EXPLORING ALTERNATIVE HERBICIDES FOR ROW CREATION IN VOLUNTEER ANNUAL RYEGRASS FIELDS TO BE USED FOR SEED PRODUCTION

C.S. Sullivan, D.W. Curtis, A.G. Hulting, and C.A. Mallory-Smith

Introduction

In addition to row spraying at planting in annual ryegrass (ARG) seed fields, Axiom DF (flufenacet + metribuzin) herbicide is used in Oregon to create rows in volunteer ARG seed production fields. Row creation in volunteer stands has previously been shown to be an effective management practice for improving yields (Young et al., 1998; Silberstein et al., 2000). Thinning the stand reduces competition between plants and results in higher seed yields. Growers in the Willamette Valley have successfully used Axiom DF and/or glyphosate to accomplish row creation in volunteer stands; however, the options for effective herbicides are limited.

Since Axiom DF herbicide is used for weed management in ARG, perennial ryegrass, tall fescue, and wheat production, OSU researchers and the grass seed industry are concerned about additional continuous and widespread use of Axiom DF for row creation. Suspected resistance of ARG to Axiom DF has developed in both field crops and orchards in the Willamette Valley. In order to maintain Axiom as an effective herbicide in field crop production, a need exists to identify alternative herbicides for row spraying purposes. The objective of this study was to evaluate several herbicide products to determine row-creation utility in ARG based on crop safety, effective row formation, and seed yield.

Materials and Methods

Two field trials were established during the fall of 2015 in Linn County. Both fields were volunteer 'Gulf' ARG fields; one field site was in Dever-Conner, and the other was in East Albany. Experiments were arranged as randomized complete block designs with four replications. Plot size was 5 feet x 30 feet.

A bicycle sprayer was set up to create a 3-inch ARG row by spraying out a 7-inch band using seven nozzles (40 03) mounted to the boom at 10-inch spacing. The treatments were sprayed in volunteer stands of ARG when the plants were approximately 4 inches tall. The ten treatments and application rates are outlined in Table 1. Row spraying and harvest details are outlined in Table 2.

Table 1. Herbicide treatments used for row creation in annual ryegrass seed fields in the fall of 2015. (***Note***: The majority of the listed herbicide treatments are not labeled for annual ryegrass seed production.)

Treatment	Active ingredient	Rate
		(lb ai/a)
Control	—	—
Axiom[1,2]	Flufenacet + metribuzin	0.425
Diuron[1,2]	Diuron	1.0
Makaze	Glyphosate	0.75
Matrix	Rimsulfuron	0.047
Goal + Rely	Oxyfluorfen + glufosinate	0.25 + 0.366
Everest	Flucarbazone	0.0273
Metribuzin	Metribuzin	0.375
Kerb	Pronamide	0.25
Alion[1]	Indaziflam	0.013

[1]Glyphosate was added to this treatment at 0.75 lb ai/a.
[2]Product is labeled for row spraying in ARG seed fields in Oregon.

Table 2. Annual ryegrass row spraying details for Experiment 2 in two volunteer stands in Linn County.

Trial	Spray date	Crop height	Spray width	Swathing date	Harvest date
		---------- (inches) ----------			
East Albany	Nov. 6	3–4	7	June 21	July 7
Dever-Conner	Nov. 10	4	7	June 21	July 8

Results and Discussion

The row creation treatments were evaluated based on control of ARG between the rows (row creation) and percent injury to the crop within the row. At both sites, the majority of treatments were successful in creating rows, except for Everest, which had less than 50% control (Table 3). Metribuzin was on the lower end of ARG control between the rows, with only 80% control.

Crop injury by treatment varied between the sites; overall, crop injury was more pronounced at the Dever-Conner site (Table 3). The Dever-Conner trial was sprayed later than the East Albany site, and it experienced more ponding in the winter of 2015–2016, which may explain the increased crop injury. All treatments with added glyphosate (Axiom, diuron, Alion) had very similar control (90–100%) and crop injury (15–30%).

There were no significant differences in clean seed yields between the treatments at either site, but overall the row spraying treatments yielded 100 to 500 lb/acre more than the untreated controls (Table 3). At the Dever-Conner site, it appears that the treatments with higher crop injury tended to produce higher yields (e.g., crop injury for Matrix = 73%; clean seed yield for Matrix = 966 lb/acre).

Based on the first year of data, row creation in volunteer stands can increase seed yield by at least 100 lb/acre, which can be agronomically significant for the grower.

Conclusions and Future Work

While row creation in volunteer stands is a less commonly used practice than row spraying at planting, several growers see benefit in this practice. This first year of data supports OSU Extension's early work that found significant yield increases when 75% of the volunteer ARG was sprayed out. Two additional trials with the same treatments were established in the fall of 2016, and these will be evaluated throughout the year and taken to harvest in 2017.

References

Silberstein, T.B., M.E. Mellbye, and W.C. Young III. 2000. Management options for volunteer established annual ryegrass seed crops. In W.C. Young III (ed.). *1999 Seed Production Research Report*. Oregon State University, Cr/S 114.

Young, W.C. III, M.E. Mellbye, T.B. Silberstein, T.C. Chastain, and C.J. Garbacik. 1998. Herbicide options for establishing rows in volunteer annual ryegrass seed. In W.C. Young III (ed.). *1997 Seed Production Research Report*, Cr/S 111.

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Table 3. Herbicide treatment effects on annual ryegrass control (row creation), crop injury, and clean seed yield at two locations in Linn County, OR.

	ARG control[1]		Crop injury[1]		Seed yield[2]	
Treatment	East Albany	Dever-Conner	East Albany	Dever-Conner	East Albany	Dever-Conner
	(%)				(lb/a)	
Control	0	0	0	0	377 a	464 a
Axiom[3]	89	88	16	30	670 a	878 a
Diuron[3]	94	95	15	11	632 a	672 a
Glyphosate	81	96	11	6	569 a	602 a
Matrix	93	85	25	73	541 a	966 a
Goal + Rely	88	89	15	33	594 a	915 a
Everest	16	48	0	23	538 a	561 a
Metribuzin	80	78	6	25	498 a	612 a
Kerb	89	90	3	39	602 a	813 a
Alion[3]	98	100	15	30	543 a	935 a
LSD ($P = 0.1$)					156	340
CV					23	38

[1]Percent control and crop injury evaluated January 27, 2016 at East Albany and April 15, 2016 at Dever-Conner.
[2]Means followed by the same letter within the same column are not significantly different at LSD ($P = 0.1$).
[3]Glyphosate was added to this treatment.