

Weed Control with Fierce and RyzUp Smartgrass (GA₃) in Winter Wheat

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The study objective was to evaluate Fierce® (pyroxasulfone with flumioxazin) and Outrider® (sulfosulfuron) with and without RyzUp Smartgrass® (GA₃) for weed control in winter wheat. The intended target weed was downy brome (*Bromus tectorum* L.) but little to no downy brome was present in the plots possibly due to low rainfall in the fall and February and March below average temperatures. Tumble mustard (*Sisymbrium altissimum* L.) and common lambsquarters (*Chenopodium album* L.) were present in the trial and evaluated for weed control.

The winter wheat study was established at the WSU Wilke Farm near Davenport, WA. Application A, Fierce treatments, was applied to winter wheat in fall of 2018 and application B, Outrider treatments, was applied early spring of 2019, detailed in Table 2 and Table 3. Treatments were applied with a CO₂ powered backpack sprayer and a 5 ft boom with 4 Teejet 11002VS nozzles, calibrated to deliver 15 gallons per acre (GPA). The study was conducted in a randomized complete block design with 4 replications. Plots were 10 ft by 30 ft long. Winter wheat, variety Jasper/Duet (50/50), was seeded at a 3-inch depth into standing wheat residue on September 24, 2018.

Table 1. Soil characteristics for field site for study ICB0319

Soil Texture	pH	OM	CEC	Sand	Silt	Clay	NO ₃ -N	NH ₄ -N	Sulfur	P (bic)	K (bic)
		%		%	%	%	lb A ⁻¹	lb A ⁻¹	ppm	ppm	ppm
Silt Loam	5.2	2.67	16.2	30	60	10	68	21	5	3.7	403

Tumble mustard control was visually assessed 30 (3 WATB) and 33 weeks after application A [WATA (6 WATB)]. Common lambsquarters control was visually rated 33 WATA (6 WATB). Crop injury in the form of chlorosis was assessed 1 WATB (28 WATA). Total weed counts and total weed biomass was collected 37 WATA (10 WATB). Wheat heights were recorded 39 WATA (12 WATB). Plots were harvested using a 5 ft wide plot combine on August 22, 2019. All 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).

Table 2. Treatment application details

Study Application	A	B
Date	October 5, 2018	April 9, 2019
Application volume (GPA)	15	15
Crop Stage	PRE	3 leaves
Air temperature (°F)	54	45
Soil temperature (°F)	52	43
Wind velocity (mph, direction)	6.5, S	7, W
Cloud Cover	90	100
Next rain occurred on	October 6, 2018	April 12, 2019
Rain accumulation 2 WAT (IN)	0.36	0.31

Results



Figure 1. Winter wheat 33 weeks after treatment of application A [WATA (6 WATB)]. Pictures include nontreated (left), Fierce® (center), and Outrider® (right).

Crop injury, primarily chlorosis or yellowing, was present a week after treatment (WATB) for Outrider + RyzUp Smartgrass which had 5% chlorosis compared to 0% chlorosis for Outrider alone and all other treatments (Table 3).

Fierce alone and with RyzUp Smartgrass had the greatest tumble mustard control 30 WATA (3 WATB) at 95% compared to 55% for Outrider alone and 69% for Outrider with RyzUp Smartgrass. By 33 WATA (6 WATB), there was no difference in tumble mustard control (95%) for Fierce or Outrider with or without RyzUp Smartgrass. However, Fierce with and without RyzUp Smartgrass had greater control of common lambsquarters (88 or 89% control 33 WATA; 6 WATB) than either Outrider alone or Outrider with RyzUp Smartgrass. Interestingly, when RyzUp Smartgrass was included with Outrider there was significantly more common lambsquarters control (50% 6 WATB) compared to Outrider alone (28% control 6 WATB).

No difference in average total weed counts (plants m^{-2}) were observed between the nontreated control (230), RyzUp Smartgrass alone (119), Outrider alone (64), and Outrider with RyzUp Smartgrass (64) 37 WATA (10 WATB). However, Fierce alone and Fierce with RyzUp Smartgrass had significantly fewer weeds m^{-2} with 9 and 4, respectively (37 WATA). Weed biomass at 37 WATA (10 WATB) was lower for all treatments ($<40 g m^{-2}$) compared to the nontreated ($102 g m^{-2}$), however the only treatments which were significantly lower were the Fierce treatments.

There were no differences in wheat heights, averaging 78 cm, and yield, averaging 29 bu A^{-1} .

Table 3. Percent crop injury and control of tumble mustard and common lambsquarters. Davenport, WA, 2019. Means followed by the same letter are not significantly different ($\alpha=0.05$).

Treatment	Rate		April 16, 2019 (28 WATA; 1 WATB)	May 1, 2019 (30 WATA; 3 WATB)	May 23, 2019 (33 WATA; 6 WATB)	Common Lambsquarters Control
	Field Rate	lb ai A ⁻¹	Injury – Chlorosis	Tumble Mustard Control	Tumble Mustard Control	%
			%	%	%	%
Nontreated	-	-	-	-	-	-
RyzUp Smartgrass	0.5 oz/A	0.0125	0 b	5 d	27 b	0 d
RyzUp Smartgrass	0.5 oz/A	0.0125	0 b	95 a	95 a	88 a
Fierce	3 oz/A	0.1430	0 b	95 a	95 a	89 a
RyzUp Smartgrass	0.5 oz/A	0.0125				
Outrider	0.66 oz/A	0.0310	5 a	69 b	95 a	50 b
AMS	2.5 lb/A					
NIS	0.25% v/v					
Outrider	0.66 oz/A	0.0310	0 b	55 c	95 a	28 c
AMS	2.5 lb/A					
NIS	0.25% v/v					
		LSD	0.62	12.19	25.97	16.31

Table 4. Total weed counts, weed biomass, wheat heights, and winter wheat yields. Davenport, WA, 2019. Means followed by the same letter are not significantly different ($\alpha=0.05$).

Treatment	Rate		June 21, 2019 (37 WATA; 10 WATB)	July 2, 2019 (39 WATA; 12 WATB)	August 22, 2019
	Field Rate	lb ai A ⁻¹	Total Weed Counts	Total Weed Biomass	Wheat Heights
			# m ⁻²	g m ⁻²	cm
Nontreated	-	-	230 a	102 a	76
RyzUp Smartgrass	0.5 oz/A	0.0125	119 a	39 ab	78
RyzUp Smartgrass	0.5 oz/A	0.0125	4 b	1 b	80
Fierce	3 oz/A	0.1430	9 b	10 b	79
RyzUp Smartgrass	0.5 oz/A	0.0125			
Outrider	0.66 oz/A	0.0310	64 a	40 ab	77
AMS	2.5 lb/A				
NIS	0.25% v/v				
Outrider	0.66 oz/A	0.0310	64 a	37 ab	78
AMS	2.5 lb/A				
NIS	0.25% v/v				
		LSD	0.42t	0.47t	NS