Diflufenican and metribuzin safety and efficacy in winter wheat

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Introduction

In fall of 2023, a field trial was established to evaluate the efficacy of diflufenican. Diflufenican is a selective pre- and postemergence herbicide widely used to control broadleaf weeds in cereals and other crops. It works by inhibiting carotenoid biosynthesis, which leads to bleaching and eventual death of the weeds. Known for its long residual activity, diflufenican is often applied in combination with other herbicides for broader spectrum weed control. Diflufenican is currently being evaluated for registration in wheat. The objective of the trial was to evaluate crop safety and efficacy on Mayweed chamomile, and in mixture with pyroxasulfone or metribuzin for broad spectrum control. Therefore, treatments included diflufenican and pyroxasulfone (as Zidua) herbicides, applied alone and in combination with metribuzin, for controlling key weeds in winter wheat

Methods

The study was established in a winter wheat field on the Plant Pathology Farm in Pullman, WA. The field selected was fallowed to minimize weed pressure. Preemergence treatments were applied with a CO_2 powered backpack sprayer and a 5 ft boom with 3 Teejet 11002VS nozzles with an effective spray pattern of 8 ft and calibrated to deliver 15 gallons per acre (Table 1). Diflufenican was applied at rates of 90 to 180 ga ai/ha, and in mixture with metribuzin, pyroxasulfone, or both. The study was conducted in a randomized complete block design with 4 replications. Plots were 10 ft wide by 30 ft long. Treatments were applied in fall 2023 and assessments for crop response and weed control were conducted in spring 2024. Plots were harvested with a Wintersteiger small plot combine with a 5-foot header. Data were subject to ANOVA using the Agricultural Research Manager software (Ver. 2024).

Table 1. *Treatment application details.*

Study Application	
Date	10/16/2023
Application volume (GPA)	15
Timing	Preemergence
Soil temperature (˚F)	54
Air temperature (˚F)	63
Wind velocity (mph, direction)	9, NW
Relative humidity (%)	49

Results

No visible injury (e.g., stunting, chlorosis) was observed across any treatments, demonstrating safety of diflufenican applied preemergence across multiple rates was very safe. Rainfall before and after planting was below normal, and typical annual weed germination was limited. No crop injury was observed, confirming the safety of these herbicides for winter wheat when applied preemergence. Rainfall before and after planting was below normal, and typical annual weed germination was limited. Control of mayweed chamomile was complete in the trial, although the population was relatively low.

Diflufenican and pyroxasulfone in combination with metribuzin control broadleaf and grass weeds in winter wheat fields. There was little rainfall before and after planting this trial. A total of 8/10 of an inch was accumulated two weeks prior to planting and 4/10 of an inch accumulated two weeks post-planting (AgWeatherNet). These results support the use of diflufenican and pyroxasulfone for integrated weed

management strategies, offering flexibility in rate selection for producers managing weed pressure. Additional experiments are needed to understand how best to incorporate diflufenican into herbicide

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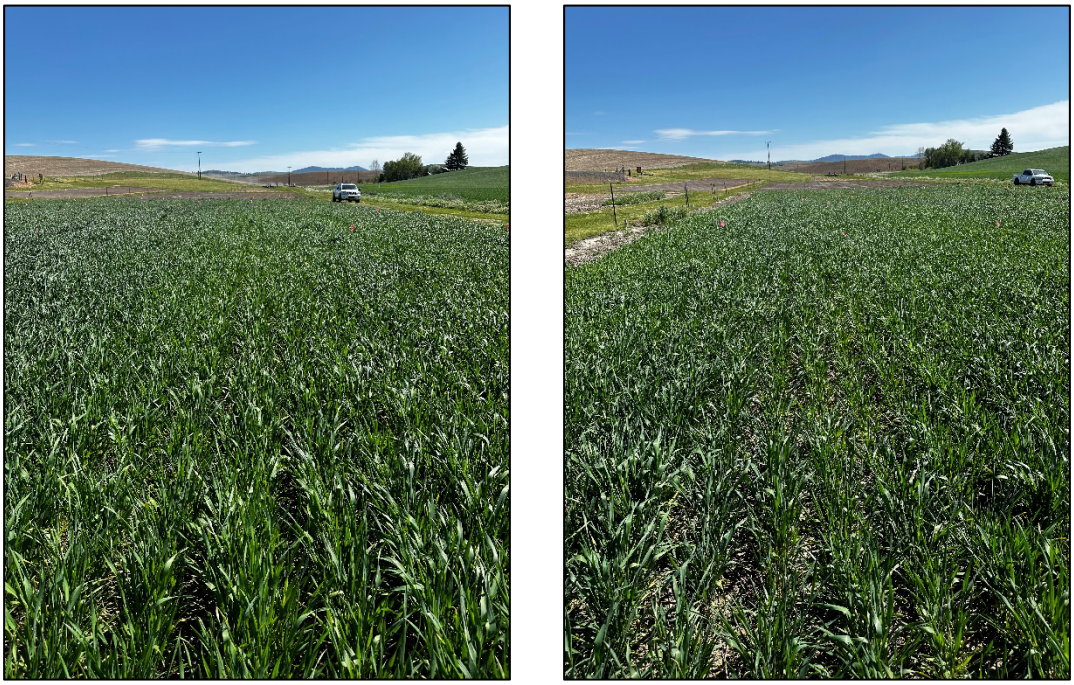

Figure 1. Nontreated plot (left) and diflufenican at 180 g ai/ha (right).

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.