

Horsetail Control in the Palouse Annual Cropping Region

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Field horsetail 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 during the Carboniferous period that developed into coal. 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.

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) or dichlobenil (Casoron), are not labeled for use in field crops grown in this region also because of long soil residual and potential crop injury.

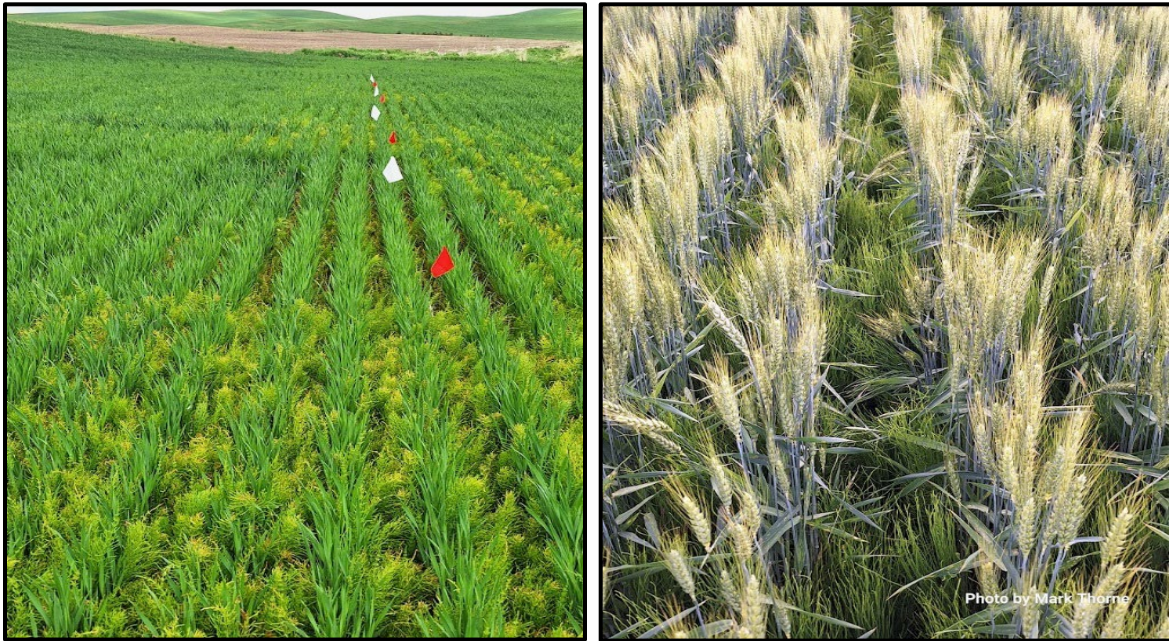


Figure 1. Field horsetail in winter wheat at the flag leaf stage in May (photo on left) and in June when the wheat was headed (photo on right).

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® (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 (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. Widematch (clopyralid + fluroxypyr) is a Group 4 synthetic auxin herbicide that can also 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 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 any of these herbicides will control field horsetail, crop rotations may have to be altered to avoid problems with plantback restrictions.

We initiated a field study on the Wayne Jensen Farm for field horsetail control in the high-rainfall (>20" annual precipitation) annual cropping region of the Palouse on September 2022 in a field 500 ft east of the Washington Idaho border near Genesee, ID. The study site was on a floodplain next to a creek and had produced a crop of dry peas in 2022. The soil type is a Latahco silt loam with a pH of 6.0 and 2.8% organic matter. The experimental design was a randomized complete block with four replicates per treatment and 10- by 30-ft plots. The field had been fertilized with a shank-type tillage applicator, therefore, very few of the field horsetail stems were still green. The soil surface was a combination of previous crop residue, withering field horsetail stems, and bare soil. Fall treatments were applied on September 28, 2022. Early spring applications were applied on May 1, 2023, when the wheat was fully tillered and field horsetail reproductive stems were present, but vegetative stems were just beginning to emerge. Late spring applications were on May 17 when the wheat had produced flag leaves and the field horsetail had vegetative stems that averaged 14 inches tall. All herbicide treatments are applied with a hand-held spray boom with six nozzles on 20-inch spacing and pressurized with a CO₂ backpack. Spray output was 15 gpa at 40 psi through TeeJet® AIXR110015 nozzles at 3 mph.

Treatment efficacy was evaluated on July 28, 2023, by collecting field horsetail stems between two rows of wheat in each plot. The distance between rows was 10 inches and the length of the sample area was 1.1 yds. Samples were bagged and dried in a plant-drying room and then weighed.

All treatments applied in late spring to field horsetail stems reduced biomass between 40 and 60% of the nontreated check (Table 1). This would indicate that foliar uptake of the herbicides applied in this trial has some effect in controlling field horsetail. Timing is particularly important for Express XP as the late spring application was 50% more effective than when applied in early spring before field horsetail stems emerged, suggesting that the efficacy of Express XP is

dependent on foliar uptake. In contrast, there was no difference in biomass reduction between Finesse + NIS applied in early spring compared with late spring or the fall preplant application. This would indicate that Finesse uptake is both foliar and soil. In addition, there was no benefit of including Syl-Coat[®] organosilicone surfactant compared with a nonionic surfactant to either Finesse or Express XP when applied in late spring to field horsetail stems. Widematch appears to be an effective burndown treatment for field horsetail when applied to the wheat crop up to the flag leaf stage when field horsetail stems are present. These treatments will be reevaluated in 2024.

Table 1. Effect of herbicides and timing on field horsetail biomass in winter wheat.

Herbicides*	Timing – crop stage	Target	Horsetail biomass** lb dry mass yd ⁻²
Express XP + NIS	Late spring – wheat with flag leaf	Horsetail stems	0.6 d
Finesse + NIS fb Widematch	Fall – preplant fb late spring – wheat with flag leaf	Ground fb horsetail stems	0.6 d
Finesse + Syl-Coat	Late spring – wheat with flag leaf	Horsetail stems	0.7 d
Finesse + NIS	Late spring – wheat with flag leaf	Horsetail stems	0.8 cd
Express XP + Syl-Coat	Late spring – wheat with flag leaf	Horsetail stems	0.8 cd
Finesse + NIS	Early spring – wheat tillered	Ground	1.0 bc
Finesse	Fall – preplant	Ground	1.0 bc
Express XP + NIS	Early spring – wheat tillered	Ground	1.1 ab
Nontreated check			1.3 a

*Applications rates: Express = 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 are not statistically different ($P \leq 0.05$).