Efficacy of Silwet® L77 organosilicone surfactant with RT® 3 glyphosate applied in no-till fallow for control of smooth scouringrush – 2 years after treatment.

Mark Thorne, Marija Savic, and Drew Lyon

Control of smooth scouringrush (*Equisetum laevigatum*) in fallow has been a challenge for producers, especially in no-till systems (Figure 1). In 2019 we initiated trials in no-till fallow comparing RT 3 plus Silwet L77 surfactant with applications of RT 3 with no added surfactant. Smooth scouringrush is also a very deep-rooted plant with extensive vertical rhizomes and it was unclear how long control from applications would persist. Treatments were evaluated in the 2020 winter wheat crops, and again in 2021, two years after the applications.

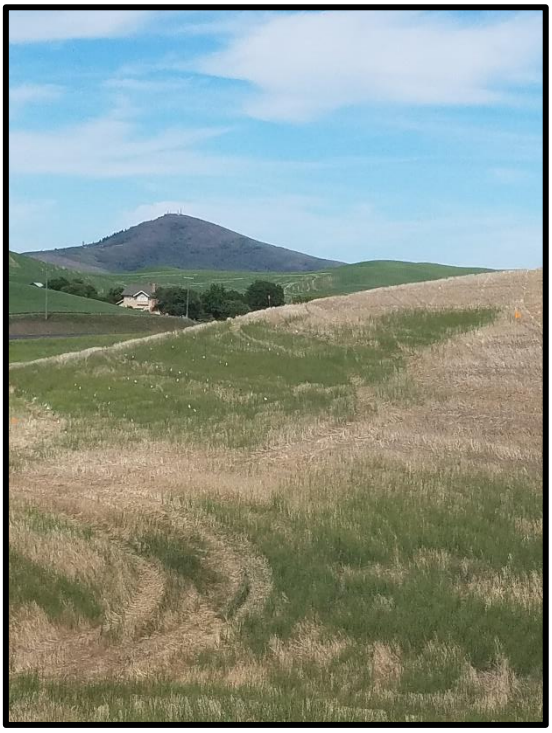

Figure 1. Dense patches of smooth scouringrush in fallow near Steptoe, WA.

Trial locations were at the Palouse Conservation Field Station (PCFS) near Pullman, WA, the Hall farm near Steptoe, WA, and the Camp farm near Edwall, WA. Soil pH and organic matter was 5.1 and 3.3% at PCFS, 5.0 and 2.7% at Steptoe, and 5.0 and 2.9% at Edwall, respectively. Initial densities in 2019 averaged 67, 125, and 370, stems/yd^2 at Edwall, PCFS, and Steptoe, respectively. All treatments were applied in 2019 near the end of each month from May through August, except for the first application at Steptoe, which was applied June 11, 2019. Experimental design was a split-plot randomized complete block, with three sub-plot treatments per main plot, and four application times. Main plots were the application times and the sub-plot treatments were the herbicide treatments of RT 3 with no added surfactant, RT 3 with Silwet L77, and no herbicide. Main-plots at Steptoe and Edwall measured 10 by 30 ft with sub-plots measuring 10 by 10 ft. Due to limited area, PCFS main plots were 6.7 by 15 ft with 6.7- by 5-ft sub-plots. Herbicides were applied with a hand-held spray boom with six TeeJet® XR11002 nozzles on 20-inch spacing and pressurized with a CO_2 backpack at 3 mph. At PCFS, two of the six nozzles were blocked to accommodate the narrower plot width. Spray output was 15 gpa at 25 psi. In June 2021, stem densities were re-counted in all plots at each site. The Edwall and PCFS sites were growing spring wheat, and the Steptoe site was in spring barley.

In June 2021, stem densities were counted in two 1-meter quadrats per plot. Overall, smooth scouringrush densities in 2021, two years after applications, were lower following RT 3 plus Silwet L77 compared with RT 3 alone (Table 1). The only exceptions were the May and August

applications at Edwall where no statistical differences existed between treatments. The best results were seen with the May and June applications at PCFS and the June application at Steptoe where densities were 2, 0, and 4 stems/yd2, respectively. The July applications at PCFS and Steptoe were also an exception as the RT 3 plus Silwet L77 were not statistically different from RT 3 alone. Clearly, there are differences in efficacy relative to timing of application and location for smooth scouringrush control with RT 3 plus Silwet L77. Each location differed in its topography and aspect. The PCFS location had a south exposure and was located at the bottom of a gentle slope (Figure 1). This location was the warmest of the three and had warmer soil temperatures at each application time. The Edwall site was in a northwest-facing draw with a gentle slope and moist soil much of the year. The Steptoe site was on a steep north-facing slope. These differences likely had an impact on the growth of the plants, and possibly the efficacy of the treatments. Organosilicone surfactants, like Silwet L77, function by substantially reducing spray drop surface tension on a leaf or stem, resulting in mass flow of the spray solution across the surface. Other research has shown that this mass flow facilitates the movement of the spray solution into open stomates where herbicide uptake can more readily occur. The downside of low surface tension and mass flow is that the spray solution is susceptible to faster evaporation off the surface, thus reducing uptake. It is likely that plant water status and soil and weather conditions could influence the amount of herbicide getting into the plant, thus effecting control.

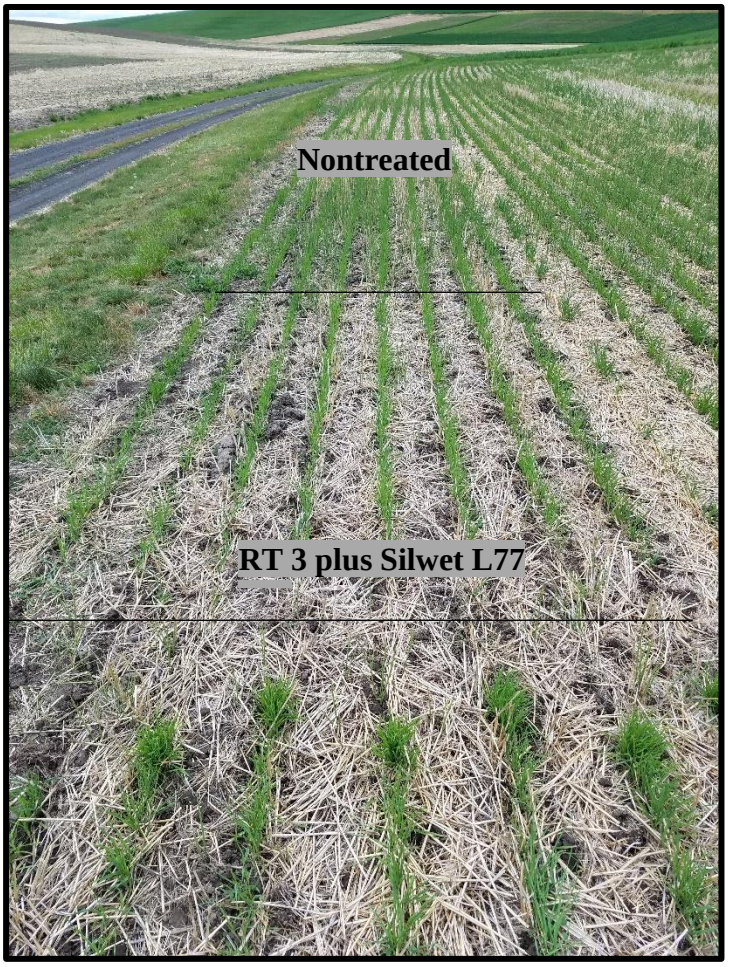

Figure 2. Effect of RT 3 plus Silwet L77 two years after application.

The application of RT 3 plus an organosilicone surfactant could be a good alternative to using long residual herbicides such as Glean® (chlorsulfuron) and Finesse® (chlorsulfuron + metsulfuron), which are known to control smooth scouringrush, but cannot be applied for at least 36 months prior to planting susceptible crops such as pulses or non-sulfonylurea resistant canola (see labels for plantback restrictions).

Table 1. Smooth scouringrush density in 2021, two years after treatments were applied in 2019 from May through August at three locations in eastern Washington.

			Smooth scouringrush density*		
Time	Treatments	Rates	Edwall	PCFS	Steptoe
		oz/A + % v/v	----------stems/yd^2----------		
May	None	-	149 a	72 a	239 a
May	RT 3 alone	96	149 a	20 a	79 b
May	RT 3 + Silwet L77	96 + 0.25	83 a	2 b	21 c
June	None	-	152 a	71 a	153a
June	RT 3 alone	96	142 a	22 a	83 a
June	RT 3 + Silwet L77	96 + 0.25	31 b	0 b	4 b
July	None	-	185 a	141 a	217 a
July	RT 3 alone	96	90 a	51 b	117 ab
July	RT 3 + Silwet L77	96 + 0.25	35 b	27 b	74 b
August	None	-	69 a	145 a	217 a
August	RT 3 alone	96	61 a	115 a	117 a
August	RT 3 + Silwet L77	96 + 0.25	48 a	20 a	74 b

*Means are based on four replicates per treatment. Means within a column for each application time followed by the same letter are not significantly different at the 95% probability level, which means that we are not confident that the difference is the result of treatment rather than experimental error or random variation associated with the experiment.