs, for each herbicide treatment was: Overdrive + MSO \$71.25/ac; Plateau + MSO and 2,4-D \$69.60; Redeem + MSO \$95.25/ac; and Tordon 22K \$90/ac.

Can these costs be justified? Probably not! Although hay yield data for each herbicide x grass treatment was not obtained there were no obvious visual differences in grass growth among the herbicide treatments. Control of Canada thistle within a perennial cool season grass irrigated hay field is desirable for no other reason than to limit its spread to other areas and to reduce the amount in the hay. However, a well established grass stand may be able to effectively compete with the thistle and a low cost application of a 2,4-D product may be all that is needed. Harvesting the hay crop prior to thistle seed set would also be advisable in helping to reduce its spread.

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