

Preemergence and Postemergence Herbicides for *Bromus* Spp. Control in Winter Wheat in Anatone, WA

Zuger, R.J., & I.C. Burke

Downy brome (*Bromus tectorum*) continues to be a problematic and widespread weed in inland PNW wheat-fallow rotations. Acetolactate synthase inhibitor resistance continues to spread, and there are very few herbicide options remaining. Sterile brome (*Bromus sterilis*) is another brome grass invading wheat fields in intermediate and low rainfall zones. Our objective was to identify one or more herbicide treatments with different herbicide modes of action for management of downy brome and sterile brome.

The study was established in a winter wheat field near Anatone, WA. Whole plot treatments were applied delayed preemergence (delayed-PRE) to wheat, some emerged downy brome was present, on October 4, 2017, detailed in Table 1 and Table 2. The whole plots were 10' by 75' long and then split into 10' by 25' long plots in the spring for postemergence (POST) applications. Split plot treatments were applied in the spring POST on April 9, 2018, detailed in Table 1 and Table 3.

Downy brome (*Bromus tectorum*) control was assessed by visual estimation at 177 and 208 days after treatment (DAT) of application of delayed-PRE treatments (A) (Table 2). Downy brome biomass was harvested by collecting two 1/10th meter quadrants from each split-plot on May 20, 2018 (Table 2 & 3). Plots were harvested using a Kincaid plot combine with a 5 ft wide header on July 31, 2018.

Data was subjected to an analysis of variance using the statistical package built into the Agricultural Research Manager software system (ARM 8.5.0, Gylling Data Management) and PROC GLIMMIX in SAS (version 9.2, SAS Institute Inc., Cary, NC) with the fixed effects of delayed-PRE treatments and POST treatments and random effect block. Significant differences between treatments were analyzed using Fisher's protected LSD in SAS using the %mult macro.

The combination of both a fall applied delayed-PRE and a spring applied POST herbicide treatment did not impact the efficiency of *Bromus spp.* control or yield. All treatments, except Olympus and Outrider + Metribuzin, controlled the *Bromus spp.* compared to the nontreated control. Zidua (pyroxasulfone) alone and in combination with diclofop (Hoelon) and metribuzin + diclofop had the greatest control of 65 to 68% 177 DAT and 73% to 78% control 208 DAT (Table 2). *Bromus spp.* biomass was significantly less for all treatments, except for Zidua + diclofop, metribuzin (alone), Axoim, and Olympus, when compared to the nontreated control. *Bromus spp.* biomass in the nontreated control was 2809 lb A⁻¹ compared to least of 1296 lb A⁻¹ *Bromus spp.* biomass for Zidua + metribuzin + diclofop. Zidua alone had 1559 lb A⁻¹ and Zidua + metribuzin had 1841 lb A⁻¹ biomass.

POST applications of Powerflex and OlympusFlex in the spring had no significant impact on *Bromus spp.* biomass compared to no-POST treatments (Table 3). No visual crop injury was observed for the POST treatments.

There was a significant increase in crop yield when any delayed-PRE treatment was applied except for Olympus. Olympus yield (55 bu A⁻¹) was not different from the nontreated control (47 bu A⁻¹). Zidua + metribuzin + diclofop had the greatest yield of 72 bu A⁻¹. When POST treatments were applied reduction in yield was observed possibly due to the low night time temperature of 41°F, although not significantly different between Powerflex HL and the no-POST. When no POST treatment was applied yield was 69 bu A⁻¹ compared to 65 bu A⁻¹ for Powerflex HL and 63 bu A⁻¹ for OlympusFlex.

Table 1. Treatment application details

Study Application	A	B
Date	10/4/2017	4/9/2018
Application Timing	Delayed PRE	POST
Application volume (GPA)	15	15
Day air temperature (°F)	45	51
Night air temperature (°F)	30	35
Soil temperature (°F)	48	41
Wind velocity (mph, direction)	3.8, N	5.5, SW
Next rain occurred on	10/7/2017	4/10/2018

Table 2. Percent control and biomass for *Bromus* spp. (*Bromus tectorum* and *Bromus sterilis*) and yield following fall preemergence applications. Anatone, WA, 2017-2018. DAT = days after treatment of preemergence (A). Means followed by the same letter are not statistically significantly different ($\alpha=0.05$).

Treatment	Application Timing	Rate		Downy Brome Control		Downy Brome Biomass	Yield
				3/30/2018	4/30/2018	5/30/2018	7/31/2018
				177 DAT	208 DAT	LB/A	bu/A
Nontreated	A	-	-	-	-	2809 ab	47 d
Zidua	A	1.50 oz/A	0.080				
RT3	A	16 fl oz/A	0.690	68 a	75 a	1559 cd	68 ab
NIS	A	0.25% v/v					
Zidua	A	1.50 oz/A	0.080				
Metribuzin	A	4.00 oz/A	0.188	43 ab	47 ab	1841 bcd	72 ab
RT3	A	16 fl oz/A	0.690				
NIS	A	0.25 % v/v					
Zidua	A	1.50 oz/A	0.080				
Diclofop	A	2.66 pt/A	1.000	68 a	78 a	2709 ab	72 ab
RT3	A	16 fl oz/A	0.690				
NIS	A	0.25 % v.v					
Zidua	A	1.50 oz/A	0.080				
Metribuzin	A	4.00 oz/A	0.188	65 a	73 a	1296 d	72 a
Diclofop	A	2.66 pt/A	1.000				
RT3	A	16 fl oz/A	0.690				
NIS	A	0.25 % v/v					
Metribuzin	A	4.00 oz/A	0.188	43 ab	43 ab	2380 abc	63 bc
RT3	A	16 fl oz/A	0.690				
NIS	A	0.25% v/v					
Diclofop	A	2.66 pt/A	1.000	29 ab	57 ab	1457 cd	71 ab
RT3	A	16 fl oz/A	0.690				
NIS	A	0.25% v/v					
Metribuzin	A	4.00 oz/A	0.188	43 ab	50 ab	1429 cd	70 ab
Diclofop	A	2.66 pt/A	1.000				
RT3	A	16 fl oz/A	0.690				
NIS	A	0.25% v/v					
Axoim	A	8 oz/A	0.068	30 ab	37 abc	3061 a	65 ab
RT3	A	16 fl oz/A	0.690				
NIS	A	0.25% v/v					
Outrider	A	0.66 oz/A	0.031	20 b	20 bc	1939 bcd	63 abc
Metribuzin	A	1.50 oz/A	0.070				
RT3	A	16 fl oz/A	0.690				
NIS	A	0.25% v/v					
Olympus	A	0.90 oz/A	0.039	0 b	0 c	2990 a	55 cd
RT3	A	16 fl oz/A	0.690				
NIS	A	0.25% v/v					
RT3	A	16 fl oz/A	0.690	43 ab	37 abc	1463 cd	66 ab
NIS	A	0.25% v/v					
			<i>LSD</i>	27.85	27.82	1049.68	9.72

Table 3. *Bromus spp. (Bromus tectorum and Bromus sterilis) biomass and yield following spring postemergence applications. Anatone, WA, 2017-2018. Means followed by the same letter are not statistically significantly different ($\alpha=0.05$).*

Treatment	Application Timing	Rate		Downy Brome Biomass	
		field rate	lb ai/A	5/30/2018	7/31/2018
				LB/A	bu/A
No POST		-	-	2215	69 a
Powerflex HL	B	2.0 oz/A	0.016		
NIS	B	0.25 % v/v		2032	65 ab
UAN	B	2.5 gal/100 gal			
OlympusFlex	B	3 oz/A	0.013		
NIS	B	0.25 % v/v	mesosulfuron	1987	63 b
UAN	B	2.5 gal/100 gal	0.009		
			propoxycarb- azone		
			<i>LSD</i>	<i>NS</i>	<i>4.86</i>

Thank you to the grower and their family for the use of their land.

Disclaimer

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