

SUGARBEET TOLERANCE FOLLOWING HERBICES FOR WATERHEMP CONTROL IN SMALL GRAIN STUBBLE

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Summary

Introduction

Small grains are effective crops to control waterhemp since they become established before waterhemp germination and emergence. However, waterhemp may begin to grow and produce seed following small grain harvest in late July and August.

Postemergence herbicides were applied alone or in mixtures for waterhemp control in wheat stubble in 2020. Sharpen and Valor (PPO inhibitors, group 14) require 4-month rotation restriction to sugarbeet (4-month unfrozen ground) and 4-month rotation restriction and tillage, respectively, to sugarbeet. Valor can carry over to sugarbeet planted in sequence with soybean, especially when soybean is planted in late May or June or in coarse textured soils or soils with low organic matter. A rotational crop experiment was seeded in 2021 to determine if fall-applied Valor or Sharpen injured sugarbeet planted the following May.

Objective

The objective of this experiment was to evaluate sugarbeet tolerance following fall-applied herbicides to control waterhemp in small grain stubble.

Material and Methods

2020

An experiment was conducted in wheat stubble on natural waterhemp populations near Moorhead, MN in 2020. Experimental area consisted of a uniform infestation of waterhemp ranging from newly emerged to 12 inches tall.

Herbicide treatments were applied on August 20 and September 2, 2020 with a bicycle wheel sprayer in 17 gpa spray solution through 8002 XR flat fan nozzles pressurized with CO₂ at 43 psi. The treatment list can be found in Table 1.

Table 1. Herbicide treatments and rates in trial near Moorhead, MN in fall of 2020.

| Herbicide Treatment | Rate (fl oz/A) |
|----------------------------------------------------|----------------|
| Roundup PowerMax ¹ | 32 |
| Roundup PowerMax + Weedar 64 ¹ | 32 + 64 |
| Roundup PowerMax + Sharpen ² | 32 + 1 |
| Roundup PowerMax + Sharpen ² | 32 + 2 |
| Roundup PowerMax + Sharpen + Valor SX ² | 32 + 1 + 1 |
| Roundup PowerMax + Sharpen + Valor SX ² | 32 + 1 + 2 |
| Roundup PowerMax / Roundup PowerMax ¹ | 32 / 32 |
| Roundup PowerMax + Weedar 64 / | 32 + 64 / |
| Roundup PowerMax + Weedar 64 ¹ | 32 + 64 |

¹Treatment applied with Prefer 90 NIS at 0.25 % v/v + N-Pak Liquid AMS at 2.5% v/v.

²Sharpen and Valor SX applied with methylated seed oil at 1.5 pt/A + N-Pak Liquid AMS at 2.5% v/v.

Fall chisel plow tillage was done parallel with fall applied treatments so that herbicide would not be carried across plots. The corners of the experimental area were marked so that plots could be located again in 2021.

2021

The experimental area was prepared for planting by applying the appropriate fertilizer. Spring tillage was with a Kongskilde s-tine field cultivator with rolling baskets and was done parallel to 2021 treatments so that soil would not be carried between plots. Sugarbeet was seeded on May 12, 2021 in 22-inch rows at about 62,000 seeds per acre

with 4.6 inch spacing between seeds. Inadequate spring rainfall lead to poor sugarbeet stands. We opted to replant on June 16, 2021 and had excellent stands since planting was timed to moisture both before and after replant.

Sugarbeet stands were counted and sugarbeet visible injury was evaluated 7, 14, and 21 days after planting (DAP). Evaluations were a visual estimate of injury in the four treated rows compared to the adjacent, two-row, untreated strip. Experimental design was randomized complete block with four replications. Data were analyzed with the ANOVA procedure of ARM, version 2021.2 software package.

Results

Sugarbeet stand (number of sugarbeet per 100 ft row) were similar across treatments and sugarbeet injury was negligible across treatments and evaluation (Table 2). Sugarbeet stand and injury differences did not relate to fall applied treatments.

Table 2. Percent visual sugarbeet injury by treatment and evaluation date near Moorhead, MN in 2021.

| Treatment | Rate --fl oz/A-- | Sugarbeet Stand Num/100 ft | Sugarbeet Injury | | |
|-----------------------------------------------------------------------------|---------------------|----------------------------------|---------------------|-----------|-----------|
| | | | 16 DAP ³ | 24 DAP | 30 DAP |
| | | | -----%----- | | |
| Roundup PowerMax ¹ | 32 | 135 | 0 | 0 | 5 |
| Roundup PowerMax + Weedar 64 ¹ | 32 + 64 | 123 | 0 | 0 | 0 |
| Roundup PowerMax + Sharpen ² | 32 + 1 | 126 | 8 | 8 | 10 |
| Roundup PowerMax + Sharpen ² | 32 + 2 | 144 | 6 | 5 | 0 |
| Roundup PowerMax + Sharpen + Valor SX ² | 32 + 1 + 1 | 134 | 8 | 13 | 10 |
| Roundup PowerMax + Sharpen + Valor SX ² | 32 + 1 + 2 | 124 | 5 | 15 | 5 |
| Roundup PowerMax / Roundup PowerMax ¹ | 32 / 32 | 110 | 10 | 10 | 5 |
| Roundup PowerMax + Weedar 64 / Roundup PowerMax + Weedar 64 ¹ | 32 + 64 / 32 + 64 | 131 | 3 | 0 | 5 |
| LSD (0.05) | | | NS | NS | NS |

¹Treatment applied with Prefer 90 NIS at 0.25 % v/v + N-Pak Liquid AMS at 2.5% v/v.

²Sharpen and Valor SX applied with methylated seed oil at 1.5 pt/A + N-Pak Liquid AMS at 2.5% v/v.

³DAP=Days after planting.

Conclusion

The experiment did not detect carryover from Sharpen or Valor. However, Valor and Sharpen carryover is an interaction depending on soil type and organic matter, herbicide rate, timing between application and sugarbeet plant, and rainfall and temperature conditions. Because of this, occasionally, we observe significant sugarbeet injury, even though none was observed in this study.