

## 2,4-DB ESTER ALTERNATIVES AND SETBACK HERBICIDES FOR ALFALFA SEED PRODUCTION

Corey V. Ransom and Joey K. Ishida  
Malheur Experiment Station  
Oregon State University  
Ontario, Oregon, 1999

### Purpose

Weed control during alfalfa establishment is critical for the production of weed free alfalfa seed. Losses due to weeds include both reduced yields from competition and contamination by weed seeds. The recent loss of 2,4-DB ester has limited the herbicide options available for alfalfa seed producers. Additionally, high temperatures during establishment can restrict further the herbicides that can be used without injury to the alfalfa crop. New herbicides offer potential to provide effective weed control during alfalfa establishment with minimal injury to the crop.

In addition to being used for weed control, contact herbicides like paraquat sometimes are used to delay early season plant development by burning back alfalfa plants. We term herbicides used for this purpose as "setback" herbicides. Growers intensively delay early plant development so that flowering coincides with warm weather that is conducive for alfalfa leafcutting bees to pollinate the crop. Setback herbicides are applied instead of cultivation. Reducing the use of cultivation to delay plant development may reduce the occurrence of diseases introduced into injured alfalfa crowns and also help to reduce stand reduction that occurs during mechanical setback. With the introduction of several new contact herbicides, it is likely that some of these herbicides may be useful for delaying crop development to synchronize the onset of bloom with the optimum time of alfalfa leafcutting bee emergence and pollination activity. The use of setback herbicide products also may provide some incidental weed control.

### Procedures

The weed control trial and setback trial both were conducted on cooperators' fields, and general management practices were carried out by the cooperators. Herbicide treatments were applied with a CO<sub>2</sub>-pressurized backpack sprayer. Plots were 10 ft wide and 30 ft long. Alfalfa seed yields were obtained by harvesting the center 4.25 ft of each plot with a small plot combine. Data were analyzed using ANOVA, and treatment means were separated using a protected least significant difference at the 5 percent level, LSD (0.05).

### *2,4-DB Ester Alternatives*

Raptor and other herbicides offer the potential to control weeds during alfalfa seed crop establishment with minimal crop injury. A trial was initiated to evaluate Raptor, Pursuit, 2,4-DB amine, Basagran, Buctril, and Tough alone and in combinations for weed control and crop tolerance in the establishment of alfalfa grown for seed. All treatments were compared to 2,4-DB ester. Alfalfa was planted March 13 in a loam soil with a pH of 6.9 and 1.4 percent organic matter. The predominant weed species were common lambsquarters, hairy nightshade, Russian thistle, and kochia. Treatments were arranged in a randomized complete block design with three replications. Herbicide treatments were applied May 14. High temperatures were 80°F or below for 10 days after treatments. The trial was harvested on September 15.

### *Alfalfa Setback*

A trial was established to evaluate herbicides for potential as setback agents and to determine alfalfa seed yields with different setback techniques. The trial was located on an established alfalfa seed field that has a loam soil with 7.4 pH and 1.5 percent organic matter. Alfalfa maturity was delayed by mowing, cultivation, and applications of paraquat, Liberty, and Blazer herbicides on April 26. Paraquat and Liberty treatments also were compared using 20 and 40 gpa of water. Treatments were arranged in a randomized complete block design with four replications. Evaluations included alfalfa setback, height, flowering, and seed yield. Temperatures were moderate several days after application. The trial was harvested on August 23.

## **Results**

### *2,4-DB Ester Alternatives*

Buctril alone did not cause significant injury to alfalfa (Table 1). All tank mix combinations including Buctril did cause injury except Buctril plus Butyrac 200. Basagran alone showed no injury, but when combined with Tough, Butyrac, or Buctril was among the most injurious. Basagran plus Tough, Buctril plus Tough, and Raptor with methylated seed oil (MSO) were among the treatments that caused the greatest alfalfa injury of any herbicide treatments. Injury from Buctril plus Tough was apparent 21 days after application, while injury with Raptor plus MSO was still visible 32 days after treatment. In general, common lambsquarters control was less with Pursuit or Raptor alone compared to tank mixtures of Pursuit or Raptor with Buctril or Butyrac. Raptor treatments provided among the greatest control of kochia and hairy nightshade. Russian thistle control with Raptor was increased when Raptor was tank mixed with Buctril or Butyrac. Treatments with Raptor alone and in combination with Buctril or Butyrac produced among the highest seed yields. Buctril alone, Buctril plus Tough, Basagran plus Butyrac, and Basagran alone had among the lowest alfalfa seed yields. In plots treated only with Raptor, healthy kochia plants were observed growing adjacent to severely injured kochia plants. This suggests that some of the kochia in our trial area may be resistant to Raptor. This is not surprising, since kochia with resistance to ALS-inhibitor herbicides (Ally, Glean) has been documented widely. Any increase in Raptor resistant kochia populations will have an impact on our weed control programs.

### *Alfalfa Setback*

In the "setback" trial, all the herbicides examined delayed alfalfa maturity effectively, but the activity was different for each herbicide (Table 2). Alfalfa height was reduced significantly by all treatments compared to no setback 17 days after treatment (DAT). Mowing and paraquat had the greatest alfalfa suppression 3 DAT. Eight DAT, mowing effects were significantly higher than all other treatments. Other treatments showed similar setback effects (40 to 45 percent) except Blazer (10 percent). Blazer was the slowest herbicide to show symptoms on the alfalfa. All mechanical or chemical setback treatments reduced flowering 33 DAT. By 80 DAT, there were no differences in flowering among treatments. No setback and cultivation produced higher seed yields than Liberty applied in 20 or 40 gallons of water per acre. Seed yields were not different among the other treatments.

Table 1. Alfalfa injury, weed control, and alfalfa seed yield with postemergence herbicides, Malheur Experiment Station, Oregon State University, Ontario, Oregon, 1999.

Treatment <sup>†</sup>	Rate	Alfalfa injury			Weed control <sup>‡</sup>				Alfalfa seed yield <sup>‡</sup> lb/acre
		5-21-99	5-28-99	6-15-99	Common lambquarters	Hairy nightshade	Russian thistle	Kochia	
	lb ai/acre	%							lb/acre
Raptor	0.024	2	0	0	50	75	50	62	164
Raptor + Buctril	0.024 + 0.25	17	2	0	78	85	82	75	195
Raptor +	0.024 + 0.5	8	5	0	83	85	85	82	271
Raptor	0.032	8	0	0	68	77	58	78	235
Raptor + Buctril	0.032 + 0.25	15	13	2	72	80	78	78	319
Raptor +	0.032 + 0.5	12	10	2	75	80	82	87	301
Raptor	0.04	8	3	0	67	77	62	75	425
Raptor + Buctril	0.04 + 0.25	20	7	2	72	77	73	72	353
Raptor +	0.04 + 0.5	25	15	7	80	78	82	87	333
Raptor	0.048	5	0	2	70	73	67	75	269
Raptor + MSO	0.04	32	18	18	78	80	78	85	334
2,4-DB	0.5	3	2	2	62	50	30	30	237
Buctril	0.25	7	0	0	48	52	38	30	88
2,4-DB ester	0.5	3	0	0	67	63	52	47	292
2,4-DB + Buctril	0.5 + 0.25	7	8	0	70	73	70	50	258
Tough	0.94	2	0	0	37	37	40	20	225
2,4-DB + Tough	0.5 + 0.94	18	0	2	92	77	87	58	246
Raptor + Tough	0.032 + 0.94	15	5	0	75	73	65	73	209
Basagran	1.0	0	0	0	0	10	0	0	121
Raptor + Basagran	0.032 + 1.0	8	0	0	57	78	75	50	166
Basagran + Tough	1.0 + 0.94	33	8	10	65	62	60	47	242
Basagran + 2,4-DB	1.0 + 0.5	10	2	0	65	58	45	23	161
Basagran + Buctril	1.0 + 0.25	25	13	2	60	58	55	43	165
Tough + Buctril	0.94 + 0.25	35	18	7	82	65	67	37	110
Pursuit	0.063	7	0	0	35	73	48	75	259
Pursuit + Buctril	0.063 + 0.25	15	8	5	73	83	83	78	249
Raptor + Select	0.024 +	2	0	2	50	73	50	60	234
Untreated		0	0	0	0	0	0	0	64
LSD (0.05)		9	6	6	13	18	18	18	153

<sup>†</sup>NIS (0.25 % v/v) and 32% nitrogen solution (1% v/v) were added to all treatments containing Raptor or Pursuit. MSO was applied at 1.0% v/v.

<sup>‡</sup>Weed control ratings were taken on June 5. Alfalfa seed was harvested on September 15.

Table 2. Alfalfa setback, height, flowering and seed yield in response to mechanical and chemical setback treatments, Malheur Experiment Station, Oregon State University, Ontario, Oregon, 1999.

Treatment†	Rate	Spray volume	Alfalfa setback			Alfalfa height			Alfalfa flowering			Alfalfa seed yield‡
			4-29	5-4	5-29	4-29	5-4	5-29	5-29	6-25	7-16	
	lb ai/acre	gpa	-----%			-----in-----			-----%			lb/acre
Mowing			69	59	21	4.8	5.7	18.8	3	78	78	798
Cultivation			53	45	19	5.8	7.6	19.5	9	76	78	835
Paraquat	0.47	20	34	45	14	8.5	9.2	20.3	5	85	76	822
Paraquat	0.47	40	34	40	8	10.0	9.7	21.0	4	73	75	767
Liberty	0.5	20	11	43	26	9.7	8.6	18.0	1	68	73	697
Liberty	0.5	40	10	43	19	9.5	9.4	18.2	2	90	80	703
Blazer	0.38	20	5	10	16	9.6	10.2	20.1	5	83	78	817
No setback			0	0	0	10.7	12.4	24.4	20	88	78	907
LSD (0.05)			4	4	10	1.4	1.5	2.9	3	10	NS	128

†NIS (0.25 % v/v) was added to treatments containing Paraquat or Blazer. AMS (3.0 lb/acre) was added to Liberty treatments.

‡Alfalfa seed was harvested on August 23.