

Agricultural Beet

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Waterhemp Escape Economics

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The Economics of Waterhemp Escapes

In the past ten years, waterhemp has become the most difficult weed to control in the SMBSC growing area. Waterhemp management in sugar beets currently relies heavily on pre-emerge and layby applications of the herbicide group 15 soil-applied herbicides. The weakness of this program is timely rainfall to activate the herbicides. When we do not receive timely rainfall, waterhemp emerges and alternate control plans must be considered. In this edition of the Agricultural Beet, we will discuss options for escaped waterhemp and the economics of weed competition in sugar beets versus available control measures.



Weed Competition

Weed competition in your sugar beet crop can cause significant yield losses. In addition to the yield losses, uncontrolled weed escapes allowed to remain in the field increase the seed bank and increase the weed control challenges in future seasons. Sugar beet yield losses to waterhemp competition have not been researched and documented. Waterhemp is in the Amaranth family however, and there is weed competition data for other Amaranth species. Sugar beet yield losses to weed competition depend on the density of the weeds, weed emergence timing, and also on the growing season conditions. Table 1 contains data on sugar beet yield losses to Powell Amaranth (Schweizer and Lauridson, 1985), and Table 2 contains data on sugar beet yield losses to Palmer Amaranth (Lawrence et al, unpublished). In the data presented, we are using the percent yield loss from each study and calculating that yield loss as a percent of the 2023 SMBSC crop.

Table 1. Sugar beet yield loss to Powell Amaranth.

Powell Amaranth plants/length of row	Calculated Powell Amaranth Escapes on Acre Basis	Percent Root Yield Loss	Estimated Root Yield Loss (Ton/Acre)*	Estimated \$ Loss/Acre**
1 plant per 16.4'	1,452	8%	2.7	-\$194
1 plant per 8'	2,975	14%	4.6	-\$330
1 plant per 5.5'	4,326	24%	8.0	-\$574

*Estimated yield loss based on percent yield loss multiplied by 2023 SMBSC average yield.

** Estimated revenue loss based on percent yield loss and 2023 SMBSC March 2024 payment estimate.

Table 2. Estimated sugar beet yield loss to Palmer Amaranth.

Palmer Amaranth plants/length of row	Year	Estimated Percent ESA Yield Loss	Estimated ESA Loss (lbs./Acre)*	Estimated \$ Loss/Acre**
1 plant per 546' of row	2018	10%	922	-\$238
1 plant per 37' of row	2018	30%	2,765	-\$714
1 plant per 131' of row	2019	10%	922	-\$238
1 plant per 10' of row	2019	30%	2,765	-\$714

*Estimated yield loss based on percent yield loss multiplied by 2023 SMBSC average yield.

** Estimated revenue loss based on percent yield loss and 2023 SMBSC payment estimate (March 2024).

Waterhemp Rescue Options

Sugar beet losses to weed competition can be substantial. In addition to the yield loss, allowing the weeds to remain in the field increases the seed bank for future seasons. If you have waterhemp escapes in your field, what are your options? Since the waterhemp is likely glyphosate-resistant at this point in the growing season, we need to look at other options and consider the positive and negative implications of each option. In the remainder of this Agricultural Beet, we will discuss the following waterhemp rescue options: cultivation, Ultra-Blazer application, electric weeder, and hand weeding.

Cultivation

Cultivation can remove resistant waterhemp between the sugar beet rows. In 2017 and 2018 cultivation trials showed cultivation following a herbicide application can improve overall waterhemp control by physically removing 50-75% of the resistant waterhemp present at cultivation. This resulted in 6-12% greater waterhemp control at the end of the season (Haugrud and Peters, 2018). A 2018 study on inter-row cultivation effect on sugar beet yield showed that interrow cultivation did not affect sugar beet yield or quality at any of the environments in the study (Haugrud and Peters, 2018). Timely cultivation needs to be considered as a tool for the removal of escaped waterhemp in your fields. Small waterhemp (<3") are much easier to remove with a cultivator than 6"+ tall weeds.

Ultra Blazer

Ultra Blazer has a Section 18 Emergency label for managing waterhemp in sugar beets. Ultra Blazer applications should be targeted at waterhemp <4" tall. We can see crop injury from Ultra Blazer to the sugar beets. Table 3 contains yield information for two seasons showing the decrease in sugar beet yield from various applications of Ultra Blazer (Peters et.al, 2022 and 2023). In these trials, there was a decrease in yield due to the Ultra Blazer application. **However, when you compare this decrease in extractable sugar per acre to the yield losses to crop competition shown in Tables 1 and 2, you can see the effects of weed competition on your crop.**

Table 3. Yield losses resulting from Ultra Blazer(UB) crop injury.

Treatment	2022 ESA	Rev/Acre*	2023 ESA	Rev/Acre*
PowerMax3	8,963	--	11,639	--
UB + NIS	8,504	-\$118	11,180	-\$118
UB + PM3 + AMS	8,167	-\$206	10,430	-\$312

* Estimated revenue loss based on percent yield loss and 2023 SMBSC payment estimate (March 2024).

Electric Weeder

The electric weeder is also an option for escaped waterhemp. One advantage to the use of the electric weeder is that it can decrease the seed production from the waterhemp plants. The major disadvantage of the electric weeder is that the waterhemp plants must be taller than the sugar beet canopy to be targeted by the weeder. Due to this, the competition effect on the sugar beets has already occurred. Waterhemp can also regrow from the lower leaf axils following treatment. Figure 1 shows the regrowth on a waterhemp plant approximately two weeks after operation of the weeder.

Hand Labor

Hand removal of the waterhemp is an effective method of reducing weed competition and seed production. To reduce the effects of competition, this should be completed before the weeds are allowed to compete with the crop for an extended period.

Conclusion

Waterhemp escapes cost sugar beet yield. In addition, the seed production from these escapes will make the weed control in other crops in your rotation more difficult. If you have waterhemp escapes in your sugar beet fields, keep in mind all the options listed in this Agricultural Beet. Contact your Agriculturist with any weed control questions.

References:

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Schweizer EE, Lauridson (1985) Powell Amaranth interference in sugarbeet. Weed Sci 33:518-520.



Figure 1. Regrowth of waterhemp plant approximately two weeks following treatment with electric weeder.



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