

Response of sugar beet to group 15 herbicides applied preemergence for early weed control.



SUGAR BEET RESEARCH

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Introduction

More than 70% of the *Amaranthus palmeri* (Palmer) and 100% of *A. tuberculatus* (waterhemp) samples collected in Idaho and Oregon have tested positive for glyphosate-resistance. Currently, there are no effective post emergence herbicides for the control of glyphosate-resistant Palmer and waterhemp in sugar beet. Research from Nebraska and North Dakota has shown that group 15 herbicides such as acetochlor (Warrant®), Dimethenamid-P (Outlook®), and S-Metolachlor (Dual® Magnum) are very effective for the control of glyphosate resistant Palmer and waterhemp in sugar beet. However, these herbicides are only labeled to be applied once the beet reaches the 2-leaf stage. Consequently, any Palmer or waterhemp that emerge before the 2-leaf stage become incredibly difficult to control.

Research Objectives

- Evaluate sugar beet response to preemergence applications of Warrant®, Outlook® and Dual® Magnum.
- Assess the effectiveness of fluxofenim (Concep® III) as a safener for protecting sugar beet from the preemergence application of Warrant®, Outlook®, and/or Dual® Magnum.

Table 1. List of subplot (herbicide) treatments applied preemergence to sugar beets.

#	Herbicide	Rate
1	Dual® Magnum	0.5 pt/A
2	Dual® Magnum	1 pt/A
3	Outlook®	16 fl oz/A
4	Outlook®	21 fl oz/A
5	Warrant®	1.25 qt/A
6	Warrant®	2 qt/A
7	Nortron® + Dual® Magnum	32 fl oz/A + 0.5 pt/A
8	Nortron® + Outlook®	32 fl oz/A + 16 fl oz/A
9	Nortron® + Warrant®	32 fl oz/A + 1.25 qt/A
10	Roundup PowerMax® (check)	32 fl oz/A

Methodology

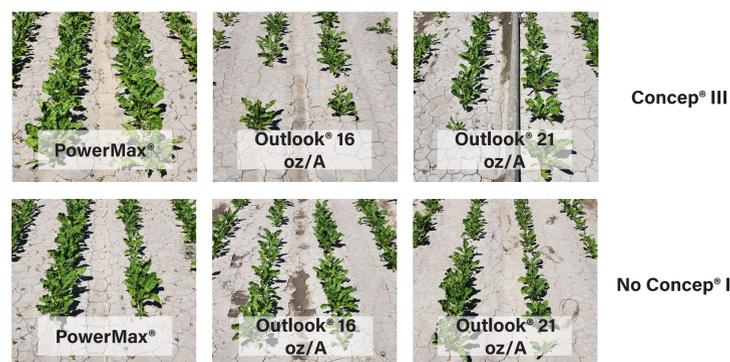
Trials were established at one site in Idaho (UI) and two sites in Oregon (ASC & OSU) in a split plot design with a safener, fluxofenim (Concep® III), as whole plots and group 15 herbicides as sub plots (Table 1). Sugar beet cultivar BTS 2024 was planted to stand at a rate of 62,964 beets/A. Treatments were sprayed immediately after planting using a CO₂ powered sprayer calibrated to deliver 15 gal/A at 30 psi. Herbicides were incorporated with 0.5 to 1-inch of irrigation water within 72 hours after application.

Sugar beet stands were counted multiple times at 14-day intervals, beginning at emergence (7-14 DAP). Crop injury was visually assessed at 10 to 14-day intervals prior to canopy closure. The two center rows of each plot were harvested in September at each site and two samples taken from each plot for sugar content and quality analysis.

Results

At the UI and ASC field sites which were both overhead-irrigated visible injury was generally higher in the Outlook® treatments and the application of Concep® III did not reduce herbicide injury (Photo 1, Table 2). At the OSU site which was furrow irrigated, visible injury was generally higher in the Warrant® treatments (Photo 2, Table 2) and the application of Concep® III resulted in about 2% reduction in injury.

- Warrant®, Outlook®, and Dual® Magnum appear to be safe when applied preemergence to sugar beet in terms of minimal loss of stand and overall crop response.



Photos 1. Outlook® applied preemergence to plots treated with Concep® III (top) compared to standard seed treated plots (bottom) at the Nyssa (ASC) site 42 DAT in 2024.



Photos 2. Warrant® applied preemergence to plots treated with Concep® III (top) compared to standard seed treated plots (bottom) at the Ontario (OSU) site 30 DAT in 2024.



Photos 3. Dual® Magnum applied preemergence to plots treated with Concep® III (top) compared to standard seed treated plots (bottom) at the Nyssa (ASC) site 55 DAT in 2024.

Table 2. Sugar beet visible injury rating (~56 DAP). Studies were conducted in 2024 at three locations (UI, ASC, and OSU).

Treatments	Visible Injury		
	UI	ASC	OSU
Whole Plot (Safener)	%		
None	8	21 a ²	10 a
Concep® III	8	16 b	8 b
Safener Prob (P>F)	.97	.004	.004
Sub Plot (Herbicide)			
Dual® Magnum (0.5 pt/A)	6 bc	18 bc	1 f
Dual® Magnum (1 pt/A)	8 abc	15 bc	1 f
Outlook® (16 oz/A)	14 ab	32 a	1 f
Outlook® (21 oz/A)	16 a	24 ab	12 cd
Warrant® (1.25 qt/A)	8 abc	14 bd	14 bc
Warrant® (2 qt/A)	7 abc	18 bc	30 a
Dual® Magnum (0.5 pt/A) + Nortron® (32 oz/A)	6 bc	17 bc	8 e
Outlook® (16 oz/A) + Nortron® (32 oz/A)	12 ab	21 ab	8 de
Warrant® (1.25 qt/A) + Nortron® (32 oz/A)	6 bc	14 bc	17 b
Roundup PowerMax® (32 oz/A)	0 c	7 d	0 f
Herbicide Prob (P>F)	<.001	<.001	<.001
Safener x Herbicide Prob (P>F)	.81	.34	<.001

²Means within a column followed by the same letter are not statistically different (Levene's LSD (P=.05).

Table 3. Sugar beet stand density (~42 DAP). Studies were conducted in 2024 at three locations (UI, ASC, and OSU).

Treatments	Stand		
	UI	ASC	OSU
Whole Plot (Safener)	plants/A		
None	35,195	52,971	42,103
Concep® III	33,413	53,948	41,034
Safener Prob (P>F)	.59	.62	.37
Sub Plot (Herbicide)			
Dual® Magnum (0.5 pt/A)	38,462 a ²	60,171 a	43,118
Dual® Magnum (1 pt/A)	33,264 a	56,341 ab	40,693
Outlook® (16 oz/A)	25,394 c	39,290 c	41,584
Outlook® (21 oz/A)	26,879 c	42,132 c	41,732
Warrant® (1.25 qt/A)	39,056 a	56,835 ab	41,633
Warrant® (2 qt/A)	37,274 ab	56,341 ab	41,534
Dual® Magnum (0.5 pt/A) + Nortron® (32 oz/A)	38,313 a	56,217 ab	43,416
Outlook® (16 oz/A) + Nortron® (32 oz/A)	28,809 bc	47,422 bc	40,968
Warrant® (1.25 qt/A) + Nortron® (32 oz/A)	36,680 ab	56,217 ab	41,039
Roundup PowerMax® (32 oz/A)	38,907 a	63,628 a	39,970
Herbicide Prob (P>F)	<.001	<.001	.27
Safener x Herbicide Prob (P>F)	.53	.73	.10

²Means within a column followed by the same letter are not statistically different (Levene's LSD (P=.05).

- Outlook® and/or Warrant® appear to cause the highest amount of early-season injury, including possible stand loss and/or stunting.
- Despite any early-season effects, Warrant®, Outlook®, and Dual® Magnum applied preemergence have little to no significant effects on yield or sugar content at the end of the season.
- Concep® III had a very minimal effect on Warrant®, Outlook®, and Dual® Magnum safety to sugar beet.

These experiments will be repeated in 2025 and results will be shared with Syngenta, BASF, and Bayer CropScience for a possible section 18 or special local needs 24(c) registration of these products in the future if waterhemp and Palmer become widespread in Idaho/Oregon.