

Established Perennial Grass Tolerance to Esplanade Applied for Annual Grass Control: Year 2

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The study was established on a conservation reserve program (CRP) site near Pullman, WA. The objective of the study was to evaluate Esplanade® (indaziflam), Laramie® (rimsulfuron), Lambient® (propoxycarbazone), and Plateau® 2XL (imazapic) for tolerances of desirable perennial grasses in Palouse prairie. Treatments were applied in the spring of 2018, detailed in Table 1 and Table 2. The study was conducted in a randomized complete block design with 4 replications of 8' by 15' long plots. Desirable perennial grass stands will be monitored over the next three to four years.

Weed and perennial grass cover was visually assessed 5 & 17 months after the first treatment timing (MAAT) [4 and 16 months after the second treatment timing (MABT)]. First year biomass was collected on August 28, 2018 for assessment 4 MAAT (3 MABT). Second year biomass was collected on July 19, 2019 for assessment 15 MAAT (14 MABT). Biomass was taken using 2-tenth meter squared quadrats randomly thrown in the plot. Cover data was collected using a 4 meter transect separated into 12 points. At each point, plant species were evaluated at a foot off either side and assessed on a presence/absence basis. 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).

Table 1. *Treatment application details*

Study Application	A	B
Date	4/19/2018	5/22/2018
Application volume (GPA)	20	20
Air temperature (°F)	61	81
Soil temperature (°C)	6	14
Wind velocity (mph, direction)	4 NW	2 N
Cloud cover	0	2

Results

During the first year: Application timing did not have an effect on either perennial grasses or invasive grass species biomass. Perennial grass biomass at was similar among treatments 4 MAAT (Table 2). Bluebunch grass (AGRSP) and smooth brome (BROIN) had uneven populations throughout the trial and were not assessable (Table 2). Treatments did not have any effect on perennial grass cover 4 MAAT (Table 3).

Treatments and application timing did not have an effect ventenata (VETDU) biomass. However, two treatments had limited control. They were Laramie at 3 oz A⁻¹ (12 g m⁻²) and Esplanade (5 oz A⁻¹) + Laramie (3 oz A⁻¹) (10 g m⁻²), compared to the nontreated (10g m⁻²) (Table 3). Downy brome (BROTE) was at low and uneven populations and was not assessable. Broadleaves (COMBINED) had no significant difference between treatments (Table 3). Ventenata (VETDU) cover at 5 MAAT was significantly reduced for all treatments (<72%) compared to the nontreated control (100%) (Table 3). Esplanade + Plateau 2L had the least amount of VETDU cover 5 MAAT with 15% cover and Laramie alone had the most VETDU cover of 72% (Table 4).

During the second year: Perennial grass biomass 15 MAAT was not affected by treatment and application timing (Table 5). Treatments and application timing had no effect on the perennial grass cover (Table 4). Cover of the most common grasses, prairie junegrass and sheep's fescue were not affected by the herbicides (Table 6).

Table 3. Biomass of ventenata (VETDU), downy brome (BROTE), Canada thistle (CIRAR), and all the broadleaves combined on August 28, 2018 (4 MAAT, 3 MABT) following application of indaziflam, rimsulfuron, and propoxycarbazone. Percent cover of ventenata (VETDU) and desirable perennial grasses on September 25, 2018 (5 MAAT, 4 MABT). Pullman, WA 2018. MAT= months after treatment. Means followed by the same letter are not statistically significantly different ($\alpha = 0.05$).

YEAR 1: BIOMASS for Weedy Species & COVER								
			August 28, 2018 (4 MAAT, 3 MABT)				September 25, 2018 (5 MAAT, 4 MABT)	
			BIOMASS				COVER	
			Invasive Annual Grasses		Broadleaves		VETDU	Desirable Perennial Grasses
Treatment	Appl. Code	Field Rate	VETDU	BROTE	CIRAR	COMBINED		
			g m⁻²				%	
Nontreated	-	-	10	0	22	22	100 a	100
Laramie Induce	A	3 oz/a 0.25% v/v	12	0	34	23	72 b	100
Esplanade Induce	A	3 oz/a 0.25% v/v	2	1	1	1	21 c	100
Esplanade Induce	A	5 oz/a 0.25% v/v	2	0	10	1	29 c	100
Esplanade Induce	A	7 oz/a 0.25% v/v	6	0	0	0	25 c	100
Esplanade Laramie Induce	A	3 oz/a 0.25% v/v	2	0	26	13	38 c	100
Esplanade Laramie Induce	A	5 oz/a 3 oz/a 0.25% v/v	10	0	0	0	17 c	100
Esplanade Laramie Induce	A	7 oz/a 3 oz/a 0.25% v/v	2	0	0	6	23 c	100
Esplanade Imazamox	A	5 oz/a 5 fl oz/a	3	0	41	16	27 c	100
Esplanade Induce	B	3 oz/a 0.25% v/v	1	0	0	4	27 c	100
Esplanade Induce	B	5 oz/a 0.25% v/v	4	0	20	8	15 c	100
Esplanade Induce	B	7 oz/a 0.25% v/v	3	0	17	4	23 c	100
Esplanade Lambient Induce	B	3 oz/a 1.2 oz/a 0.25% v/v	3	0	2	27	29 c	100
Esplanade Plateau 2XL Induce	B	5 oz/a 7 fl oz/a 0.25% v/v	1	0	6	1	15 c	100
Esplanade Imazamox	B	5 oz/a 5 fl oz/a	2	0	2	0.2	17 c	100
<i>LSD (P=.05)</i>			<i>NS</i>	<i>NS</i>	<i>NS</i>	<i>NS</i>	22.7	<i>NS</i>

Table 5. Biomass of Canada thistle (CIRAR), Western salsify (TRODM), prickly lettuce (LACSE), and the combination of all the broadleaves (COMBINED) on July 19, 2019 (15 MAAT, 14 MABT) following application of indaziflam, rimsulfuron, and propoxycarbazone. Pullman, WA 2018. MAT= months after treatment. Means followed by the same letter are not statistically significantly different ($\alpha = 0.05$).

YEAR 2: BIOMASS for Weedy Species						
July 19, 2019 (15 MAAT, 14 MABT)						
Treatment	Application Code	Field Rate	Broadleaf Weeds			
			CIRAR	TRODM	LACSE	COMBINED
			g m⁻²			
Nontreated	-	-	0	0	0	2
Laramie Induce	A	3 oz/a 0.25% v/v	3	2	0	4
Esplanade Induce	A	3 oz/a 0.25% v/v	0	2	0.1	2
Esplanade Induce	A	5 oz/a 0.25% v/v	11	0	0	4
Esplanade Induce	A	7 oz/a 0.25% v/v	0	6	0	6
Esplanade Laramie Induce	A	3 oz/a 3 oz/a 0.25% v/v	2	0	0	1
Esplanade Laramie Induce	A	5 oz/a 3 oz/a 0.25% v/v	0	7	0	7
Esplanade Laramie Induce	A	7 oz/a 3 oz/a 0.25% v/v	0	5	0	5
Esplanade Imazamox	A	5 oz/a 5 fl oz/a	0	1	0	1
Esplanade Induce	B	3 oz/a 0.25% v/v	17	2	0	12
Esplanade Induce	B	5 oz/a 0.25% v/v	5	3	0	6
Esplanade Induce	B	7 oz/a 0.25% v/v	0	0	0	0
Esplanade Lambient Induce	B	3 oz/a 1.2 oz/a 0.25% v/v	1	3	0	4
Esplanade Plateau 2XL Induce	B	5 oz/a 7 fl oz/a 0.25% v/v	3	5	0	6
Esplanade Imazamox	B	5 oz/a 5 fl oz/a	6	0	0	3
<i>LSD (P=0.05)</i>			<i>NS</i>	<i>NS</i>	<i>NS</i>	<i>NS</i>

Table 6. Percent cover of Idaho fescue (FESID), bluebunch wheatgrass (AGRSP), slender wheatgrass (AGRTR), prairie junegrass (KOLMA), sheep’s fescue (FESOV), and intermediate wheatgrass (AGRIT) on August 28, 2019 (17 MAAT, 16 MABT) following application of indaziflam, rimsulfuron, and propoxycarbazone. MAT= months after treatment. Means followed by the same letter are not statistically significantly different ($\alpha = 0.05$).

YEAR 2: COVER								
August 28, 2019 (17 MAAT, 16 MABT)								
Treatment	Application Code	Field Rate	Desirable Perennial Grasses					
			FESID	AGRSP	AGRTR	KOLMA	FESOV	AGRIT
%								
Nontreated	-	-	2	0	25	75	100	0
Laramie Induce	A	3 oz/a 0.25% v/v	6	8	50	75	75	25
Esplanade Induce	A	3 oz/a 0.25% v/v	6	0	25	75	75	75
Esplanade Induce	A	5 oz/a 0.25% v/v	0	25	0	75	100	25
Esplanade Induce	A	7 oz/a 0.25% v/v	0	8	50	100	100	38
Esplanade Laramie Induce	A	3 oz/a 3 oz/a 0.25% v/v	6	6	8	100	100	25
Esplanade Laramie Induce	A	5 oz/a 3 oz/a 0.25% v/v	0	0	69	100	100	25
Esplanade Laramie Induce	A	7 oz/a 3 oz/a 0.25% v/v	0	6	75	100	100	50
Esplanade Imazamox	A	5 oz/a 5 fl oz/a	8	0	31	100	100	0
Esplanade Induce	B	3 oz/a 0.25% v/v	15	6	50	100	100	50
Esplanade Induce	B	5 oz/a 0.25% v/v	0	6	50	100	100	38
Esplanade Induce	B	7 oz/a 0.25% v/v	0	0	42	100	100	25
Esplanade Lambient Induce	B	3 oz/a 1.2 oz/a 0.25% v/v	0	0	50	100	100	0
Esplanade Plateau 2XL Induce	B	5 oz/a 7 fl oz/a 0.25% v/v	31	0	60	100	100	0
Esplanade Imazamox	B	5 oz/a 5 fl oz/a	15	0	29	100	100	0
<i>LSD (P=0.05)</i>			<i>NS</i>	<i>NS</i>	<i>NS</i>	<i>NS</i>	<i>NS</i>	<i>NS</i>

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

