Surfactant comparison with RT 3 at 96 oz/A for control of smooth scouringrush – Steptoe

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Control of smooth scouringrush (*Equisetum laevigatum* A. Braun) in no-till fallow with glyphosate herbicides has been largely unsuccessful, especially at lower applications rates intended for annual weed control. We compared four different surfactants with RT 3 glyphosate herbicide applied at 96 oz/A for control of smooth scouringrush in no-till fallow. Surfactants were Silwet® L77, Spray Guard®, Crop Oil-M®, and Wetcit®. Silwet L77 is an organosilicone non-ionic surfactant. Spray Guard is a water conditioning and deposition aid that contains ammonium sulfate (2 lbs NH_4SO_4/gallon) and phosphoric acid. Crop Oil-M is a petroleum-based surfactant, and Wetcit is a citrus, alcohol-based surfactant. In related studies, we have found that Silwet L77 has increased efficacy of RT 3 at the 96 oz/A rate; however, Silwet L77 is no longer available in this region and is being replaced by Kinetic®, a similar organosilicone non-ionic surfactant. This trial examines other options besides organosilicone surfactants.

The study site is located on the Hall farm near Steptoe, WA (Table 1). The field is in a three-year rotation of no-till fallow/winter wheat/spring wheat. Initial smooth scouringrush density averaged 41 stems/ft^2 (Figure 1.). Plots measure 10 by 30 ft and were arranged in a randomized complete block design with four replications per treatment. All herbicide treatments 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. Spray output is 15 gpa at 25 psi. Evaluations were visual assessments of herbicide efficacy at two different times, 7 weeks after treatment (WAT) and 16 WAT. The trial will re-evaluated in 2020 to see if any of the treatments effect a change in stem density the following year.

Figure 1. Smooth scouringrush stems with strobili (spore producing reproductive structures).

Table 1. Application and soil data.

Location	Steptoe, WA
Application date	6/11/2019
Rotation phase	no-till fallow
Smooth scouringrush stage	stems with strobili
Air temperature (F)	77
Relative humidity (%)	34
Wind (mph, direction)	1-3, E
Cloud cover (%)	1
Soil temperature at 2 in (F)	72
Soil texture	Palouse-Thatuna silt loam
OM (%)	2.7
pH	5.0

Visual assessments in 2019 confirmed results from our other studies that Silwet L77 increases efficacy of RT 3 on smooth scouringrush (Table 2). At 7 WAT, stem injury averaged 77%, but was not different from Wetcit, which averaged 72% injury. Both Silwet L77 and Wetcit were superior to Crop Oil-M or Spray Guard; however, Crop Oil-M was slightly more effective than Spray Guard with 35 vs 9% injury visible. At 16 WAT, visual injury from RT 3 + Silwet L77 was 68% and still more effective than Crop Oil-M or Spray Guard. Furthermore, RT 3 + Wetcit efficacy was intermediate in that it was not different from Silwet L77 but also not different from Crop Oil-M. We will re-evaluate these treatments (Figure 2) in 2020 to determine if there are lasting effects on stem density.

Table 2. Surfactant comparison for smooth scouringrush control at Steptoe, WA

		Smooth scouringrush visual assessment of herbicide activity*	
Herbicide + Surfactant	Rate	7 WAT	16 WAT
	(oz/A + %v/v)	----------(% injury)----------	
RT 3 + Spray Guard	96 + 0.75	9 c	29 c
RT 3 + Crop oil	96 + 0.75	35 b	36 bc
RT 3 + Wetcit	96 + 0.5	72 a	54 ab
RT 3 + Silwet	96 + 0.25	77 a	68 a

*Control based on stem discoloration and death compared with untreated plants.
WAT=weeks after treatment. Numbers in each column followed by the same letter are not different (P-value≤0.05).

Figure 2. Foreground - discoloration in smooth scouringrush stems caused by RT 3 plus surfactants. Background - smooth scouringrush not yet effected by treatments.