

Weed Control in Grass/Alfalfa Mixed Hay

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Abstract

Herbicide options in mixed stands of grass and alfalfa harvested for hay are limited, partially because selectivity is difficult to achieve in mixed stands. Currently metribuzin (Sencor[®]) is the only herbicide that is clearly registered for use in mixed stands of grass and alfalfa for hay. The objective of these trials was to determine crop safety with herbicides that could be registered for use in mixed hay. Two trials were conducted in commercial fields of orchardgrass/alfalfa mixed hay, one near Prineville, Oregon and one near Madras, Oregon. Nine herbicide treatments were applied near the end of winter dormancy on February 28, 2007 in Prineville and on March 2, 2007 in Madras. Orchardgrass was much more likely to be injured than alfalfa with all the dormant treatments. Three treatments were somewhat safe on the orchardgrass across locations: 1) metribuzin at 0.25 lb, 2) metribuzin at 0.25 lb plus paraquat, and 3) flumioxazin. None of the other dormant treatments demonstrated an appropriate margin of crop safety across locations.

Introduction

In 2006 in central Oregon (Crook, Deschutes, and Jefferson counties) there were roughly 7,500 acres of grass/alfalfa mixed hay. Mixed hay yields approximately 5.5 to 7 tons per acre per season and is currently being sold from \$120 to \$180 per ton, depending on the quality, for a gross value ranging from \$660 to \$1,260 per acre in central Oregon.

Herbicide options in mixed stands of grass and alfalfa for hay are limited, partially because selectivity is difficult to achieve in mixed stands. Currently metribuzin is the only herbicide that is clearly registered for use in mixed stands of grass and alfalfa for hay. Labels for products like bromoxynil (Buctril[®]) and paraquat (Gramoxone Inteon[®]) are less clear on whether or not they can be used in mixed stands.

According to the Sencor 75 DF label, metribuzin can severely injure grasses in mixed stands, especially at high labeled rates. Furthermore, metribuzin does not work well on problematic weeds like shepherd's-purse (*Capsella bursa-pastoris*), flixweed (*Descurainia sophia*), and downy brome (*Bromus tectorum*) in mixed hay, so in order to achieve acceptable weed control, metribuzin is often used at higher rates.

Several herbicides have recently been or are soon to be registered for use in alfalfa: flumioxazin (Chateau[®]), pronamide (Kerb[®]), and pendimethalin (Prowl H20[®]). There is some likelihood that these herbicides could also be registered for use in grass/alfalfa mixed hay, depending on the rates used and crop tolerance. If these herbicides are safe for use in grass/alfalfa mixtures, they would be useful tools to improve control of the problem weeds mentioned above and limit the yield loss resulting from metribuzin use.

The objective of these trials was to determine crop safety with herbicides that could be registered for use in mixed hay.

Materials and Methods

Two trials were conducted in commercial fields of orchardgrass (*Dactylis glomerata*)/alfalfa mixed-hay, one near Prineville, Oregon and one near Madras, Oregon. Nine herbicide treatments were applied near the end of winter dormancy on February 28, 2007 in Prineville and on March 2, 2007 in Madras and one treatment was applied post-dormancy on April 5, 2007 at both locations. The dormant treatments included: terbacil (Sinbar[®]), pronamide, flumioxazin, imazapic (Plateau[®]), metribuzin at 0.25 and 0.5 lb/acre, paraquat, metribuzin plus paraquat, and pendimethalin plus paraquat; the post-dormancy treatment was bromoxynil plus 2,4-DB (Butyrac 200[®]). Plots were 10 ft by 28 ft with four replications arranged as randomized complete blocks. Treatments were applied with a CO₂ backpack sprayer delivering 20 gal/acre operating at 20 psi and 3 mph.

Crop injury was determined by making visual evaluations from March through May on a percentage scale. The final evaluation was made prior to first cutting and describes the orchardgrass stand density in each treatment as a percent of the check (noted as stand in Tables 1 and 2) and orchardgrass heading in each treatments as percent of the check (noted as heading in Tables 1 and 2). Treatments that resulted in no visible reduction in stand or heading were rated 100 percent. Treatments that thinned the stand but did not diminish the heads that the remaining plants produced were rated something like 60 and 60 percent. Treatments that reduced heading beyond what resulted only from stand thinning were rated something like 80 and 40 percent.

Results and Discussion

Orchardgrass was much more likely to be injured than alfalfa with all the dormant treatments (Tables 1 and 2). The second visual evaluation was made 63 and 61 days after treatment for Madras and Prineville, respectively, at which point none of the dormant-applied treatments resulted in severe injury to the alfalfa.

Three treatments were somewhat safe on the orchardgrass across locations: 1) metribuzin at 0.25 lb, 2) metribuzin at 0.25 lb plus paraquat, and 3) flumioxazin. Orchardgrass injury from flumioxazin was slightly greater in Prineville than in Madras. None of the other dormant treatments demonstrated an appropriate margin of crop safety across locations. In Prineville, terbacil and pronamide resulted in minor reductions in orchardgrass stand density and heading; in Madras, both treatments greatly reduced heading. Paraquat resulted in severe orchardgrass injury in Madras, but in Prineville injury was much less, possibly because the orchardgrass in Madras was no longer dormant on the March 2 application date. This would also account for the orchardgrass injury from pendimethalin plus paraquat at Madras. In Prineville, however, orchardgrass injury from pendimethalin plus paraquat was noticeably greater than from paraquat alone.

Weed populations at both locations were inadequate for visual evaluation.

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Table 1. Response of established orchardgrass/alfalfa mixed hay to herbicides near Madras, Oregon, 2007.

Treatment ¹	Rate (lb/acre)	March 31		May 4		May 22	
		Alfalfa	Orchard- grass	Alfalfa	Orchard- grass	Orchardgrass Stand	Orchardgrass Heading
		----- % injury -----				----- % of check -----	
Check	---	0	0	0	0	100	100
Terbacil ²	0.2	13	35	5	14	83	68
Pronamide ²	0.25	0	11	10	13	83	63
Flumioxazin ²	0.125	12	13	0	1	91	80
Imazapic ²	0.1	29	83	18	74	29	15
Metribuzin ²	0.25	0	11	3	5	85	75
Metribuzin ²	0.5	9	40	5	15	81	65
Paraquat ²	0.25	15	36	3	19	85	53
Metribuzin + paraquat ²	0.25 + 0.25	14	20	0	15	88	73
Pendimethalin + paraquat ²	3.8 + 0.25	5	60	0	29	73	45
Bromoxynil + 2,4-DB ³	0.375 + 0.5	---	---	10	5	98	75

¹All treatments were applied with non-ionic surfactant at 0.25 % v/v.

²Treatments were applied March 2, 2007 to dormant alfalfa and orchardgrass.

³Treatments were applied April 5, 2007 to 3-inch-tall alfalfa and 5-inch-tall orchardgrass.

Table 2. Response of established orchardgrass/alfalfa mixed hay to herbicides near Prineville, Oregon, 2007.

Treatment ¹	Rate (lb/acre)	April 5		April 30		June 8	
		Alfalfa	Orchard- grass	Alfalfa	Orchard- grass	Orchardgrass Stand	Heading
		----- % injury -----				% of check	
Check	---	0	0	0	0	100	100
Terbacil ²	0.2	4	8	5	24	90	85
Pronamide ²	0.25	8	14	0	21	98	98
Flumioxazin ²	0.125	20	20	10	15	73	73
Imazapic ²	0.1	48	81	0	86	20	11
Metribuzin ²	0.25	14	13	3	3	95	95
Metribuzin ²	0.5	10	14	8	13	88	78
Paraquat ²	0.25	8	13	4	13	83	83
Metribuzin + paraquat ²	0.25 + 0.25	5	10	5	5	85	85
Pendimethalin + paraquat ²	3.8 + 0.25	14	10	3	20	70	68
Bromoxynil + 2,4-DB ³	0.375 + 0.5	---	---	24	23	80	80

¹All treatments were applied with non-ionic surfactant at 0.25 % v/v.

²Treatments were applied March 2, 2007 to dormant alfalfa and orchardgrass.

³Treatments were applied April 5, 2007 to 3-inch tall alfalfa and 5-inch tall orchardgrass.