Invasive Annual Grass Control with Laramie and Glyphosate 5.4 + Laramie

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The study was established a conservation reserve program (CRP) site near Albion, WA. The objective of the study was to evaluate Laramie 25DF (rimsulfuron) and Laramie 25DF with Glyphosate 5.4 for control of annual grasses (ventenata, *Ventenata dubia* (Leers) Coss. and downy brome, *Bromus tectorum* L.) in Palouse prairie. Treatments were applied mid- and late-winter when perennial grasses were dormant as a broadcast foliar application, detailed in Table 1 and Table 2. The study was conducted in a randomized complete block with 4 replications with 8' by 20' long plots. Climate was much wetter than normal, with normal temperatures (Figure 1). Snow was present on the site until just before Application A.

Weed cover and perennial grass (crop) stand was visually assessed 71 days after the first treatment timing (DAAT) or 45 days after the second treatment timing (DABT) (Table 2 & 3). All data were 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).

Results

Ventenata (VETDU) cover was reduced 71 days after the first application timing (DAAT) and 45 days after the second application timing (DABT) compared to the nontreated control. Treatments in timing C had not been applied as of June 2, 2017 (Table 2). Treatments had no effect on weed cover of downy brome (BROTE), medusa-head rye (ELYCM), western salsify (TRODM), and rush skeletonweed (CHOJU) compared to the nontreated control; however, low and uneven populations throughout the trial created non-assessable populations of those weeds. Rimsulfuron (Laramie 25 DF) applied at the higher rate of 0.063 lb ai A^{-1} had higher prickly lettuce (LACSE) cover (15%) 71 DAAT compared to the nontreated control (7%) and other application A treatments (<7%) and the later timing of application B (<5%). The higher coverage of prickly lettuce could likely be due to less competition from native species and other weed species as well as herbicide resistance. Field bindweed (CONAR) cover was not affected by treatment compared to the nontreated.

Imazapic (Panoramic 2SL) applied at 0.125 lb ai A^{-1} at the second application timing (B) had a significantly greater percent bluegrass spp. stand (79%) compared to the nontreated control (30%) 45 DABT. Percent bluegrass spp. cover for all other treatments at the second application timing (B) were similar to the higher rate of imazapic applied at timing B 45 DABT, as well as both rates of rimsulfuron (Laramie 25DF) and both rates of imazapic (Panoramic 2 SL) applied at timing A 71 DAAT (Table 3). Results indicate that as ventenata is managed, the bluegrass spp. stand begins to recover, but that there is considerable injury in certain treatments – cover was less than the nontreated check.

Table 1. *Treatment application details.*

Study Application	A	B	C
Date	March 23, 2017	April 18, 2017	October 16, 2017
Application volume (GPA)	15	15	15
Application timing*	326 GDD	664 GDD	-
Air temperature (˚F)	41	46	58
Soil temperature (˚F)	50	50	48
Wind velocity (mph, direction)	6, S	4, SW	5, E
Cloud cover	50%	100%	0%
Next rain occurred on	March 24, 2017	April 20, 2017	October 19, 2017

* Growing degree days (GDD) were from January 1, 2017 till spray date at 32 degrees

Table 2. *Percent cover of ventenata (VETDU), downy brome (BROTE), medusa-head rye (ELYCM), prickly lettuce (LACSE), western salsify (TRODM), rush skeletonweed (CHOJU), and field bindweed*

(CONAR) following application of rimsulfuron at different application rates and formulations. Albion, WA, 2017. DAAT = days after treatment A and DABT = days after treatment B. Means followed by the same letter are not statistically significantly different (α=0.05). A (-) indicates a non-assessable population.

Trt	Application Code	Rate		June 2, 2017 71 DAAT, 45 DABT						
				VETDU Cover	BROTE Cover	ELYCM Cover	LACSE Cover	TRODM Cover	CHOJU Cover	CONAR Cover
		field rate	*lb ai/A*	*%*	*%*	*%*	*%*	*%*	*%*	*%*
Nontreated	-	-	-	36 a	9	19	1 b	2	-	9 b
Laramie 25DF MSO	A A	3 oz/A 1% v/v	0.047	0 b	-	-	7 b	5	3	5 b
Laramie 25DF MSO	A A	4 oz/A 1% v/v	0.063	0 b	3	-	15 a	6	-	18 b
Glyphosate 5.4 Laramie 25DF MSO	A A A	6 fl oz/A 3 oz/A 1% v/v	0.253 0.047	0 b	-	-	7 b	8	9	5 b
Panoramic MSO	A A	6 fl oz/A 1% v/v	0.094	8 b	11	5	3 b	6	-	3 b
Panoramic MSO	A A	8 fl oz/A 1% v/v	0.125	5 b	25	-	2 b	5	-	3 b
Laramie 25DF MSO	B B	3 oz/A 1% v/v	0.047	7 b	5	25	3 b	3	13	8 b
Laramie 25DF MSO	B B	4 oz/A 1% v/v	0.063	1 b	3	-	5 b	1	-	8 b
Glyphosate 5.4 Laramie 25DF MSO	B B B	6 fl oz/A 3 oz/A 1% v/v	0.253 0.047	6 b	11	-	5 b	3	-	3 b
Panoramic MSO	B B	6 fl oz/A 1% v/v	0.094	0 b	5	-	3 b	8	-	5 b
Panoramic MSO	B B	8 fl oz/A 1% v/v	0.125	0 b	-	-	4 b	3	5	3 b
Laramie 25DF MSO	C C	3 oz/A 1% v/v	0.047	46 a	18	3	3 b	4	-	18 b
Laramie 25DF MSO	C C	4 oz/A 1% v/v	0.063	33 a	15	3	10 ab	3	13	30 a
Glyphosate 5.4 Laramie 25DF MSO	C C C	6 fl oz/A 3 oz/A 1% v/v	0.253 0.047	44 a	-	25	1 b	3	1	14 b
Panoramic MSO	C C	6 fl oz/A 1% v/v	0.094	38 a	5	18	-	3	-	13 b
Panoramic MSO	C C	8 fl oz/A 1% v/v	0.125	35 a	35	18	-	6	8	8 b
			LSD	*20*	*NS*	-	*5*	*NS*	-	*10*

Table 3. *Percent cover of perennial grasess, panicled willowweed (Epilobium brachycarpum* C. Presl*) and bluegrass spp., following application of rimsulfuron at different application rates and formulations. Albion, WA, 2017. DAAT = days after treatment A and DABT = days after treatment B. Means followed by the same letter are not statistically significantly different (α=0.05). A (-) indicates a non-assessable population*

Trt	Application Code	Rate		*June 2, 2017* 71 DAAT, 45 DABT	
				Panicle Willowweed Cover	Bluegrass spp. Cover
		field rate	*lb ai/A*	*%*	*%*
Nontreated	-	-	-	3	30 bc
Laramie 25DF	A	3 oz/A	0.047	3	68 ab
MSO	A	1% v/v			
Laramie 25DF	A	4 oz/A	0.063	1	36 abc
MSO	A	1% v/v			
Glyphosate 5.4	A	6 fl oz/A	0.253		
Laramie 25DF	A	3 oz/A	0.047	3	18 bc
MSO	A	1% v/v			
Panoramic	A	6 fl oz/A	0.094	-	38 abc
MSO	A	1% v/v			
Panoramic	A	8 fl oz/A	0.125	-	64 abc
MSO	A	1% v/v			
Laramie 25DF	B	3 oz/A	0.047	-	49 abc
MSO	B	1% v/v			
Laramie 25DF	B	4 oz/A	0.063	2	66 ab
MSO	B	1% v/v			
Glyphosate 5.4	B	6 fl oz/A	0.253		
Laramie 25DF	B	3 oz/A	0.047	-	46 abc
MSO	B	1% v/v			
Panoramic	B	6 fl oz/A	0.094	3	68 ab
MSO	B	1% v/v			
Panoramic	B	8 fl oz/A	0.125	3	79 a
MSO	B	1% v/v			
Laramie 25DF	C	3 oz/A	0.047	5	27 bc
MSO	C	1% v/v			
Laramie 25DF	C	4 oz/A	0.063	-	21 bc
MSO	C	1% v/v			
Glyphosate 5.4	C	6 fl oz/A	0.253		
Laramie 25DF	C	3 oz/A	0.047	-	23 bc
MSO	C	1% v/v			
Panoramic	C	6 fl oz/A	0.094	-	16 c
MSO	C	1% v/v			
Panoramic	C	8 fl oz/A	0.125	-	29 bc
MSO	C	1% v/v			
			LSD	*NS*	*29*

Figure 1. *Climate for nearest weather station located ~4 miles east of trial site.*