

DEVELOPMENT OF NEW HERBICIDE OPTIONS FOR ALFALFA SEED PRODUCTION

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Introduction

Weed control during alfalfa establishment is critical for the production of weed-free alfalfa seed. Losses due to weeds include reduced yields from competition, difficulty at harvest, and contamination of the crop by weed seeds. The loss of 2,4-DB ester has limited the herbicide options available for alfalfa seed producers. Additionally, high temperatures during establishment can further restrict 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.

Methods

General Procedures

Two weed control trials were conducted on a cooperator's field in Adrian, Oregon. Alfalfa (var. Cal-West 'BN-12') was planted on March 25. Standard practices in planting, cultivation, irrigation, insect control, and pollination were used by the grower. Herbicide treatments were applied with a CO₂-pressurized backpack sprayer delivering 20 gal/acre at 30 psi. Plots were 10 ft wide and 25 ft long and replicated three times in a randomized complete block design. In both trials, postemergence herbicide applications were made on May 22 to 3-inch-tall alfalfa. Crop injury and weed control were evaluated throughout the growing season. Data were analyzed using ANOVA, and treatment means were separated using a protected least significant difference at the 5 percent level, LSD (0.05). After the last weed control rating both trials were hand weeded because of high weed populations, therefore eliminating any differences that may have been determined by harvesting the trials. Neither trial was harvested.

Postemergence Tough Combinations

Treatments consisted of Buctril and 2,4-DB ester applied alone, Tough applied with and without crop oil concentrate (COC), and Butyrac 200 applied with and without a non-ionic surfactant (NIS). Combinations of Tough plus Butyrac 200, Basagran, or Buctril were evaluated. Basagran was applied with either Buctril or Butyrac 200. All tank-mix combinations included COC at 1 qt/acre. Air temperature at the time of application was 69°F. Weed control ratings were taken on common lambsquarters, hairy nightshade, Russian thistle, kochia, and annual sowthistle.

Raptor Rates and Additives

Raptor was applied at 0.032 and 0.048 lb ai/acre with either NIS, COC, or methylated seed oil (MSO). NIS was added at 0.25 percent v/v, COC at 1 percent v/v, and MSO at 1 percent v/v. Raptor plus Poast was also evaluated with either COC or MSO. All treatments contained 32 percent N at 1 percent v/v. The same weeds were present as in the previous trial. This trial also was not harvested due to high weed populations and hand weeding.

Results

Because weeds were large at the time of herbicide application, control declined rapidly as weeds outgrew the injury caused by the herbicides. The last visual evaluation was made 19 days after application, at which time both trials were terminated.

Postemergence Tough Combinations

On May 31, 9 days after treatment (DAT), all combinations that included Basagran showed injury between 37 and 48 percent (Table 1). Tough plus Buctril was also among the highest in crop injury with 45 percent. Even though temperatures were relatively cool following application, injury with Buctril was 20 percent. Crop injury with Tough, 2,4-DB ester, Butyrac 200, and Butyrac 200 plus NIS was not statistically different than the untreated check. On May 19, treatments that included Basagran and Tough plus Buctril continued to show significantly greater injury than the untreated check (13-27 percent).

On May 9, Tough was equal to 2,4-DB ester in common lambsquarters, Russian thistle, kochia, and sowthistle control. In most cases, Tough plus COC did not appear to have any weed control benefits over Tough alone. Treatments provided similar common lambsquarters control except Tough plus COC. The addition of NIS to Butyrac 200 significantly increased control of hairy nightshade, Russian thistle, kochia, and annual sowthistle. Generally, tank-mix combinations provided greater weed control than herbicides applied alone. On May 19, 2,4-DB ester was superior to Buctril, Butyrac 200, and Tough for control of common lambsquarters, hairy nightshade, kochia, and annual sowthistle.

Raptor Rates and Additives

On May 31, Raptor at both 0.032 and 0.048 lb ai/acre caused significant injury compared to the untreated check when either NIS or methylated seed oil (MSO) was added (Table 2). The addition of COC to Raptor did not cause an increase in crop injury. By June 9, only Raptor at 0.048 lb ai/acre plus MSO showed significant injury.

Raptor at 0.032 lb ai/acre plus MSO controlled common lambsquarters, hairy nightshade, kochia, and annual sowthistle significantly better than when NIS or COC were added. With Raptor at 0.048 lb ai/acre, weed control for all weed species was better with MSO than NIS or COC. Weed control was similar with treatments containing NIS or COC. Raptor at 0.048 lb ai/acre plus MSO was among the best treatment for all weeds evaluated but only provided between 77-85 percent control.

Table 1. Alfalfa injury and weed control with postemergence herbicides, Malheur Experiment Station, Oregon State University, Ontario, OR, 2001.

Treatment*	Rate	Alfalfa injury			Weed control†				
		5-31	6-9	6-19	Common lambsquarters	Hairy nightshade	Russian thistle	Kochia	Sow-thistle
	lb ai/acre	-----%							
Buctril	0.25	20	13	5	98	22	48	45	68
2,4-DB ester	0.5	2	5	0	98	72	83	83	77
Butyrac 200	0.5	2	0	0	97	3	27	17	12
Tough	0.94	7	5	0	63	13	57	50	22
Tough + COC	0.94	17	5	0	62	18	91	55	47
Butyrac 200 + Tough + COC	0.5 + 0.94	31	24	8	97	79	93	89	75
Basagran + Tough + COC	1.0 + 0.94	37	42	27	88	56	92	82	81
Basagran + Butyrac 200 +COC	1.0 + 0.5	41	31	13	98	48	98	84	84
Basagran + Buctril + COC	1.0 + 0.25	48	53	23	70	65	92	70	78
Tough + Buctril + COC	0.94 + 0.25	45	41	20	94	37	93	82	75
Butyrac 200 + NIS	0.5	11	10	2	98	80	78	87	61
Untreated		0	0	0	0	0	0	0	0
LSD (0.05)		11	13	10	31	28	32	27	16

*NIS was applied at 0.25 percent v/v and COC was applied at 1.0 qt/acre.

†Weed control ratings were taken on June 19.

Table 2. Alfalfa injury and weed control with Raptor rates and adjuvants, Malheur Experiment Station, Oregon State University, Ontario, OR, 2001.

Treatment*	Rate	Alfalfa injury			Weed control†			
		5-31	6-9	Common lambsquarters	Hairy nightshade	Russian thistle	Kochia	Annual sowthistle
	lb ai/acre	-----%						
Raptor + NIS	0.032	7	0	25	42	45	38	28
Raptor + COC	0.032	3	0	30	46	57	63	48
Raptor + MSO	0.032	8	10	58	62	74	77	66
Raptor + NIS	0.048	11	2	27	40	55	66	50
Raptor + COC	0.048	0	0	27	44	53	62	37
Raptor + MSO	0.048	17	28	82	77	85	83	78
Raptor + Poast + COC	0.048+0.375	2	8	42	58	63	72	62
Raptor + Poast + MSO	0.048+0.375	7	5	70	72	72	80	73
Untreated		0	0	0	0	0	0	0
LSD (0.05)		5	11	21	18	18	11	17

*32 percent N solution (1 percent v/v) was added to all treatments. NIS was applied at 0.25 percent v/v and MSO was applied at 1.0 percent v/v.

†Weed control ratings were taken on June 9.