

SPRING WHEAT TOLERANCE TO ETHOFUMESATE APPLIED THE PREVIOUS YEAR IN SUGARBEET

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Summary

1. This experiment was a continuation from Experiment 1 described in “Waterhemp Control in 2020” in the 2020 Sugarbeet Research and Extension Reports.
2. Ethofumesate rate did not influence spring wheat emergence. Spring wheat growth reduction injury was negligible from ethofumesate PRE at 1.5 pt/A to 7.5 pt/A applied the previous season.

Introduction

Ethofumesate is one of our most flexible herbicides in sugarbeet and is used at rates ranging from 0.25 to 7.5 pint per acre for control of pigweed species including waterhemp. A common question from sugarbeet producers relates to the number of weeks of weed control provided by ethofumesate at various rates. For others, questions about ethofumesate safety to spring wheat or barley as a nurse crop are concerns.

Ethofumesate (a group 16 herbicide) binds stronger to soil colloids, is less water soluble, and has a half-life greater than group 15 herbicides used in sugarbeet. Thus, sugarbeet producers have concerns about ethofumesate carryover from sugarbeet to crops in sequence with sugarbeet including spring wheat and corn. Lystad, Peters, and Sprague reported ethofumesate does not injure corn, dry bean, soybean, and wheat when applied at labeled rates 9-, 10- or 11-months before rotation crop planting (Journal of Sugarbeet Research, 2020). Schroeder and Dexter (1978) and Schweizer (1977) reported ethofumesate carryover is greatest under dry environmental conditions or when little or no tillage follows sugarbeet in preparation for wheat.

Objective

Our objectives spanned over two growing seasons. The first objective was to determine how many weeks of waterhemp control can be expected from ethofumesate preemergence (PRE). The second objective determined spring wheat injury from ethofumesate PRE at 1.5 to 7.5 pt/A in 2020.

Material and Methods

2020 Experiment

Experiments were conducted on natural weed populations near Moorhead, MN and Blomkest, MN to evaluate waterhemp control and wheat nurse-crop tolerance to ethofumesate PRE at multiple rates in 2020. The experimental area was prepared for planting by applying the appropriate fertilizer and tillage. Spring wheat at 0.75 bu/A was uniformly spread across the experimental area and incorporated with shallow tillage before ethofumesate application. Sugarbeet was seeded in rows spaced 22 inches apart at approximately 62,000 seeds/A or approximately 4.6 inch spacing between seeds within the row in the experiment at Blomkest, MN but sugarbeet was not planted in the experiment at Moorhead, MN.

Herbicide treatments were applied PRE after planting with a bicycle wheel sprayer in 17 gpa spray solution through 8002 XR flat fan nozzles pressurized with CO₂ at 40 psi to the center 6.67 feet of the 11 by 40 feet long plots. Treatments consisted of one application of ethofumesate at 0, 1.5, 3.0, 4.5, 6.0 and 7.5 pt/A.

Wheat injury and waterhemp control were evaluated visually, beginning approximately twenty-three days after ethofumesate application (DAA). Additional waterhemp control was evaluated 43, 56, and 62 days after planting (DAP) at Moorhead and 36, 44, 58, and 77 DAP at Blomkest. All evaluations were a visual estimate of control in the treated area compared to the adjacent untreated strip. Experimental design was randomized complete block with four replications. Data were analyzed with the ANOVA procedure of ARM, version 2020.2 software package.

2021 Experiment

The 2020 experiment was continued near Moorhead, MN in 2021 to determine spring wheat tolerance in the year following PRE ethofumesate application. The experimental area was prepared for planting by applying the appropriate fertilizer and tillage. Spring wheat at 0.75 bu/A was evenly spread throughout the plot area and incorporated with shallow tillage. Tillage was applied in the same direction as the previous herbicide treatments. Experimental area was maintained weed-free to evaluate spring wheat growth.

Evaluations considering the number of days for spring wheat to emerge and visible assessment of wheat safety in the treated area (0% to 100% injury, 0% indicating no wheat injury and 100% indicating complete loss of wheat stand) compared with the adjacent untreated strip were collected 7, 14, and 21 days after wheat emergence. Experimental design was randomized complete block with four replications. Data were analyzed with the ANOVA procedure of ARM, version 2021.2 software package.

Results

For results regarding the 2020 experiment, please reference “Waterhemp control in 2020” in the [2020 Sugarbeet Research and Extension Reports](#). Spring wheat did not immediately germinate and emerge following May planting due to extremely dry conditions. We did not observe spring wheat emergence until mid-June or after June 7 and June 10 when the site received 0.7- and 1.4-inch rainfall, respectively. Ethofumesate rate did not delay emergence and spring wheat injury was negligible (Table 1). A trend of increased ethofumesate rate translated to increased growth reduction; however, the greatest growth reduction measured was 15%.

Table 1. Spring wheat growth reduction in response to ethofumesate rate applied PRE in 2020 at Moorhead, MN in 2021.

Ethofumesate Rate	17 DAE ¹	22 DAE	30 DAE
--pt/A--	-----% growth reduction-----		
0	0 a	0	0
1.5	0 a	5	0
3	11 ab	10	8
4.5	5 ab	5	0
6	6 ab	8	0
7.5	15 b	13	0
LSD (0.20)	12	NS	NS

¹DAE=Days after emergence.

Conclusion

Carryover to spring wheat was negligible from ethofumesate application from 1.5 pt/A to 7.5 pt/A to sugarbeet the previous season. There were no differences observed in spring wheat growth by 22 days after emergence.

References

1. Lystad AL, Peters TJ, Sprague C (2020) Sugarbeet and rotational crop tolerance from Ethofumesate 4SC applied postemergence. *Journal of Sugarbeet Research*. 57:1-20
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3. Schroeder GL and Dexter AG (1978) Weed control and residual effects on wheat and barley with Nortron. Publication of the Department of Agronomy
4. Schweizer EE (1977) Response of spring cereal crops to soil residues of ethofumesate. *Weed Res* 17:339-345