

# Management of ALS-Resistant Italian Ryegrass with Pyroxasulfone and Sulfosulfuron in Winter Wheat

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

The study objective was to evaluate Zidua® (pyroxasulfone; group 15) in combination with Outrider® (sulfosulfuron; group 2) for Italian ryegrass control in winter wheat. Multiple herbicide modes of action applied at the same timing against the target weed, Italian ryegrass for example, could help delay the selection of herbicide resistance. However, the method is not effective if the population already has resistance to one of modes of action being applied. Then control is dependent upon the only mode of action still active.

The study was established at the WSU Cook Farm near Pullman, WA. Treatments were applied preemergence (PRE) in the fall and at 2-3 tiller wheat in early spring, detailed in Table 2 and Table 3. Treatments were applied with a CO<sub>2</sub> powered backpack sprayer and a 6.67 ft boom with 5 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.



*Figure 1. Overview of study at application timing B applied April 30, 2019.*

**Table 1.** Soil characteristics for field site for study ICB0719

Soil Texture	pH	OM	CEC	Sand	Silt	Clay	NO <sub>3</sub> -N	NH <sub>4</sub> -N	Sulfur	P (bic)	K (bic)
		%		%	%	%	lb A <sup>-1</sup>	lb A <sup>-1</sup>	ppm	ppm	ppm
Silt Loam	5.0	2.53	22.9	17.5	58.7	23.8	77	42	3	3.2	100

Crop stunting was assessed at 30 (1 WATB) and 35 (7 WATB) weeks after treatment of application A (WATA). Crop heading was also evaluated 35 WATA (7 WATB). Italian ryegrass control was visually assessed at 35 WATA (7 WATB) and 40 WATA (11 WATB). Plots were harvested using a 5 ft wide plot combine on August 20, 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 for ICB0719

Study Application	A	B
Date	October 10, 2018	April 30, 2019
Application volume (GPA)	15	15
Crop Stage	PRE	2-tiller
Air temperature (°F)	52	49
Soil temperature (°F)	50	47
Wind velocity (mph, direction)	5, SW	8, NW
Cloud Cover	30	10
Next rain occurred on	October 26, 2018	May 14, 2019
Rain accumulation 2 WAT (IN)	0	0.05

## Results

There were no crop stunting was observed 30 (1) and 35 WATA (7 WATB) for any treatment. Although not significant, there was a visual delay in wheat heading when Outrider was applied PRE with either Zidua and/or RyzUp Smartgrass of 0 to 30% compared to greater than 50% for all other treatments 35 WATA (7 WATB) (Table 3).

Italian ryegrass control was greatest when Zidua was applied preemergence alone or in combination with Outrider and RyzUp Smartgrass. At 35 WATA (7 WATB) Italian ryegrass control was most effective with treatments of Zidua alone (69%), Zidua + Outrider (80%), Zidua + Outride + RyzUp Smartgrass (88%), and Zidua + RyzUP Smartgrass (93%) applied PRE compared to all other treatments, which had less than 28% control. When Zidua was applied postemergence to 2-tiller wheat with Outrider, there was only 20% Italian ryegrass control, likely due to lack of activity on emerged plants (Table 3). Similar results were observed at 40 WATA (11 WATB) (Table 3).

Yield was similar for all treatments, with an average of 68 bu A<sup>-1</sup>.

**Table 3.** Percent crop stunting and heading, and Italian ryegrass (LOLMU) control in winter wheat following applications of pyroxasulfone and sulfosulfuron. Pullman, WA, 2019. Means followed by the same letter are not significantly different ( $\alpha=0.05$ ).

Treatment	Appl. Code	Field Rate	lb ai/A	May 8, 2019	June 11, 2019	July 18, 2019	August 20,	Yield	
				(30 WATA; 1 WATB)	(35 WATA; 7 WATB)	(40 WATA; 11 WATB)	2019		
				Crop Stunting	Crop Stunting	Crop Heading	LOLMU Control		LOLMU Control
%	%	%	%	%					
Nontreated	-	-	-	-	-	80	-	62	
RT3	A	28.4 fl oz/A	1.000						
AMS	A	2.5 lb/A		0	0	80	0 b	15 bc	
NIS	A	0.25% v/v						64	
RT3	A	28.4 fl oz/A	1.000						
Zidua	A	1.51 oz/A	0.080						
AMS	A	2.5 lb/A		3	0	50	69 a	68 ab	
NIS	A	0.25% v/v						65	
RT3	A	28.4 fl oz/A	1.000						
Zidua	A	1.51 oz/A	0.080						
Outrider	A	1.01 oz/A	0.047	3	0	30	80 a	90 a	
AMS	A	2.5 lb/A						71	
NIS	A	0.25% v/v							
RT3	A	28.4 fl oz/A	1.000						
Zidua	A	1.51 oz/A	0.080						
Outrider	A	1.01 oz/A	0.047	5	0	0	88 a	88 a	
RyzUp Smartgrass	A	0.43 oz/A	0.011					68	
AMS	A	2.5 lb/A							
NIS	A	0.25% v/v							
RT3	A	28.4 fl oz/A	1.000						
Everest 3.0	A	4.7 fl oz/A	0.028	0	0	100	28 b	25 bc	
AMS	A	2.5 lb/A						69	
NIS	A	0.25% v/v							
RT3	A	28.4 fl oz/A	1.000						
AMS	A	2.5 lb/A		0	0	80	20 b	44 abc	
NIS	A	0.25% v/v						67	
Zidua	B	1.51 oz/A	0.080						
Outrider	B	1.01 oz/A	0.047						
NIS	B	0.25% v/v							
RT3	A	28.4 fl oz/A	1.000						
AMS	A	2.5 lb/A		4	0	80	8 b	23 bc	
NIS	A	0.25% v/v						72	
Powerflex HL	B	2 oz/A	0.016						
NIS	B	0.25% v/v							
RT3	A	28.4 fl oz/A	1.000						
Zidua	A	1.51 oz/A	0.080						
RyzUp Smartgrass	A	0.43 oz/A	0.011	2	0	80	93 a	83 a	
AMS	A	2.5 lb/A						70	
NIS	A	0.25% v/v							
RyzUp Smartgrass	A	0.43 oz/A	0.011	0	0	100	26 b	26 bc	
Outrider	B	1.01 oz/A	0.047	0	0	80	5 b	4 c	
NIS	B	0.25% v/v						72	
RT3	A	28.4 fl oz/A	1.000						
Outrider	A	1.01 oz/A	0.047						
AMS	A	2.5 lb/A		1	0	30	18 b	5 c	
NIS	A	0.25% v/v						66	
RyzUp Smartgrass	A	0.43 oz/A	0.011						
			LSD	NS	NS	NS	25.72	28.95 <sub>t</sub>	NS