Russian Thistle Control in Chemical Fallow

Mark Thorne and Drew Lyon

Russian thistle is a warm-season introduced annual forb and is a major weed problem in the low to mid-rainfall farming regions of eastern Washington. Russian thistle is particularly problematic during the fallow phase of wheat/fallow crop rotations (Figure 1) and if left uncontrolled, will significantly deplete soil moisture, and reduce yield of the following wheat crop. Chemical fallow is used in reduced-tillage or no-till cropping systems to protect soil from erosion; however, control of ongoing flushes of Russian thistle through the summer requires repeat herbicide applications. Glyphosate is a common herbicide for weed control in fallow, but it has no soil residual, and repeat applications are often required. Herbicides with some soil residual could reduce the number of repeat applications, providing the herbicide is effective on Russian thistle.

Figure 1. Russian thistle in fallow in early May near Kahlotus (photo on left), and early July near Lind (photo on right).

We compared PowerMax® (glyphosate) alone and tank mixed with Sharpen®, Valor®, Reviton®, Huskie®, or Talinor® herbicides for Russian thistle control in fallow at three locations in eastern Washington. Treatments were applied on May 2, 2023, near Kahlotus, WA, on the Jeff Yerbich Farm, and near Lind, WA on May 31 on the Traven Smith Farm, and July 3 on the WSU Lind Dryland Research Station. Sharpen (saflufenacil), Valor (flumioxazin), and Reviton (tiafenacil) are Group 14 protoporphyrinogen oxidase (PPO) inhibitors that are primarily burndown herbicides with varying degrees of soil activity. Huskie is a product mix of pyrasulfotole and bromoxynil. Talinor is a product mix of bicyclopyrone and bromoxynil. Bicyclopyrone and pyrasulfotole are both Group 27 herbicides that inhibit carotenoid biosynthesis and have some soil activity. Bromoxynil is a Group 6 herbicide that inhibits photosynthesis but is only a contact herbicide with very little soil activity.

Treatments were applied with a CO_2-pressurized backpack sprayer and 10-ft hand-held spray boom with six AIXR11002 TeeJet® nozzles. Spray output was 10 gpa with 21 psi nozzle

pressure and 4 mph ground speed. The experimental design at each location was a randomized complete block with four replicates per treatment and 10- by 30-ft plots.

All treatments included PowerMax at 48 oz/A. PowerMax applied alone included ammonium sulfate (AMS) at 17 lb/100 gal. Sharpen was added at 1 oz/A with AMS at 17 lb/100 gal and methylated seed oil (MSO) at 1% v/v. Valor was added at 2 oz/A with AMS at 2.5 lb/A and MSO at 0.25% v/v. Reviton was added at 2 oz/A with AMS at 17 lb/100 gal and MSO at 1% v/v. Huskie was added at 13.5 oz/A with AMS at 1 lb/A and nonionic surfactant (NIS) at 0.25 v/v. Talinor was added at 16 oz/A with AMS at 1 lb/A and crop oil concentrate (COC) at 1% v/v. CoAct+ was not added. Talinor is not currently labeled in fallow and has a 1-month plant-back restriction interval for wheat and barley.

Soil pH and organic matter (OM) at the Kahlotus site were 5.5 and 2.0%, respectively. At Lind, pH and OM were 5.9 and 1.1% at the May 3 application site, and 6.0 and 2.8% at the July application site. At the time of each application, Russian thistle plants were 3-4 inches tall at Kahlotus, 1-6 inches tall at Lind on May 31, and 3-8 inches tall at Lind on July 3. Treatment efficacy was evaluated visually at 1 week after treatment (WAT), 2 WAT, and 4 WAT as a percentage of nontreated plants.

At Kahlotus, Russian thistle control 1 WAT was greater than 90% and was faster acting with all tank-mix treatments than with PowerMax alone at 83% control (Figure 1). At 2 WAT, control had increased to at or near 100% for all treatments. However, by 4 WAT secondary Russian thistle flushes had occurred and PowerMax alone and the tank mixes with Sharpen or Reviton had zero control. Only the PowerMax plus Valor tank mix had maintained control over 50% while tank mixes with Huskie or Talinor still had some residual activity with 16 and 32% control, respectively.

At Lind, the May 31 tank mix applications all resulted in Russian thistle control ranging between 94 and 100% by 1 WAT, and control was maintained through 4 WAT. PowerMax alone only resulted in 63% control by 1 WAT, but its control increased to 100% by 2 and 4 WAT. The high level of control with all treatments was due to good initial efficacy on small plants and a lack of secondary flushes during the evaluation period.

Following the July 3 applications at Lind, Russian thistle control with PowerMax alone declined from 55% at 1 WAT to only 25% control at 4 WAT. This is likely due to the difficulty of controlling larger, more robust, and possibly drought-stressed plants. However, control 1 WAT with the Sharpen, Reviton, Huskie, or Talinor tank mixes resulted in good control between 80 and 94%, and they maintained similar control through 4 WAT. In contrast, control with Valor plus PowerMax was 50% at 1 WAT, similar to PowerMax alone, and only increased to 65% by 4 WAT.

Timing of application and soil activity of the herbicide are important factors in Russian thistle control in chemical fallow. Early applications with herbicides with little or no soil activity will not control subsequent flushes. Later applications may have the potential to be effective if they include tank-mix partners that are effective on larger plants, but larger plants also have had time to deplete soil moisture.

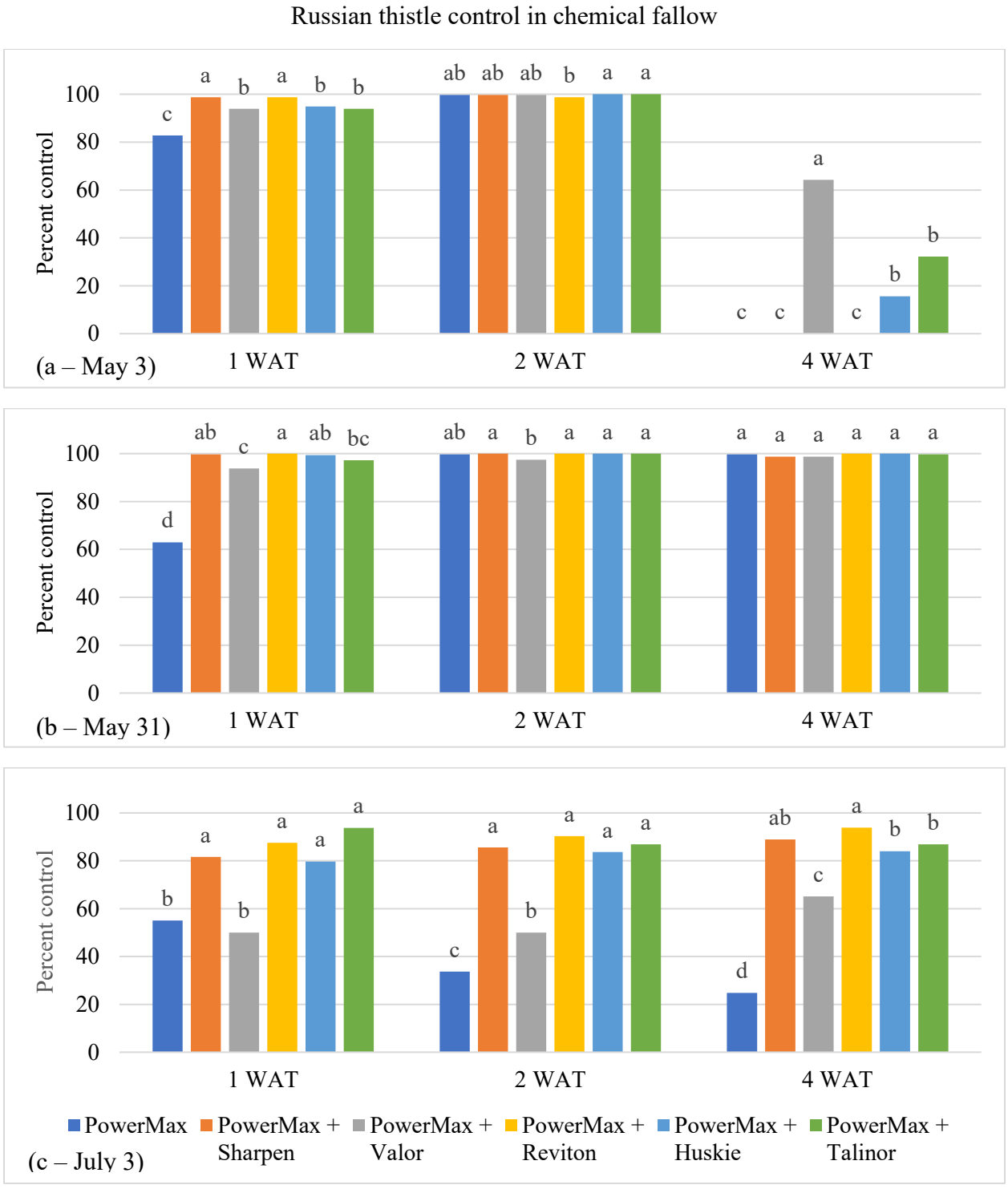

Figure 2. Russian thistle control in chemical fallow as a percent of nontreated check visually rated 1 week after treatment (WAT), 2 WAT, and 4 WAT. Treatments were applied on (a) May 2 near Kahlotus, WA, (b) May 31 at Lind, WA, and (c) July 3 at Lind, WA. Columns within each rating time with the same letter are not significantly different from each other.

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