

RO-NEET VERSUS NORTRON FOLLOWED BY POSTEMERGENCE AND LAY-BY HERBICIDES MIXED WITH GLYPHOSATE TO CONTROL GLYPHOSATE-RESISTANT WATERHEMP – HOLLOWAY, MN –SITE 2

Jeff M. Stachler

Extension Agronomist – Sugarbeet Weed Science
North Dakota State University and University of Minnesota

Introduction

Glyphosate-resistant waterhemp continues to increase in Minnesota and North Dakota. This trial compares Ro-Neet versus Nortron followed by postemergence and lay-by herbicides mixed with glyphosate.

Materials and Methods

This site has a clay soil texture. ‘Hilleshog 4022’ Roundup Ready sugarbeet seed treated with Tachigaren at 45 grams product per 100,000 seeds and Poncho Beta was seeded May 16 at 60,825 seeds/A in six row plots 30 feet in length in a cooperator’s field having glyphosate-resistant waterhemp. Headline at 12 fl oz/A was applied in-furrow at planting to all plots. Preplant incorporated treatments were applied May 16 and incorporated 2 inches deep with a field cultivator with rolling baskets. Postemergence herbicide treatments were applied June 9 June 27 and July 12. All treatments were applied in 17 gpa water at 40 psi through XR8002 nozzles to the center four rows of six row plots. All postemergence treatments included N-Pak AMS at 2.5% v/v and Destiny HC at 1.5 pt/A (except treatment 15). Quadris at 15.4 fl oz/A was applied June 15 to the entire experiment. Sugarbeet injury was evaluated June 27, July 12, July 20, and August 9. Waterhemp control was evaluated June 27, July 12, July 20, August 9 and August 24. Sugarbeet stand counts were recorded for the middle two rows at a total length of 60 feet on June 30 and August 1. All evaluations are a visual estimate of percent weed control or percent sugarbeet injury in the treated plot compared to the adjacent untreated strips and plots. Proline at 5.7 fl oz/A plus NIS at 0.25 % v/v, Agritin at 8 oz/A plus Manzate at 2 pounds/A, and Headline at 7 fl oz/A were applied on July 19, August 9, and August 26, respectively, over the entire trial area to control Cercospora. Sugarbeet from 20 feet of a center row in each plot was harvested September 7.

Table 1. Application information.

Date of Application	May 16	June 9	June 27	July 12
Time of Day	5:00 pm	3:45 pm	2:15 pm	1:15 pm
Air Temperature (°F)	66	63	71	76
Relative Humidity (%)	23	45	62	45
Soil Temp. (°F at 6")	46	57	58	72
Wind Velocity (mph)	9	16	15	3
Cloud Cover (%)	0	95	50	10
Soil Moisture	good	good	wet	good
Sugarbeet Stage (range/Avg)	PPI	V1.0-V2.7/V2.0	-	V10-V23/V15
Waterhemp (range/Avg) Trt. 1	PPI	cot-5 lf/2 lf; 0.125-0.25"/0.125"	-	cot-28 lf/13.5 lf; 0.125-21"/7.75"
Waterhemp (avg. density) Trt. 1	PPI	9/M ²	-	25/M ²
Waterhemp (range/Avg) Trt. 2	PPI	-	-	cot-21 lf/6.5 lf; 0.125-9"/1.9"
Waterhemp (avg. density) Trt. 2	PPI	-	-	3.8/M ²
Waterhemp (range/Avg) Trt. 3	PPI	-	-	4 lf; 0.75"
Waterhemp (avg. density) Trt. 3	PPI	-	-	0.1/M ²
Waterhemp (range/Avg) Trt. 7	PPI	-	-	cot-5 lf/3 lf; 0.125-1"/0.67"
Waterhemp (avg. density) Trt. 7	PPI	-	-	0.4/M ²

Summary

Sugarbeet injury was greatest on June 27 and declined to almost no injury by August 9. All treatments having a preplant herbicide caused more sugarbeet injury than glyphosate alone and Ro-Neet followed by Warrant plus Roundup PowerMAX plus Betamix plus Nortron caused the greatest injury. Treatments having Outlook mixed postemergence caused the next greatest sugarbeet injury regardless of the preplant herbicide. No treatment caused a reduction in sugarbeet stand at any time recorded.

Roundup PowerMAX caused 82 and 92% mortality of ten flagged waterhemp plants per plot and controlled 80 and 61% of waterhemp on June 27 and August 24, respectively, indicating the presence of glyphosate-resistant waterhemp. Roundup PowerMAX reduced waterhemp density and size compared to the untreated check. Nortron and Ro-Neet followed by Betamix plus Nortron plus Roundup PowerMAX reduced waterhemp density and size compared to Roundup PowerMAX alone on July 12. All treatments containing Ro-Neet and Nortron alone controlled waterhemp greater than Ro-Neet plus Eptam.

Treatments 5, 8, 10, 11, and 12 reduced extractable sucrose compared to Roundup PowerMAX alone and Ro-Neet followed by Betamix plus Nortron plus Roundup PowerMAX.

Results

Table 2. Ro-Neet versus Nortron followed by postemergence and lay-by herbicides mixed with glyphosate to control glyphosate-resistant waterhemp, Holloway, MN, 2011. (Stachler)

Treatment ¹	Rate lb ai/A or lb ae/A	Date of Applic.	June 27	June 27	June 30	Aug. 1
			Sgbt Inju %	Wahe Cntl %	Sgbt Popl /60ft row	Sgbt Popl /60ft row
1. Untreated Check	-	-	0	0	107	106
2. Roundup PM	1.125	June 9				
Roundup PM	0.75	June 27				
		July 12	0	80	100	102
3. Nortron (PPI)	7.5 pt/A	May 16				
Roundup PM+Betamix+Nortron	1.125+12 fl oz/A+4 fl oz/A	June 9				
Roundup PM+Betamix+Nortron	0.75+16 fl oz/A+4 fl oz/A	June 27				
Roundup PM+Betamix+Nortron	0.75+24 fl oz/A+4 fl oz/A	July 12	3	99	104	112
4. Nortron (PPI)	7.5 pt/A	May 16				
Roundup PM+Nortron+Outlook+Betamix	1.125+4 fl oz/A+14 fl oz/A+12 fl oz/A	June 9				
Roundup PM+Nortron+Outlook+Betamix	0.75+4 fl oz/A+10 fl oz/A+16 fl oz/A	June 27				
Roundup PM+Nortron+Betamix	0.75+4 fl oz/A+24 fl oz/A	July 12	10	99	95	101
5. Nortron (PPI)	7.5 pt/A	May 16				
Roundup PM+Dual Magnum+Nortron+Betamix	1.125+1.5 pt/A+4 fl oz/A+12 fl oz/A	June 9				
Roundup PM+Dual Magnum+Nortron+Betamix	0.75+1 pt/A+4 fl oz/A+16 fl oz/A	June 27				
Roundup PM+Nortron+Betamix	0.75+4 fl oz/A+24 fl oz/A	July 12	7	99	104	110
6. Nortron (PPI)	7.5 pt/A	May 16				
Roundup PM+Warrant+Nortron+Betamix	1.125+1.5 qt/A+4 fl oz/A+12 fl oz/A	June 9				
Roundup PM+Warrant+Nortron+Betamix	0.75+1 qt/A+4 fl oz/A+16 fl oz/A	June 27				
Roundup PM+Nortron+Betamix	0.75+4 fl oz/A+24 fl oz/A	July 12	8	99	111	111
7. Ro-Neet SB (PPI)	5.3 pt/A	May 16				
Roundup PM+Betamix+Nortron	1.125+12 fl oz/A+4 fl oz/A	June 9				
Roundup PM+Betamix+Nortron	0.75+16 fl oz/A+4 fl oz/A	June 27				
Roundup PM+Betamix+Nortron	0.75+24 fl oz/A+4 fl oz/A	July 12	3	98	96	104
8. Ro-Neet SB (PPI)	5.3 pt/A	May 16				
Roundup PM+Nortron+Outlook+Betamix	1.125+4 fl oz/A+14 fl oz/A+12 fl oz/A	June 9				
Roundup PM+Nortron+Outlook+Betamix	0.75+4 fl oz/A+10 fl oz/A+16 fl oz/A	June 27				
Roundup PM+Nortron+Betamix	0.75+4 fl oz/A+24 fl oz/A	July 12	10	99	96	103
9. Ro-Neet SB (PPI)	5.3 pt/A	May 16				
Roundup PM+Dual Magnum+Nortron+Betamix	1.125+1.5 pt/A+4 fl oz/A+12 fl oz/A	June 9				
Roundup PM+Dual Magnum+Nortron+Betamix	0.75+1 pt/A+4 fl oz/A+16 fl oz/A	June 27				
Roundup PM+Nortron+Betamix	0.75+4 fl oz/A+24 fl oz/A	July 12	6	99	106	11
10. Ro-Neet SB (PPI)	5.3 pt/A	May 16				
Roundup PM+Warrant+Nortron+Betamix	1.125+1.5 qt/A+4 fl oz/A+12 fl oz/A	June 9				
Roundup PM+Warrant+Nortron+Betamix	0.75+1 qt/A+4 fl oz/A+16 fl oz/A	June 27				
Roundup PM+Nortron+Betamix	0.75+4 fl oz/A+24 fl oz/A	July 12	16	99	106	109
11. Eptam + Ro-Neet SB (PPI)	2.3 + 3.3 pt/A	May 16				
Roundup PM+Betamix+Nortron	1.125+12 fl oz/A+4 fl oz/A	June 9				
Roundup PM+Betamix+Nortron	0.75+16 fl oz/A+4 fl oz/A	June 27				
Roundup PM+Betamix+Nortron	0.75+24 fl oz/A+4 fl oz/A	July 12	3	97	108	117
12. Nortron (PPI)	7.5 pt/A	May 16				
Roundup PM+Betamix+Nortron (No Destiny HC)	1.125+2 pt/A+4 fl oz/A	June 9				
Roundup PM+Betamix+Nortron (No Destiny HC)	0.75+3pt/A+4 fl oz/A	June 27				
Roundup PM+Betamix+Nortron (No Destiny HC)	0.75+4 pt/A+4 fl oz/A	July 12	7	99	109	109
LSD (5%)			2.2	1.4	NS	NS

¹N-Pak AMS (liquid ammonium sulfate from Winfield Solutions) at 2.5% v/v and Destiny HC (HSOC {MSO based}) from Winfield Solutions) at 1.5 pt/A [except treatment 15] was included in all postemergence treatments. Roundup PM=Roundup PowerMAX formulation of glyphosate.

Table 3. Ro-Neet versus Nortron followed by postemergence and lay-by herbicides mixed with glyphosate to control glyphosate-resistant waterhemp, Holloway, MN, 2011. (Stachler)

Treatment ¹	Rate	Date of Applic.	Aug. 9 Sgbt Inju %	Aug. 9 Wahe Cntl %	Aug. 24 Wahe Cntl %
1. Untreated Check	-	-	0	0	0
2. Roundup PM	1.125	June 9			
Roundup PM	0.75	June 27			
		July 12	0	68	61
3. Nortron (PPI)	7.5 pt/A	May 16			
Roundup PM+Betamix+Nortron	1.125+12 fl oz/A+4 fl oz/A	June 9			
Roundup PM+Betamix+Nortron	0.75+16 fl oz/A+4 fl oz/A	June 27			
Roundup PM+Betamix+Nortron	0.75+24 fl oz/A+4 fl oz/A	July 12	0	99	99
4. Nortron (PPI)	7.5 pt/A	May 16			
Roundup PM+Nortron+Outlook+Betamix	1.125+4 fl oz/A+14 fl oz/A+12 fl oz/A	June 9			
Roundup PM+Nortron+Outlook+Betamix	0.75+4 fl oz/A+10 fl oz/A+16 fl oz/A	June 27			
Roundup PM+Nortron+Betamix	0.75+4 fl oz/A+24 fl oz/A	July 12	1	99	99
5. Nortron (PPI)	7.5 pt/A	May 16			
Roundup PM+Dual Magnum+Nortron+Betamix	1.125+1.5 pt/A+4 fl oz/A+12 fl oz/A	June 9			
Roundup PM+Dual Magnum+Nortron+Betamix	0.75+1 pt/A+4 fl oz/A+16 fl oz/A	June 27			
Roundup PM+Nortron+Betamix	0.75+4 fl oz/A+24 fl oz/A	July 12	1	99	99
6. Nortron (PPI)	7.5 pt/A	May 16			
Roundup PM+Warrant+Nortron+Betamix	1.125+1.5 qt/A+4 fl oz/A+12 fl oz/A	June 9			
Roundup PM+Warrant+Nortron+Betamix	0.75+1 qt/A+4 fl oz/A+16 fl oz/A	June 27			
Roundup PM+Nortron+Betamix	0.75+4 fl oz/A+24 fl oz/A	July 12	0	99	99
7. Ro-Neet SB (PPI)	5.3 pt/A	May 16			
Roundup PM+Betamix+Nortron	1.125+12 fl oz/A+4 fl oz/A	June 9			
Roundup PM+Betamix+Nortron	0.75+16 fl oz/A+4 fl oz/A	June 27			
Roundup PM+Betamix+Nortron	0.75+24 fl oz/A+4 fl oz/A	July 12	1	99	98
8. Ro-Neet SB (PPI)	5.3 pt/A	May 16			
Roundup PM+Nortron+Outlook+Betamix	1.125+4 fl oz/A+14 fl oz/A+12 fl oz/A	June 9			
Roundup PM+Nortron+Outlook+Betamix	0.75+4 fl oz/A+10 fl oz/A+16 fl oz/A	June 27			
Roundup PM+Nortron+Betamix	0.75+4 fl oz/A+24 fl oz/A	July 12	1	99	99
9. Ro-Neet SB (PPI)	5.3 pt/A	May 16			
Roundup PM+Dual Magnum+Nortron+Betamix	1.125+1.5 pt/A+4 fl oz/A+12 fl oz/A	June 9			
Roundup PM+Dual Magnum+Nortron+Betamix	0.75+1 pt/A+4 fl oz/A+16 fl oz/A	June 27			
Roundup PM+Nortron+Betamix	0.75+4 fl oz/A+24 fl oz/A	July 12	1	99	99
10. Ro-Neet SB (PPI)	5.3 pt/A	May 16			
Roundup PM+Warrant+Nortron+Betamix	1.125+1.5 qt/A+4 fl oz/A+12 fl oz/A	June 9			
Roundup PM+Warrant+Nortron+Betamix	0.75+1 qt/A+4 fl oz/A+16 fl oz/A	June 27			
Roundup PM+Nortron+Betamix	0.75+4 fl oz/A+24 fl oz/A	July 12	2	99	99
11. Eptam + Ro-Neet SB (PPI)	2.3 + 3.3 pt/A	May 16			
Roundup PM+Betamix+Nortron	1.125+12 fl oz/A+4 fl oz/A	June 9			
Roundup PM+Betamix+Nortron	0.75+16 fl oz/A+4 fl oz/A	June 27			
Roundup PM+Betamix+Nortron	0.75+24 fl oz/A+4 fl oz/A	July 12	2	96	95
12. Nortron (PPI)	7.5 pt/A	May 16			
Roundup PM+Betamix+Nortron (No Destiny HC)	1.125+2 pt/A+4 fl oz/A	June 9			
Roundup PM+Betamix+Nortron (No Destiny HC)	0.75+3pt/A+4 fl oz/A	June 27			
Roundup PM+Betamix+Nortron (No Destiny HC)	0.75+4 pt/A+4 fl oz/A	July 12	2	99	99

LSD (5%)

NS

2.2

2.9

¹N-Pak AMS (liquid ammonium sulfate from Winfield Solutions) at 2.5% v/v and Destiny HC (HSOC {MSO based}) from Winfield Solutions) at 1.5 pt/A [except treatment 15] was included in all postemergence treatments. Roundup PM=Roundup PowerMAX formulation of glyphosate.

Table 4. Ro-Neet versus Nortron followed by postemergence and lay-by herbicides mixed with glyphosate to control glyphosate-resistant waterhemp, Holloway, MN, 2011. (Stachler)

Treatment ¹	Rate	Date of Applic.	Sept. 7	Sept. 7	Sept. 7	Sept. 7
			Sgbt Popl	Root Yield	Sucros e	Extrac Sucrose
	lb ai/A or lb ae/A		Plts/20 ⁷	Tons/A	%	lb/A
1. Untreated Check	-	-	38	12.8	13.5	2807
2. Roundup PM	1.125	June 9				
Roundup PM	0.75	June 27				
		July 12	41	19.8	14.7	4730
3. Nortron (PPI)	7.5 pt/A	May 16				
Roundup PM+Betamix+Nortron	1.125+12 fl oz/A+4 fl oz/A	June 9				
Roundup PM+Betamix+Nortron	0.75+16 fl oz/A+4 fl oz/A	June 27				
Roundup PM+Betamix+Nortron	0.75+24 fl oz/A+4 fl oz/A	July 12	36	19.8	14.3	4612
4. Nortron (PPI)	7.5 pt/A	May 16				
Roundup PM+Nortron+Outlook+Betamix	1.125+4 fl oz/A+14 fl oz/A+12 fl oz/A	June 9				
Roundup PM+Nortron+Outlook+Betamix	0.75+4 fl oz/A+10 fl oz/A+16 fl oz/A	June 27				
Roundup PM+Nortron+Betamix	0.75+4 fl oz/A+24 fl oz/A	July 12	39	18.7	14.2	4220
5. Nortron (PPI)	7.5 pt/A	May 16				
Roundup PM+Dual Magnum+Nortron+Betamix	1.125+1.5 pt/A+4 fl oz/A+12 fl oz/A	June 9				
Roundup PM+Dual Magnum+Nortron+Betamix	0.75+1 pt/A+4 fl oz/A+16 fl oz/A	June 27				
Roundup PM+Nortron+Betamix	0.75+4 fl oz/A+24 fl oz/A	July 12	42	17.7	14.0	4027
6. Nortron (PPI)	7.5 pt/A	May 16				
Roundup PM+Warrant+Nortron+Betamix	1.125+1.5 qt/A+4 fl oz/A+12 fl oz/A	June 9				
Roundup PM+Warrant+Nortron+Betamix	0.75+1 qt/A+4 fl oz/A+16 fl oz/A	June 27				
Roundup PM+Nortron+Betamix	0.75+4 fl oz/A+24 fl oz/A	July 12	41	18.2	14.5	4296
7. Ro-Neet SB (PPI)	5.3 pt/A	May 16				
Roundup PM+Betamix+Nortron	1.125+12 fl oz/A+4 fl oz/A	June 9				
Roundup PM+Betamix+Nortron	0.75+16 fl oz/A+4 fl oz/A	June 27				
Roundup PM+Betamix+Nortron	0.75+24 fl oz/A+4 fl oz/A	July 12	37	21.0	14.0	4798
8. Ro-Neet SB (PPI)	5.3 pt/A	May 16				
Roundup PM+Nortron+Outlook+Betamix	1.125+4 fl oz/A+14 fl oz/A+12 fl oz/A	June 9				
Roundup PM+Nortron+Outlook+Betamix	0.75+4 fl oz/A+10 fl oz/A+16 fl oz/A	June 27				
Roundup PM+Nortron+Betamix	0.75+4 fl oz/A+24 fl oz/A	July 12	37	17.7	14.2	4016
9. Ro-Neet SB (PPI)	5.3 pt/A	May 16				
Roundup PM+Dual Magnum+Nortron+Betamix	1.125+1.5 pt/A+4 fl oz/A+12 fl oz/A	June 9				
Roundup PM+Dual Magnum+Nortron+Betamix	0.75+1 pt/A+4 fl oz/A+16 fl oz/A	June 27				
Roundup PM+Nortron+Betamix	0.75+4 fl oz/A+24 fl oz/A	July 12	43	19.2	14.3	4514
10. Ro-Neet SB (PPI)	5.3 pt/A	May 16				
Roundup PM+Warrant+Nortron+Betamix	1.125+1.5 qt/A+4 fl oz/A+12 fl oz/A	June 9				
Roundup PM+Warrant+Nortron+Betamix	0.75+1 qt/A+4 fl oz/A+16 fl oz/A	June 27				
Roundup PM+Nortron+Betamix	0.75+4 fl oz/A+24 fl oz/A	July 12	36	17.3	14.5	3996
11. Eptam + Ro-Neet SB (PPI)	2.3 + 3.3 pt/A	May 16				
Roundup PM+Betamix+Nortron	1.125+12 fl oz/A+4 fl oz/A	June 9				
Roundup PM+Betamix+Nortron	0.75+16 fl oz/A+4 fl oz/A	June 27				
Roundup PM+Betamix+Nortron	0.75+24 fl oz/A+4 fl oz/A	July 12	44	18.1	14.1	4081
12. Nortron (PPI)	7.5 pt/A	May 16				
Roundup PM+Betamix+Nortron (No Destiny HC)	1.125+2 pt/A+4 fl oz/A	June 9				
Roundup PM+Betamix+Nortron (No Destiny HC)	0.75+3pt/A+4 fl oz/A	June 27				
Roundup PM+Betamix+Nortron (No Destiny HC)	0.75+4 pt/A+4 fl oz/A	July 12	35	17.8	13.8	3974
LSD (5%)			NS	2.73	NS	641.5

¹N-Pak AMS (liquid ammonium sulfate from Winfield Solutions) at 2.5% v/v and Destiny HC (HSOC {MSO based}) from Winfield Solutions) at 1.5 pt/A [except treatment 15] was included in all postemergence treatments. Roundup PM=Roundup PowerMAX formulation of glyphosate.