



Project Objective: The objective of this project was to quantify the effects of soil-applied Group 14 herbicides on soybean yields, and to evaluate their potential to suppress herbicide-resistant weeds.

Project Insights:

1. Using an herbicide that includes a group 14 mode of action (Fierce EZ) did not decrease yield in soybeans in the trials that were tested.
2. Soybeans treated with Fierce EZ showed a 1.8 bu/acre yield advantage across 5 locations.
3. Soybeans treated with Fierce EZ showed minimal damage to early growth soybeans in 2023 and 2024.
4. Both Fierce EZ and Zidua SC include a group 15 mode of action and were effective at controlling small-seeded broadleaf weeds like waterhemp.

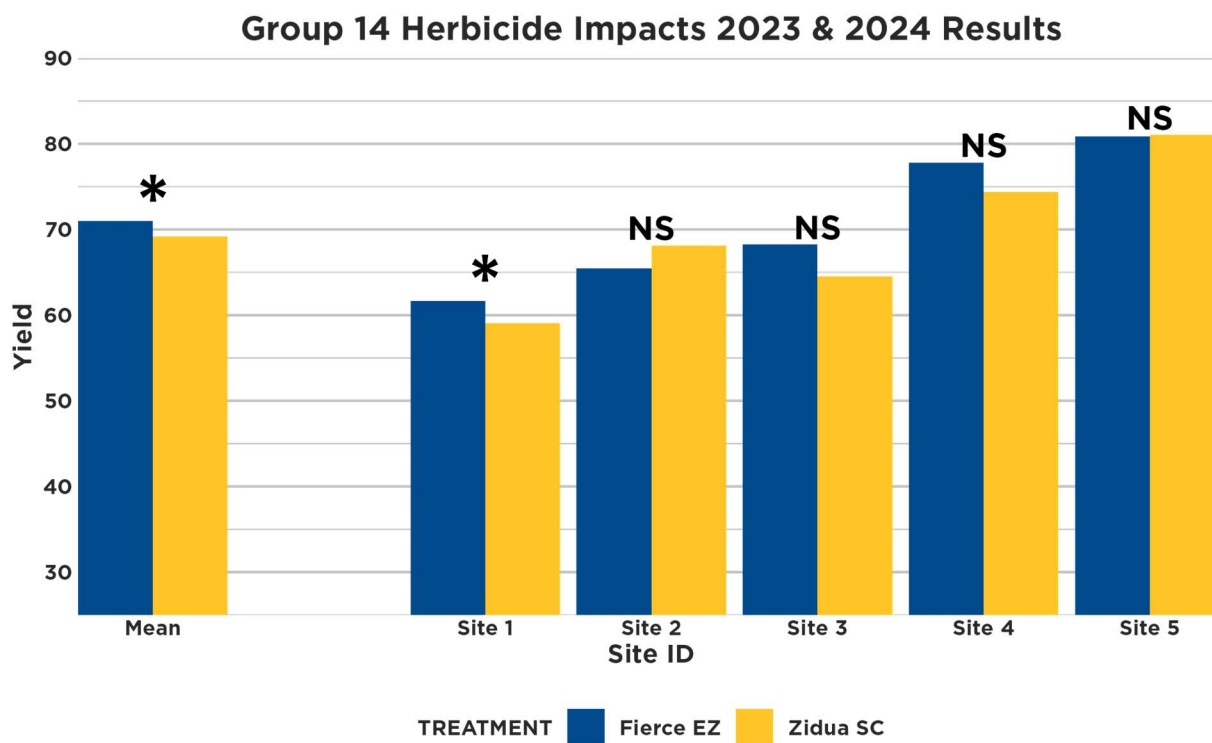


Figure 1: Significant difference in yield is designated by the * symbol. Results that are not significant are designated by NS.

Fierce EZ (Group 14 and 15) and Zidua SC (Group 15) were compared to look at yield differences that could be attributed to early season stress from using a Group 14 herbicide. Sites 1 & 2 were conducted in 2023, and Sites 3, 4 and 5 were conducted in 2024, See Figure 2 for trial locations. Site 4 was a small plot trial, (10 ft X 40 ft



plots with 30-inch row spacing) and the others were on-farm replicated strip trials. Across all sites in 2023 and 2024, Figure 1 shows that the Fierce EZ treatment had a 1.8 bushel/acre yield advantage compared to the Zidua SC treatment. Individual site analysis showed a significant difference in yield at Site 1.

Group 14 Herbicide Impacts 2023 & 2024

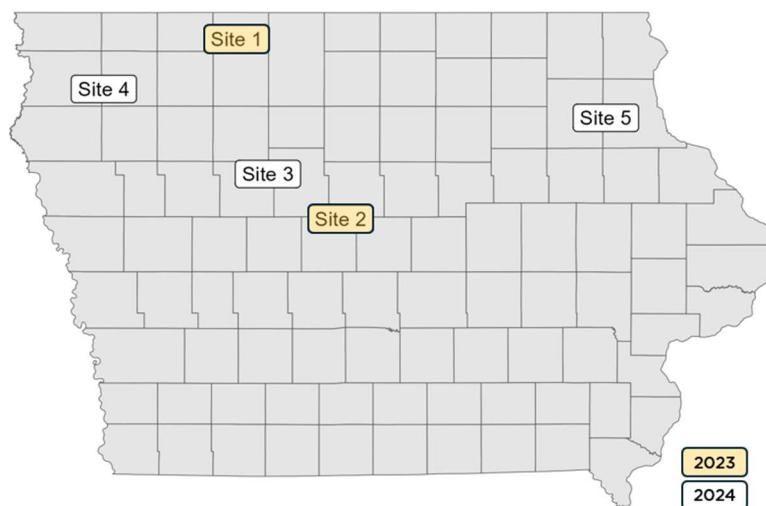


Figure 2: 2023 and 2024 Group 14 Herbicide Trial locations by year.

Project Discussion

Waterhemp is the most widespread herbicide-resistant weed in Iowa according to Iowa State University (Hartzler and Anderson 2025). It is resistant to ALS inhibitors (Group 2), glyphosate (Group 9), triazines (Group 5), PPO inhibitors (Group 14), and HPPD inhibitors (Group 27). Group 15 resistance has not yet been reported in Iowa. Group 14 herbicides can cause tissue burn, slower canopy development and stand loss. This generally occurs when the herbicides are applied to sensitive varieties during a cool wet spring. There is currently little research in Iowa characterizing these crop responses and their effect on yield.

Early season leaf injuries were identified in both the Fierce EZ strips and the Zidua SC strips as seen in Figure 3. Injury severity was rated on a scale of 1 (no injury) to 9 (completely dead) and averaged 3 for both herbicide treatments. The injury observed in both treatments included necrotic spots on the cotyledons, and leaf malformations were observed in the Zidua SC strips. Plants quickly recovered from the early season injuries and grew normally during the remainder of the season. Site 4 was the only small plot site in the study and the only one that included untreated control blocks in the trial. Waterhemp is notably absent in the photo of the plot treated with Fierce EZ as shown in Figure 4.



Fierce EZ



Zidua SC

Figure 3: PPO Inhibitor injury on left, necrotic spots on cotyledons. Group 15 injury on right, heart-shaped malformed leaves. (Photo: Iowa Soybean Association/ Shane Beck)



Untreated



Zidua SC



Fierce EZ

Figure 4: The photos above were taken on August 21, 2024 (R3-R4 with pods just starting to develop in O'Brien County (Photo: Iowa Soybean Association/Alex Litvin)



Conclusion

Although there was not a significant yield response at 4 of the 5 sites, overall, there was a significant yield response for Fierce EZ treatments which included a Group 14 mode of action (PPO Inhibitor). Despite early season damage observed for both treatments, Fierce EZ was effective at controlling small-seeded broadleaf weeds like waterhemp to reduce yield loss. PPO Inhibitor herbicides are still very effective at controlling small-seeded broadleaf weeds like waterhemp. These products remain a useful tool for farmers where resistant weeds become a problem. Despite possible injury when the conditions are cold and wet in early spring, when applied properly, there does not appear to be a yield reduction associated with that injury. Farmers may wish to include it in their herbicide rotation to help combat the development of herbicide resistance in their fields.

Reference:

Hartzler, Bob, and Meaghan Anderson. 2025. "Waterhemp." May 1, 2025.
<https://crops.extension.iastate.edu/encyclopedia/waterhemp>.