## RO-NEET FOLLOWED BY POSTEMERGENCE AND LAY-BY HERBICIDES MIXED WITH GLYPHOSATE TO CONTROL GLYPHOSATE-RESISTANT WATERHEMP – HOLLOWAY, MN SITE 1

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#### Introduction

Glyphosate-resistant waterhemp continues to increase in Minnesota and North Dakota. This trial looks at the benefits of a soil-applied herbicide (Ro-Neet) followed by postemergence herbicides and split-applied lay-by herbicides mixed with glyphosate.

#### **Materials and Methods**

'Hilleshog 4022' Roundup Ready sugarbeet seed treated with Tachigaren at 45 grams product per 100,000 seeds and Poncho Beta was seeded May 4 at 60,825 seeds/A in six row plots 30 feet long 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 3 and incorporated 2 inches deep with a field cultivator with rolling baskets. Postemergence herbicide treatments were applied May 25, June 9 and June 24. 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. Quadris at 15.4 fl oz/A was applied to the entire experiment June 15. Sugarbeet injury and common lambsquarters control were evaluated May 26, June 9, June 24, July 8 and July 20. Waterhemp control was evaluated May 26, June 9, June 24, July 8, July 20 and August 24. Annual grass control was evaluated May 26 and July 20. Wild buckwheat control was evaluated May 26, June 24, July 8 and July 20. Common ragweed control was evaluated July 8 and July 20. 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 3	May 26	June 9	June 24
Time of Day	5:00 pm	2:45 pm	11:00 am	12:35 pm
Air Temperature (°F)	58	70	61	69
Relative Humidity (%)	22	31	47	59
Soil Temp. (°F at 6")	48	58	58	63
Wind Velocity (mph)	8	3	12	7
Cloud Cover (%)	0	10	95	90
Soil Moisture	Good	Good	Good	Good
Sugarbeet Stage (range/Avg)	PPI	V1.0-V2.3/V2.0	V6.0-V10.0/V8.5	-
Waterhemp (range/Avg) Trt. 1	PPI	cot-3 lf/2 lf; 0-0.25"/0.125"	cot-13 lf/9 lf; 0.125-5"/3"	-
Waterhemp (avg. density) Trt. 1	PPI	$96/M^{2}$	$166/M^2$	=
Waterhemp (range/Avg) Trt. 2	PPI	cot-3 lf/2 lf; 0-0.33"/0.125"	cot-10 lf/6 lf; 0.125-2"/1.25"	-
Waterhemp (avg. density) Trt. 2	PPI	$104/M^2$	$44/M^2$	-
Waterhemp (range/Avg) Trt. 14	PPI	cot-2 lf/1 lf; 0-0.125/0.125	cot-10 lf/6 lf; 0.125-2"/1"	-
Waterhemp (avg. density) Trt. 14	PPI	$10/M^2$	$7/\mathbf{M}^2$	-
Com. Lambsquarters (range/Avg) Trt. 1	PPI	2-4 lf/2 lf; 0.25-0.75"/0.5"	2-17 lf/12 lf; 0.25-7.5"/3"	-
Com. Lambsquarters (avg. density) Trt. 1	PPI	$6/M^2$	$18/M^{2}$	-
Com. Lambsquarters (range/Avg) Trt. 2	PPI	cot-4 lf/2 lf; 0.125-0.5"/0.33"	4-8 lf/5 lf; 0.5-0.75"/0.67"	-
Com. Lambsquarters (avg. density) Trt. 2	PPI	$5/M^2$	$1/\mathbf{M}^2$	-
Com. Lambsquarters (range/Avg) Trt. 14	PPI	cot-2 lf/2 lf; 0.125-0.33"/0.25"	3-6 lf/4.5 lf; 0.33-0.75"/0.5"	=
Com. Lambsquarters (avg. density) Trt. 14	PPI	$0.5/M^2$	$0.5/M^2$	-
Annual Grasses (range/Avg) Trt. 1	PPI	1-3 lf/2 lf; 0.25-1.25"/0.5"	1-7 Till/4 Till; 1-5"/3"	-
Annual Grasses (avg. density) Trt. 1	PPI	$7/M^2$	$9/M^2$	-
Annual Grasses (range/Avg) Trt. 2	PPI	1-3 lf/2 lf; 0.25-1"/0.75"	3 lf-1T/1T; 0.75-1.75"/1.25"	-
Annual Grasses (avg. density) Trt. 2	PPI	$5/M^2$	$0.5/M^2$	-
Annual Grasses (range/Avg) Trt. 14	PPI	-	-	-
Annual Grasses (avg. density) Trt. 14	PPI	$0/M^2$	$0/M^2$	-
Wild Buckwheat (range/Avg) Trt. 1	PPI	cot-2 lf/1 lf; 0.33-1"/0.5"	1-11 lf/3 lf; 0.75-11"/3"	=
Wild Buckwheat (avg. density) Trt. 1	PPI	$13/M^2$	$16/M^2$	=
Wild Buckwheat (range/Avg) Trt. 2	PPI	1 lf/1 lf; 0.25-0.75"/0.5"	2-3 lf/3 lf; 0.75-1.5"/1.25"	=
Wild Buckwheat (avg. density) Trt. 2	PPI	$4/M^2$	$1/\mathbf{M}^2$	-
Wild Buckwheat (range/Avg) Trt. 14	PPI	cot-2 lf/1 lf; 0.25-1"/0.5"	2-5 lf/3 lf; 0.5-3"/1.25"	-
Wild Buckwheat (avg. density) Trt. 14	PPI	$9/M^2$	$4/\mathbf{M}^2$	-
Common Ragweed (range/Avg) Trt. 1	PPI	1 N/1 N; 0.33"/0.33"	-	-
Common Ragweed (avg. density) Trt. 1	PPI	$0.5/M^2$	-	-
Common Ragweed (range/Avg) Trt. 2	PPI	1 N/1 N; 0.5"/0.5"	-	=
Common Ragweed (avg. density) Trt. 2	PPI	$1/M^2$	-	=
Common Ragweed (range/Avg) Trt. 14	PPI	cot/cot; 0.25"/0.25"	-	=
Common Ragweed (avg. density) Trt. 14	PPI	$0.25/M^2$	-	=

# Results Table 2. Ro-Neet followed by POST and Lay-by Herbicides mixed with glyphosate to control glyphosate-resistant waterhemp, Holloway, MN, 2011. (Stachler)

2011. (Stachler)			(1)	(2)	(3)	(4)	(5)
			May26	May26	<u>May26</u>	May26	<u>May26</u>
		Date of	Sgbt	Wahe	Colq	Grass	Wibw
Treatment <sup>1</sup>	Rate	Applic.	Inju	Cntl	Cntl	Cntl	Cntl
	lb ai/A or lb ae/A		%	%	%	%	%
Untreated Check	-	-	0	0	0	0	0
Roundup PM	1.125	May 25					
Roundup PM	0.75	June 9, 24	0	0	0	0	0
Roundup PM+Betanex	1.125+12 fl oz/A	May 25					
Roundup PM+Betanex	0.75+16 fl oz/A	June 9					
Roundup PM+Betanex	0.75+24 fl oz/A	June 24	0	0	0	0	0
Roundup PM+Betamix+Nortron	1.125+12 fl oz/A+4 fl oz/A	May 25					
Roundup PM+Betamix+Nortron	0.75+16 fl oz/A+4 fl oz/A	June 9					
Roundup PM+Betamix+Nortron	0.75+24 fl oz/A+4 fl oz/A	June 24	0	0	0	0	0
Roundup PM+Outlook	1.125+14 fl oz/A	May 25					
Roundup PM+Outlook	0.75+10  fl oz/A	June 9					
Roundup PM	0.75	June 24	0	0	0	0	0
Roundup PM+Outlook+Betanex	1.125+14 fl oz/A+12 fl oz/A	May 25					
Roundup PM+Outlook+Betanex	0.75+10 fl oz/A+16 fl oz/A	June 9					
Roundup PM+Betanex	0.75+24 fl oz/A	June 24	0	0	0	0	0
Roundup PM+Nortron+Outlook+Betamix	1.125+4 fl oz/A+14 fl	May 25					
	oz/A+12 fl oz/A						
Roundup PM+Nortron+Outlook+Betamix	0.75+4 fl oz/A+10 fl oz/A+16	June 9					
	fl oz/A						
Roundup PM+Nortron+Betamix	0.75+4 fl oz/A+24 fl oz/A	June 24	0	0	0	0	0
Roundup PM+Dual Magnum	1.125+1.5 pt/A	May 25					
Roundup PM+Dual Magnum	0.75+1  pt/A	June 9					
Roundup PM	0.75	June 24	0	0	0	0	0
Roundup PM+Dual Magnum+Betanex	1.125+1.5 pt/A+12 fl oz/A	May 25					
Roundup PM+Dual Magnum+Betanex	0.75+1  pt/A+16  fl oz/A	June 9					
Roundup PM+Betanex	0.75+24 fl oz/A	June 24	0	0	0	0	0
Roundup PM+Dual Magnum+Nortron+Betamix	1.125+1.5 pt/A+4 fl oz/A+12	May 25					
	fl oz/A						
Roundup PM+Dual Magnum+Nortron+Betamix	0.75+1 pt/A+4 fl oz/A+16 fl	June 9					
	oz/A						
Roundup PM+Nortron+Betamix	0.75+4 fl oz/A+24 fl oz/A	June 24	0	0	0	0	0
Roundup PM+Warrant	1.125+1.5 qt/A	May 25					
Roundup PM+Warrant	0.75+1  qt/A	June 9					
Roundup PM	0.75	June 24	0	0	0	0	0
Roundup PM+Warrant+Betanex	1.125+1.5 qt/A+12 fl oz/A	May 25					
Roundup PM+Warrant+Betanex	0.75+1  qt/A+16  fl oz/A	June 9					
Roundup PM+Betanex	0.75+24 fl oz/A	June 24	0	0	0	0	0
Roundup PM+Warrant+Nortron+Betamix	1.125+1.5 qt/A+4 fl oz/A+12	May 25					
	fl oz/A						
Roundup PM+Warrant+Nortron+Betamix	0.75+1 qt/A+4 fl oz/A+16 fl	June 9					
	oz/A						
Roundup PM+Nortron+Betamix	0.75+4 fl oz/A+24 fl oz/A	June 24	0	0	0	0	0
Ro-Neet SB (PPI)	5.3 pt/A	May 3					
Roundup PM	1.125	June 9					
Roundup PM	0.75	June 24	22	85	88	95	26
Ro-Neet SB (PPI)	5.3 pt/A	May 3					
Roundup PM+Betanex	1.125 + 12  fl oz/A	May 25					
Roundup PM+Betanex	0.75+16 fl oz/A	June 9					

Table continued on next page.

Table 2. Ro-Neet followed by POST and Lay-by Herbicides mixed with glyphosate to control glyphosate-resistant waterhemp, Holloway, MN, 2011. (continued)

			(1)	(2)	(3)	(4)	(5)
Ro-Neet SB (PPI)	5.3 pt/A	May 3					
Roundup PM+Betamix+Nortron	1.125+12 fl oz/A+4 fl oz/A	May 25					
Roundup PM+Betamix+Nortron	0.75+16  fl oz/A+4  fl oz/A	June 9					
Roundup PM+Betamix+Nortron	0.75+24 fl oz/A+4 fl oz/A	June 24	21	86	88	95	29
Ro-Neet SB (PPI)	5.3 pt/A	May 3					
Roundup PM+Outlook	1.125+14 fl oz/A	May 25					
Roundup PM+Outlook	0.75+10  fl oz/A	June 9					
Roundup PM	0.75	June 24	19	87	91	95	28
Ro-Neet SB (PPI)	5.3 pt/A	May 3					
Roundup PM+Outlook+Betanex	1.125+14 fl oz/A+12 fl oz/A	May 25					
Roundup PM+Outlook+Betanex	0.75+10 fl oz/A+16 fl oz/A	June 9					
Roundup PM+Betanex	0.75+24  fl oz/A	June 24	22	87	90	96	30
Ro-Neet SB (PPI)	5.3 pt/A	May 3					
Roundup PM+Nortron+Outlook+Betamix	1.125+4 fl oz/A+14 fl	May 25					
1	oz/A+12 fl oz/A	·					
Roundup PM+Nortron+Outlook+Betamix	0.75+4 fl oz/A+10 fl	June 9					
1	oz/A+16 fl oz/A						
Roundup PM+Nortron+Betamix	0.75+4 fl oz/A+24 fl oz/A	June 24	25	86	90	95	30
Ro-Neet SB (PPI)	5.3 pt/A	May 3					
Roundup PM+Dual Magnum	1.125+1.5 pt/A	May 25					
Roundup PM+Dual Magnum	0.75+1  pt/A	June 9					
Roundup PM	0.75	June 24	25	88	90	96	30
Ro-Neet SB (PPI)	5.3 pt/A	May 3					
Roundup PM+Dual Magnum+Betanex	1.125+1.5 pt/A+12 fl oz/A	May 25					
Roundup PM+Dual Magnum+Betanex	0.75+1  pt/A+16  fl oz/A	June 9					
Roundup PM+Betanex	0.75+24 fl oz/A	June 24	23	88	89	95	30
Ro-Neet SB (PPI)	5.3 pt/A	May 3					
Roundup PM+Dual Magnum+Nortron+Betamix	1.125+1.5 pt/A+4 fl	May 25					
Trounday 1111/2 dar iviagnam (1 vora on / 20 dam)	oz/A+12 fl oz/A	1.14, 20					
Roundup PM+Dual Magnum+Nortron+Betamix	0.75+1  pt/A+4  fl oz/A+16  fl	June 9					
Roundap 1 111 / Buar Wagnam / Trordon / Betaning	oz/A	Julie )					
Roundup PM+Nortron+Betamix	0.75+4 fl oz/A+24 fl oz/A	June 24	19	85	87	93	29
Ro-Neet SB (PPI)	5.3 pt/A	May 3	17	0.5	07	,,,	
Roundup PM+Warrant	1.125+1.5 qt/A	May 25					
Roundup PM+Warrant	0.75+1 qt/A	June 9					
Roundup PM	0.75 0.75	June 24	22	86	90	95	30
Ro-Neet SB (PPI)	5.3 pt/A	May 3		00	- 70		- 50
Roundup PM+Warrant+Betanex	1.125+1.5 qt/A+12 fl oz/A	May 25					
Roundup PM+Warrant+Betanex	0.75+1 qt/A+16 fl oz/A	June 9					
Roundup PM+Betanex	0.75+1  qt/A+10  H oz/A 0.75+24  fl oz/A	June 24	20	87	88	95	30
Ro-Neet SB (PPI)		May 3	20	07	00	73	30
,	5.3 pt/A	•					
Roundup PM+Warrant+Nortron+Betamix	1.125+1.5  qt/A+4  fl	May 25					
Downdon DM   Woment   Northern   Dot	oz/A+12 fl oz/A	Tuna O					
Roundup PM+Warrant+Nortron+Betamix	0.75+1  qt/A+4  fl oz/A+16  fl	June 9					
Roundup PM+Nortron+Betamix	oz/A 0.75+4 fl oz/A+24 fl oz/A	June 24	22	84	90	95	30
Noundup I MTTNOIHOHT DETAIHIN	0.7517 II 02/AT24 II 02/A	June 24		04	<i>7</i> 0	,,,	30

Experiment continued on next page.

Table 3. Ro-Neet followed by POST and Lay-by Herbicides mixed with glyphosate to control glyphosate-resistant waterhemp, Holloway, MN, 2011. (Stachler)

			(6) <u>June 9</u>	(7) June 9	(8) <u>June 9</u>	(9) <u>July 20</u>	(10) July 20
		Date of	Sgbt	Wahe	Colq	Sgbt	Wahe
Treatment <sup>1</sup>	Rate	Applic.	Inju	Cntl	Cntl	Inj	Cntl
H ICI I	lb ai/A or lb ae/A		%	%	%	%	%
Untreated Check	1.125	- M 25	0	0	0	0	0
Roundup PM Roundup PM	0.75	May 25 June 9, 24	2	71	91	0	51
Roundup PM+Betanex	1.125+12 fl oz/A	May 25		/1	71	U	31
Roundup PM+Betanex	0.75+16  fl oz/A	June 9					
Roundup PM+Betanex	0.75+24  fl oz/A	June 24	7	74	90	8	74
Roundup PM+Betamix+Nortron	1.125+12 fl oz/A+4 fl oz/A	May 25		•		-	-
Roundup PM+Betamix+Nortron	0.75+16 fl oz/A+4 fl oz/A	June 9					
Roundup PM+Betamix+Nortron	0.75+24 fl oz/A+4 fl oz/A	June 24	7	71	93	14	61
Roundup PM+Outlook	1.125+14 fl oz/A	May 25					
Roundup PM+Outlook	0.75+10  fl oz/A	June 9					
Roundup PM	0.75	June 24	7	86	95	11	73
Roundup PM+Outlook+Betanex	1.125+14 fl oz/A+12 fl oz/A	May 25					
Roundup PM+Outlook+Betanex	0.75+10  fl oz/A+16  fl oz/A	June 9	7	02	02	10	02
Roundup PM+Betanex	0.75+24 fl oz/A	June 24	7	92	93	10	92
Roundup PM+Nortron+Outlook+Betamix	1.125+4 fl oz/A+14 fl oz/A+12 fl oz/A	May 25					
Roundup PM+Nortron+Outlook+Betamix	0.75+4 fl oz/A+10 fl oz/A+16	June 9					
Roundap I MITHOLITOILIOURTDEMIIIX	61.73+4 II 02/A+10 II 02/A+10 fl oz/A	June					
Roundup PM+Nortron+Betamix	0.75+4 fl oz/A+24 fl oz/A	June 24	9	94	96	16	88
Roundup PM+Dual Magnum	1.125+1.5 pt/A	May 25			,,,		
Roundup PM+Dual Magnum	0.75+1 pt/A	June 9					
Roundup PM	0.75	June 24	6	88	92	9	79
Roundup PM+Dual Magnum+Betanex	1.125+1.5 pt/A+12 fl oz/A	May 25					
Roundup PM+Dual Magnum+Betanex	0.75+1  pt/A+16  fl oz/A	June 9					
Roundup PM+Betanex	0.75+24 fl oz/A	June 24	13	82	94	14	80
Roundup PM+Dual Magnum+Nortron+Betamix	1.125+1.5 pt/A+4 fl oz/A+12 fl	May 25					
	oz/A						
Roundup PM+Dual Magnum+Nortron+Betamix	0.75+1 pt/A+4 fl oz/A+16 fl	June 9					
Downdow DM   Northon   Dotomire	oz/A 0.75+4 fl oz/A+24 fl oz/A	June 24	11	86	94	12	87
Roundup PM+Nortron+Betamix Roundup PM+Warrant		June 24 May 25	11	80	94	12	8/
Roundup PM+Warrant	1.125+1.5 qt/A 0.75+1 qt/A	June 9					
Roundup PM	0.75+1 qt/A 0.75	June 24	4	84	91	9	73
Roundup PM+Warrant+Betanex	1.125+1.5 qt/A+12 fl oz/A	May 25	,	0.7	/1		13
Roundup PM+Warrant+Betanex	0.75+1  gt/A+16  fl oz/A	June 9					
Roundup PM+Betanex	0.75+24 fl oz/A	June 24	7	79	94	11	87
Roundup PM+Warrant+Nortron+Betamix	1.125+1.5 qt/A+4 fl oz/A+12 fl	May 25	-		-		
	oz/A	•					
Roundup PM+Warrant+Nortron+Betamix	0.75+1 qt/A+4 fl oz/A+16 fl	June 9					
	oz/A						
Roundup PM+Nortron+Betamix	0.75+4 fl oz/A+24 fl oz/A	June 24	8	87	96	13	91
Ro-Neet SB (PPI)	5.3 pt/A	May 3					
Roundup PM	1.125	June 9	_	0.4	0.4	0	<b></b>
Roundup PM	0.75	June 24	6	86	94	9	74
Ro-Neet SB (PPI)	5.3 pt/A	May 3					
Roundup PM+Betanex Roundup PM+Betanex	1.125+12 fl oz/A 0.75+16 fl oz/A	May 25 June 9					
Roundup PM+Betanex	0.75+10  fl oz/A 0.75+24  fl oz/A	June 24	14	94	96	10	90
Ro-Neet SB (PPI)	5.3 pt/A	May 3	17	77	70	10	70
Roundup PM+Betamix+Nortron	1.125+12 fl oz/A+4 fl oz/A	May 25					
Roundup PM+Betamix+Nortron	0.75+16  fl oz/A+4  fl oz/A	June 9					
Roundup PM+Betamix+Nortron	0.75+24 fl oz/A+4 fl oz/A	June 24	15	93	97	10	83
Ro-Neet SB (PPI)	5.3 pt/A	May 3					
Roundup PM+Outlook	1.125+14 fl oz/A	May 25					
Roundup PM+Outlook	0.75+10  fl oz/A	June 9					
Roundup PM	0.75	June 24	10	98	99	18	97

Table continued on next page.

Table 3. Ro-Neet followed by POST and Lay-by Herbicides mixed with glyphosate to control glyphosate-resistant waterhemp, Holloway, MN, 2011. (continued)

2011. (continued)			(6)	(7)	(8)	(9)	(10)
Ro-Neet SB (PPI)	5.3 pt/A	May 3	(0)	(,)	(0)	(>)	(10)
Roundup PM+Outlook+Betanex	1.125+14 fl oz/A+12 fl oz/A	May 25					
Roundup PM+Outlook+Betanex	0.75+10 fl oz/A+16 fl oz/A	June 9					
Roundup PM+Betanex	0.75+24 fl oz/A	June 24	15	97	97	12	99
Ro-Neet SB (PPI)	5.3 pt/A	May 3					
Roundup PM+Nortron+Outlook+Betamix	1.125+4 fl oz/A+14 fl	May 25					
r	oz/A+12 fl oz/A	,					
Roundup PM+Nortron+Outlook+Betamix	0.75+4 fl oz/A+10 fl oz/A+16	June 9					
1	fl oz/A						
Roundup PM+Nortron+Betamix	0.75+4 fl oz/A+24 fl oz/A	June 24	16	98	96	16	97
Ro-Neet SB (PPI)	5.3 pt/A	May 3					
Roundup PM+Dual Magnum	1.125 + 1.5  pt/A	May 25					
Roundup PM+Dual Magnum	0.75+1  pt/A	June 9					
Roundup PM	0.75	June 24	13	98	99	15	97
Ro-Neet SB (PPI)	5.3 pt/A	May 3					
Roundup PM+Dual Magnum+Betanex	1.125+1.5 pt/A+12 fl oz/A	May 25					
Roundup PM+Dual Magnum+Betanex	0.75+1  pt/A+16  fl oz/A	June 9					
Roundup PM+Betanex	0.75+24 fl oz/A	June 24	18	98	97	11	98
Ro-Neet SB (PPI)	5.3 pt/A	May 3					
Roundup PM+Dual Magnum+Nortron+Betamix	1.125+1.5 pt/A+4 fl oz/A+12	May 25					
	fl oz/A	•					
Roundup PM+Dual Magnum+Nortron+Betamix	0.75+1 pt/A+4 fl oz/A+16 fl	June 9					
	oz/A						
Roundup PM+Nortron+Betamix	0.75+4 fl oz/A+24 fl oz/A	June 24	18	95	99	10	94
Ro-Neet SB (PPI)	5.3 pt/A	May 3					
Roundup PM+Warrant	1.125+1.5 qt/A	May 25					
Roundup PM+Warrant	0.75+1  qt/A	June 9					
Roundup PM	0.75	June 24	5	68	74	9	83
Ro-Neet SB (PPI)	5.3 pt/A	May 3					
Roundup PM+Warrant+Betanex	1.125+1.5 qt/A+12 fl oz/A	May 25					
Roundup PM+Warrant+Betanex	0.75+1  qt/A+16  fl oz/A	June 9					
Roundup PM+Betanex	0.75+24 fl oz/A	June 24	15	96	97	12	95
Ro-Neet SB (PPI)	5.3 pt/A	May 3					
Roundup PM+Warrant+Nortron+Betamix	1.125+1.5 qt/A+4 fl oz/A+12	May 25					
•	fl oz/A	•					
Roundup PM+Warrant+Nortron+Betamix	0.75+1 qt/A+4 fl oz/A+16 fl	June 9					
•	oz/A						
				0.0	0.7	1.5	0.0
Roundup PM+Nortron+Betamix	0.75+4 fl oz/A+24 fl oz/A	June 24	17	98	97	15	98

 $Table \ 4. \ Ro\text{-}Neet \ followed \ by \ POST \ and \ Lay\text{-}by \ Herbicides \ mixed \ with \ glyphosate \ to \ control \ glyphosate-resistant \ waterhemp, \ Holloway, \ MN, \ 2011. \ (Stachler)$ 

2011. (Stachler)			(1.1)	(10)	(10)	(1.4)	(1.5)
			(11)	(12)	(13)	(14)	(15)
		Date of	<u>July 20</u> Colq	July 20 Wibw	July 20 Cora	<u>July 20</u> Grass	Aug 24 Wahe
Treatment <sup>1</sup>	Rate	Applic.	Cntl	Cntl	Cntl	Cntl	Cntl
	lb ai/A or lb ae/A	T I	%	%	%	%	%
Untreated Check	-	-	0	0	0	0	0
Roundup PM	1.125	May 25					
Roundup PM	0.75	June 9, 24	99	93	99	99	51
Roundup PM+Betanex	1.125+12 fl oz/A	May 25					
Roundup PM+Betanex	0.75+16 fl oz/A	June 9		0.4	0.0	0.7	
Roundup PM+Betanex	0.75+24 fl oz/A	June 24	98	84	99	97	60
Roundup PM+Betamix+Nortron	1.125+12 fl oz/A+4 fl oz/A	May 25					
Roundup PM+Betamix+Nortron	$0.75+16 \ fl \ oz/A+4 \ fl$	June 9					
Roundup PM+Betamix+Nortron	oz/A 0.75+24 fl oz/A+4 fl	June 24	99	98	99	98	54
	oz/A						
Roundup PM+Outlook	1.125+14 fl oz/A	May 25					
Roundup PM+Outlook	0.75+10 fl oz/A	June 9	00	83	99	00	61
Roundup PM Roundup PM+Outlook+Betanex	0.75 1.125+14 fl oz/A+12 fl	June 24 May 25	99	63	99	99	64
Roundup FW+Outlook+Betallex	0Z/A	May 23					
Roundup PM+Outlook+Betanex	0.75+10 fl oz/A+16 fl	June 9					
Roundup PM+Betanex	oz/A 0.75+24 fl oz/A	June 24	99	86	99	99	80
Roundup PM+Betanex Roundup PM+Nortron+Outlook+Betamix	1.125+4 fl oz/A+14 fl	May 25	99	80	99	99	- 00
Roundup I M+Nortion+Outlook+Betainix	oz/A+12 fl oz/A	May 25					
Roundup PM+Nortron+Outlook+Betamix	0.75+4  fl oz/A+10  fl	June 9					
The state of the s	oz/A+16 fl oz/A						
Roundup PM+Nortron+Betamix	0.75+4 fl oz/A+24 fl	June 24	99	97	99	99	79
	oz/A						
Roundup PM+Dual Magnum	1.125+1.5 pt/A	May 25					
Roundup PM+Dual Magnum	0.75+1  pt/A	June 9					
Roundup PM	0.75	June 24	99	81	99	99	70
Roundup PM+Dual Magnum+Betanex	1.125+1.5 pt/A+12 fl oz/A	May 25					
Roundup PM+Dual Magnum+Betanex	0.75+1  pt/A+16  fl oz/A	June 9					
Roundup PM+Betanex	0.75+24 fl oz/A	June 24	99	93	98	99	68
Roundup PM+Dual Magnum+Nortron+Betamix	1.125+1.5 pt/A+4 fl	May 25					
D I DM.D IM .N. ( D ( '	oz/A+12 fl oz/A						
Roundup PM+Dual Magnum+Nortron+Betamix	0.75+1 pt/A+4 fl oz/A+16 fl oz/A	June 9					
Roundup PM+Nortron+Betamix	0.75+4 fl oz/A+24 fl	June 24	99	99	99	99	73
Roundup I WI+I Volution + Betainix	oz/A	June 24	"	"	"	,,,	73
Roundup PM+Warrant	1.125+1.5 qt/A	May 25					
Roundup PM+Warrant	0.75+1  qt/A	June 9					
Roundup PM	0.75	June 24	99	89	99	98	68
Roundup PM+Warrant+Betanex	1.125+1.5 qt/A+12 fl	May 25					
	oz/A						
Roundup PM+Warrant+Betanex	0.75+1  qt/A+16  fl oz/A	June 9					
Roundup PM+Betanex	0.75+24 fl oz/A	June 24	99	94	99	99	72
Roundup PM+Warrant+Nortron+Betamix	1.125+1.5 qt/A+4 fl	May 25					
Roundup PM+Warrant+Nortron+Betamix	oz/A+12 fl oz/A 0.75+1 qt/A+4 fl	June 9					
Roundup I III Waitant (Notition (Detain))	oz/A+16 fl oz/A	June )					
Roundup PM+Nortron+Betamix	0.75+4 fl oz/A+24 fl oz/A	June 24	99	99	99	99	80
Ro-Neet SB (PPI)	5.3 pt/A	May 3					
Roundup PM	3.5 pt/A 1.125	June 9					
Roundup PM	0.75	June 24	99	78	99	99	72
Ro-Neet SB (PPI)	5.3 pt/A	May 3	- //	, 0	- //	- //	, 2
Roundup PM+Betanex	1.125+12 fl oz/A	May 25					
Roundup PM+Betanex	0.75+16  fl oz/A	June 9					
Roundup PM+Betanex	0.75+24 fl oz/A	June 24	99	93	99	99	80
-	Table continued						

Table 4. Ro-Neet followed by POST and Lay-by Herbicides mixed with glyphosate to control glyphosate-resistant waterhemp, Holloway, MN, 2011 (continued)

2011. (continued)							
			(11)	(12)	(13)	(14)	(15)
Ro-Neet SB (PPI)	5.3 pt/A	May 3					
Roundup PM+Betamix+Nortron	1.125+12 fl oz/A+4 fl	May 25					
	oz/A						
Roundup PM+Betamix+Nortron	0.75+16 fl oz/A+4 fl	June 9					
D 1 D/D 1 1	oz/A						=0
Roundup PM+Betamix+Nortron	0.75+24 fl oz/A+4 fl	June 24	99	99	99	99	79
	oz/A						
Ro-Neet SB (PPI)	5.3 pt/A	May 3					
Roundup PM+Outlook	1.125+14 fl oz/A	May 25					
Roundup PM+Outlook	0.75+10  fl oz/A	June 9					
Roundup PM	0.75	June 24	99	93	99	99	92
Ro-Neet SB (PPI)	5.3 pt/A	May 3					
Roundup PM+Outlook+Betanex	1.125+14 fl oz/A+12 fl	May 25					
	oz/A						
Roundup PM+Outlook+Betanex	0.75+10  fl oz/A+16  fl	June 9					
	oz/A						
Roundup PM+Betanex	0.75+24 fl oz/A	June 24	98	92	98	98	98
Ro-Neet SB (PPI)	5.3 pt/A	May 3					
Roundup PM+Nortron+Outlook+Betamix	1.125+4 fl oz/A+14 fl	May 25					
	oz/A+12 fl oz/A						
Roundup PM+Nortron+Outlook+Betamix	0.75+4 fl oz/A+10 fl	June 9					
	oz/A+16 fl oz/A						
Roundup PM+Nortron+Betamix	0.75+4 fl oz/A+24 fl	June 24	99	99	99	99	94
	oz/A						
Ro-Neet SB (PPI)	5.3 pt/A	May 3					
Roundup PM+Dual Magnum	1.125+1.5 pt/A	May 25					
Roundup PM+Dual Magnum	0.75+1  pt/A	June 9					
Roundup PM	0.75	June 24	99	80	99	99	95
Ro-Neet SB (PPI)	5.3 pt/A	May 3					
Roundup PM+Dual Magnum+Betanex	1.125+1.5 pt/A+12 fl	May 25					
	oz/A	y =-					
Roundup PM+Dual Magnum+Betanex	0.75+1 pt/A+16 fl oz/A	June 9					
Roundup PM+Betanex	0.75+24 fl oz/A	June 24	96	89	95	96	96
Ro-Neet SB (PPI)	5.3 pt/A	May 3					
Roundup PM+Dual Magnum+Nortron+Betamix	1.125+1.5 pt/A+4 fl	May 25					
Roundup 1 111 / Buar Wagnam / Trordon / Betanin X	oz/A+12 fl oz/A	111dy 25					
Roundup PM+Dual Magnum+Nortron+Betamix	0.75+1 pt/A+4 fl	June 9					
Roundup 1 111 / Butt Wagnum / Trofton / Bettimix	oz/A+16 fl $oz/A$	June					
Roundup PM+Nortron+Betamix	0.75+4  fl oz/A+24  fl	June 24	99	99	99	99	90
Roundup 1 W1 ( Nortion ) Betannix	oz/A	June 24	,,	//	,,,	,,,	70
Ro-Neet SB (PPI)	5.3 pt/A	May 3					
Roundup PM+Warrant	1.125+1.5 qt/A	May 25					
Roundup PM+Warrant	0.75+1.9  qt/A	June 9					
Roundup PM	0.75+1 qt/A 0.75	June 24	94	82	94	94	84
Ro-Neet SB (PPI)			24	62	24	24	04
	5.3 pt/A	May 3					
Roundup PM+Warrant+Betanex	1.125+1.5  qt/A+12  fl	May 25					
D 1 DM:W (D)	0Z/A						
Roundup PM+Warrant+Betanex	0.75+1  qt/A+16  fl oz/A	June 9	00	02	00	00	02
Roundup PM+Betanex	0.75+24 fl oz/A	June 24	98	93	99	99	93
Ro-Neet SB (PPI)	5.3 pt/A	May 3					
Roundup PM+Warrant+Nortron+Betamix	1.125+1.5 qt/A+4 fl	May 25					
	oz/A+12 fl oz/A						
Roundup PM+Warrant+Nortron+Betamix	0.75+1  qt/A+4  fl	June 9					
	oz/A+16 fl oz/A						
Roundup PM+Nortron+Betamix	0.75+4 fl oz/A+24 fl	June 24	99	98	99	99	98
	oz/A						
LSD (5%)			3	9	3	4	10
lana a							

Experiment continued on next page.

Table 5. Ro-Neet followed by POST and Lay-by Herbicides mixed with glyphosate to control glyphosate-resistant waterhemp, Holloway, MN, 2011. (Stachler)

2011. (Stachler)		Date of	(16) Sept.7 Sgbt	(17) Sept.7 Root	(18) Sept.7 Extract	(19) Sept.7
Treatment <sup>1</sup>	Rate	Applic.	Popl	Yield	Sucrose	Sucrose
Treatment	lb ai/A or lb ae/A	търше.	plts/20'	tons/A	lb/A	%
Untreated Check	-	-	8	0.4	0	0
Roundup PM	1.125	May 25				
Roundup PM	0.75	June 9, 24	47	13.5	3086	13.9
Roundup PM+Betanex	1.125+12 fl oz/A	May 25				
Roundup PM+Betanex	0.75+16 fl oz/A	June 9				
Roundup PM+Betanex	0.75+24 fl oz/A	June 24	47	12.6	3028	13.7
Roundup PM+Betamix+Nortron	1.125+12 fl oz/A+4 fl oz/A	May 25				
Roundup PM+Betamix+Nortron	0.75+16  fl oz/A + 4  fl oz/A	June 9				
Roundup PM+Betamix+Nortron	0.75+24 fl oz/A+4 fl oz/A	June 24	51	10.9	2637	12.1
Roundup PM+Outlook	1.125+14 fl oz/A	May 25				
Roundup PM+Outlook	0.75+10 fl oz/A 0.75	June 9	50	13.0	3072	13.0
Roundup PM Roundup PM+Outlook+Betanex	1.125+14 fl oz/A+12 fl oz/A	June 24 May 25	50	13.0	3072	13.0
Roundup PM+Outlook+Betanex	0.75+10 fl oz/A+16 fl oz/A	June 9				
Roundup PM+Betanex	0.75+10  if  02/A+10  if  02/A 0.75+24  fl  0z/A	June 24	52	15.1	3383	13.6
Roundup PM+Nortron+Outlook+Betamix	1.125+4 fl oz/A+14 fl	May 25	32	13.1	3363	13.0
Roundup PM+Nortron+Outlook+Betamix	oz/A+12 fl oz/A 0.75+4 fl oz/A+10 fl oz/A+16	June 9				
	fl oz/A		40	445	2252	
Roundup PM+Nortron+Betamix	0.75+4 fl oz/A+24 fl oz/A	June 24	49	14.7	3353	14.4
Roundup PM+Dual Magnum	1.125+1.5 pt/A	May 25				
Roundup PM+Dual Magnum Roundup PM	0.75+1 pt/A 0.75	June 9 June 24	50	14.2	3257	13.2
Roundup PM+Dual Magnum+Betanex	1.125+1.5 pt/A+12 fl oz/A	May 25	30	14.2	3231	13.2
Roundup PM+Dual Magnum+Betanex	0.75+1 pt/A+16 fl oz/A	June 9				
Roundup PM+Betanex	0.75+1  pt/A+10  H oz/A 0.75+24  fl oz/A	June 24	50	14.4	3296	14.1
Roundup PM+Dual Magnum+Nortron+Betamix	1.125+1.5 pt/A+4 fl oz/A+12	May 25			0270	
Roundup PM+Dual Magnum+Nortron+Betamix	fl oz/A 0.75+1 pt/A+4 fl oz/A+16 fl	June 9				
Downdry DM   Northon   Dotomiy	oz/A	June 24	51	14.2	3237	1.4.4
Roundup PM+Nortron+Betamix Roundup PM+Warrant	0.75+4 fl oz/A+24 fl oz/A 1.125+1.5 qt/A	June 24 May 25	31	14.2	3231	14.4
Roundup PM+Warrant	0.75+1  qt/A	June 9				
Roundup PM	0.75 0.75	June 24	53	16.3	3890	15.2
Roundup PM+Warrant+Betanex	1.125+1.5 qt/A+12 fl oz/A	May 25		10.5	2070	10.2
Roundup PM+Warrant+Betanex	0.75+1  qt/A+16  fl oz/A	June 9				
Roundup PM+Betanex	0.75 + 24  fl oz/A	June 24	55	15.1	3431	14.7
Roundup PM+Warrant+Nortron+Betamix	1.125+1.5 qt/A+4 fl oz/A+12 fl oz/A	May 25				
Roundup PM+Warrant+Nortron+Betamix	0.75+1  qt/A+4  fl oz/A+16  fl oz/A	June 9				
Roundup PM+Nortron+Betamix	0.75+4 fl oz/A+24 fl oz/A	June 24	57	14.3	3278	15.2
Ro-Neet SB (PPI)	5.3 pt/A	May 3				
Roundup PM	1.125	June 9	£1	10.7	2000	116
Roundup PM	0.75	June 24	51	12.7	2999	14.6
Ro-Neet SB (PPI) Roundup PM+Betanex	5.3 pt/A 1.125+12 fl oz/A	May 3 May 25				
Roundup PM+Betanex	0.75+16 fl oz/A	June 9				
Roundup PM+Betanex	0.75+10  H oz/A 0.75+24  fl oz/A	June 24	44	12.6	3007	14.9
Ro-Neet SB (PPI)	5.3 pt/A	May 3	17	12.0	5001	17./
Roundup PM+Betamix+Nortron	1.125+12 fl oz/A+4 fl oz/A	May 25				
Roundup PM+Betamix+Nortron	0.75+16 fl oz/A+4 fl oz/A	June 9				
Roundup PM+Betamix+Nortron	0.75+24  fl oz/A+4  fl oz/A	June 24	46	16.3	3969	15.2
Ro-Neet SB (PPI)	5.3 pt/A	May 3	-			
Roundup PM+Outlook	1.125+14 fl oz/A	May 25				
Roundup PM+Outlook	0.75+10 fl oz/A	June 9				
Roundup PM	0.75	June 24	56	14.7	3501	15.7

Table 5. Ro-Neet followed by POST and Lay-by Herbicides mixed with glyphosate to control glyphosate-resistant waterhemp, Holloway, MN, 2011. (continued)

2011. (continued)						
			<u>(16)</u>	<u>(17)</u>	<u>(18)</u>	<u>(19)</u>
Ro-Neet SB (PPI)	5.3 pt/A	May 3				
Roundup PM+Outlook+Betanex	1.125+14 fl oz/A+12 fl oz/A	May 25				
Roundup PM+Outlook+Betanex	0.75+10 fl oz/A+16 fl oz/A	June 9				
Roundup PM+Betanex	0.75+24 fl oz/A	June 24	51	14.8	3480	14.9
Ro-Neet SB (PPI)	5.3 pt/A	May 3				
Roundup PM+Nortron+Outlook+Betamix	1.125+4 fl oz/A+14 fl	May 25				
	oz/A+12 fl oz/A					
Roundup PM+Nortron+Outlook+Betamix	0.75+4  fl oz/A+10  fl	June 9				
	oz/A+16 fl oz/A					
Roundup PM+Nortron+Betamix	0.75+4 fl oz/A+24 fl oz/A	June 24	53	14.2	3337	14.9
Ro-Neet SB (PPI)	5.3 pt/A	May 3				
Roundup PM+Dual Magnum	1.125+1.5 pt/A	May 25				
Roundup PM+Dual Magnum	0.75+1  pt/A	June 9				
Roundup PM	0.75	June 24	46	13.4	3203	15.4
Ro-Neet SB (PPI)	5.3 pt/A	May 3				
Roundup PM+Dual Magnum+Betanex	1.125+1.5 pt/A+12 fl oz/A	May 25				
Roundup PM+Dual Magnum+Betanex	0.75+1  pt/A+16  fl oz/A	June 9				
Roundup PM+Betanex	0.75 + 24  fl oz/A	June 24	51	14.5	3379	13.8
Ro-Neet SB (PPI)	5.3 pt/A	May 3				
Roundup PM+Dual Magnum+Nortron+Betamix	1.125+1.5 pt/A+4 fl	May 25				
	oz/A+12 fl $oz/A$	•				
Roundup PM+Dual Magnum+Nortron+Betamix	0.75+1 pt/A+4 fl oz/A+16 fl	June 9				
	oz/A					
Roundup PM+Nortron+Betamix	0.75+4 fl oz/A+24 fl oz/A	June 24	55	14.1	3352	14.0
Ro-Neet SB (PPI)	5.3 pt/A	May 3				
Roundup PM+Warrant	1.125 + 1.5  qt/A	May 25				
Roundup PM+Warrant	0.75+1  qt/A	June 9				
Roundup PM	0.75	June 24	57	15.3	3491	14.4
Ro-Neet SB (PPI)	5.3 pt/A	May 3				
Roundup PM+Warrant+Betanex	1.125+1.5 qt/A+12 fl oz/A	May 25				
Roundup PM+Warrant+Betanex	0.75+1  qt/A+16  fl oz/A	June 9				
Roundup PM+Betanex	0.75 + 24  fl oz/A	June 24	50	12.8	2958	13.9
Ro-Neet SB (PPI)	5.3 pt/A	May 3				
Roundup PM+Warrant+Nortron+Betamix	1.125+1.5 qt/A+4 fl	May 25				
	oz/A+12 fl oz/A	,				
Roundup PM+Warrant+Nortron+Betamix	0.75+1 qt/A+4 fl oz/A+16 fl	June 9				
	oz/A					
Roundup PM+Nortron+Betamix	0.75+4 fl oz/A+24 fl oz/A	June 24	53	14.0	3239	13.9
LSD (5%)			10	3.4	813	2.4

### **Summary**

Significant sugarbeet injury was caused by Ro-Neet due to the soil being sandier than most soils in the area. Significant sugarbeet injury persisted during the growing season, especially treatments containing Ro-Neet followed by a layby herbicide mixed with Betamix plus Nortron or Betanex, however sugarbeet yield was not different for most treatments.

Roundup PowerMAX applied three times controlled 93 to 99% of wild buckwheat, common lambsquarters, and annual grass on July 20, but only controlled 51% of waterhemp on August 24, indicating the presence of glyphosate-resistant waterhemp at this location. Treatments containing Ro-Neet followed by Betamix plus Nortron or Betanex plus a lay-by herbicide controlled the most waterhemp.