Residual efficacy of HPPD-inhibiting herbicides

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In the fall of 2024, a field trial was established to evaluate the efficacy of the HPPD inhibitor herbicides in controlling weeds under bare ground conditions in Eastern Washington. Weed control is critical for optimizing crop yields, and herbicides that provide residual activity provide longer-term weed control that may reduce early-season competition. HPPD-inhibiting herbicides prevent the production of chlorophyll, which disrupts plant growth. Talinor (bicyclopyrone), Tolvera (tolpyralate), and Huskie (pyrasulfotole) were selected for this study because they are available in Washington and registered in winter and spring wheat. The objective of this study was to evaluate (1) the overall weed control efficacy of different herbicide treatments, and (2) the residual weed control.

This trial took place at the Palouse Conservation Field Station near Pullman, WA. Initial herbicide treatments of Talinor (18 oz/A), Tolvera (14.7 oz/A), and Huskie (15 oz/A) occurred once in the fall and once in the spring. The plots were divided into five subplots: (A) main treatment alone, (B) main treatment with glyphosate applied 14 days after main treatment (DAT), (C) main treatment with glyphosate applied 28 DAT, (D) main treatment with glyphosate applied 42 DAT, and (E) main treatments with glyphosate applied 56 DAT. Main treatments that were applied in the fall received one glyphosate application in the fall and the remaining glyphosate applications were applied in the spring (Tables 1 & 2). All herbicide treatments were applied with a CO_2 powered backpack sprayer. The spray boom had four Teejet® 11002VS nozzles with 20-inch spacing and spray output was calibrated to deliver 15 gallons per acre at 3 mph. Plots were 10 ft wide by 75 ft long, with each subplot (A-E) measuring 10 ft wide by 15 ft long, arranged in a randomized complete block design with four replications. Treatments were visually assessed for weed control, by species, at 14 and 28 days after the last treatment. Weed density and biomass was taken by species in each subplot at the end of the growing season (early August) using two ½ m^2 quadrats.

RStudio (R version 4.5.1) was used to analyze and visualize data. Fixed effects included treatment, subplot, species, and the interaction between treatment and subplot. Random effects included replication. A negative binomial distribution was applied to model density data.

Each weed species germinated throughout the period of subplot treatments, although emergence declined after 5/30/2025. It should also be noted that the farm received little rainfall during this trial (Figure 4), which could prohibit the efficacy of these herbicides. The limited rainfall could have also affected weed germination throughout the trial. And while these herbicides are not specifically labeled for winter annual grass weed control, we did find that Talinor reduced the biomass of rattail fescue (Figure 3).

Common lambsquarters densities were highly variable across the trial but appear to be reduced in spring-treated plots (Figure 1). Trends in biomass trends were similar to trends in density, were spring Talinor and spring Tolvera reduced lambsquarters biomass, but was relatively consistent across fall-treated plots (Figure 2).

Mayweed chamomile density was reduced in spring-treated plots compared to fall-treated plots, though overall, Tolvera had no effect on Mayweed density (Figure 1). Mayweed biomass was more variable and showed no significant trends (Figure 2).

Overall, prickly lettuce was not controlled with any of the herbicides that were applied in the fall. Spring-treated Huskie and Tolvera plots have significantly lower densities, indicating better residual control compared to spring-applied Talinor (Figure 2). Biomass trends were similar – spring applied Huskie and

Tolvera reduced overall biomass compared to spring-applied Talinor and there was no difference between herbicides applied in the fall (Figure 3).

Tumble pigweed was present in all treatments and most subplots (apart from subplots A, B, and C in fall-applied herbicides), indicating limited residual activity for the three herbicides. The absence of tumble pigweed in the earlier subplots was most likely due to earlier germination of other weeds.

Growers now have three HPPD herbicide options to manage broadleaf weeds in wheat. The data presented here indicates that Talinor may be best utilized early in the season for residual activity on tumble pigweed and prickly lettuce, while Tolvera and Huskie should be utilized at the traditional postemergence timings for control of emerged weeds, as their residual activity appears to be shorter in duration and what residual activity there is appears to be more selective. More seasons are needed to determine best timing of application, and for individual species management recommendations.

We continue to recommend the use of herbicide systems that utilize multiple effective modes of action on each weed every season, and do not advocate for the use of two different HPPD inhibitors in the same season.

Off-Label or Experimental-Use Disclaimer

Some of the pesticides discussed in this presentation were tested under an experimental use permit granted by WSDA. Application of a pesticide to a crop or site that is not on the label is a violation of pesticide law and may subject the applicator to civil penalties up to $7,500. In addition, such an application may also result in illegal residues that could subject the crop to seizure or embargo action by WSDA and/or the U.S. Food and Drug Administration. It is your responsibility to check the label before using the product to ensure lawful use and obtain all necessary permits in advance.

Table 1. Application details for fall-applied main treatments.

	Study Applications				
	Main Application	**Glyphosate Reset 1**	**Glyphosate Reset 2**	**Glyphosate Reset 3**	**Glyphosate Reset 4**
Date	10/18/2024	11/15/2024	4/15/2025	4/30/2025	5/30/2025
Application volume (GPA)	15	15	15	15	15
Air temperature (˚F)	53	38	55	51	69
Soil temperature (˚F)	37	42	41	54	53
Wind velocity (mph, direction)	8, S	8, W	5, S	7, WSW	2, SSE
Relative humidity (%)	44	90	49	58	42

Table 2. Application details for spring-applied main treatments.

	Study Applications				
	Main Application	**Glyphosate Reset 1**	**Glyphosate Reset 2**	**Glyphosate Reset 3**	**Glyphosate Reset 4**
Date	4/15/2025	4/30/2025	5/30/2025	6/17/2025	6/30/2025
Application volume (GPA)	15	15	15	15	15
Air temperature (˚F)	55	51	69	69	66
Soil temperature (˚F)	41	54	53	64	64
Wind velocity (mph, direction)	5, S	7, WSW	2, SSE	9, WSW	5, ESE
Relative humidity (%)	49	58	42	36	52

Figure 1. Mean weed density by treatment and subplot.

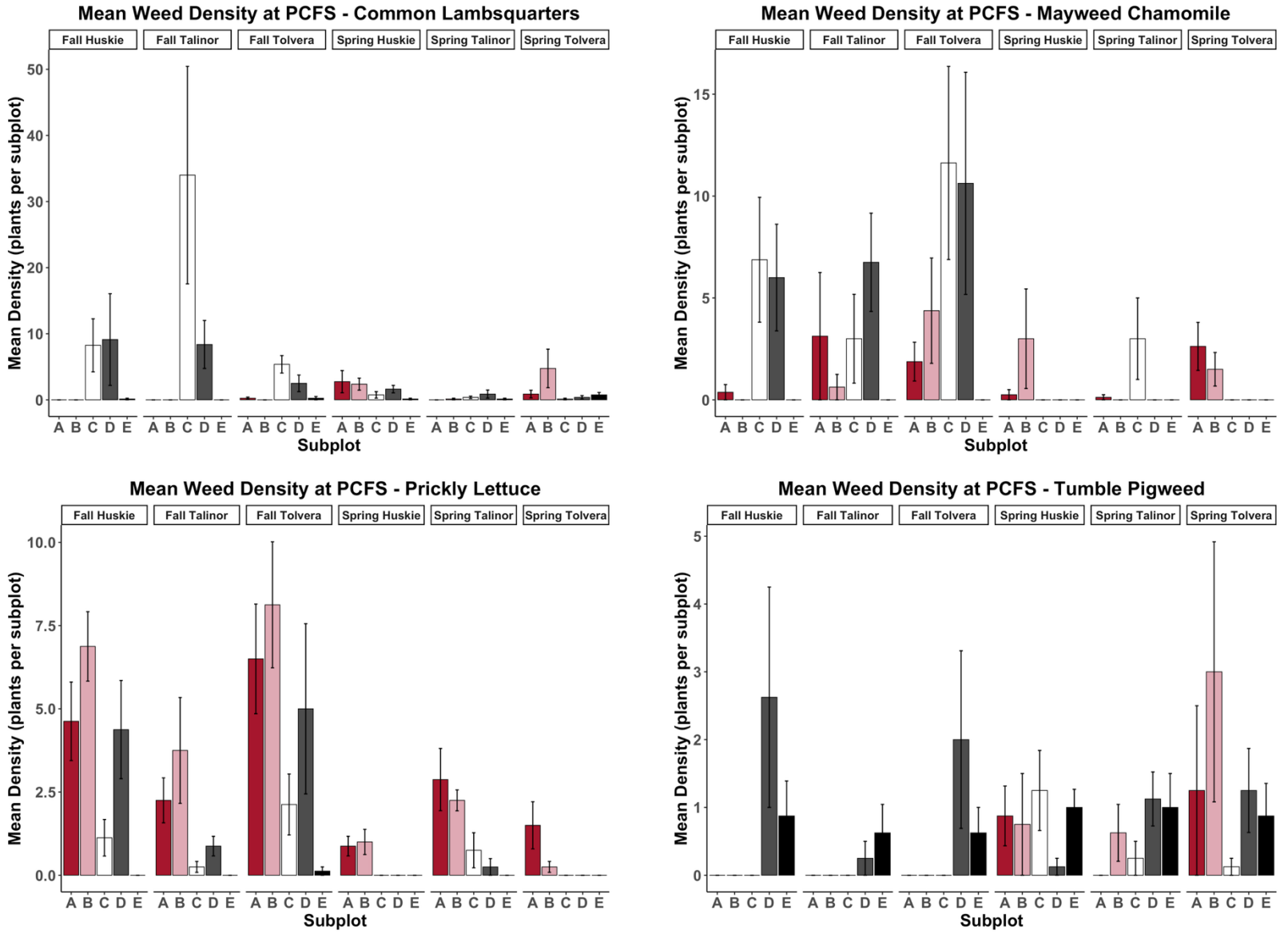

Figure 2. Mean weed biomass by treatment and subplot.

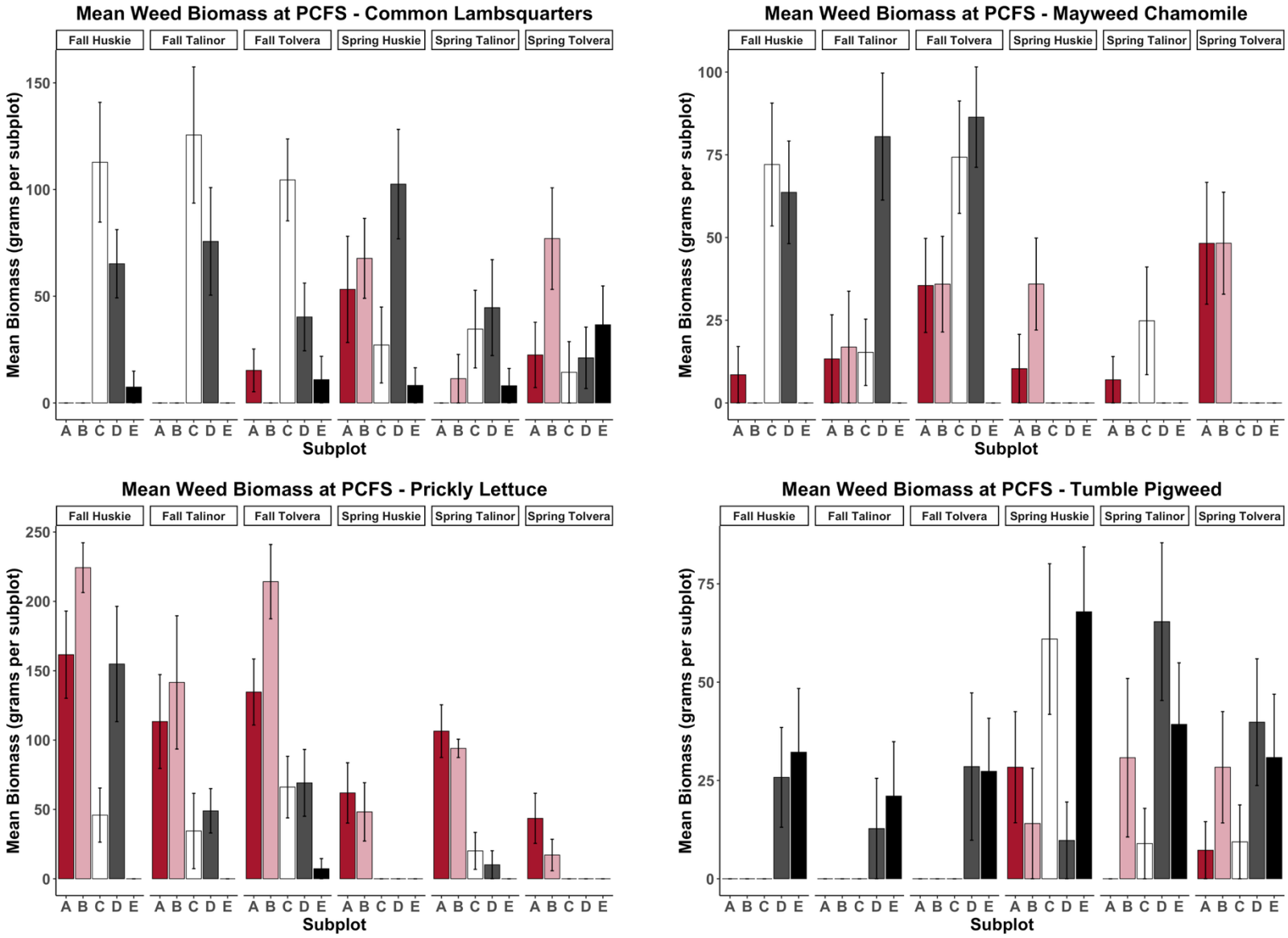

Figure 3. Rattail Fescue biomass by treatment and subplot.

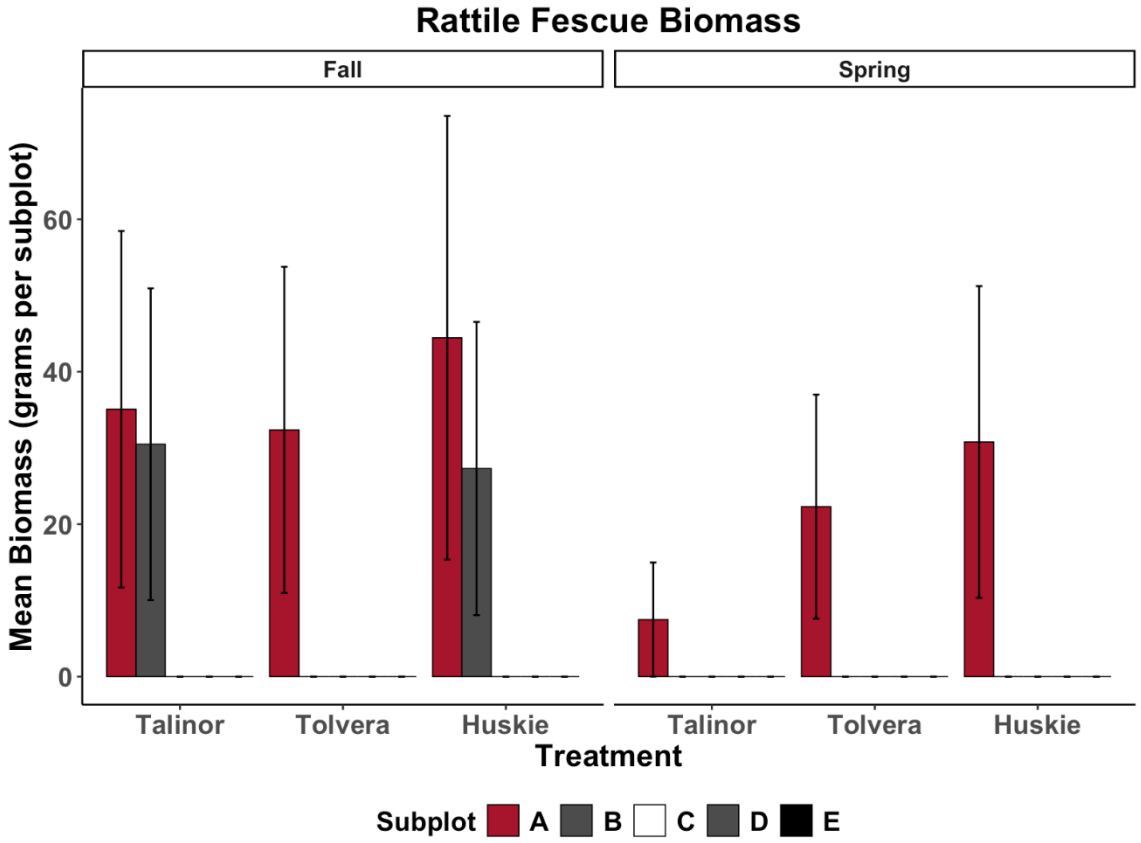

Table 3. Total rainfall (fall 2024) for Pullman, WA by date.

Date	Total Rainfall (mm)
10/04/2024	0.255
10/16/2024	1.003
10/21/2024	3.451
10/27/2024	0.255
10/30/2024	0.017
10/31/2024	0.306
11/01/2024	0.527
11/02/2024	0.884
11/03/2024	0.306
11/04/2024	1.089
11/05/2024	0.051
11/11/2024	0.051
11/13/2024	0.153
11/16/2024	0.017
11/17/2024	0.595
11/20/2024	0.612
11/22/2024	0.051
12/07/2024	0.068
12/09/2024	0.017
12/17/2024	0.017
12/18/2024	0.017
12/26/2024	0.085
12/29/2024	0.17
12/30/2024	0.017

Table 4. Total rainfall (spring 2025) for Pullman, WA by date.

Date	Total Rainfall (mm)
1/3/25	0.017
1/10/25	0.034
1/31/25	0.136
2/1/25	0.017
2/19/25	0.051
2/22/25	0.017
2/23/25	0.051
2/24/25	0.85
3/13/25	0.068
3/15/25	0.34
3/20/25	0.085
3/21/25	0.068
3/22/25	0.034
3/28/25	0.017
3/31/25	0.119
4/7/25	0.255
4/29/25	0.034
5/11/25	0.017