Russian thistle control in chemical fallow with fall- and late winter-applied soil-active herbicides

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Controlling Russian thistle in chemical fallow in the winter wheat/fallow region of eastern Washington is critical for protecting soil moisture but often requires multiple herbicide applications throughout the fallow year (Figure 1). Herbicides such as glyphosate, paraquat, and 2,4-D can be effective, but have no soil activity, therefore, do not control subsequent flushes. Soil-active herbicides could provide a longer period of control but require precipitation to activate the herbicides in the soil prior to seed germination. Applications made too late in the spring risk not being effective if there is limited rainfall after application. Fall applications will likely be followed by adequate precipitation for soil activation but may be less effective the following year if degradation occurs.

Figure 1. Russian thistle in chemical fallow near Ralston, WA, on June 27, 2024. Nontreated check plot (left) and plot treated November 9, 2023, with Spartan Charge (right).

We evaluated Russian thistle control in chemical fallow with Spartan® Charge (carfentrazone + sulfentrazone, Group 14), Fierce® EZ (flumioxazin, Group 14, + pyroxasulfone, Group 15), Fierce® MTZ (flumioxazin + metribuzin, Group 5, + pyroxasulfone), and Authority® MTZ DF (sulfentrazone + metribuzin). All four herbicide products are labeled for weed control in fallow applications. Applications were made November 9, 2023, and March 18, 2024, at a field site near Ralston, WA, with a Ritzville silt loam soil with 5.6 pH and 1.5% organic matter. Precipitation near Washtucna, WA, from November 9, 2023, through March 18, 2024, totaled 4.7 inches. Precipitation between March 18 and June 27, 2024, totaled 1.1 inch. All applications were made with a CO_2-pressurized backpack sprayer and 10-ft hand-held spray boom with six AIXR110015 TeeJet® nozzles. The spray output was 15 gpa with 40 psi nozzle pressure and 3 mph ground speed. The experimental design at each timing was a randomized complete block with four replicates per treatment and 10- by 30-ft plots. At each timing, PowerMax® (glyphosate) at 24 oz/A and Downrigger® (acidifier, drift aid, surfactant) at 0.5% v/v was applied to control all presently emerged vegetation.

Russian thistle control was evaluated visually on June 13 and June 27, 2024, as a percent of the nontreated check treatment. Observable efficacy included both Russian thistle density and plant size. At the June 27 evaluation, all plants were counted in each plot. Plant density does not consider plant size or biomass; therefore, the visual ratings are also important to consider when evaluating control. Visual ratings on June 13 for all treatments averaged between 85 and 94% but differences between herbicides or timing were not found (data not shown). However, for the June 27 visual ratings, a significant statistical interaction between timing and herbicides found that the late-winter applications resulted in 92% Russian thistle control compared with 83% for the fall applications (Table 1). Differences between herbicide treatments were also found and Spartan Charge and Authority MTZ DF both resulted in the highest control with 94% for each herbicide. The least control averaged 74% with Fierce EZ and 85% with Fierce MTZ. Plant counts were consistent with the visual ratings as Fierce EZ and Fierce MTZ had the highest densities compared with Spartan Charge; however, Fierce MTZ was not statistically different from Authority MTZ DF.

In this trial, there was adequate precipitation following both application timings (> 0.5 inches) to activate the herbicides in the soil; therefore, we were able to see activity with all herbicides and timings. These results do suggest that sulfentrazone, as a component of both Spartan Charge and Authority MTZ DF, was providing the greatest Russian thistle control. It was also evident that metribuzin added some control as visual ratings for Fierce MTZ averaged slightly higher than Fierce EZ. Russian thistle control with flumioxazin + pyroxasulfone (Fierce EZ) averaged 74% and was not as effective as the products containing sulfentrazone. Furthermore, late winter applications were more effective than fall applications and were likely a result of adequate rainfall following applications to activate the herbicides. This research shows that applications of soil-active herbicides can be an effective tool in managing Russian thistle in chemical fallow.

Table 1. Russian thistle control and plant density in chemical fallow as affected by timing of herbicide applications and herbicides applied.

		Evaluations 6/27/2024*	
Factors	Rate	Control**	Density***
	(fl oz/A)	(% of nontreated check)	(plants/plot)
Time			
Late winter		92 a	6 a
Fall		83 b	8 a
Herbicide			
Nontreated check		0	26 a
Spartan Charge	6	94 a	3 d
Fierce EZ	9	74 c	11 b
Fierce MTZ	20	85 b	8 bc
Authority MTZ DF	10	94 a	5 cd

*Means followed by the same letter for each factor in each column are not different (P≤0.05).
**Control ratings include assessment of plant density and size.
***Plots measured 300 ft^2, or 0.007 acres.