

## Field horsetail control in the Palouse annual cropping region

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Field horsetail (*Equisetum arvense*) is a member of a prehistoric group of plants in the genus *Equisetum*. Equisetums date back about 350 million years and were forage for dinosaurs and then became a major component of the vegetation that developed into coal during the Carboniferous period. Currently, three *Equisetum* species are common in the Pacific Northwest and include field horsetail, smooth scouringrush, and scouringrush. Field horsetail is a perennial rhizomatous species that produces fertile spore-bearing leafless stems early in the spring followed by vegetative stems that resemble Christmas trees that persist through the rest of the year up to freezing temperatures in the fall. Field horsetail can be found on flood plains and along roads where water collects in ditches and barrow pits.



Figure 1. Field horsetail in winter wheat (left) and chickpeas (right).

In the high-rainfall Palouse region of eastern Washington and northern Idaho, field horsetail is a problem weed because it is very persistent, hard to control with tillage or herbicides, and is competitive with all crops grown (Figure 1). Herbicides that could be effective do not fit well in the commonly used crop rotations because of long plant-back intervals that would injure sensitive crops like canola or pulses. Chlorsulfuron is an herbicide that is labeled on wheat and is

effective on other *Equisetum* species like smooth scouringrush but has up to a 36-month plant-back interval to crops other than wheat. Other herbicides that can control field horsetail, e.g., sulfometuron (Oust<sup>®</sup>) or dichlobenil (Casoron<sup>®</sup>), are also not labeled for use in field crops grown in this region because of long soil residual and potential crop injury.

In this region, crops are generally grown each year without a fallow year in between. Therefore, herbicides are applied either following crop harvest in the fall, preplant in the spring, or to a growing crop. Finesse<sup>®</sup> Cereal and Fallow Herbicide (chlorsulfuron + metsulfuron) is a Group 2 ALS inhibitor herbicide that has been effective on smooth scouringrush when applied during a fallow year, but it has not been well tested on field horsetail. Finesse has a 36-month plantback restriction to peas and a bioassay is recommended for chickpeas or canola. Express XP<sup>®</sup> (tribenuron) is another Group 2 herbicide that has a molecular structure very similar to sulfometuron but has not been tested for field horsetail control; however, Express XP has no plantback restrictions that would affect a crop after 2 months following application. Widematch<sup>®</sup> (clopyralid + fluroxypyr) is a Group 4 synthetic auxin herbicide that can be applied to wheat up to the flag leaf stage. It is not known if Widematch has any effect on field horsetail other than to burn down the current year's growth. The Widematch plantback interval to canola is 12 months or 18 months to any pulse crop.

Since field horsetail does not emerge early in the spring, foliar applications to field horsetail need to consider the labeled application window of the crop. Finesse, Express XP, and Widematch can all be applied to wheat when it is tillered up to the flag leaf stage, which is typically when field horsetail emerges in the spring. However, if these herbicides control field horsetail, crop rotations would have to be altered to avoid problems with plantback restrictions.

We initiated a field study September 2023 on the Jared Druffel farm near Pullman, WA for field horsetail control in the high-rainfall (>20" annual precipitation) annual cropping region of the Palouse. The study site is on a floodplain near a creek and is a Caldwell silt loam soil type with a pH of 5.4 and 3.2% organic matter. The experimental design is a randomized complete block with four replicates per treatment and 10- by 25-ft plots. The field produced a spring canola crop in 2023. The soil surface contained canola stubble and green field horsetail stems that were 6 to 12 inches in height. Fall treatments were applied on September 9, 2023. Early spring applications were applied on April 2, 2024, when the wheat was fully tillered, but field horsetail had not yet emerged. Late spring applications were on May 9, 2024, when the wheat had flag leaves, and the field horsetail had vegetative stems up to 6 inches high. All herbicide treatments were applied with a hand-held spray boom with six nozzles on 20-inch spacing and pressurized with a CO<sub>2</sub> backpack. Spray output was 15 gpa at 40 psi through TeeJet<sup>®</sup> AIXR110015 nozzles at 3 mph. All treatments included a nonionic surfactant (NIS) or an organosilicone surfactant (Syl-Coat<sup>®</sup>).

Treatment efficacy was evaluated visually May 9, 2024, and July 3, 2024, as a percent of the nontreated check treatment and included assessments of both field horsetail density and canopy volume. Visual ratings on May 9 showed that all fall- and early spring-applied Finesse treatments, including the application to bare soil, had resulted in 95-100% control of field horsetail as it was emerging in the spring (Table 1). In contrast, the early spring application of Express XP only resulted in 40% control. By the July 3 rating, only fall-applied Finesse to field

horsetail stems were effective. The late-spring application of Widematch did not add any benefit to the fall-applied Finesse treatment, but it might have controlled other broadleaf weeds if they were present. At the July 3 rating, field horsetail was no longer controlled by the fall-applied Finesse to bare soil treatment, which provided only 36% control and not different from any of the spring-applied Finesse treatments. Furthermore, Express XP was not effective in controlling field horsetail. In addition, there was no benefit of including Syl-Coat compared with NIS to either Finesse or Express XP applied in the spring.

Field horsetail is very difficult to control in crop production fields; however, fall applications of Finesse may be effective but only if they are applied to actively growing stems. Finesse applied to soil is not effective for long-term control as there appears to be minimal herbicide uptake through the rhizomes. Furthermore, applying Finesse to field horsetail in spring does not appear effective and this may be because plants have not yet begun to translocate photosynthates back into the rhizomes. Plantback intervals for sensitive crops should be observed following any Finesse application, and bioassays used if there is any doubt.

Table 1. Field horsetail control with herbicides and timing of application.

Herbicides*	Timing – wheat stage	Target	Field horsetail control**	
			5-9-2024	7-3-2024
			(percent of nontreated check)	
Finesse + NIS	Fall – preplant	Horsetail	100 a	91 a
Finesse + NIS fb Widematch	Fall – preplant fb flag leaf	Horsetail	100 a	91 a
Finesse + NIS	Fall – preplant	Soil	100 a	36 b
Finesse + NIS	Early spring –tillered	Soil	95 a	32 b
Express XP + NIS	Early spring –tillered	Soil	40 b	1 c
Express XP + NIS	Late spring –flag leaf	Horsetail	---	17 b
Express XP + Syl-Coat	Late spring –flag leaf	Horsetail	---	1 c
Finesse + NIS	Late spring –flag leaf	Horsetail	---	35 b
Finesse + Syl-Coat	Late spring –flag leaf	Horsetail	---	37 b
Nontreated check			0	0

\*Applications rates: Express XP = 0.33 oz/A; Finesse in crop = 0.4 oz/A; Finesse in fallow/preplant = 0.5 oz/A; Widematch = 1.33 pt/A; NIS (nonionic surfactant) = 0.5% v/v; Syl-Coat (organosilicone surfactant) = 0.5% v/v.

\*\*Means followed by the same letter in each column are not statistically different ( $P \leq 0.05$ ).