

## Control of Canada Thistle with Herbicides

Jim E. Smith and Donald R. Clark<sup>1</sup>

### Abstract

A trial was established at the Klamath Experiment Station Worden Site at Lower Klamath Lake to evaluate efficacy of herbicides for control of Canada thistle (*Cirsium arvense*) in pasture. Chemicals evaluated included Transline® (clopyralid, Dow Agroscience), Ally® (Metsulfuron, E.I. duPont), Weedmaster® (a combination of Dicamba and 2,4-D Amine, BASF), and Roundup Ultra® (glyphosate, Monsanto). Twelve treatments included herbicides used alone, or in tank mix combinations, with Transline at two application rates. Treatments were evaluated for early vigor control and percent desiccation, and regrowth several times prior to frost-induced dormancy. Transline, alone or in combination, was most effective in reducing regrowth. Ally was least effective in early visual control and regrowth prevention. All treatments were similar in desiccation rate. Control ratings will not be finalized until regrowth is evaluated in spring 2002.

### Introduction

Canada thistle has become a very persistent and problematic plant in our current agriculture production system by competing with crops, contaminating forages, and reducing pasture productivity and quality. Klamath Experiment Station (KES) currently operates a pasture on a muck soil experimental site at Lower Klamath Lake, close to Worden, Oregon. Canada thistle has invaded and spread at this

site, providing an opportunity to evaluate control measures. A replicated trial was established to investigate herbicides individually and in combinations of Transline with Weedmaster, Ally, and Roundup Ultra for control of Canada thistle. Efficacy was measured through the 2001 growing season, and will be re-evaluated in 2002 for long-term effectiveness.

Canada thistle is a native of Eurasia and was introduced to America around 1750 (Whitson, 1996). Canada thistle is a profusely rooting perennial noxious weed. It can reproduce from seed or vegetatively from underground nodes. Canada thistle is a dioecious plant, requiring both male and female plants for sexual reproduction. Plants bloom when day length reaches 14 to 16 hours. Seed production ranges from up to 100 seeds per head, to 5,000 seeds per plant. Seeds are viable 8-10 days after blooming and maintain viability for up to 20 years in the soil. Extensive roots allow vegetative propagation, with horizontal growth up to 15 ft at depths from 6 to 15 ft. New plants can develop from pieces as small as 0.25 inches long and 0.125 inches in diameter. These pieces can survive 100 days without photosynthesis. A 6- to 8-week old plant can produce new growth from roots if its top is removed. Roots exude toxins inhibiting neighboring species. Canada thistle forms patches wherever it grows (spreading rhizomes), and each patch is of one sex. Male plants do not form seed. Seed from the female plant is wind

<sup>1</sup> Faculty Research Assistant and Assistant Professor, respectively, Klamath Experiment Station, Klamath Falls, OR.

blown, enhanced by the attached plumose bristles.

Transline is a plant growth regulator (auxin imitator), which is active on many broadleaf plants and some grasses. It has foliar and soil activity with a 15- to 84-day half-life. It is a liquid material containing 3 lb/gal active ingredient (ai). There are no grazing restrictions on this compound; however, it is concentrated in the urine of livestock feeding on treated plants, and can be deposited with the urine. Therefore, it is recommended that livestock be fed untreated hay prior to moving to a susceptible crop, such as mixed pasture containing beneficial broadleaf plants. Residue from treated plants should not be used for any growing purpose, especially not as compost for gardens, since the active ingredient remains within the plant and can cause damage to susceptible plants.

Ally is a dry flowable granule containing 60 percent ai by weight. Ally is a sulfonyleurea compound absorbed through the foliage of broadleaf weeds, and the label recommends application to young, actively growing weeds. Ally is an amino acid inhibitor, causing meristems to cease growth with accompanying growth symptoms, such as yellow, pink, and purple coloration. Ally works slowly, requiring up to 3 weeks for symptoms to develop. There are no grazing restrictions following application of Ally.

Weedmaster, a combination of dicamba at 1 lb/gal ai and 2,4-D Amine at 2.87 lb/gal ai, is a synthetic auxin, or plant growth regulator. Typical symptoms occurring from treatments with this compound include epinasty, or distorted new growth. Dicamba has foliar and soil activity, while 2,4-D has mainly foliar activity. Grazing

restrictions for pasture application include 7 days for lactating livestock, none for non-lactating livestock, and 30 days to slaughter restriction. Haying restrictions require a 37-day preharvest interval (PHI).

Roundup is a foliar-applied, amino acid inhibiting compound, effective against a great number of weeds, including perennial, annual, broad-leaved, and grass weeds. Thorough coverage is important for this product, and the presence of dust on foliage can deactivate the active ingredient, as does soil contact. This product translocates throughout the plant. Timing of applications is important for control of certain weeds. For example, best control of perennial weeds is in the fall as the root receives carbohydrate reserves for overwinter survival, and also the applied glyphosate. Various formulations of this product are available, ranging in concentration from 5-lb/gal ai (our trial formulation), to minute quantities found in products in home and garden sections of retail outlets. Roundup has an 8-week preharvest interval restriction.

### Procedures

Plots consisted of a minimum number of plants, (approximately 4-5 each), encompassing 5.5 ft by 15 ft per plot. Ten treatments were arranged in a randomized block design with three replications. Herbicide treatments were applied July 6-9, 2001, to plants prior to and/or just following initial bloom. Chemicals used in the trial included Transline, Ally, Weedmaster, Roundup Ultra, and R-11 Spreader (Wilbur-Ellis). Herbicides were used alone and in tank mixes. Tank mixes included two rates of Transline.

Plot visual control ratings were recorded several times prior to dormancy, with 100 = 100 percent control, 0 = 0 percent control; and regrowth was rated 1-10, with 10 = no regrowth and 1 = total regrowth. Canada thistle plants were healthy and vigorously growing prior to herbicide applications. Plots were sprayed with a CO<sub>2</sub> backpack sprayer calibrated to provide 30 gal/acre at a calibrated walking speed of 1.6 miles/hour, and timed with a metronome at 70 steps/minute. Spray tips were 8003 flat fan nozzles operated at 40 psi. The spray boom had 3 tips, 20 in apart, and covered a swath of 5 ft.

Treatments included the following:

1. Transline at 1.33 pt/acre plus Weedmaster at 2 pt/acre.
2. Transline at 1.33 pt/acre plus Roundup Ultra at 2 pt/acre.
3. Transline at 1.33 pt/acre plus Ally at 0.33 oz/acre.
4. Transline at 1.33 pt/acre.
5. Transline at 0.66 pt/acre.
6. Transline at 0.66 pt/acre plus Weedmaster at 2 pt/acre.
7. Transline at 0.66 pt/acre plus Roundup Ultra at 2 pt/acre.
8. Transline at 0.66 pt/acre plus Ally at 0.33 oz/acre.
9. Roundup Ultra at 2 pt/acre.
10. Weedmaster at 2 pt/acre.
11. Roundup Ultra at 2 pt/acre plus Weedmaster at 2 pt/acre.
12. Ally at 0.33 oz/acre.

Note that all treatments received R-11 spreader at 2 pt/acre, and no check plot was deemed necessary due to the abundance of nearby healthy and untreated plants available for comparison.

### Results and Discussion

Treatments were rated visually on early control, desiccation, and regrowth. There were no statistical differences between treatments for desiccation as all were rated at full desiccation (Table 1). Ratings for early control showed best results with Transline + Roundup Ultra at both rates of Transline, Transline plus Weedmaster at the low rate of Transline, Transline alone and Transline plus Ally at the high rate of Transline, and Weedmaster plus Roundup Ultra. All treatments were initially active, as evidenced by the total desiccation ratings (100 percent). Six out of 12 treatments exhibited excellent early control. Ally alone was significantly less effective than all other treatments for early control.

Ratings for regrowth showed only four treatments in the top control level: Transline plus Weedmaster, Transline plus Ally, and Transline plus Roundup Ultra, all at the high rate of Transline, and Transline alone at the low rate. The apparent anomaly for Transline at the high rate may be due to rapid early desiccation, which prevented full translocation of product to the root system.

Canada thistle regrowth measured in the spring of 2002 will provide more data on control measure effectiveness, since any plants or parts of plants that have died, will not regenerate. This information will be reported in the 2002 report.

### References

Whitson, T.D., Editor. 1996. Weeds of the West. The Western Society of Weed Science in cooperation with the Western United States Land Grant Universities Cooperative Extension Service. Fifth Edition. Pioneer of Jackson Hole, Jackson, WY.

## **2001 Annual Report**

Table 1. Early visual control rating, visual desiccation, and number of Canada thistle plants regrowing following herbicide treatments, Worden, OR, 2001.

Herbicide	Rate	Early Visual Control	Visual Desiccation	Number Regrowing
Transline Weedmaster	1.33 pt/acre 2 pt/acre	50 bcd <sup>1</sup>	100 a	2.0 a
Transline Roundup Ultra	1.33 pt/acre 2 pt/acre	73 a	100 a	4.7 ab
Transline Ally	1.33 pt/acre 0.33 oz/acre	70 a	97 a	4.7 ab
Transline	0.66 pt/acre	50 bcd	90 a	5.0 abc
Roundup Ultra	2 pt/acre	53 ab	90 a	6.7 bcd
Transline	1.33 pt/acre	70 a	97 a	7.3 bcd
Weedmaster	2 pt/acre	47 cd	73 a	7.7 bcd
Weedmaster Roundup Ultra	2 pt/acre 2 pt/acre	67 a	93 a	8.7 bcd
Transline Ally	0.66 pt/acre 0.33 oz/acre	60 abc	83 a	8.7 bcd
Transline Roundup Ultra	0.66 pt/acre 2 pt/acre	70 a	90 a	9.3 cd
Transline Weedmaster	0.66 pt/acre 2 pt/acre	70 a	83 a	10.0 d
Ally	0.33 oz/acre	37 d	70 a	10.0 d
CV (%)		16	14	39
LSD (0.05)		17	NS	5

<sup>1</sup>Values within columns followed by the same letter are not significantly different (p=0.05).