

HPPD report

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Introduction

In the spring of 2024, a field trial was established to evaluate the efficacy of the BIR+BXN+PYR premix in controlling weeds under bare ground conditions at the Cook Research Farm near Pullman, Washington. Weed control in agricultural fields is critical for optimizing crop yields, and the BIR+BXN+PYR premix combines three herbicides aimed at improving efficacy across a variety of weed species. The objective of this study was to evaluate (1) the overall weed control efficacy of different herbicide treatments, and (2) the residual weed control at multiple assessment intervals.

Methods

Two study sites were identified for these trials: WSU Wilke Farm near Davenport, WA and the Palouse Conservation Field Station (PCFS) near Pullman, WA. Initial treatments were applied in the early spring across the whole plot. The plots were divided into three subplots: a) main treatment alone, b) main treatment with glyphosate applied 14 DAA, and c) main treatment with glyphosate applied 28 DAA (Tables 1 & 2). All herbicide treatments were applied with a CO₂ powered backpack sprayer and a 5 ft boom with 4 Teejet 11002VS nozzles. The sprayer was calibrated to deliver 15 gallons per acre. These studies were conducted in a randomized complete block design with 3 replications. Plots were 10 ft wide by 45 ft long, with the first 15 ft receiving the main herbicide application, the middle 15ft receiving the main herbicide treatment and a glyphosate treatment ~14 days after the main application, and the last 15ft receiving the main herbicide application and a glyphosate treatment ~28 days after the main application. Treatments were visually assessed for weed control at 17, 34, 49, and 60 DAT. Weed density and biomass was taken by species in each subplot at the end of the growing season using 2 ½ m² quadrats.

RStudio (R version 4.4.2) 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.

Results

Weed communities were different at the trial locations so each site is presented by herbicide treatment and weed species. At Wilke Farm, Talinor was the only herbicide that significantly reduced common lambsquarters density compared to the nontreated (Figure 1). Timing of emergence was not affected, as most rainfall at the Wilke Farm occurred prior to trial initiation. Tolvera had little residual control on common lambsquarters, while Huskie Complete provided variable residual control of common lambsquarters. Trends in biomass were similar to trends in density (Figure 2), where Talinor reduced overall weed biomass at Wilke compared to nontreated – other treatments show reductions but are not significant. Given the limited rainfall that occurred after treatment for activation, common lambsquarters is either very sensitive to Talinor, or Talinor requires a relatively low amount of rainfall for activation.

At PCFS Farm, regular rainfall occurred after the application of the HPPD inhibitors (Figure 5). Each weed species germinated throughout the period of subplot treatments, although emergence did decline after 6/6/2024. Common lambsquarters density was reduced by Talinor and Huskie Complete, but a very late large rainfall event on 6/3/2024 stimulated germination after the second glyphosate treatment (which occurred 5/20/2024). Tolvera had no residual effect on common lambsquarters.

Tumble pigweed was present at low density in all treatments and subplots, indicating limited residual activity for the three HPPD inhibitors. Conversely, redroot pigweed germinated in large numbers after the first glyphosate treatment. Talinor completely controlled redroot pigweed after application, while the residual activity of Tolvera and Huskie Complete was variable. Finally, prickly lettuce was controlled by residual activity of all the HPPD inhibitors at PCFS.

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 common lambsquarters and prickly lettuce, while Tolvera and Huskie Complete 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 the 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.

Table 1. Treatment application details for the Wilke Farm near Davenport, WA.

| Study Applications | | | |
|--------------------------------|-------------------------|--------------------------------|--------------------------------|
| | Main Application | Glyphosate Spray Back 1 | Glyphosate Spray Back 2 |
| Date | 4/23/2024 | 5/9/2024 | 5/23/2024 |
| Application volume (GPA) | 15 | 15 | 15 |
| Timing | Preemergence | Preemergence | Preemergence |
| Air temperature (°F) | 56 | 59 | 50 |
| Soil temperature (°F) | 53 | 49 | 53 |
| Wind velocity (mph, direction) | 5, ESE | 9, NE | 7, SSW |
| Relative humidity (%) | 29 | 43 | 62 |

Table 2. Treatment application details for the PCFS Farm near Pullman, WA.

| Study Applications | | | |
|--------------------------------|-------------------------|---------------------------------|---------------------------------|
| | Main Application | Glyphosate Application 1 | Glyphosate Application 2 |
| Date | 5/3/2024 | 5/20/2024 | 6/6/2024 |
| Application volume (GPA) | 15 | 15 | 15 |
| Timing | Preemergence | Preemergence | Preemergence |
| Air temperature (°F) | 49 | 51 | 72 |
| Soil temperature (°F) | 48 | 53 | 70 |
| Wind velocity (mph, direction) | 4, SSE | 9, W | 3, SW |
| Relative humidity (%) | 54 | 56 | 40 |

Figure 1. Mean weed density per subplot at Wilke Farm near Davenport, WA. Glyphosate was applied to three different subplots on 4/23/24, 5/9/24, and 5/23/24, therefore any emergence that occurred in the subplot happened after those dates.

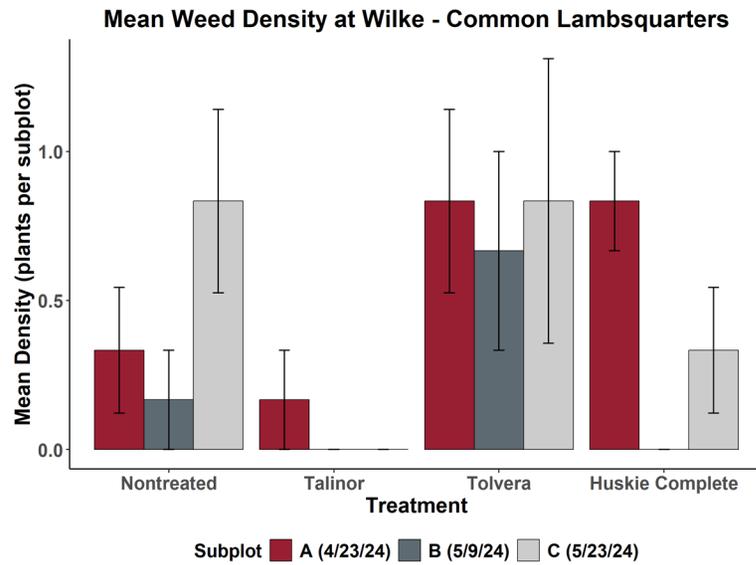


Figure 2. Mean weed biomass per subplot at Wilke Farm near Davenport, WA. Glyphosate was applied to three different subplots on 4/23/24, 5/9/24, and 5/23/24, therefore any emergence that occurred in the subplot happened after those dates.

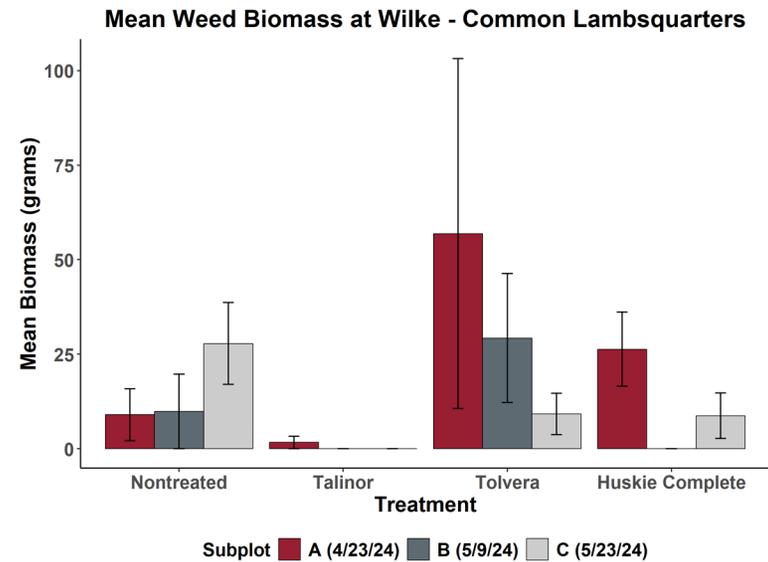


Figure 3. Mean weed density per subplot at the PCFS Farm near Pullman, WA. Glyphosate was applied to three different subplots on 5/3/24, 5/20/24, and 6/6/24, therefore any emergence that occurred in the subplot happened after those dates.

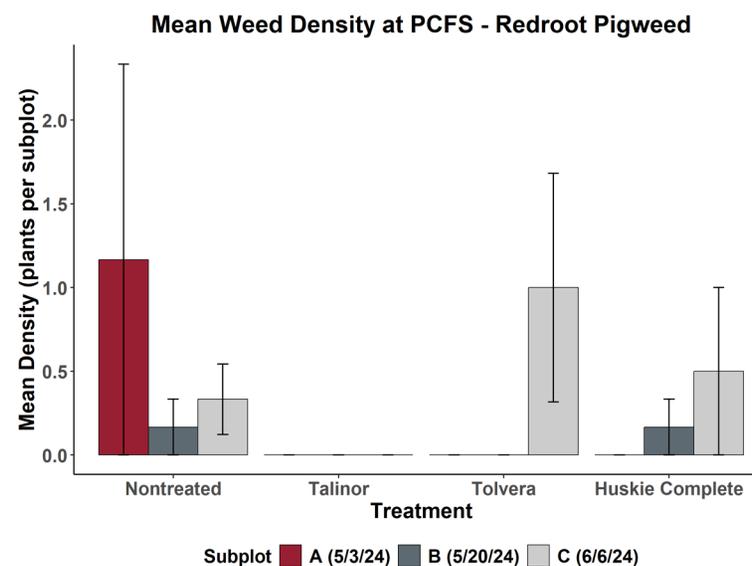
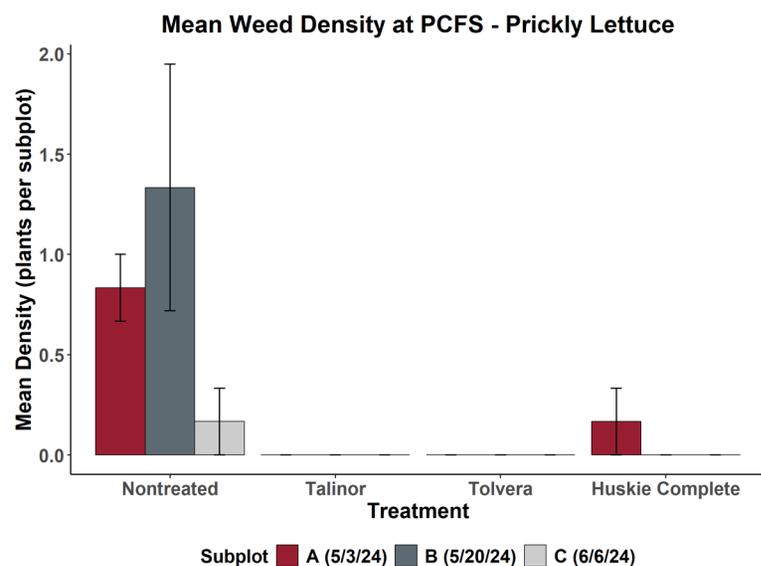
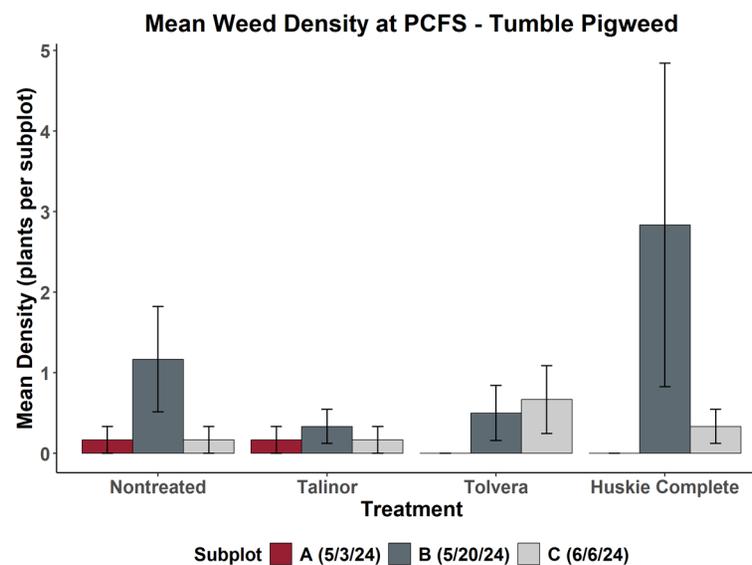
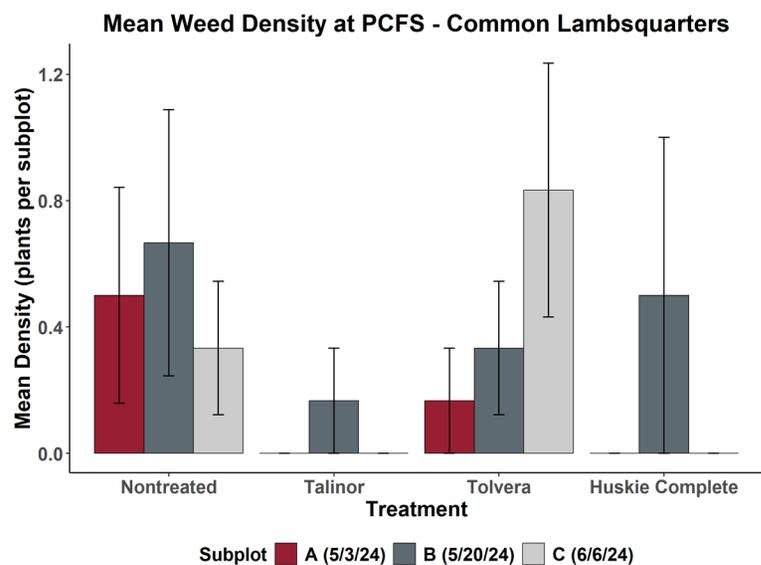


Figure 4. Mean weed biomass per subplot at the PCFS Farm near Pullman, WA.

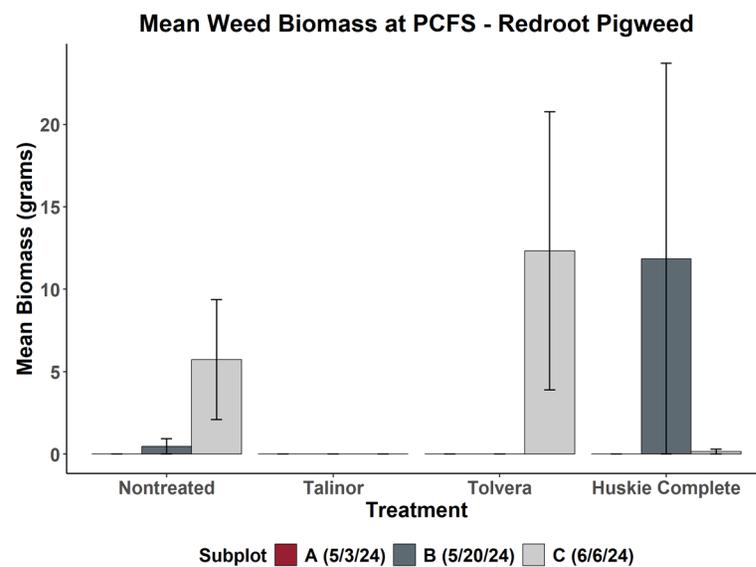
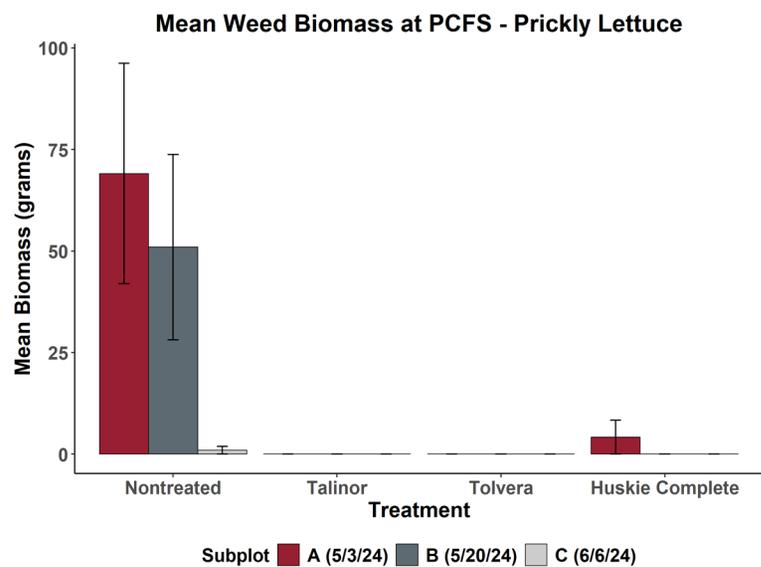
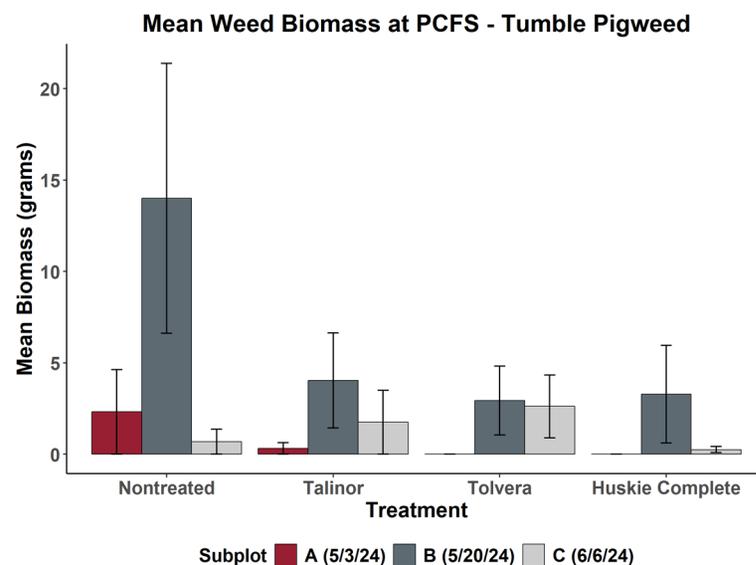
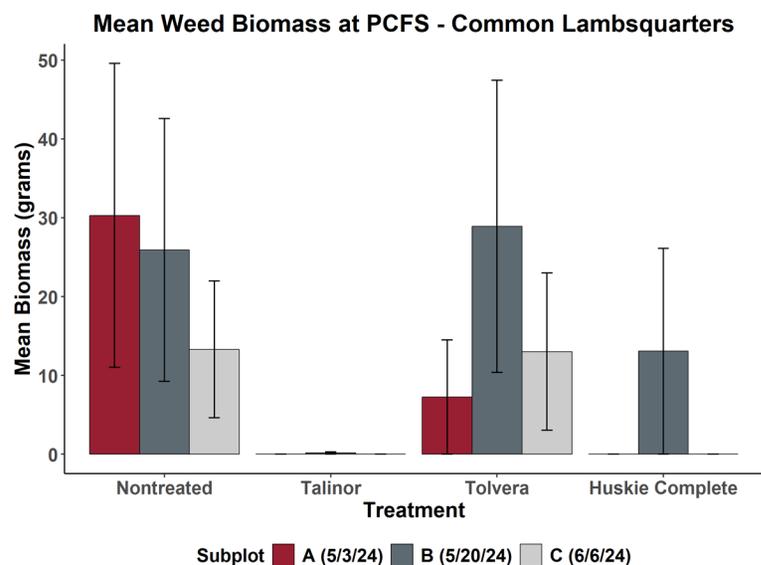
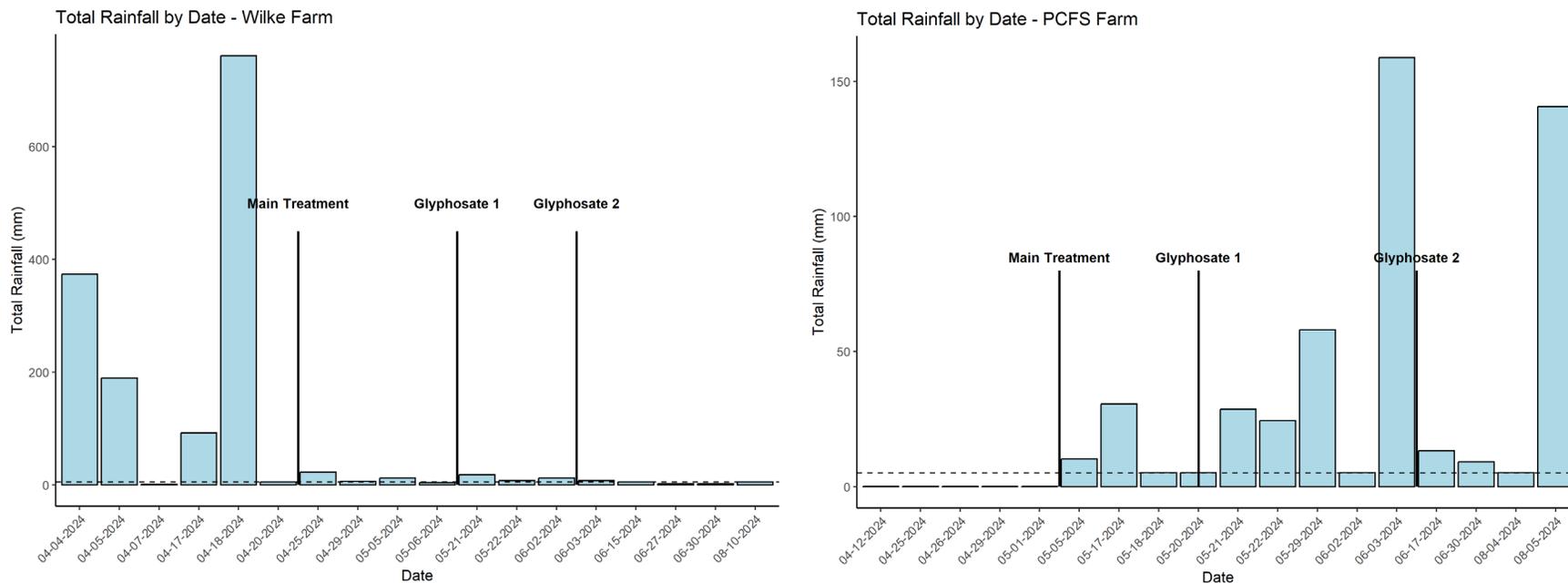


Figure 5. Total rainfall for Wilke Farm (left) and PCFS Farm (right) by date. Horizontal dashed line represents 5mm, or 2/10 of an inch.



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.