Post-harvest Russian Thistle Control in Spring Wheat Stubble

Mark Thorne and Drew Lyon

Post-harvest Russian thistle control in the low and mid-rainfall areas of eastern Washington is critical for preventing soil moisture loss, biomass accumulation, and seed production that will cause problems in future crops. Russian thistle is a warm-season introduced annual forb and is a major weed problem in both winter and spring wheat and will flourish in wheat stubble following harvest if left uncontrolled (Figure 1). Previous research has found that post-harvest late-season Russian thistle root growth can remove as much as 26 gallons of water per plant and deplete most all the available soil moisture to a depth of at least 6 feet. Herbicides effective for post-harvest Russian thistle control are usually contact-type herbicides, e.g., paraquat, that must contact all surfaces of the plants to achieve complete control. Paraquat can be very effective but is also a very toxic chemical and can pose health risks to applicators. Glyphosate, a systemic herbicide, is also applied post-harvest for Russian thistle control but can be less effective if applied at too low of a rate and if the Russian thistle stage of growth is too far advanced. Group 14 protoporphyrinogen oxidase (PPO) inhibitor herbicides have burndown activity and can be tank mixed with glyphosate for increased efficacy.

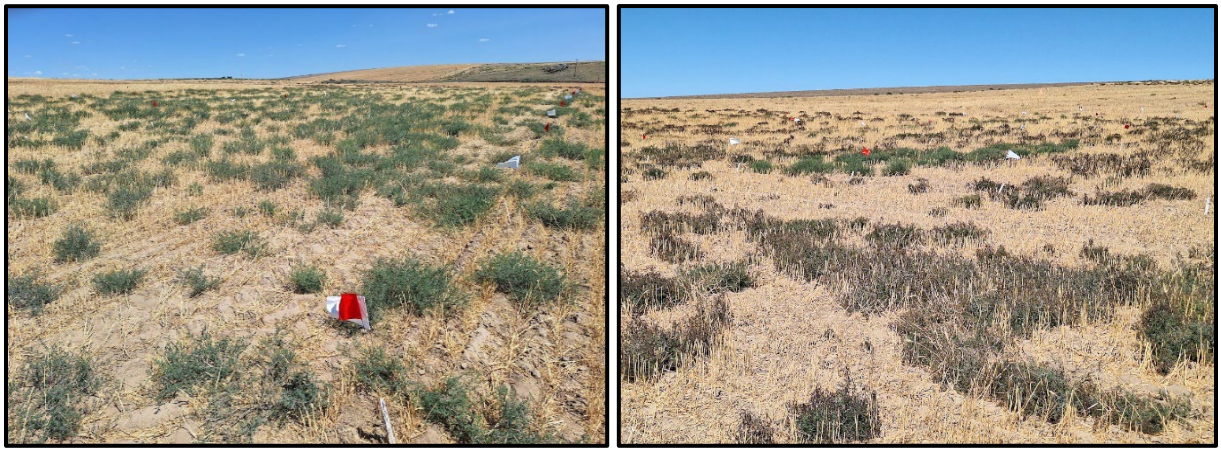

Figure 1. Russian thistle in spring wheat stubble near Lind, WA. Plants actively growing and depleting soil moisture (photo on left), and two weeks after treatment (photo on right.

We compared BAS85101H, an experimental Group 14 PPO herbicide, with and without a glyphosate (PowerMax) tank mix partner for post-harvest Russian thistle control. We also compared Sharpen (saflufenacil) and Reviton (tiafenacil), two other PPO herbicides that are labeled for post-harvest use.

The study location was the WSU Lind Dryland Research Station near Lind, WA, and all treatments were applied on July 28, 2023, a week after the spring wheat was harvested. The wheat stubble height was 8 inches at the time of application and the Russian thistle averaged 12 inches high and 15 inches in diameter with a density of 1.1 plants/yd^{-2}.

Treatments were applied with a CO_2-pressurized backpack sprayer and 10-ft hand-held spray boom with six TT11001 TeeJet® nozzles. Spray output was 10 gpa with 48 psi nozzle pressure and 3 mph ground speed. The experimental design was a randomized complete block with four replicates per treatment and 10- by 30-ft plots. All treatments included ammonium sulfate (AMS) at 8.5 lb/100 gal and methylated seed oil (MSO) at 16 oz/A. Treatments were visually evaluated at 1, 2, and 4 weeks after treatment (WAT) and compared as a percent of the nontreated check.

Control 1 WAT was greatest with BAS 8510H tank mixed with PowerMax at either 22 or 32 oz/A and averaged 84 and 81% of the nontreated check (Table 1). BAS 8510H alone resulted in 73% control and was not different than Reviton + PowerMax. Sharpen resulted in the lowest control and did not benefit from PowerMax. At 2 WAT, control was greatest with BAS 8510H tank mixed with PowerMax at 32 oz/A, then with PowerMax at 22 oz/A, and then alone. All Sharpen or Reviton treatments were less effective as the Russian thistle plants exhibited regrowth following the herbicide applications. At 4 WAT, all Russian thistle plants had some degree of regrowth; however, control from BAS 8510H tank mixed with PowerMax was still the most effective treatment with no difference between PowerMax at 22 or 32 oz/A.

BAS 8510H has potential for post-harvest Russian thistle control; however, some further testing may be needed. In this trial, the application rate of 10 gpa may not have been adequate to get good coverage. Furthermore, even though the treatments were applied within two weeks of wheat harvest, Russian thistle regrowth was fast and substantial. Applications closer to harvest may have had greater success. Overall, BAS 8510H resulted in better control than with Sharpen or Reviton when tank-mixed with PowerMax.

Table 1. Post-harvest control of Russian thistle.

		Visual control ratings**		
Herbicide*	Rate	1 WAT	2 WAT	4 WAT
	oz/A	----- percent of nontreated check -----		
Nontreated check	---	---	---	---
BAS 8510H	1.4	73 b	61 c	55 bc
BAS 8510H + PowerMax	1.4 + 22	84 a	74 b	70 a
BAS 8510H + PowerMax	1.4 + 32	81 a	80 a	76 a
Sharpen	1.0	68 bc	55 d	47 cd
Sharpen	2.0	61 de	55 d	45 d
Sharpen + PowerMax	1.0 + 22	64 cd	54 d	54 bc
Sharpen + PowerMax	2.0 + 22	58 e	55 d	58 b
Reviton + PowerMax	2.0 + 22	73 b	69 b	59 b

*All treatments included ammonium sulfate (AMS) at 8.5 lb/100 gal and methylated seed oil (MSO) at 16 oz/A.
**Visual ratings made 1, 2, and 4 weeks after treatment (WAT). Numbers in each column followed by the same letter are not statistically different.

Off-label or Experimental-Use Disclaimer

Some of the pesticides discussed in this presentation were tested under an experimental use permit granted by WSDA. Application of a pesticide to a crop or site that is not on the label is a violation of pesticide law and may subject the applicator to civil penalties up to $7,500. In addition, such an application may also result in illegal residues that could subject the crop to seizure or embargo action by WSDA and/or the U.S. Food and Drug Administration. It is your responsibility to check the label before using the product to ensure lawful use and obtain all necessary permits in advance.