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PPI and PRE Herbicides Followed by Glyphosate to Control Glyphosate-Resistant Waterhemp in Roundup Ready® Sugarbeet - Holloway, MN - 2012 (Stachler). A seedbed was prepared using an 11-foot Kongskilde S-tine field cultivator equipped with rolling baskets. Glyphosate-resistant waterhemp from Swift County, ND was spread and shallowly incorporated on April 24. 'Hilleshog 4022 RR' sugarbeet was seeded 1.25 inches deep in 22-inch rows at 60,825 seeds/A on April 25. Sugarbeet was treated with Tachigaren and Poncho Beta at 45 grams and 5.07 fl oz of product, respectively, per 100,000 seeds. Counter 20G insecticide was applied at 8.9 pounds/A in a 5-inch band and incorporated with a drag chain at planting. Herbicide treatments were applied April 24, 25, May 14, 22, June 4, 27. All treatments were applied with a bicycle sprayer in 17 gpa spray solution through 8002 XR flat fan nozzles pressurized with  $CO_2$  at 40 psi to the center four rows of six row plots 30 feet in length. Preplant-incorporated treatments were incorporated 2 inches deep with an 8-foot 'S-tine' field cultivator equipped with rolling baskets. Quadris was applied in-furrow at 9.2 fl oz/A and broadcast at 16 fl oz/A April 25 and June 1, respectively to control Rhizoctonia root rot. Cercospora leaf spot was controlled with Topsin + Proline at 7.6 + 5 fl oz/A, Headline at 9 fl oz/A, and Inspire XT at 7 fl oz/A broadcast July 2, July 19, and August 14, respectively. Sugarbeet was harvested September 10 from the center two rows of each plot and weighed. Twenty to thirty pounds of sugarbeet roots were collected from each plot and analyzed for quality at American Crystal Sugar Quality Lab, East Grand Forks, MN.

Sugarbeet stand was counted in the center two rows of plots on May 30, July 31, and September 10. Sugarbeet injury was evaluated on June 4, 27, July 12, August 7, and September 10. Waterhemp control was evaluated on June 4, 27, July 12, August 7, and September 10. All evaluations were a visual estimate of percent fresh weight reduction in the four treated rows compared to the adjacent untreated strip. Experimental design was randomized complete block with 4 replications. Data were analyzed with the ANOVA procedure of Agriculture Research Manager, version 8.4.2 software package.

Application code	A (PPI)	B (PRE)	X (V1)	Y (V2 sgrbt)	C (13 DAT Y)	D (23 DAT C)
Date	April 24	April 25	May 14	May 22	June 4	June 27
Time of Day	3:00 P	7:00 P	12:00 P	2:30 P	2:30 P	12:00 P
Air Temperature (F)	76	76	89	88	84	81
Relative Humidity (%)	36	28	20	30	26	64
Wind Velocity (mph)	3	4	8	15	13	1
Wind Direction	ENE	E	WSW	S	N	SE
Soil Temp. (F at 6")	57	60	65	70	64	70
Soil Moisture	Good	Good	Fair	Good	Good	Wet
Cloud Cover	20	50	20	60	40	20
Sugarbeet stage (avg)	PPI	PRE	V1 (cot.)	V2.4 (2-3 lf)	V7 (7 lf)	V20 (20 lf)
Wahe height (avg/range) – Trt. 2	-	-	-	· –	1.43"/0.12-7"	3.3"/0.12-16"
Wahe density (plants/m <sup>2</sup> ) – Trt. 2	-	-	-	_	119.3	25.3
Wahe height (avg/range) – Trt. 13	-	-	-	-	0.63"/0.12-2.8"	
Wahe density (plants/m <sup>2</sup> ) – Trt. 13	-	·· _	-	-	3.5	0
Wahe height (avg/range) – Trt. 18	-	-	-	-	0.52"/0.12-2"	1.5"/0.12-5.3"
Wahe density (plants/m <sup>2</sup> ) – Trt. 18	-	-	-	_	12.5	1.8

#### **Table 1. Application Information**

**Summary:** At the time of the first POST glyphosate application, June 4, all treatments containing Ro-Neet applied PPI controlled more waterhemp than applied PRE. Nortron and Warrant applied PRE controlled more waterhemp on June 4 than applied PPI. On June 4, Dual Magnum controlled waterhemp similarly regardless of application method. Nortron applied PRE controlled more waterhemp than any other soil-applied herbicide on June 4. Roundup PowerMAX (glyphosate) controlled only 68% of waterhemp on September 10, indicating the presence of glyphosate-resistant waterhemp at this location. On September 10, all treatments improved the control of waterhemp after two glyphosate applications, although very little for some and significantly for others. No treatment caused a loss of sugarbeet root yield or extractable sucrose, except the non-treated check.

					· Jun	e 4			Septen	nber 10		:
	Treatment		Rate	Appl	Wahe <sup>2</sup>	Sgbt	Wahe	Sgbt	Sgbt	Sgbt	Sgbt	Sgbt
No.	Name <sup>1</sup>	Rate	Unit	Code	Cntl	Inju	Cntl	Inju	Stand	Yield	Sucr	Ext. Su
							-%	No all the cost per per per cos	#/100'	ton/A	%	lb/A
1	Non-treatedChee	ck			0	0	0	0	186	19.1	18.2	6355
2	PowerMax	1.125	i lb ae/a	С	0	0	68	0	196	29.0	18.5	9739
	N-Pak AMS	2.5	% v/v	CD								
	PowerMax	0.75	lb ae/a	D								
3	Ro-Neet	5.33	pt/a	Α	76	11	94	0	206	31.0	18.6	10475
	PowerMax	1.125	i lb ae/a	С								
	N-Pak AMS	2.5	% v/v	C D								1
	PowerMax	0.75	lb ae/a	D								
1	Ro-Neet SB	5.33	pt/a	А	75	12	80	1	204	28.9	18.6	9812
	PowerMax	1.125	i lb ae/a	С								1
	N-Pak AMS	2.5	% v/v	CD								
	PowerMax	0.75	lb ae/a	D								
5	Ro-Neet	5.33	pt/a	В	33	4	82	0	208	29.0	18.7	9820
	PowerMax	1.125	i lb ae/a	С								
	N-Pak AMS	2.5	% v/v	C D								
	PowerMax	0.75	lb ae/a	D								
5	Ro-Neet SB	5.33	pt/a	В	40	7	95	0	188	29.6	18.0	9649
	PowerMax	1.125	i lb ae/a	С								
	N-Pak AMS	2.5	% v/v	CD								1
	PowerMax	0.75	lb ae/a	D								
7	Ro-Neet	5.33	pt/a	A	75	8	88	0	191	28.7	18.8	9773
	PowerMax	1.125	i lb ae/a	С								
	Outlook	21	fl oz/a	С								
	N-Pak AMS	2.5	% v/v	C D								-
	PowerMax	0.75	lb ae/a	D								I
8	Ro-Neet	5.33	pt/a	В	35	5	94	1	204	29.2	18.9	9998
	PowerMax	1.125	lb ae/a	С								
	Outlook	21	fl oz/a	С								
	N-Pak AMS	2.5	% v/v	C D	*							4
	PowerMax	0.75	lb ae/a	D								
<del>)</del>	Ro-Neet	5.33	pt/a	Α	75	9	89	0	198	28.1	18.9	9595
	PowerMax	1.125	lb ae/a	С								
	Warrant	1.5	qt/a	С								
	N-Pak AMS	2.5	% v/v	C D								
	PowerMax	0.75	lb ae/a	D								1
10	Ro-Neet	5.33	pt/a	В	45	6	89	0	204	30.3	18.5	10214
	PowerMax	1.125	lb ae/a	С								4
	Warrant	1.5	qt/a	С								2
	N-Pak AMS	2.5	% v/v	CD								
	PowerMax	0.75	lb ae/a	D								
1	Ro-Neet	2.33	pt/a	A	87	13	91	0	187	28.1	18.6	9488
	Eptam	2.3	pt/a	А								
	PowerMax		lb ae/a	С								1
	N-Pak AMS	2.5	% v/v	CD								

Table 2. PPI and PRE herbicides followed by glyphosate to control glyphosate-resistant waterhemp in Roundup Ready® sugarbeet – Holloway, MN – 2012 (Stachler).

					Jun	e 4			Septen	nber 10		
Trt	Treatment		Rate	Appl	Wahe <sup>2</sup>	Sgbt	Wahe	Sgbt	Sgbt	Sgbt	Sgbt	Sgbt
No.	Name <sup>1</sup>	Rate	Unit	Code	Cntl	Inju	Cntl	Inju	Stand	Yield	Sucr	Ext. Suc
							-%		#/100'	ton/A	%	lb/A
12	Ro-Neet	2.33	pt/a	В	55	8	81	1	185	29.3	17.9	9463
	Eptam	2.3	pt/a	В								
	PowerMax	1.125	lb ae/a	С								
	N-Pak AMS	2.5	% v/v	C D								1
	PowerMax	0.75	lb ae/a	D								
13	Nortron	7.5	pt/a	А	83	9	99	0	184	28.5	18.9	9856
	PowerMax	1.125	lb ae/a	С								-
	N-Pak AMS	2.5	% v/v	CD								
	PowerMax	0.75	lb ae/a	D								
14	Nortron	7.5	pt/a	В	93	13	99	1	208	29.0	18.8	9894
	PowerMax	1.125	lb ae/a	С								
	N-Pak AMS	2.5	% v/v	CD								7
	PowerMax	0.75	lb ae/a	D								4
15	Dual Magnum	1.5	pt/a	A	84	11	94	0	202	29.3	18.3	9768
	PowerMax	1.125	lb ae/a	С								
	N-Pak AMS	2.5	% v/v	CD								
	PowerMax	0.75	lb ae/a	D								
16	Dual Magnum	1.5	pt/a	В	80	7	87	0	188	29.2	18.3	9671
	PowerMax	1.125	lb ae/a	С								
	N-Pak AMS	2.5	% v/v	CD								
	PowerMax	0.75	lb ae/a	D								
17	Warrant	1.5	qt/a	A	65	4	. 84	0	174	27.7	18.5	9362
	PowerMax	1.125	lb ae/a	С								
	N-Pak AMS	2.5	% v/v	CD								
	PowerMax	0.75	lb ae/a	D								
18	Warrant	1.5	qt/a	В	80	6	94	0	209	29.9	18.9	10262
	PowerMax	1.125	lb ae/a	С								
	N-Pak AMS	2.5	% v/v	CD								
	PowerMax	0.75	lb ae/a	D			•					
19	Weed-free Check	κ.			100	0	94	1	197	28.0	18.5	9430
	PowerMax		lb ae/a	Х								
	PowerMax	0.75	lb ae/a	YCD								
	R-11	0.25	% v/v	XYCD								
	N-Pak AMS	2.5	% v/v	XYCD								
		LSD 5%	6		6.1	4.0	15.8	NS	NS	4.0	NS	1401
		CV %	6		7	42	11	345	10	8	2	9

 Table 2. PPI and PRE herbicides followed by glyphosate to control glyphosate-resistant waterhemp in Roundup

 Ready® sugarbeet – Holloway, MN – 2012 (Stachler).

<sup>1</sup>PowerMax = Roundup PowerMAX; N-Pak AMS = liquid AMS at 3.4 lbs dry AMS/gal of product from Winfield Solutions; R-11 = a NIS from Wilbur-Ellis.

<sup>2</sup>Wahe = Glyphosate-resistant waterhemp.

 $E_{M}^{i}$  :

**PPI. POST. and Lay-by Herbicides with Glyphosate to Control Glyphosate-Resistant Waterhemp in Roundup Ready® Sugarbeet – Moorhead, MN – 2012** (Stachler). A seedbed was prepared using an 11-foot Kongskilde S-tine field cultivator equipped with rolling baskets. Glyphosate-resistant waterhemp from Richland County, ND was spread on May 11. Due to exceptionally dry conditions, sugarbeet was not seeded until May 25. 'Hilleshog 4022 RR' sugarbeet was seeded 1.25 inches deep in 22-inch rows at 60,825 seeds/A. Sugarbeet was treated with Tachigaren and Poncho Beta at 45 grams and 5.07 fl oz of product, respectively, per 100,000 seeds. Counter 20G insecticide was applied at 8.9 pounds/A in a 5-inch band and drag chain incorporated at planting. Herbicide treatments were applied May 25, June 8, 15, 28, and July 12. All treatments were applied with a bicycle sprayer in 17 gpa spray solution through 8002 XR flat fan nozzles pressurized with CO<sub>2</sub> at 40 psi to the center four rows of six row plots 30 feet in length. Preplant-incorporated treatments were incorporated 2 inches deep with an 8-foot John Deere 'S-tine' field cultivator equipped with a spring tooth harrow. Quadris was broadcast at 16 fl oz/A June 12 & 26 to control Rhizoctonia root rot. Cercospora leaf spot was controlled with Headline at 9 fl oz/A and Inspire XT at 7 fl oz/A broadcast July 18 and August 7, respectively. Sugarbeet was harvested September 20 from the center two rows of each plot and weighed. Twenty to thirty pounds of sugarbeet roots were collected from each plot and analyzed for quality at American Crystal Sugar Quality Lab, East Grand Forks, MN.

Sugarbeet stand was counted in the center two rows of plots on June 28, July 19, and September 20. Sugarbeet injury was evaluated on June 15, 30, July 5, 13, 16, 25, and August 9. Waterhemp, common lambsquarters, and redroot pigweed control was evaluated on June 15, 30, July 13, 25, and August 9, 29. All evaluations were a visual estimate of percent fresh weight reduction in the four treated rows compared to the adjacent untreated strip. Experimental design was randomized complete block with 4 replications. Data were analyzed with the ANOVA procedure of Agriculture Research Manager, version 8.4.2 software package.

Application code	A (PPI)	X (V1)	B (V2 sgrbt)	C (13 DAT B)	D (14 DAT C)
Date	May 25	June 8	June 15	June 28	July 12
Time of Day	11:30 A	9:30 A	9:30 A	1:15 P	11:30 P
Air Temperature (F)	62	70	79	84	81
Relative Humidity (%)	41	55	47	23	59
Wind Velocity (mph)	4	10	5	6	6
Wind Direction	W	WNW	ENE	NW	SSE
Soil Temp. (F at 6")	50	70	68	70	79
Soil Moisture	Good	Fair	Good	Fair	Dry
Cloud Cover	80	10	15	5	25
Sugarbeet stage (avg)	PPI	V1 (cot.)	V2.4 (2-3 lf)	V7 (7 lf)	V12 (11 lf)
Wahe height (avg/range) – Trt. 2	_	-	0.3"/0.12-1"	1"/0.12-3"	3.8"/0.3-7"
Wahe density (plants/m <sup>2</sup> ) – Trt. 2	-	-	15.75	10.5	5
Wahe height (avg/range) – Trt. 14	-	-	0.25"/0.12-0.5"	0.67"/ N/A	-
Wahe density (plants/m <sup>2</sup> ) – Trt. 14	-	-	2.75	0.25	0
Colq density (plants/m <sup>2</sup> ) – Trt. 2	-	-	39	7.25	0.5
Rrpw density (plants/m <sup>2</sup> ) – Trt. 2	-	-	9	13.3	0

# Table 1. Application Information

Table 2. PPI, POST, and lay-by herbicides with glyphosate to control glyphosate-resistant waterhemp in Roundup Ready® sugarbeet – Moorhead, MN – 2012 (Stachler).

Trt	Treatment	Rate	Appl		June 15			Jul	y 13		Aug. 9		Aug. 29	ĩ
No	. Name <sup>1</sup>	Rate Unit	Code	Wahe <sup>2</sup>	Colq	Rrpw	Wahe	Colq	Rrpw	Cano <sup>3</sup>	Wahe	Wahe	Colq	Rrpw
									% Cont	trol				
1	Non-trt Check			0	0	0	0	0	0	0	0	0	0	0
2	RU P.Max	1.125 lb ae/a	В	0	0	0	71	99	99	11	69	62	99	99
	Destiny HC	1.5 pt/a	BCD							8) :r:				
	N-Pak AMS	2.5 % v/v	BCD											i
	RU P.Max	0.75 lb ae/a	CD											

-	ady® sugarbee													
	Treatment	Rate	Appl		June 15			Contraction of the local data	y 13		Aug. 9		Aug. 29	
No	. Name <sup>1</sup>	Rate Unit	Code	Wahe <sup>2</sup>	Colq	Rrpw	Wahe			Cano <sup>3</sup>	Wahe	Wahe	Colq	Rrpw
			_						% Con					
3	Betanex	12 fl oz/a	В	0		0	71	99	99	48	69	60	99	99
	RU P.Max	1.125 lb ae/a	В											:
	Destiny HC	1.5 pt/a	BCD											
	N-Pak AMS	2.5 % v/v	BCD											
	Betanex	16 fl oz/a	C											
	Betanex	24 fl oz/a	D											1
<u> </u>	RU P.Max	0.75 lb ae/a	CD	-										
4	Betamix	12 fl oz/a	B	0	0	0	72	99	99	56	71	60	99	99
	Nortron	4 fl oz/a	BCD											
	RU P.Max	1.125 lb ae/a	В											-
	Destiny HC	1.5 pt/a	BCD											
	N-Pak AMS	2.5 % v/v	BCD											
	Betamix	16 fl oz/a	C											
	Betamix	24 fl oz/a	D											
	RU P.Max	0.75 lb ae/a	CD								~ ~ ~			
5	Outlook	14 fl oz/a	В	0	0	0	84	99	99	19	80	72	99	99
	RU P.Max	1.125 lb ae/a	В											
	Destiny HC	1.5 pt/a	BCD											
	N-Pak AMS	2.5 % v/v	BCD											
	Outlook	10 fl oz/a	С											
	RU P.Max	0.75 lb ae/a	CD											
6	Betanex	12 fl oz/a	В	0	0	0	76	99	99	61	74	66	99	99
	Outlook	14 fl oz/a	В											ġ.
	RU P.Max	1.125 lb ae/a	B											-
	Destiny HC	1.5 pt/a	BCD											4
	N-Pak AMS	2.5 % v/v	BCD											-
	Betanex	16 fl oz/a	C											
	Outlook	10  fl oz/a	C											1
	Betanex	24 fl oz/a	D											
	RU P.Max	0.75 lb ae/a	CD				<u> </u>				0.2			
7	Betamix	12 fl oz/a	B	0	0	0	86	99	99	54	82	74	99	99
	Nortron	4 fl oz/a	BCD											4
	Outlook	14 fl oz/a	B											j
	RU P.Max	1.125 lb ae/a	B											4
	Destiny HC	1.5 pt/a	BCD											
	N-Pak AMS	2.5 % v/v	BCD											
	Betamix	16 fl oz/a	C											4
	Outlook	10 fl oz/a	C											
	Betamix	24 fl oz/a	D											-
	RU P.Max	0.75 lb ae/a	CD				<b>6 -</b>							
8	Dual Magnum		В	0	0	0	85	99	99	14	80	69	99	99
	RU P.Max	1.125 lb ae/a												
	Destiny HC	1.5 pt/a	BCD											
	N-Pak AMS	2.5 % v/v	BCD											
	Dual Magnum		C											
	RU P.Max	0.75 lb ae/a	CD											

Table 2. PPI, POST, and lay-by herbicides with glyphosate to control glyphosate-resistant waterhemp in Roundup Ready® sugarbeet – Moorhead, MN – 2012 (Stachler).

	ady® sugarbee											-		i
	Treatment	Rate	Appl		June 15				y 13		Aug. 9		Aug. 29	
No	. Name <sup>1</sup>	Rate Unit	Code	Wahe <sup>2</sup>	Colq	Rrpw	Wahe			Cano <sup>3</sup>	Wahe	Wahe	Colq	Rrpw
			_						% Con					
9	Betanex	12 fl oz/a	В	0	0	0	73	99	99	47	70	60	99	99
	Dual Magnum		В											
	RU P.Max	1.125 lb ae/a	В											
	Destiny HC	1.5 pt/a	BCD											
	N-Pak AMS	2.5 % v/v	BCD											
	Betanex	16 fl oz/a	C											
	Dual Magnum	1 pt/a	C											
	Betanex	24 fl oz/a	D											
10	RU P.Max	$\frac{0.75 \text{ lb ae/a}}{10.75 \text{ lb } \text{ ae/a}}$	CD	0		0	0.1		00			(0		99
10	Betamix	12 fl oz/a	B	0	0	0	81	99	99	37	77	69	99	99
	Nortron	4 fl oz/a	BCD											
	Dual Magnum		В											
	RU P.Max	1.125 lb ae/a	B											
	Destiny HC	1.5  pt/a	BCD											
	N-Pak AMS	2.5% v/v	BCD											1
	Betamix	16 fl oz/a	C											
	Dual Magnum		C											1
	Betamix	24 fl oz/a	D											
11	RU P.Max	0.75  lb ae/a	CD	0	0	0	84	99	99	14	81	68	99	99
11	Warrant	1.5 qt/a	B	0	0	0	84	99	99	14	01	00	99	99
	RU P.Max	1.125 lb ae/a	B											
	Destiny HC	1.5  pt/a	BCD											
	N-Pak AMS	2.5% v/v	BCD											
	Warrant RU P.Max	1 qt/a 0.75 lb ae/a	C CD											
12	Betanex	$\frac{0.73 \text{ fb ae/a}}{12 \text{ fl oz/a}}$	<u> </u>	0	0	0	81	99	- 99	54	79	68	99	99
14	Warrant	1.5 qt/a	B	0	U	0	01	""	""	74	19	00		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
	RU P.Max	1.3  q/a 1.125 lb ae/a	B											
	Destiny HC	1.125 10 ae/a 1.5 pt/a	BCD											
	N-Pak AMS	2.5% v/v	BCD											
	Betanex	16 fl oz/a	C											1
	Warrant	1 qt/a	c											
	Betanex	24  fl oz/a	D											
	RU P.Max	0.75  lb ae/a	CD											
13	Betamix	$\frac{0.75 \text{ fb ac/a}}{12 \text{ fl oz/a}}$	<u> </u>	0	0	0	87	99	99	67	83	74	99	99
15	Nortron	4  fl oz/a	BCD	v	v	v		,,	//	57	55	<i>,</i> .		-
	Warrant	1.5 qt/a	B											
	RU P.Max	1.5  qua 1.125 lb ae/a	B											
	Destiny HC	1.125 10 ac/a 1.5 pt/a	BCD											
	N-Pak AMS	2.5% v/v	BCD											
	Betamix	16  fl oz/a	C											
	Warrant	1 qt/a	č											
	Betamix	24  fl oz/a	Ď											
	RU P.Max	0.75  lb ae/a												
14	Ro-Neet SB	5.3 pt/a	A	82	82	76	98	99	99	19	99	99	99	99
т-т	RU P.Max	1.125  lb  ae/a			52	, ,	20							
	Destiny HC	1.125 to do/d 1.5 pt/a	BCD											1
	N-Pak AMS	2.5% v/v	BCD											
	RU P.Max	0.75  lb ae/a												
	10011000	01, 0 10 av/a												

Table 2. PPI, POST, and lay-by herbicides with glyphosate to control glyphosate-resistant waterhemp in Roundup Ready® sugarbeet – Moorhead, MN – 2012 (Stachler).

Re	ady® sugarbee	et – Moorhead	I, MN -	- 2012 (S	Stachler	;).						~		
	Treatment	Rate	Appl		June 15				y 13		Aug. 9		Aug. 29	
No	. Name <sup>1</sup>	Rate Unit	Code	Wahe <sup>2</sup>	Colq	Rrpw	Wahe	Colq	Rrpw		Wahe	Wahe	Colq	Rrpw
									% Con					
15	Ro-Neet SB	5.3 pt/a	Α	85	81	79	98	99	99	75	99	96	99	99
	Betanex	12 fl oz/a	в											
	RU P.Max	1.125 lb ae/a	в											
	Destiny HC	1.5 pt/a	BCD											
	N-Pak AMS	2.5 % v/v	BCD											
	Betanex	16 fl oz/a	С											
	Betanex	24 fl oz/a	D											
	RU P.Max	0.75 lb ae/a	CD											
16	Ro-Neet SB	5.3 pt/a	A	86	80	76	98	99	99	72	98	96	99	99
	Betamix	12 fl oz/a	В											
	Nortron	4 fl oz/a	BCD											1
	RU P.Max	1.125 lb ae/a	В											
	Destiny HC	1.5 pt/a	BCD											
	N-Pak AMS	2.5 % v/v	BCD											
	Betamix	16 fl oz/a	С											
	Betamix	24 fl oz/a	D											
	RU P.Max	0.75 lb ae/a	CD											
17	Ro-Neet SB	5.3 pt/a	Α	87	81	77	99	99	99	21	98	98	99	99
	Outlook	14 fl oz/a	в											
	RU P.Max	1.125 lb ae/a	В											4
	Destiny HC	1.5 pt/a	BCD											
	N-Pak AMS	2.5 % v/v	BCD											
	Outlook	10 fl oz/a	С											
	RU P.Max	0.75 lb ae/a	CD											1
18	Ro-Neet SB	5.3 pt/a	А	86	82	76	99	99	99	44	99	98	99	99
	Betanex	12 fl oz/a	В											
	Outlook	14 fl oz/a	В											à
	RU P.Max	1.125 lb ae/a	В											
	Destiny HC	1.5 pt/a	BCD											
	N-Pak AMS	2.5 % v/v	BCD											1
	Betanex	16 fl oz/a	С											
	Outlook	10 fl oz/a	С											
	Betanex	24 fl oz/a	D											- -
	RU P.Max	0.75 lb ae/a	CD											
19	Ro-Neet SB	5.3 pt/a	A	87	80	78	99	99	99	68	99	97	99	99
	Betamix	12 fl oz/a	в											
	Nortron	4 fl oz/a												
	Outlook	14 fl oz/a	В											1
	RU P.Max	1.125 lb ae/a	B											-i
	Destiny HC	1.5 pt/a	BCD											
	N-Pak AMS	2.5% v/v	BCD											
	Betamix	16  fl oz/a	C											
	Outlook	10  fl oz/a	č											1
	Betamix	24  fl oz/a	D											
	RU P.Max	0.75  lb ae/a												
$\overline{20}$	Ro-Neet SB	5.3 pt/a	A	88	82	78	98	99	- 99	17	- 99	99	99	99
20	Dual Magnum		B	50	52	70	20	//		17	//			1.1
	RU P.Max	1.125 lb ae/a												
	Destiny HC	1.125 to ac/a 1.5 pt/a	BCD											
	N-Pak AMS	2.5% v/v	BCD											
	Dual Magnum		C											
	RU P.Max	0.75  lb ae/a	CD											
	ICO I HVIAA	0.75 10 av/a												

Table 2. PPI, POST, and lay-by herbicides with glyphosate to control glyphosate-resistant waterhemp in Roundup Ready® sugarbeet – Moorhead, MN – 2012 (Stachler).

Re	ady® sugarbee	t – Moorhead	I, <u>MN</u> -	<u>- 2012 (</u> S	stachler	·).								
	Treatment	Rate	Appl		June 15				y 13		Aug. 9		Aug. 29	:
No	. Name <sup>1</sup>	Rate Unit	Code	Wahe <sup>2</sup>	Colq	Rrpw	Wahe	Colq	Rrpw	Cano <sup>3</sup>	Wahe	Wahe	Colq	Rrpw
									% Con					
21	Ro-Neet SB	5.3 pt/a	Α	86	81	78	97	99	99	59	97	96	99	99
	Betanex	12 fl oz/a	В											
	Dual Magnum	1.5 pt/a	В											
	RU P.Max	1.125 lb ae/a	В											d.
	Destiny HC	1.5 pt/a	BCD											
	N-Pak AMS	2.5 % v/v	BCD											
	Betanex	16 fl oz/a	С											
	Dual Magnum	1 pt/a	С											-
	Betanex	24 fl oz/a	D											
	RU P.Max	0.75 lb ae/a	CD											į
22	Ro-Neet SB	5.3 pt/a	Α	86	82	78	99	99	99	44	98	95	99	99
	Betamix	12 fl oz/a	В											
	Nortron	4 fl oz/a	BCD											
	Dual Magnum	1.5 pt/a	В											
	RU P.Max	1.125  lb ae/a	В											
	Destiny HC	1.5  pt/a	BCD											
	N-Pak AMS	2.5% v/v	BCD											
	Betamix	16  fl oz/a	C											
	Dual Magnum	1 pt/a	č											:
	Betamix	24  fl oz/a	D											
	RU P.Max	0.75  lb ae/a	CD											
23	Ro-Neet SB	5.3 pt/a	A	87	81	77	99	99	99	11	99	98	99	99
25	Warrant	1.5 qt/a	B	07	01	,,			,,	11		20	,,,	1
	RU P.Max	1.125  lb ae/a	B											
	Destiny HC	1.5 pt/a	BCD											
	N-Pak AMS	2.5% v/v	BCD											
	Warrant	2.3 /6 v/v 1 qt/a	C											1) 1
	RU P.Max	0.75  lb ae/a	CD											1
24	Ro-Neet SB	5.3 pt/a	A	88	82	78	99	99	99	55	99	99	99	99
24	Betanex	$12 \mathrm{fl} \mathrm{oz/a}$	B	00	02	70	99	99	99	55	99	77	77	99 1
	Warrant	1.5  qt/a	B											
			В											1
	RU P.Max	1.125  lb ae/a												
	Destiny HC	1.5  pt/a	BCD											
	N-Pak AMS	2.5% v/v	BCD											
	Betanex Warrant	16  fl oz/a	C											
		1 qt/a	C											
	Betanex	24  fl oz/a	D											p.
~~~	RU P.Max	0.75  lb ae/a	CD	07										
25		5.3 pt/a	A	87	77	78	99	99	99	73	99	99	99	99
	Betamix	12  fl oz/a	B											
	Nortron	4 fl oz/a	BCD											:
	Warrant	1.5 qt/a	B											
	RU P.Max	1.125 lb ae/a	В											
	Destiny HC	1.5 pt/a	BCD											
	N-Pak AMS	2.5% v/v	BCD											-
	Betamix	16 fl oz/a	С											
	Warrant	1 qt/a	С											
	Betamix	24 fl oz/a	D											
	RU P.Max	0.75 lb ae/a	CD											

Table 2. PPI, POST, and lay-by herbicides with glyphosate to control glyphosate-resistant waterhemp in Roundup Ready® sugarbeet – Moorhead, MN – 2012 (Stachler).

Table 2. PPI, POST, and lay-by herbicides with glyphosate to control glyphosate-resistant waterhemp in Roundup Ready® sugarbeet - Moorhead, MN - 2012 (Stachler).

Trt Treatment	Rate	Appl		June 15			Jul	y 13		Aug. 9		Aug. 29	
No. Name <sup>1</sup>	Rate Unit	Code	Wahe <sup>2</sup>	Colq	Rrpw	Wahe	Colq	Rrpw	Cano <sup>3</sup>	Wahe	Wahe	Colq	Rrpw
								% Con	trol				
26 Weed-freeChk			90	91	99	99	99	99	-	99	93	99	99
RU P.Max	1.125 lb ae/a	Х											
RU P.Max	0.75 lb ae/a	BCD											
R-11	0.25 % v/v	XBCD											
N-Pak AMS	2.5 % v/v	XBCD											
LSD (P=.05)			2.6	2.8	3.6	8.0	NS	NS	17.1	7.2	8.1	NS	NS
CV			4	5	7	7	0	0	29	6	7	0	0

<sup>1</sup>RU P.Max = Roundup PowerMAX; Dual Mag = Dual Magnum; Destiny HC is a HSMOC from Winfield Solutions; R-11 = a NIS from Wilbur-Ellis; N-Pak AMS = N-Pak AMS is a liquid AMS at 3.4 lbs dry AMS/gal of product from Winfield Solutions.
<sup>2</sup>Wahe = Glyphosate-resistant waterhemp.
<sup>3</sup>Cano = Natural population of volunteer RR canola.

Table 3. PPI, POST, and lay-by herbicides with glyphosate to control glyphosate-resistant waterhemp in Roundu	p
Ready® sugarbeet – Moorhead, MN – 2012 (Stachler).	•

_	15-June	13-July	9-August	19-July		20-Se	ptember	
Trt No.		Sugarbeet Inju	ry	Sugarbe	et Stand	Yield	Sucrose	Ext. Sucrose
	*************	%		No. per	100 ft	ton/A	%	lb/A
1	0	0	0	103	112	11.9	15.7	3273
2	0	1	3	99	90	24.1	15.5	6322
3	0	10	7	103	98	24.3	15.6	6416
4	0	14	9	113	114	23.5	15.6	6224
5	0	7	11	104	109	24.0	15.8	6425
6	0	15	10	106	110	25.2	15.9	6833
7	0	20	11	103	108	21.8	16.2	6049
8	0	5	9	93	96	23.1	15.8	6130
9	0	16	10	90	101	23.2	15.8	6211
10	0	20	11	93	102	24.0	15.4	6140
11	0	5	8	93	95	24.1	16.1	6614
12	0	11	8	97	111	23.2	16.0	6341
13	0	15	6	94	100	22.6	15.7	5975
14	9	5	5	91	91	24.9	15.8	6763
15	10	18	7	85	86	21.4	15.7	5790
16	10	16	8	90	104	24.5	15.8	6579
17	9	7	6	89	102	25.6	15.7	6741
18	10	18	9	85	100	22.7	15.8	6139
19	10	21	11	94	103	22.7	15.3	5832
20	10	9	9	87	99	24.7	15.2	6278
21	10	18	8	96	93	21.2	15.7	5579
22	10	19	7.	107	101	25.6	15.4	6660
23	10	8	6	88	95	23.4	15.8	6259
24	9	18	11	88	93	24.0	15.7	6454
25	9	19	8	94	96	23.2	15.7	6183
26	0	0	3	91	97	24.0	15.4	6216
LSD 5%	0.8	6.8	4.6	NS	NS	4.5	NS	1208
CV %	13	40	43	14	14	12	4	12

**Summary:** On August 29, Roundup PowerMAX (glyphosate) applied three times controlled 62% of waterhemp and caused 80% mortality (data not shown) of 10 waterhemp plants flagged at the time of the first POST application. Therefore glyphosate-resistant waterhemp is present at this location, although at a somewhat reduced frequency at this time.

Averaged across all POST applications on June 15 at the time of the first POST application, Ro-Neet controlled waterhemp, common lambsquarters, and redroot pigweed at 86, 81, and 77%, respectively. On August 29, all treatments with Ro-Neet controlled glyphosate-resistant waterhemp at greater than 94% while all treatments without Ro-Neet controlled less than 75% of glyphosate-resistant waterhemp. The addition of Outlook, Dual Magnum, or Warrant to those treatments with no Ro-Neet usually improved waterhemp control compared to those treatments not including these layby products. Betanex and Betamix plus Nortron controlled waterhemp similarly. Betanex and Betamix plus Nortron did not improve glyphosate-resistant waterhemp control compared to glyphosate alone (Trt. 2). This lack of additional control may likely be caused by the presence of waterhemp biotypes resistant to Group 5 (Betamix/Betanex) herbicides based upon greenhouse testing. The addition of any POST herbicide with glyphosate did not reduce control of common lambsquarters or redroot pigweed.

No treatment reduced sugarbeet root yield or extractable sucrose compared to the weed-free check, except for the non-treated check. When all treatments are averaged across no Ro-Neet and with Ro-Neet, root yield was nearly the same (23.6 vs. 23.7, no Ro-Neet vs. with Ro-Neet, respectively).

PPI, POST, and Lay-by Herbicides with Glyphosate to Control Glyphosate-Resistant Waterhemp in Roundup Ready® Sugarbeet - Holloway, MN - 2012 (Stachler). A seedbed was prepared using an 11-foot Kongskilde S-tine field cultivator equipped with rolling baskets. Glyphosate-resistant waterhemp from Swift County, ND was spread and shallowly incorporated on April 24. 'Hilleshog 4022 RR' sugarbeet was seeded 1.25 inches deep in 22-inch rows at 60,825 seeds/A on April 25. Sugarbeet was treated with Tachigaren and Poncho Beta at 45 grams and 5.07 fl oz of product, respectively, per 100,000 seeds. Counter 20G insecticide was applied at 8.9 pounds/A in a 5-inch band and drag chain incorporated at planting. Herbicide treatments were applied April 24, May 14, 22, June 4, 25. All treatments were applied with a bicycle sprayer in 17 gpa spray solution through 8002 XR flat fan nozzles pressurized with CO<sub>2</sub> at 40 psi to the center four rows of six row plots 30 feet in length. Preplant-incorporated treatments were incorporated 2 inches deep with an 8-foot 'S-tine' field cultivator equipped with rolling baskets. Quadris was applied in-furrow at 9.2 fl oz/A and broadcast at 16 fl oz/A April 25 and June 1, respectively to control Rhizoctonia root rot. Cercospora leaf spot was controlled with Topsin + Proline at 7.6 + 5 fl oz/A, Headline at 9 fl oz/A, and Inspire XT at 7 fl oz/A broadcast July 2, July 18, and August 7, respectively. Sugarbeet was harvested September 10 from the center two rows of each plot and weighed. Twenty to thirty pounds of sugarbeet roots were collected from each plot and analyzed for quality at American Crystal Sugar Quality Lab, East Grand Forks, MN.

Sugarbeet stand was counted in the center two rows of plots on June 31 and September 10. Sugarbeet injury was evaluated on May 22, 30, June 5, 27, July 7, 17, and September 5. Waterhemp and common lambsquarters control were evaluated on May 22, June 5, 27, July 7, 17, and September 5. All evaluations were a visual estimate of percent fresh weight reduction in the four treated rows compared to the adjacent untreated strip. Experimental design was randomized complete block with 4 replications. Data were analyzed with the ANOVA procedure of Agriculture Research Manager, version 8.4.2 software package.

Application code	A (PPI)	X (V1)	B (V2 sgrbt)	C (14 DAT B)	D (20 DAT C)
Date	April 24	May 14	May 22	June 5	June 25
Time of Day	3:00 P	12:00 P	12:30 P	1:00 P	4:00 P
Air Temperature (F)	76	89	88	87	79
Relative Humidity (%)	36	20	30	26	45
Wind Velocity (mph)	3	8	15	7	7
Wind Direction	ENE	WSW	S	E	SE
Soil Temp. (F at 6")	57	65	60	69	72
Soil Moisture	Good	Fair	Good	Good	Good
Cloud Cover	20	20	60	40	30
Sugarbeet stage (avg)	PPI	V1 (cot.)	V2.4 (2-3 lf)	V6.5 (6-7 lf)	V12 (12 lf)
Wahe height (avg/range) – Trt. 2	-	-	0.19"/0.12-0.5"	0.25"/0.125-2"	0.88"/0.125-10.5
Wahe density (plants/ $m^2$ ) – Trt. 2	-	-	30	88.5	30.8
Wahe height (avg/range) – Trt. 14	-	-	0.125"/0.12-0.25"	0.21"/0.125-0.75"	0.8"/0.125-10.8"
Wahe density (plants/m <sup>2</sup> ) – Trt. 14	-	-	1.5	11.5	6.3
Colq density (plants/m <sup>2</sup> ) – Trt. 2	-	-	1.75	0.5	0
Colq density (plants/m <sup>2</sup> ) – Trt. 14	-	-	0	0.25	0

# Table 1. Application Information

**Summary:** On September 5, Roundup PowerMAX (glyphosate) applied three times controlled 67% of waterhemp and on July 17 caused 75% mortality (data not shown) of 10 waterhemp plants flagged at the time of the first POST application. Therefore glyphosate-resistant waterhemp is present at this location, although at a very low frequency at this time.

Averaged across all POST applications on May 22 at the time of the first POST application, Ro-Neet controlled waterhemp and common lambsquarters at 73 and 81%, respectively. Preplant-incorporated Ro-Neet improved waterhemp control on September 5 compared to no Ro-Neet (95% vs. 89%, respectively). In the absence of Ro-Neet, the addition of Betanex and Betamix plus Nortron improved glyphosate-resistant waterhemp control compared to glyphosate applied alone at this location. Outlook, Dual Magnum, and Warrant improved waterhemp control compared to those treatments without these layby products. Outlook controlled more waterhemp than Dual Magnum and Warrant when no Ro-Neet was applied. Improved waterhemp control with layby herbicides was most noticeable when Ro-Neet was not applied. The addition of any POST herbicide with glyphosate did not reduce control of common lambsquarters. No treatment reduced sugarbeet root yield or extractable sucrose compared to the weed-free check, except for the non-treated check.

		_			May 22		the second	June 27			<u>y 17</u>		otembe				nber 10	
	Treatment		Appl		Wahe <sup>2</sup>											Sgbt		Ext
10.	Name <sup>1</sup>	Rate Unit	Code	Inju	Cntl	Cntl	Inju		<u>Cnti</u> %	inju	Cntl	inju	Cnu	Cntl	#/100	Yield ton/A	Sucr %	Suc
	NontrtCheck			0	0	0	0	0	% 0	0	0	0	0	0	#/100	16.6	% 18.4	lb// 553
_	RU PMax	1.13 lb ae/a	D	0	0	0	0	70	99	0	80	0	67	- 99	$\frac{177}{200}$	26.2	18.1	869
	Destiny HC		BCD	0	0	0	0	70	99	U	00	0	07	77	200	20.2	10.1	009
	NPak	1.5 pt/a 2.5 % v/v																1
	RU PMax	0.75 lb ae/a																4
	Betanex	12  fl oz/a		0	0	0	9	87	99	5	96	1	87	99	200	25.3	18.5	843
	RU PMax	1.13  lb ae/a		U	, U	U	,	07	"	5	70	1	07	,,	200	25.5	10.5	045
	Destiny HC	1.15 to ac/a																
	NPak	2.5% v/v																
	Betanex	16  fl oz/a																
	Betanex	24 fl oz/a																
	RU PMax	0.75 lb ae/a																
	Betamix	12 fl oz/a		0	0	0	. 7	86	99	5	96	2	89	99	214	25.9	18.7	875
	Nortron	4 fl oz/a	BCD															
	RU PMax	1.13 lb ae/a	В															
	Destiny HC	1.5 pt/a	BCD															
	NPak	2.5 % v/v																
	Betamix	16 fl oz/a																
	Betamix	24 fl oz/a																÷
	RU PMax	0.75 lb ae/a																
	Outlook	14 fl oz/a		0	0	0	3	97	99	4	99	0	91	99	193	26.1	19.0	903
	RU PMax	1.13 lb ae/a																i.
	Destiny HC		BCD															
	NPak	2.5 % v/v																1
	Outlook	10 fl oz/a																
	RU PMax	0.75 lb ae/a		0			1.7	00				~~~~~	07	00	107	255	10 #	0.54
	Betanex	12  fl oz/a		0	0	0	15	98	99	9	98	2	96	99	196	25.5	18.5	859
	Outlook	14  fl oz/a																.1
	RU PMax	1.13  lb ae/a																
	Destiny HC NPak	1.5 pt/a 2.5 % v/v	BCD															
	Betanex	2.5% V/V 16 fl oz/a																1. 1
	Outlook	10  fl  oz/a 10 fl oz/a																
	Betanex	24  fl oz/a																4
	RU PMax	0.75 lb ae/a																i.
,	Betamix	12  fl oz/a		0	0	0 .	15	96	99	5	99	2	97	99	199	25.0	19.0	864
	Nortron	4  fl oz/a		U	•	0	15	20	,,	5	,,	2	1	,,,	177	20.0	17.0	
	Outlook	14 fl oz/a																
	RU PMax	1.13  lb ae/a																÷į.
	Destiny HC	1.5  pt/a																
	NPak	2.5% v/v																
	Betamix	16 fl oz/a																
	Outlook	10 fl oz/a	С															
	Betamix	24 fl oz/a																
	RU PMax	0.75 lb ae/a	L CD															
}	Dual Mag	1.5 pt/a		0	0	0	7	92	99	6	95	2	88	99	183	25.5	19.3	895
	RU PMax	1.13 Îb ae/a																
	Destiny HC	1.5 pt/a	BCD															
	NPak	2.5 % v/v																i
	Dual Mag	*	C															
	RU PMax	0.75 lb ae/a																
	Betanex	12 fl oz/a		0	0	0	14	93	99	5	96	2	90	99	200	24.5	18.8	852
	Dual Mag		В															
	RU PMax	1.13 lb ae/a																
	Destiny HC		BCD															1
	NPak	2.5 % v/v																
	Betanex	16 fl oz/a																1
	Dual Mag	1	C															
		24 fl oz/a	11															
	Betanex RU PMax	0.75  lb ae/a																1

Table 2. PPI, POST, and lay-by herbicides with glyphosate to control glyphosate-resistant waterhemp in Roundup Ready® sugarbeet – Holloway, MN – 2012 (Stachler).

					May 22			June 27			y 17		otembe				nber 1(	) "
	Treatment Name <sup>1</sup>	Rate Rate Unit	Appl Code	Sgbt Inju	Wahe <sup>2</sup> Cntl	Colq Cntl		Wahe Cntl							Stand			Ext Suci lb/A
10	Betamix Nortron Dual Mag RU PMax	12 fl oz/a 4 fl oz/a 1.5 pt/a 1.13 lb ae/a	a BCD B	0	0	0	16	94	99	8	98	2	89	99	201	26.2	18.9	907.
	Destiny HC NPak Betamix	1.5 pt/a 2.5 % v/v 16 fl oz/a 1 pt/a	a C															
	Dual Mag Betamix RU PMax	24 fl oz/a 0.75 lb ae/a	a D															
1	Warrant RU PMax	1.5 qt/a 1.13 lb ae/s	B a B	0	0	0	6	94	99	4	99	1	91	99	193	26.5	18.9	907
	Destiny HC NPak Warrant RU PMax	1.5 pt/a 2.5 % v/v 1 qt/a 0.75 lb ae/s	С															
12	Betanex Warrant RU PMax	12 fl oz/a 1.5 qt/a 1.13 lb ae/a	a B B	0	0	0	11	97	99	.5	99	2	93	99	192	27.1	18.7	920
	Destiny HC NPak Betanex		BCD BCD															-
	Warrant Betanex RU PMax	1 qt/a 24 fl oz/a 0.75 lb ae/	C a D															
3	Betamix Nortron Warrant	12 fl oz/a 4 fl oz/a 1.5 qt/a	аB	0	0	0	10	96	99	5	97	2	93	99	205	26.7	19.2	932
	RU PMax Destiny HC NPak Betamix Warrant	1.13 lb ae/	a B BCD / BCD															
	Betamix RU PMax	24 fl oz/a 0.75 lb ae/	a D															5 3 12
4	Ro-Neet SB RU PMax Destiny HC NPak RU PMax	1.13 Îb ae/	BCD BCD	8	72	79	5	90	99	4	93	1	93	99	189	27.2	19.0	937
5	Ro-Neet SB Betanex RU PMax Destiny HC	5.3 pt/a 12 fl oz/a 1.13 lb ae/	A a B	8	73	83	13	89	99	8	97	2	88	99	194	26.8	19.2	939
	NPak Betanex Betanex RU PMax	2.5 % v/v 16 fl oz/a 24 fl oz/a 0.75 lb ae/	a C a D															10 A
6	Ro-Neet SB Betamix Nortron RU PMax		A a B a BCD	6	71	80	13	94	99	6	96	3	90	99	198	26.0	19.0	899
	Destiny HC NPak Betamix Betamix		BCD 7 BCD a C															
	RU PMax	24  fl oz/s 0.75 lb ae/																

Table 2. PPI, POST, and lay-by herbicides with glyphosate to control glyphosate-resistant waterhemp in Roundup Ready® sugarbeet – Holloway, MN – 2012 (Stachler).

					May 22		PROFESSION OF THE OWNER	June 27	the second s		y 17		otembe				nber 1(	) +
	Treatment Name <sup>1</sup>	Rate Rate Unit	Appl Code	Sgbt Inju	Wahe <sup>2</sup> Cntl	Colq Cntl	Sgbt Inju	Wahe Cntl			Wahe Cntl				Stand	Sgbt Yield ton/A		Ext Sucr lb/A
17	Ro-Neet SB Outlook RU PMax Destiny HC NPak	14 fl oz/a 1.13 lb ae/a 1.5 pt/a 2.5 % v/v	a B a B BCD BCD	8	72	80	9	99	99	7	99	1	97	99	196	27.7	<sup>%</sup> 18.9	9530
	Outlook RU PMax	10 fl oz/a 0.75 lb ae/a	a CD										~ ~		100			
18	Ro-Neet SB Betanex Outlook RU PMax Destiny HC NPak Betanex Outlook Betanex	12 fl oz/a 14 fl oz/a 1.13 lb ac/a 1.5 pt/a 2.5 % v/v 16 fl oz/a 10 fl oz/a 24 fl oz/a	a B a B BCD BCD a C a C a C a D	9	71	81	11	99	99	9	99	4	97	99	189	25.5	18.8	8684
0	RU PMax Ro-Neet SB	0.75 lb ae/a 5.3 pt/a		9	72	81	14	99	99	5	99	2	07	00	107	26.6	10.0	0041
	Ro-Neet SB Betamix Nortron Outlook RU PMax Destiny HC NPak Betamix	5.3 pt/a 12 fl oz/a 4 fl oz/a 14 fl oz/a 1.13 lb ae/a 1.5 pt/a 2.5 % v/v 16 fl oz/a	a B a BCD a B a B BCD b BCD	9	12	81	14	. 99			99	2	97	99	187	26.6	18.6	9043
	Outlook Betamix RU PMax	10 fl oz/a 24 fl oz/a 0.75 lb ae/a	a C a D															
	Ro-Neet SB Dual Mag RU PMax Destiny HC NPak Dual Mag RU PMax	5.3 pt/a 1.5 pt/a 1.13 lb ae/a 1.5 pt/a 2.5 % v/v 1 pt/a 0.75 lb ae/a	A B a B BCD BCD C	8	73	82	11	98	99	5	99	1	94	99	197	26.4	18.3	881
1	Ro-Neet SB Betanex Dual Mag RU PMax Destiny HC NPak Betanex Dual Mag Betanex RU PMax	5.3 pt/a 12 fl oz/a 1.5 pt/a 1.13 lb ac/i 1.5 pt/a 2.5 % v/v 16 fl oz/a 1 pt/a 24 fl oz/a 0.75 lb ac/a	B BCD BCD BCD C C a D	9	74	82	16	99	99	5	99	1	94	99	188	26.2	19.1	9199
2	Ro-Neet SB Betamix Nortron Dual Mag RU PMax Destiny HC NPak Betamix Dual Mag Betamix RU PMax	5.3 pt/a 12 fl oz/a 4 fl oz/a	A a B b BCD B a B BCD BCD a C C a D	8	73	81	20	99	99	9	99	2	99	99	198	26.1	19.3	918(

Table 2. PPI, POST, and lay-by herbicides with glyphosate to control glyphosate-resistant waterhemp in Roundup Ready® sugarbeet – Holloway, MN – 2012 (Stachler).

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					May 22			June 27	7		/ 17	Contract of the local division of the	otembe	manufacturine and the second second		Septer	nber 10	
Trt Treat	tment	Rate	Appl	Sgbt	Wahe <sup>2</sup>	Colq	Sgbt	Wahe	Colq	Sgbt	Wahe	Sgbt	Wahe	Colq	Sgbt	Sgbt	Sgbt	Ext
No. Nam	e <sup>1</sup>	Rate Unit	Code	Inju	Cntl	Cntl	Inju	Cntl	Cntl	Inju	Cntl	Inju	Cntl	Cntl	Stand			Sucr
									%						#/100'	ton/A	%	lb/A
23 Ro-N	Veet SB	5.3 pt/a	А	8	75	81	7	99	99	4 .	99	2	99	99	189	26.8	18.7	9155
Warı	rant	1.5 qt/a	В															d.
RU I	PMax	1.13 lb ae/a	ιB															
Dest	iny HC	1.5 pt/a	BCD															
NPal		2.5% v/v																
War			C															
	PMax	0.75 lb ae/a																
24 Ro-N			A	8	75	82	8	98	99	5	99	1	96	99	194	27.2	19.1	9533
Beta		12  fl oz/a		-		-												
War		1.5 qt/a																
	PMax	1.13  lb ae/a																
	iny HC		BCD															1
NPal		2.5% v/v																
Beta		16  fl  oz/a																
War		1 qt/a																
Beta		24  fl oz/a																
	PMax	0.75 lb ae/a								1 · · ·								
25 Ro-N		5.3 pt/a		10	71	82	14	99	99	7	99	2	98	99	188	25.9	18.6	8758
Beta		12 fl oz/a		10		02												
Nort		4  fl oz/a																
War			B															
	PMax	1.13  lb ae/a																1
	iny HC	1.5 pt/a																
NPa		2.5% v/v																
Beta		16 fl oz/a																·
War			Ċ															
Beta		24  fl oz/a																
	PMax	0.75 lb ae/a																
$\frac{100}{26}$ Wee		0.7510 dore		9	77	83	3	87	99	2	- 99	1	92	99	192	26.1	18.9	8978
	PMax	1.13 lb ae/a	γX	,	//	05	5	0,	,,	-	,,			,,	174	20.1	10.9	
	PMax	0.75 lb ae/a																
R-11		0.7510  ae/a 0.25%  v/v																i.
NPa		2.5% v/v																d.
nra	v			1.8	5.3	2.5	4.9	6.5	0.3	3.9	5.5	NS	8.5	NS	NS	2.94	NS	1109
				1.8 32	5.5 10	2.5 4	4.9 36	0.5 5	0.5	5.9 52	5.5 4	111	0.5 7	0	6	2.94 8	4	9
		CV %	0	32	10	4	30	Э	U	34	4	111	/	<u> </u>	<u> </u>	0	- 4	7

Table 2. PPI, POST, and lay-by herbicides with glyphosate to control glyphosate-resistant waterhemp in Roundup Ready® sugarbeet – Holloway, MN – 2012 (Stachler).

<sup>1</sup>RU PMax = Roundup PowerMAX; Dual Mag = Dual Magnum; Destiny HC is a HSMOC from Winfield Solutions; R-11 = a NIS from Wilbur-Ellis; NPak = N-Pak AMS (liquid AMS at 3.4 lbs dry AMS/gal of product from Winfield Solutions).

 $^{2}$ Wahe = Glyphosate-resistant waterhemp.

Management of Glyphosate-Susceptible Waterhemp with Soil-Applied Followed by Postemergence Herbicides in Roundup Ready® Sugarbeet – Dwight, ND – 2012 (Stachler). The seedbed was prepared using an 11-foot Kongskilde S-tine field cultivator equipped with rolling baskets. 'Hilleshog 4022 RR' sugarbeet was seeded 1.25 inches deep in 22-inch rows at 60,825 seeds/A on May 14. Sugarbeet was treated with Tachigaren and Poncho Beta at 45 grams and 5.1 fl oz of product, respectively, per 100,000 seeds. Counter 20G insecticide at 8.9 lbs/A was applied in a 5-inch band and drag chain incorporated at planting. Herbicide treatments were applied May 14, 29, June 12, 26, and July 11. All treatments were applied with a bicycle sprayer in 17 gpa spray solution through 8002 XR flat fan nozzles pressurized with CO<sub>2</sub> at 40 psi to the center four rows of six row plots 30 feet in length. Preplant-incorporated treatments were incorporated 2 inches deep with an 8-foot John Deere 'S-tine' field cultivator equipped with rolling baskets. Quadris was broadcast at 16 fl oz/A June 21 to control Rhizoctonia root rot. Cercospora leaf spot was controlled with Headline at 9 fl oz/A and Inspire XT at 7 fl oz/A broadcast July 19 and August 9, respectively. Sugarbeet was harvested September 11 from the center two rows of each plot and weighed. Twenty to thirty pounds of sugarbeet roots were collected from each plot and analyzed for quality at American Crystal Sugar Quality Lab, East Grand Forks, MN.

Sugarbeet stand was counted in the center two rows of plots on June 26, July 18, and September 11. Sugarbeet injury was evaluated on June 12, 19, 30, July 7, 11, 25, and August 8. Waterhemp, common lambsquarters, and annual grass control was evaluated on June 12, 30, July 11, 25, August 8, and September 11. All evaluations were a visual estimate of percent fresh weight reduction in the four treated rows compared to the adjacent untreated strip. Experimental design was randomized complete block with 4 replications. Data were analyzed with the ANOVA procedure of Agriculture Research Manager, version 8.4.2 software package.

Application code	A (PPI)	B (PRE)	Х	C (V2 sgrbt)	D (14 DAT C)	E (15 DAT D)
Date	May 14	May 14	May 29	June 12	June 26	July 11
Time of Day	1:30 P	4:00 P	10:00 A	2:00 P	2:30 P	11:30 A
Air Temperature (F)	86	87	55	70	81	84
Relative Humidity (%)	11	6	60	3	52	51
Wind Velocity (mph)	4	14	12	7	10	7
Wind Direction	SW	NW	N	W	SSE	S
Soil Temp. (F at 6")	75	77	48	68	77	80
Soil Moisture	Good	Good	Good	Good	Fair	Dry
Cloud Cover	5	50	75	• 7	5	25
Sugarbeet stage (avg)	PPI	PRE	V1(cot)	V3.5 (3–4 lf)	7 lf	14 lf
Wahe height (avg/range) – Trt.1	-	<u>-</u>	· · -	0.33" / 0.1-0.75	4" / 0.25-13	14" / 1.2-39
Wahe density (plants/m <sup>2</sup> ) – Trt. 1	-	-	-	88	27	32
Colq height (avg/range) – Trt. 1	-	-	-	0.8″ / 0.12-2	6.5" / 0.12-13	22" / 0.2-39
Colq density (plants/m <sup>2</sup> ) – Trt. 1	-	-	-	308	134	193

#### Table 1. Application Information

**Summary:** This waterhemp population is susceptible to glyphosate because mortality of 10 flagged plants prior to the first POST application was 100% and waterhemp control was 98% from Roundup alone on September 11.

On June 12, Dual Magnum (1 and 1.5 pt/A), Ro-Neet (4 and 5.33 pt/A), and Nortron (6 and 7.5 pt/A) controlled waterhemp at 89, 92, 87, 89, 91, and 92% averaged across all like soil-applied rates and products. All three soil-applied herbicides were similar and no difference between rates of any of the products. Ro-Neet controlled the most lambsquarters ( $\geq$ 70%) of the three products with Nortron very similar and Dual Magnum the poorest.

All treatments controlled greater than or equal to 97% and 91% of waterhemp and lambsquarters, respectively on September 11 with nearly all treatments controlling 99% of waterhemp.

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Due to the sandy clay loam soil type, nearly every POST treatment following Ro-Neet (5.3 pt/A) and Dual Magnum (1.5 pt/A) and nearly every POST treatment containing Outlook caused sugarbeet root yield loss.

	Treatment	ugarbeet – Dwig Rate	Appl	(50	June 12			July 25		Se	ptember	· 11
	Name <sup>1</sup>	Rate Unit	Code	Wahe	Colq	An.Gras	Wahe	Colq	An.Gras			An.Gras
								-% Cntl-				
1	Untrt Check			0	0	0	0	0	0	0	0	0
2	Weed-free Chk			10	10	10	99	98	98	99	96	98
	RU PowerMax	1.125 lb ae/a	Х									
	RU PowerMax	0.75 lb ae/a	CDE									1
	R-11	0.25 % v/v	XCDE									
	NPak	2.5 % v/v	XCDE	÷1								3
3	RU PowerMax	1.125 lb ae/a	С	0	0	0	99	98	98	98	91	90
	RU PowerMax	0.8441b ae/a	D									
	RU PowerMax	0.75 lb ae/a	Е									1
	Destiny HC	1.5 pt/a	CDE									
	NPak	2.5 % v/v	CDE									
4	RU PowerMax	1.125 lb ae/a	С	0	0	0	99	99	99	97	95	93
	RU PowerMax	0.844 lb ae/a	D									j.
	RU PowerMax	0.75 lb ae/a	Е									1
	Nortron	4 fl oz/a	CDE									
	Destiny HC	1.5 pt/a	CDE									
	NPak	2.5 % v/v	CDE									
5	Betamix	12 fl oz/a	С	0	0	0	99	98	98	98	95	87
	Betamix	16 fl oz/a	D									
	Betamix	24 fl oz/a	Е									1
	Nortron	4 fl oz/a	CDE									
	RU PowerMax	1.125 lb ae/a	С									4
	RU PowerMax	0.844 lb ae/a	D									i.
	RU PowerMax	0.75 lb ae/a	Е									:
	Destiny HC	1.5 pt/a	CDE									
	NPak	2.5% v/v	CDE									
6	Betamix	12 fl oz/a	С	0	0	0	99	99	98	99	.97	98
	Betamix	16 fl oz/a	D									
	Betamix	24 fl oz/a	Е									
	Nortron	4 fl oz/a	CDE									1
	Outlook	14 fl oz/a	С									
	Outlook	10 fl oz/a	D									4
	RU PowerMax	1.125 lb ae/a	С									
	RU PowerMax	0.844 lb ae/a	D									1
	RU PowerMax	0.75 lb ae/a	Е									
	Destiny HC	1.5 pt/a	CDE									j
	NPak	2.5% v/v	CDE									9 2
7	Dual Magnum	1 pt/a	<u> </u>	85	54	71	99	98	99	98	92	91
-	RU PowerMax	1.125  lb ae/a	C C							~ ~	-	~  <b>*</b>
	RU PowerMax	0.844  lb  ae/a	D									
	RU PowerMax	0.75 lb ae/a	Ē									
	Destiny HC	1.5 pt/a	CDE									1
	NPak	2.5 % v/v	CDE									

Table 2. Management of Glyphosate-Susceptible Waterhemp with Soil-Applied Followed by POST Herbicides in Roundup Ready® Sugarbeet – Dwight, ND – 2012 (Stachler).

	Treatment	Rate	Appl		June 12			July 25			ptember	: 11
No	Name <sup>1</sup>	Rate Unit	Code	Wahe	Colq	An.Gras			An.Gras	Wahe	Colq	An.Gra
								-% Cntl-				
8	Dual Magnum	1 pt/a	В	88	50	56	99	99	97	99	98	92
	RU PowerMax	1.125 lb ae/a	С									
	RU PowerMax	0.844 lb ae/a	D									
	RU PowerMax	0.75 lb ae/a	Е									- 5
	Nortron	4 fl oz/a	CDE									
	Destiny HC	1.5 pt/a	CDE									4
	NPak	2.5 % v/v	CDE									
9	Dual Magnum	1 pt/a	В	90	55	64	99	99	99	99	95	95
	Betamix	12 fl oz/a	С									
	Betamix	16 fl oz/a	D									
	Betamix	24 fl oz/a	E									
	Nortron	4 fl oz/a	CDE									
	RU PowerMax	1.125 lb ae/a	С									j.
	RU PowerMax	0.844 lb ae/a	D									i Q
	RU PowerMax	0.75 lb ae/a	Е									
	Destiny HC	1.5 pt/a	CDE									4
	NPak	2.5 % v/v	CDE									
10	Dual Magnum	1 pt/a	В	94	55	69	99	99	99	99	99	99
	Betamix	12 fl oz/a	С									
	Betamix	16 fl oz/a	D									
	Betamix	24 fl oz/a	Е									
	Nortron	4 fl oz/a	CDE									1
	Outlook	14 fl oz/a	С									2
	Outlook	10 fl oz/a	D									ч. - 4
	RU PowerMax	1.125 lb ae/a	С									
	RU PowerMax	0.844 lb ae/a	D									
	RU PowerMax	0.75 lb ae/a	E									
	Destiny HC	1.5 pt/a	CDE									-
	NPak	2.5 % v/v	CDE									5
11	Dual Magnum	1.5 pt/a	В	88	62	72	99	98	99	99	95	91
	RU PowerMax	1.125 lb ae/a	С									
	RU PowerMax	0.844 lb ae/a	D									:
	RU PowerMax	0.75 lb ae/a	Е									
	Destiny HC	1.5 pt/a	CDE									
	NPak	2.5 % v/v	CDE									
12	Dual Magnum	1.5 pt/a	В	93	63	64	99	99	98	99	98	89
	RU PowerMax	1.125 lb ae/a	С									
	RU PowerMax	0.844  lb ae/a	D									1
	RU PowerMax	0.75  lb  ae/a	Ē									
	Nortron	4 fl oz/a	CDE									
	Destiny HC	1.5 pt/a	CDE									4
	NPak	2.5 % v/v	CDE									

Table 2. Management of Glyphosate-Susceptible Waterhemp with Soil-Applied Followed by POST Herbicides in Roundup Ready® Sugarbeet – Dwight, ND – 2012 (Stachler).

Trt Treatn		Rate	Appl		June 12	2		July 25		Se	ptember	• 11
No Name <sup>1</sup>		Rate Unit	Code	Wahe	Colq	An.Gras	Wahe	Colq	An.Gras	Wahe	Colq	An.Gra
								% Cntl				
13 Dual N	-	1.5 pt/a	В	93	65	71	99	99	99	99	99	93
Betam	ix	12 fl oz/a	С									4
Betam	ix	16 fl oz/a	D									
Betam		24 fl oz/a	E									
Nortro	n	4 fl oz/a	CDE									
RU Po	werMax	1.125 lb ae/a	С									
RU Po	werMax	0.8441b ae/a	D									
RU Po	werMax	0.75 lb ae/a	Е									i.
Destin	y HC	1.5 pt/a	CDE									
NPak		2.5 % v/v	CDE									2
14 Dual N	/lagnum	1.5 pt/a	В	95	63	71	99	99	99	99	99	99
Betam	ix	12 fl oz/a	С									
Betam	ix	16 fl oz/a	D									
Betam	ix	24 fl oz/a	Е									
Nortro	n	4 fl oz/a	CDE									5
Outloc	k	14 fl oz/a	С									į.
Outloc	k	10 fl oz/a	D									
RU Po	werMax	1.125 lb ae/a	С									1
	werMax	0.844 lb ae/a	D									1
	werMax	0.75 lb ae/a	Е									
Destin		1.5 pt/a	CDE									
NPak	<b>,</b>	2.5 % v/v	CDE									-
15 Ro-Ne	et SB	4 pt/a	A	83	73	71	99	98	97	99	96	91
	werMax	1.125  lb ae/a	C								20	
	werMax	0.844  lb  ae/a	D									
	werMax	0.75 lb ae/a	Ē									
Destin		1.5 pt/a	CDE									1
NPak	<i>y</i> 110	2.5 % v/v	CDE									
16 Ro-Ne	et SR	4 pt/a	A	88	70	71	99	99	98	99	94	93
	werMax	1.125  lb ae/a	C	00	70	/1		,,,	90	"	74	25
	werMax	0.844 lb ae/a	D									
	werMax	0.344  lb ac/a 0.75 lb ae/a	E									1
Nortro		4 fl oz/a	CDE									:1
Destin		1.5 pt/a	CDE									21 
NPak	<i>ј</i> не	1.5 pt/a 2.5 % v/v	CDE									1
17 Ro-Ne	et SB	$\frac{2.3 \% \sqrt{v}}{4 \text{ pt/a}}$	A	87	71	68	99	98	98	99	99	94
Betam		4 pt/a 12 fl oz/a	A C	07	/1	00	77	70	70	77	77	74
Betam		12 fl 0z/a 16 fl oz/a	D									-1
Betam		16 fl oz/a 24 fl oz/a	D E									
		24 fi oz/a 4 fi oz/a										t,
Nortro			CDE									
	werMax	1.125 lb ae/a	C									
	werMax	0.844 lb ae/a	D									1.00
	werMax	0.75 lb ae/a	E									
Destin	у НС	1.5 pt/a	CDE									
NPak		2.5 % v/v	CDE									1

Table 2. Management of Glyphosate-Susceptible Waterhemp with Soil-Applied Followed by POST Herbicides in Roundup Ready® Sugarbeet – Dwight, ND – 2012 (Stachler).

Trt 7	Treatment	Rate	Appl		June 12	2		July 25			ptember	11
No 1	Name <sup>1</sup>	Rate Unit	Code	Wahe	Colq	An.Gras	Wahe	Colq	An.Gras	Wahe	Colq	An.Gra
								% Cntl-				
18 I	Ro-Neet SB	4 pt/a	А	91	70	69	99	99	99	99	99	99
]	Betamix	12 fl oz/a	С									1
J	Betamix	16 fl oz/a	D									ł.
J	Betamix	24 fl oz/a	Е									
]	Nortron	4 fl oz/a	CDE									
(	Outlook	14 fl oz/a	С									
	Outlook	10 fl oz/a	D									
]	RU PowerMax	1.125 lb ae/a	С									
]	RU PowerMax	0.844 lb ae/a	D									
]	RU PowerMax	0.75 lb ae/a	Е									
]	Destiny HC	1.5 pt/a	CDE									-
	NPak	2.5 % v/v	CDE									. 4
	Ro-Neet SB	5.3 pt/a	А	83	76	80	99	99	97	99	96	94
	RU PowerMax	1.125 lb ae/a	С									
	RU PowerMax	0.844 lb ae/a	D									
	RU PowerMax	0.75  lb ae/a	Ē									
	Destiny HC	1.5  pt/a	CDE									
	NPak	2.5 % v/v	CDE									j.
	Ro-Neet SB	5.3 pt/a	A	90	76	73	99	99	98	99	92	94
	RU PowerMax	1.125 lb ae/a	C	,,,	70	15			20			
	RU PowerMax	0.844  lb  ae/a	D									
	RU PowerMax	0.75 lb ae/a	E									
	Nortron	4 fl oz/a	CDE									
		1.5 pt/a	CDE									
	Destiny HC NPak	2.5% v/v	CDE									
	Ro-Neet SB		A	91	77	79	99	99	99	99	96	96
		5.3 pt/a	A C	91	//	19	99	99	77	22	90	90
	Betamix	12 fl oz/a										
	Betamix	16 fl oz/a	D									)
	Betamix	24 fl oz/a	E									
	Nortron	4 fl oz/a	CDE									
	RU PowerMax	1.125 lb ae/a	C									1
	RU PowerMax	0.844 lb ae/a	D									
	RU PowerMax	0.75 lb ae/a	E									l.
	Destiny HC	1.5 pt/a	CDE									1 17
	NPak	2.5 % v/v	CDE									
	Ro-Neet SB	5.3 pt/a	A	92	75	75	99	99	99	99	97	98
	Betamix	12 fl oz/a	С									
	Betamix	16 fl oz/a	D									
	Betamix	24 fl oz/a	E									
	Nortron	4 fl oz/a	CDE									
	Outlook	14 fl oz/a	С									
	Outlook	10 fl oz/a	D									i i
	RU PowerMax	1.125 lb ae/a	С									
	RU PowerMax	0.8441b ae/a	D									
	RU PowerMax	0.75 lb ae/a	Е									
	Destiny HC	1.5 pt/a	CDE									
	NPak	2.5 % v/v	CDE									

 Table 2. Management of Glyphosate-Susceptible Waterhemp with Soil-Applied Followed by POST Herbicides in

 Roundup Ready® Sugarbeet – Dwight, ND – 2012 (Stachler).

	Treatment	Rate	Appl		June 12			July 25			ptember	
No	Name <sup>1</sup>	Rate Unit	Code	Wahe	Colq	An.Gras	Wahe	-	An.Gras	Wahe	Colq	An.Gra
								-% Cntl-				
23	Nortron	6 pt/a	А	86	66	65	99	99	98	99	96	95
	RU PowerMax	1.125 lb ae/a	С									
	RU PowerMax	0.844 lb ae/a	D									j.
	RU PowerMax	0.75 lb ae/a	Е									l.
	Destiny HC	1.5 pt/a	CDE									-
	NPak	2.5 % v/v	CDE									
24	Nortron	6 pt/a	Α	93	61	68	99	99	99	99	96	97
	RU PowerMax	1.125 lb ae/a	С									
	RU PowerMax	0.844 lb ae/a	D									-
	RU PowerMax	0.75 lb ae/a	Е									
	Nortron	4 fl oz/a	CDE									
	Destiny HC	1.5 pt/a	CDE									·
	NPak	2.5 % v/v	CDE									
	Nortron	6 pt/a	A	91	68	71	99	99	99	99	97	97
	Betamix	12 fl oz/a	C	~~								1
	Betamix	16 fl oz/a	D									
	Betamix	24 fl oz/a	Ē									
	Nortron	4 fl oz/a	CDE									
	RU PowerMax	1.125  lb ae/a	CDL									
	RU PowerMax	0.844  lb  ae/a	D									
		0.344  lb ae/a 0.75 lb ae/a	E									1
	RU PowerMax		CDE									
	Destiny HC	1.5  pt/a										4
	NPak	2.5 % v/v	CDE	0.4	61	65	99	99	98	99	99	98
26	Nortron	6 pt/a	A	94	01	63	99	99	90	99	99	90
	Betamix	12 fl oz/a	C									1
	Betamix	16 fl oz/a	D									
	Betamix	24 fl oz/a	E									-
	Nortron	4 fl oz/a	CDE									
	Outlook	14 fl oz/a	С									
	Outlook	10 fl oz/a	D									4
	RU PowerMax	1.125 lb ae/a	С									1
	RU PowerMax	0.844 lb ae/a	D									
	RU PowerMax	0.75 lb ae/a	Е									
	Destiny HC	1.5 pt/a	CDE									
	NPak	2.5 % v/v	CDE									:
27	Nortron	7.5 pt/a	А	85	68	70	99	99	99	99	98	95
	RU PowerMax	1.125 lb ae/a	С									
	RU PowerMax	0.844 lb ae/a	D									
	RU PowerMax	0.75 lb ae/a	E									4
	Destiny HC	1.5 pt/a	CDE									
<u> </u>	NPak	2.5 % v/v	CDE					~~~			07	
28	Nortron	7.5 pt/a	A	95	66	70	99	99	99	99	97	97
	RU PowerMax	1.125 lb ae/a	C									
	RU PowerMax	0.844 lb ae/a	D									1
	RU PowerMax	0.75 lb ae/a	E									
	Nortron	4 fl oz/a	CDE									
	Destiny HC	1.5 pt/a	CDE									

Table 2. Management of Glyphosate-Susceptible Waterhemp with Soil-Applied Followed by POST Herbicides in Roundup Ready® Sugarbeet – Dwight, ND – 2012 (Stachler).

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Trt Treatment	Rate	Appl		June 12	,		July 25		Sej	ptember	· 11
No Name <sup>1</sup>	Rate Unit	Code	Wahe	Colq	An.Gras	Wahe	Colq	An.Gras	Wahe	Colq	An.Gras
							-% Cntl				
29 Nortron	7.5 pt/a	А	95	71	66	99	99	99	99	99	97
Betamix	12 fl oz/a	С									1
Betamix	16 fl oz/a	D									
Betamix	24 fl oz/a	Е									
Nortron	4 fl oz/a	CDE									
RU PowerMax	1.125 lb ae/a	С									
RU PowerMax	0.8441b ae/a	D									
RU PowerMax	0.75 lb ae/a	Е									1
Destiny HC	1.5 pt/a	CDE									
NPak	2.5 % v/v	CDE									
30 Nortron	7.5 pt/a	Α	93	69	71	99	99	99	99	99	98
Betamix	12 fl oz/a	С									
Betamix	16 fl oz/a	D									
Betamix	24 fl oz/a	Е									i . a
Nortron	4 fl oz/a	CDE									l.
Outlook	14 fl oz/a	С									-
Outlook	10 fl oz/a	D									
RU PowerMax	1.125 lb ae/a	С									
RU PowerMax	0.844 lb ae/a	D									
RU PowerMax	0.75 lb ae/a	Е									
Destiny HC	1.5 pt/a	CDE									
NPak	2.5 % v/v	CDE									1
	LSD 59	/0	5.5	11.6	13.6	NS	1.2	1.8	1.5	5.5	7.1
	CV 9	/0	5	15	17	-	1	1	1	4	5

Table 2. Management of Glyphosate-Susceptible Waterhemp with Soil-Applied Followed by POST Herbicides in Roundup Ready® Sugarbeet – Dwight, ND – 2012 (Stachler).

<sup>1</sup>RU PowerMax = Roundup PowerMAX; Dual Mag = Dual Magnum; Destiny HC is a HSMOC from Winfield Solutions; NPak = N-Pak AMS (liquid AMS at 3.4 lbs dry AMS/gal of product from Winfield Solutions). Table 3. Sugarbeet response - Dwight, ND - 2012 (Stachler) Table 3. Sugarbeet response - Dwight, ND - 2012 (Stachler)

Table 3	5. Sugart	beet res	ponse -	Dwight	, ND –	2012	(Stachler)	Table 5.	Sugari	beet res	ponse -	Dwigin	, ND –	2012 (	(Stacmer)
	Jun 12	Jun 30	July 25		Septer	nber 1	11		Jun 12	Jun 30	July 25		Septer	mber 1	.1
Trt	Inju	Inju	Inju	Stand	Yield	Sucr	Ext. Sucr	Trt	Inju	Inju	Inju	Stand	Yield	Sucr	Ext. Sucr
		%		#/100'	ton/A	%	lb/A			%		#/100'	ton/A	%	lb/A
1	0	0	0	77	1.1	5.3	173	17	10	16	7	157	22.3	18.0	7360
2	0	0	0	151	26.3	17.2	8257	18	14	25	11	138	22.5	17.7	7334
3	0	3	3	153	23.3	17.2	7229	19	12	4	1	124	22.9	17.0	7110
4	0	8	3	158	24.6	17.3	7855	20	16	7	6	130	21.9	17.6	7131
5	0	16	6	145	21.4	17.6	6977	21	14	15	11	146	22.3	17.1	7016
6	0	17	7	156	21.0	17.5	6791	22	17	29	13	130	19.4	17.5	6277
7	14	7	3	145	24.4	18.0	7961	23	12	5	2	154	23.7	17.7	7761
8	13	8	5	138	21.2	17.3	6806	24	11	8	5	170	24.8	18.1	8331
. 9	14	22	5	145	20.3	18.2	6799	25	11	15	7	151	23.2	17.6	7564
10	18	29	12	147	22.9	17.3	7247	26	10	21	8	144	22.6	17.0	7087
11	20	7	3	155	20.7	17.5	6769	27	13	4	2	156	24.5	17.3	7817
12	20	13	5	115	21.3	17.4	6896	28	19	8	4	154	23.8	17.4	7677
13	19	17	6	132	20.9	17.3	6605	29	14	18	5	156	24.7	17.7	8081
14	23	31	8	148	21.1	17.6	6708	30	16	29	13	125	19.7	17.1	6215
15	12	5	3	143	25.5	17.2	8019	LSD 5%	5.5	6.5	4.8	24.1	3.9	2.9	1259
16	11	5	4	145	22.5	17.8	7365	CV%	33	35	61	10	11	10	11

Management of Glyphosate-Resistant Waterhemp with Soil-Applied Followed by Postemergence Herbicides in Roundup Ready® Sugarbeet - Moorhead, MN - 2012 (Stachler). The soil was tilled two or three times prior to seedbed preparation using a spring-tooth harrow. A seedbed was prepared using an 11-foot Kongskilde S-tine field cultivator equipped with rolling baskets. Glyphosate-resistant waterhemp from Richland County, ND was spread on May 11 to increase density to the variable local glyphosate-resistant population. Due to exceptionally dry conditions, sugarbeet was not seeded until May 25. 'Hilleshog 4022 RR' sugarbeet was seeded 1.25 inches deep in 22 inch rows at 60,825 seeds per acre. Sugarbeet was treated with Tachigaren and Poncho Beta at 45 grams and 5.07 fl oz of product, respectively, per 100,000 seeds. Counter 20G insecticide at 8.9 pounds product per acre was applied in a 5-inch band and drag chain incorporated at planting. Herbicide treatments were applied May 25, June 8, 15, 28, and July 12. All treatments were applied with a bicycle sprayer in 17 gpa spray solution through 8002 XR flat fan nozzles pressurized with CO<sub>2</sub> at 40 psi to the center four rows of six row plots 30 feet in length. Preplant-incorporated treatments were incorporated 2 inches deep with an 8-foot John Deere 'Stine' field cultivator equipped with a spring tooth harrow. Quadris was broadcast at 16 fl oz/A June 12, 26 to prevent Rhizoctonia root rot. Cercospora leaf spot was controlled with Headline at 9 fl oz/A and Inspire XT at 7 fl oz/A broadcast July 18 and August 7, respectively. Sugarbeet was harvested September 20 from the center two rows of each plot and weighed. Twenty to thirty pounds of sugarbeet roots were collected from each plot and analyzed for quality at American Crystal Sugar Quality Lab, East Grand Forks, MN.

Sugarbeet stand was counted in the center two rows of plots on June 28, July 19, and September 20. Sugarbeet injury was evaluated on June 15, 21, 30, July 5, 13, 16, 25, and August 9. Waterhemp, common lambsquarters, and redroot pigweed control were evaluated on June 15, 30, July 13, 25, and August 9, 29 and volunteer RR canola evaluated on July 25. All evaluations were a visual estimate of percent fresh weight reduction in the four treated rows compared to the adjacent untreated strip. Experimental design was randomized complete block with 4 replications. Data were analyzed with the ANOVA procedure of Agriculture Research Manager, version 8.4.2 software package.

Application code	A (PPI)	B (PRE)	Х	C (V2 sgrbt)	D (13 DAT C)	E (14 DAT D)
Date	May 25	May 25	June 8	June 15	June 28	July 12
Time of Day	11:30 A	1:30 P	9:30 A	3:00 P	11:00 A	12:30 P
Air Temperature (F)	62	64	70	79	82	81
Relative Humidity (%)	41	40	55	44	29	59
Wind Velocity (mph)	4	4	10	2	9	8
Wind Direction	W	W	WNW	ENE	NW	SSE
Soil Temp. (F at 6")	50	50	70	70	70	81
Soil Moisture	Good	Good	Fair	Good	Fair	Dry
Cloud Cover	80	80	10	15	5	40
Sugarbeet stage (avg)	PPI	PRE	V1(Cot.)	V2.5 (2-3 lf)	V8 (8 lf)	V12 (12 lf)
Wahe height (avg/range) – Trt.1	-	-	-	0.35″ / 0.1-1	6.4" / 1-12	20" / 5-41
Wahe density (plants/ $m^2$ ) – Trt. 1	-	-	-	18	7	13
Colq height (avg/range) – Trt. 1	-	-	-	0.63" / 0.1-1.5	4.9" / 0.5-12	18" / 1-43
Colq density (plants/m <sup>2</sup> ) – Trt. 1	-	-	-	51	33	38

# Table 1. Application Information

**Summary:** This location has glyphosate-resistant waterhemp based upon the 55% control on August 29<sup>th</sup> following three glyphosate applications. On June 15 at the time of the first postemergence applications, Nortron provided the greatest waterhemp control, followed closely by Dual Magnum. Ro-Neet controlled significantly fewer waterhemp compared to the other two soil-applied herbicides and produced a greater difference between rates than Nortron and Dual Magnum. The addition of Betamix to glyphosate did not improve control of waterhemp and can be explained by the presence of a resistant biotype based upon greenhouse research. The addition of Outlook to the postemergence applications did not improve control substantially, but caused more injury and the greatest root yield loss. The use of a soil-applied herbicide is essential to controlling waterhemp.

							e 15		Jun 30			uly 2			Aug			Septem		
	Treatment	_	Rate		-	Wahe <sup>2</sup>	-	~	-	-		-	-			-	•	Sgbt	Ų	1
No.	Name <sup>1</sup>	Rate	Unit	Code	Inj	Cntl	Cntl	Cntl	Inj	-		Cntl	Cntl	Cntl	Cntl	Cntl	Stnd			
1	Mara tut. Charala									9	•						#/100'		%	Ib//
	Non-trt. Check Weed-freeChk				$\frac{0}{0}$	0 87	0 95	0 	$\frac{0}{0}$	$\frac{0}{4}$	0 96	0 99	<u>0</u> 99	0 99	0 94	0 99	81	4.7	16.3	
		1 1 2	11. 00/0	v	U	8/	95	99	0	4	90	99	99	99	94	99	106	25.9	16	714
	RU P.Max		lb ae/a																	
	RU P.Max		lb ae/a																	:
	R-11 N Dol: AMS		% v/v % v/v																	
	N-Pak AMS RU P.Max		$\frac{76}{1b} ae/a$		0			0		1	60	99	99	16	55	00	102	24.2	1( )	(01/
	RU P.Max RU P.Max		lb ae/a lb ae/a		0	0	0	0	0	1	60	99	99	16	55	99	102	24.2	16.2	681
	RU P.Max RU P.Max		lb ae/a																	
																				1
	Destiny HC		pt/a	CDE																
	N-Pak AMS		%.v/v				0	0			71				(1		101	24.2	15.0	((()
	RU P.Max RU P.Max		lb ae/a		0	0	0	0	, 7	7	71	99	99	31	61	99	101	24.3	15.9	6662
			lb ae/a																	1
	RU P.Max		lb ae/a																	
	Nortron		fl oz/a	-																
	Destiny HC		pt/a	CDE																ł
	N-Pak AMS		$\frac{\% v/v}{\alpha}$						17	11	<u></u>			- 10	= 1		100			
5	Betamix		fl oz/a	C	0	0	0	0	17	11	65	99	99	43 <sup>.</sup>	51	99	103	22.6	16.1	628:
	Betamix		fl oz/a																	2
	Betamix		fl oz/a	E																е. 1
	Nortron		fl oz/a																	-
	RU P.Max		lb ae/a																	
	RU P.Max		lb ae/a																	
	RU P.Max		Ib ae/a																	
	Destiny HC		pt/a	CDE																
	N-Pak AMS		% v/v						•									/		
	Betamix		fl oz/a	C	0	0	0	0	20	16	73	99	99	39	- 61	99	100	22.4	15.7	5996
	Betamix		fl oz/a	D																
	Betamix		fl oz/a	E			· · · ·													
	Nortron		fl oz/a																	
	Outlook		fl oz/a																	
	Outlook		fl oz/a																	
	RU P.Max		lb ae/a																	
	RU P.Max		lb ae/a	D																1
	RU P.Max		lb ae/a																	
	Destiny HC		pt/a	CDE																:
	N-Pak AMS		% v/v			0.2	45	0.2						10	0.1				1	
	Dual Mag RU P.Max		pt/a	B	7	83	45	83	7	4	90	99	99	18	84	99	99	25.7	16.6	7382
			lb ae/a																	
	RU P.Max		lb ae/a																	1
	RU P.Max		lb ae/a																	
	Destiny HC		pt/a	CDE																
	N-Pak AMS		% v/v			07	42	mr	-	-	00		00	~ ~	00			0.5.5	100	
	Dual Mag		pt/a	B	6	87	43	76	7	5	93	99	99	34	90	99	99	25.1	16.6	7208
	RU P.Max		lb ae/a																	4
	RU P.Max		lb ae/a																	
	RU P.Max		lb ae/a																	
	Nortron	4	fl oz/a	CDE																
	Destiny HC	1 5	pt/a	CDE																

 Table 2. Management of glyphosate-resistant waterhemp with soil-applied followed by POST herbicides in Roundup Ready® sugarbeet - Moorhead, MN – 2012 (Stachler).

						June			Jun 30			July 2			Aug			Septem	ber 20	
	Treatment		Rate		-	Wahe <sup>2</sup>	Colq	Rrpw	Sgbt								Sgbt	Sgbt	-	
No.	Name <sup>1</sup>	Rate	Unit	Code	Inj	Cntl	Cntl	Cntl	Inj		,	Cntl	Cntl	Cntl	Cntl	Cntl	Stnd			Suci
-		_		_						9	-							ton/A		lb/A
9	Dual Mag		pt/a	B	8	84	41	78	17	11	91	99	99	44	86	99	90	23.4	15.7	6226
	Betamix		fl oz/a	C																
	Betamix		fl oz/a	D																
	Betamix		fl oz/a	E																-j
	Nortron		fl oz/a																	
	RU P.Max		lb ae/a																	÷
	RU P.Max		lb ae/a	D																÷
	RU P.Max		lb ae/a																	
	Destiny HC		pt/a	CDE																
	N-Pak AMS		% v/v	CDE			• •										100		1.0	
	Dual Mag		pt/a	В	6	87	38	77	18	10	95	99	99	47	91	99	109	25.2	15.9	6874
	Betamix		fl oz/a	С																
	Betamix		fl oz/a	D																4
	Betamix		fl oz/a	Е																
	Nortron		fl oz/a																	Ĵ
	Outlook		fl oz/a	С													:			
	Outlook		fl oz/a	D																
	RU P.Max		lb ae/a	С																
	RU P.Max		lb ae/a																	
	RU P.Max		lb ae/a																	i.
	Destiny HC		pt/a	CDE																i.
	N-Pak AMS		% v/v																	i
11	Dual Mag		pt/a	В	8	88	48	87	7	4	94	99	99	18	90	99	101	25.2	16.4	707
	RU P.Max		lb ae/a																	
	RU P.Max		lb ae/a																	
	RU P.Max		lb ae/a																	
	Destiny HC		pt/a	CDE																-
	N-Pak AMS		% v/v																	
12	Dual Mag		pt/a	В	8	91	60	85	7	2	97	99	99	35	95	99	109	25.4	16.8	735
	RU P.Max	1.13	lb ae/a	С																
	RU P.Max	0.84	lb ae/a	D																4
	RU P.Max	0.75	lb ae/a	Ε																
	Nortron		fl oz/a	CDE																
	Destiny HC		pt/a	CDE																i i
	N-Pak AMS	2.5	% v/v	CDE																
13	Dual Mag		pt/a	В	10	90	60	82	13	11	94	99	99	45	94	99	101	25.1	16.8	733
	Betamix	12	fl oz/a	С																
	Betamix	16	fl oz/a	D																l.
	Betamix		fl oz/a																	
	Nortron	4	fl oz/a	CDE																:
	RU P.Max	1.13	lb ae/a	С																
	RU P.Max	0.84	lb ae/a	D																
	RU P.Max	0.75	lb ae/a	Е																
	Destiny HC	1.5	pt/a	CDE																
	N-Pak AMS	2.5	% v/v	CDE																

 Table 2. Management of glyphosate-resistant waterhemp with soil-applied followed by POST herbicides in Roundup Ready® sugarbeet - Moorhead, MN - 2012 (Stachler).

						Jun	e 15		Jun 30	)		July 2	5 -		Aug	, 29	S	Septem	ber 20	,i
Trt	Treatment		Rate	Appl	Sgbt	Wahe <sup>2</sup>	Colq	Rrpw	Sgbt	Sgbt	Wahe	Colq	Rrpw	Cano	Wahe	Colq	Sgbt	Sgbt	Sgbt	Ext.
No.	Name <sup>1</sup>	Rate	Unit	Code	Inj	Cntl	Cntl	Cntl	Inj	Inj	Cntl	Cntl	Cntl	Cntl	Cntl	Cntl	Stnd	Yield		
										,	%						#/100'		%	lb/A
14	Dual Mag		pt/a	В	8	94	65	84	17	15	97	99	99	50	96	99	97	23.9	16	6531
	Betamix		fl oz/a	С																
	Betamix		fl oz/a	D																
	Betamix		fl oz/a	E																5 10
	Nortron		fl oz/a																	
	Outlook		fl oz/a	С																4
	Outlook		fl oz/a	D																
	RU P.Max		lb ae/a																	
	RU P.Max		lb ae/a																	
	RU P.Max		lb ae/a																	
	Destiny HC		pt/a	CDE																
2	N-Pak AMS		% v/v	CDE																Ì
15	Ro-Neet SB		pt/a	Α	6	64	60	58	5	2	81	99	99	16	73	99	96	25.1	16.3	7102
111	RU P.Max	1.13	lb_ae/a	C																
5	RU P.Max	0.84	lb ae/a	D																
	RU P.Max	0.75	lb ae/a	E																
	Destiny HC	1.5	pt/a	CDE																
	N-Pak AMS	2.5	% v/v	CDE																
16	Ro-Neet SB	4	pt/a	Α	11	75	71	65	10	6	89	99	99	35	84	99	105	24.7	15.9	6696
	RU P.Max	1.13	lb ae/a	С																
	RU P.Max	0.84	lb ae/a	D																,
	RU P.Max	0.75	lb ae/a	E																
	Nortron	4	fl oz/a	CDE																
	Destiny HC	1.5	pt/a	CDE																-
	N-Pak AMS	2.5	% v/v	CDE																
17	Ro-Neet SB	4	pt/a	A	8	76	68	66	15	12	87	99	99	42	83	99	109	25.9	16.8	7610
	Betamix		fl oz/a	С																
	Betamix	16	fl oz/a	D																
	Betamix		fl oz/a	Е																
	Nortron		fl oz/a																	
	RU P.Max		lb ae/a																	i
	RU P.Max		lb ae/a																	
	RU P.Max		lb ae/a																	i.
	Destiny HC		pt/a	CDE																-1
	N-Pak AMS		% v/v				1443													i
18	Ro-Neet SB		pt/a	A	9	72	71	63	17	16	91	99	99	56	85	99	102	22.9	16.3	6521
10	Betamix		fl oz/a		,	12	/1	05	17	10	71	,,	,,	50	05	,,	102	hi hi e s	10.5	0521
	Betamix		fl oz/a	D																
	Betamix		fl oz/a																	
	Nortron		fl oz/a																	3
	Outlook		fl oz/a																	
	Outlook		fl oz/a	D																
	RU P.Max		lb ae/a																	-1
	RU P.Max RU P.Max		lb ae/a																	
	RU P.Max Destiny HC		lb ae/a	E CDE																1
	-		pt/a																	
	N-Pak AMS	2.3	% v/v	UDE																-

Table 2. Management of glyphosate-resistant waterhemp with soil-applied followed by POST herbicides in Roundup Ready® sugarbeet - Moorhead, MN – 2012 (Stachler).

							e 15		Jun 30			July 2			Aug			eptem	ber 20	
	Treatment		Rate			Wahe <sup>2</sup>			Sgbt									Sgbt	v	
No.	Name <sup>1</sup>	Rate	Unit	Code	Inj	Cntl	Cntl	Cntl	Inj		Cntl	Cntl	Cntl	Cntl	Cntl	Cntl				Sucr
										9	•									lb/A
19	Ro-Neet SB		pt/a	A	8	82	77	71	6	3	93	99	99	25	90	99	107	25.6	16.5	7359
	RU P.Max		lb ae/a																	
	RU P.Max		lb ae/a																	
	RU P.Max		lb ae/a																	
	Destiny HC		pt/a	CDE																â
	N-Pak AMS		% v/v		4.4	01			1.7	0	0.5								1 ( 1	6400
20	Ro-Neet SB		pt/a	A	11	81	76	74	11	8	95	99	99	38	86	99	94	23.2	16.1	6439
	RU P.Max		lb ae/a																	
	RU P.Max		lb ae/a																	
	RU P.Max		lb ae/a																	
	Nortron		fl oz/a																	1
	Destiny HC		pt/a	CDE																
	N-Pak AMS		% v/v	CDE					1.6	10								<u> </u>		
	Ro-Neet SB		pt/a	A	11	77	73	69	16	13	89	.99	99	44	81	99	87	24.4	16.1	6826
	Betamix		fl oz/a	C																1
	Betamix		fl oz/a																	
	Betamix		fl oz/a	E																
	Nortron		fl oz/a																	
	RU P.Max		lb ae/a																	
	RU P.Max		lb ae/a																	
	RU P.Max		lb ae/a																	
	Destiny HC		pt/a	CDE																
	N-Pak AMS		% v/v														100			
22	Ro-Neet SB		pt/a	A	11	84	77	71	20	14	96	99	99	62	97	99	109	23.1	16.1	6355
	Betamix		fl oz/a																	
	Betamix		fl oz/a																	:
	Betamix		fl oz/a																	
	Nortron		fl oz/a																	.)
	Outlook		fl oz/a																	,
	Outlook		fl oz/a																	
	RU P.Max		lb ae/a																	
	RU P.Max		lb ae/a								•									
	RU P.Max		lb ae/a																	.4 14
	Destiny HC	1.5	-	CDE																
	N-Pak AMS		% v/v			07	<u> </u>	0.4				00		1		00	104	25.0	16.7	= 100
23	Nortron		pt/a	A	7	95	58	94	8	2	99	99	99	31	99	99	104	25.9	16.5	7439
	RU P.Max		lb ae/a																	
	RU P.Max		lb ae/a																	
	RU P.Max		lb ae/a																	
	Destiny HC		pt/a	CDE																
24	N-Pak AMS		% v/v			04	50	02		-	00	00	00	27	00		110	20.4	17	705
24	Nortron		pt/a	A	9	94	59	92	9	3	99	99	99	36	99	99	112	28.4	16	7856
	RU P.Max		lb ae/a																	
	RU P.Max		lb ae/a																	
	RU P.Max		lb ae/a																	1
	Nortron		fl oz/a																	
	Destiny HC		pt/a	CDE																
	N-Pak AMS	2.5	% v/v	CDE														;		

 Table 2. Management of glyphosate-resistant waterhemp with soil-applied followed by POST herbicides in Roundup Ready® sugarbeet - Moorhead, MN – 2012 (Stachler).

						June			Jun 30			July 2			Aug			Septem	ber 20	)
Trt	Treatment		Rate	Appl	Sgbt	Wahe <sup>2</sup>	Colq	Rrpw	Sgbt	Sgbt	Wahe	Colq	Rrpw	Cano	Wahe	Colq	Sgbt	Sgbt	Sgbt	Ext.
No.	Name <sup>1</sup>	Rate	Unit	Code	Inj	Cntl	Cntl	Cntl	Inj	Inj	Cntl	Cntl	Cntl	Cntl	Cntl	Cntl	Stnd	Yield	Sucr	Sucr
										9	/ <sub>0</sub>						#/100'	ton/A	%	lb/A
25	Nortron		pt/a	Α	6	95	50	88	13	6	95	99	99	63	95	99	130	26.1	16.5	7455
	Betamix	12	fl oz/a	С																d.
	Betamix		fl oz/a	D																
	Betamix		fl oz/a	Е																
	Nortron		fl oz/a																	
	RU P.Max		lb ae/a	С																
	RU P.Max		lb ae/a	D																
	RU P.Max		lb ae/a	Е																4
	Destiny HC		pt/a	CDE																ų.
	N-Pak AMS		% v/v	CDE																
26	Nortron		pt/a	Α	5	90	58	83	17	15	98	99	99	68	96	99	111	24.9	16	6884
1	Betamix		fl oz/a	С																
	Betamix		fl oz/a	D																
	Betamix	24	fl oz/a	Е																
	Nortron		fl oz/a					1												
	Outlook		fl oz/a	С																
	Outlook	10	fl oz/a	D																
	RU P.Max	1.13	lb ae/a	С																þ.
	RU P.Max	0.84	lb ae/a	D																2
	RU P.Max	0.75	lb ae/a	Е																3
	Destiny HC	1.5	pt/a	CDE																
	N-Pak AMS		% v/v	CDE																
27	Nortron	7.5	pt/a	А	9	92	57	93	8	2	97	99	99	36	97	99	115	27.6	16.6	7948
	RU P.Max	1.13	lb ae/a	С																
	RU P.Max	0.84	lb ae/a	D																-
	RU P.Max		lb ae/a	Е																
	Destiny HC	1.5	pt/a	CDE																ų.
	N-Pak AMS	2.5	% v/v	CDE																\$
28	Nortron	7.5	pt/a	Α	6	97	56	93	7	5	99	99	99	54	99	99	105	26	16.4	7375
	RU P.Max	1.13	lb ae/a	С																1
	RU P.Max	0.84	lb ae/a	D																
	RU P.Max	0.75	lb ae/a	E																
	Nortron	4	fl oz/a	CDE																
	Destiny HC	1.5	pt/a	CDE																
	N-Pak AMS	2.5	% v/v	CDE																
29	Nortron	7.5	pt/a	Α	11	98	62	96	17	11	96	99	99	57	93	99	107	24.9	16.1	6870
	Betamix	12	fl oz/a	С																
	Betamix	16	fl oz/a	D																
	Betamix	24	fl oz/a	Е																1
	Nortron	4	fl oz/a	CDE																
	RU P.Max	1.13	lb ae/a	С																
	RU P.Max	0.84	lb ae/a	D																
	RU P.Max	0.75	lb ae/a	Е																
	Destiny HC		pt/a																	
	N-Pak AMS	2.5	% v/v	CDE																

Table 2. Management of glyphosate-resistant waterhemp with soil-applied followed by POST herbicides in Roundup Ready® sugarbeet - Moorhead, MN – 2012 (Stachler).

					Jun	e 15		Jun 30	ł		July 2	5		Aug	, 29	S	Septem	ber 20	)
Trt Treatment		Rate	Appl	Sgbt	Wahe <sup>2</sup>	Colq	Rrpw	Sgbt	Sgbt	Wahe	Colq	Rrpw	Cano	Wahe	Colq	Sgbt	Sgbt	Sgbt	Ext.
No. Name <sup>1</sup>	Rate	Unit	Code	Inj	Cntl	Cntl	Cntl	Inj	Inj	Cntl	Cntl	Cntl	Cntl	Cntl	Cntl	Stnd	Yield	Sucr	Sucr
									9	6						#/100'	ton/A	%	lb/A
30 Nortron	7.5	pt/a	Α	6	95	58	91	17	13	99	99	99	77	99	99	116	24.1	16.3	6744
Betamix	12 :	fl oz/a	С																4
Betamix	16	fl oz/a	D																
Betamix	24 :	fl oz/a	Ε																
Nortron	4 :	fl oz/a	CDE																-
Outlook	14 :	fl oz/a	С																
Outlook	10 :	fl oz/a	D																
RU P.Max	1.131	b ae/a	С																-
RU P.Max	0.841	b ae/a	D																
RU P.Max	0.751	b ae/a	Е																
Destiny HC	1.5	pt/a	CDE																
N-Pak AMS	2.5	% v/v	CDE																
	LS	D 5%		3.4	9.0	11.3	11.8	3.1	5.6	7.0	0.4	0.1	11.4	11.2	0.1	18.6	4.3	NS	1324.5
the contract of		CV %		38	9	16	12	20	53	6	0	0	20	10	0	13	13	4	13.78

Table 2. Management of glyphosate-resistant waterhemp with soil-applied followed by POST herbicides in Roundup Ready® sugarbeet - Moorhead, MN - 2012 (Stachler).

<sup>1</sup>RU P.Max = Roundup PowerMAX; Dual Mag = Dual Magnum; Destiny HC is a HSMOC from Winfield Solutions; R-11 = a NIS from Wilbur-Ellis; NPak = N-Pak AMS (liquid AMS at 3.4 lbs dry AMS/gal of product from Winfield Solutions).

**Management of Glyphosate-Resistant Waterhemp with Soil-Applied Followed by Postemergence Herbicides in Roundup Ready® Sugarbeet – Holloway, MN – 2012** (Stachler). Glyphosate-resistant waterhemp seed from Swift County, MN was spread and shallowly incorporated on April 24. 'Hilleshog 4022 RR' sugarbeet was seeded 1.25 inches deep in 22-inch rows at 60,825 seeds per acre on April 25. Sugarbeet was treated with Tachigaren and Poncho Beta at 45 grams and 5.07 fl oz of product, respectively, per 100,000 seeds. Counter 20G insecticide at 8.9 pounds product per acre was applied in a 5-inch band and drag chain incorporated at planting. Herbicide treatments were applied April 24, 25, May 14, 21, and June 4, 22. All treatments were applied with a bicycle sprayer in 17 gpa spray solution through 8002 XR flat fan nozzles pressurized with CO<sub>2</sub> at 40 psi to the center four rows of six row plots 30 feet in length. Preplant-incorporated treatments were incorporated 1.5 inches deep with an 8-foot 'S-tine' field cultivator equipped with rolling baskets. Quadris was applied in furrow at 9.2 fl oz/A April 25 and broadcast at 16 fl oz/A June 1 to reduce Rhizoctonia root rot. Cercospora leaf spot was controlled with broadcast application of Topsin + Proline at 7.6 + 5 fl oz/A, Headline at 9 fl oz/A, and Inspire XT at 7 fl oz/A on July 2, July 18, and August 13, respectively. Sugarbeet was harvested September 10 from the center two rows of each plot and weighed. Twenty to thirty pounds of sugarbeet roots were collected from each plot and analyzed for quality at American Crystal Sugar Quality Lab, East Grand Forks, MN.

Sugarbeet stand was counted in the center two rows of plots on May 30, July 30, and Sept 10. Sugarbeet injury was evaluated on May 21, 30, June 4, 12, July 7, 17, August 7, and September 5. Waterhemp control was evaluated on May 21, June 4, 12, July 7, 17, August 7, and September 5. All evaluations were a visual estimate of percent fresh weight reduction in the four treated rows compared to the adjacent untreated strip. Experimental design was randomized complete block with 4 replications. Data were analyzed with the ANOVA procedure using Agriculture Research Manager, version 8.4.2 software package.

Application code	A (PPI)	B (PRE)	X	C (2lf sgrbt)	D (14 DAT C)	E (18 DAT D)
Date	April 24	April 25	May 14	May 21	June 4	June 22
Time of Day	1:45 P	3:00 P	12:00 P	1:15 P	2:00 P	12:00 P
Air Temperature (F)	76	77	89	74	72	80
Relative Humidity (%)	36	50	20	30	31	45
Wind Velocity (mph)	3	13	8	10	6	2
Wind Direction	ENE	NW	WSW	SSW	NNE	NW
Soil Temp. (F at 6")	57	58	65	70	72	65
Soil Moisture	Good	Good	Fair	Good	Good	Good
Cloud Cover	20	30	20	85	10	5
Sugarbeet stage (avg)	PPI	PRE	V1(cot.)	V2.2 (2-3 lf)	V5.9 (5-6 lf)	V12.8(12-13lf)
Wahe density $(plants/m^2) - Trt. 1$				16	66	29
Wahe height (avg/range) - Trt. 1				0.12"/0.12-0.25	0.88"/0.12-3	4.6"/0.2-14
Wahe stage (avg/range) – Trt. 1				1 lf/cot4 lf	4.8 lf/cot10 lf	7.5 lf/2-18 lf

 Table 1. Application Information

**Summary:** This location has glyphosate-resistant waterhemp, but at a very low frequency as the mortality of 10 flagged waterhemp plants prior to the first glyphosate application in treatments having glyphosate applied alone was 99%. There were other plants within the plot that survived glyphosate, but not the majority of the flagged plants. The waterhemp density within this trial was fairly low as indicated above and was variable.

On May 21st, at the time of the first POST application, Dual (1 pt/A), Dual (1.5 pt/A), Ro-Neet (4 pt/A), Ro-Neet (5.3 pt/A), Nortron (4 pt/A), and Nortron (7.5 pt/A) averaged 55, 60, 64, 74, 75, and 81% waterhemp control, respectively. Rainfall did not occur quickly enough after application to completely activate these soil-applied herbicides at this location causing reduced control with at least Dual and Nortron. On September 5<sup>th</sup>, only Roundup PowerMAX applied alone three times and Betamix plus Nortron plus Roundup controlled fewer than 90% waterhemp. All remaining treatments provided greater than 90% waterhemp control with most providing 99% control, especially all treatments containing Outlook as a layby.

Sugarbeet root yield was reduced compared to the weed-free check for five of the six treatments containing Outlook. All remaining treatments provided similar root yield to the weed-free check, except Nortron (6 pt/A) followed by Roundup plus Nortron and Ro-Neet (5.3 pt/A) followed by Betamix plus Nortron plus Roundup.

			-		y 21	station to an operation of		у 7			mber 5	Distance of the local	Colors and a second	nber 10	0
	Treatment	Rate	Appl	Sgbt	Wahe <sup>2</sup>	Sgbt	Wahe	Colq	Rrpw	Sgbt	Wahe		Suga	arbeet	:
No.	Name <sup>1</sup>	Rate Unit	Code	Inju	Cntl	Inju	Cntl	Cntl	Cntl	Inju	Cntl	Stand	Yield	Sucr	Ext Su
								%				#/100'	ton/A	%	lb/A
	Non-treated														i
1	Check			2	0	0	0	0	0	0	- 0	185	15.8	18.3	5210
2	Weed-free			2	90	3	97	99	99	2	98	202	26.3	18.6	8814
	RU PMax	1.125 lb ae/a	Х												
	RU PMax	0.75 lb ae/a													4
	R-11	0.25 % v/v													
	NPak	2.5 % v/v													
3	RU PMax	1.125 lb ae/a	С	1	0	0	96	99	99	0	89	204	26.3	18.5	8831
	RU PMax	0.844 lb ae/a	D												
	RU PMax	0.75 lb ae/a	E												
	Destiny HC		CDE												
	NPak	2.5 % v/v	CDE												
4	RU PMax	1.125 lb ae/a	С	1	0	4	98	99	99	2	95	207	25.3	18.3	8396
	RU PMax	0.844 lb ae/a	D												
÷ ;	RU PMax	0.75 lb ae/a	Е												
	Nortron	4 fl oz/a													
	Destiny HC		CDE												
	NPak	2.5 % v/v	CDE												. 1
5	Betamix	12 fl oz/a	С	0	0	7	96	99	99	1	87	207	25.9	18.6	8796
	Betamix	16 fl oz/a	D												
	Betamix	24 fl oz/a	E												
	Nortron	4 fl oz/a													
	RU PMax	1.125 lb ae/a	C												i
	RU PMax	0.844 lb ae/a	D												
	RU PMax	0.75 lb ae/a	E												
	Destiny HC	~	CDE												1
_	NPak	2.5 % v/v													
6	Betamix	12 fl oz/a	C	2	0	10	99	99	99	5	99	204	25.2	18.7	8576
	Betamix	16 fl oz/a	D												
	Betamix	24 fl oz/a	E												
	Nortron	4 fl oz/a													
	Outlook	14 fl oz/a	C												-
	Outlook	10 fl oz/a	D												i.
	RU PMax	1.125 lb ae/a	C												1
	RU PMax	0.844 lb ae/a	D												
	RU PMax	0.75 lb ae/a	E												-
	Destiny HC	1.5 pt/a	CDE												
	NPak	2.5 % v/v	CDE												
7	Dual Mag	1 pt/a	B	1	41	4	98	99	99	0	95	207	26.1	19.1	9076
	RU PMax	1.125 lb ae/a	C												
	RU PMax	0.844  lb ae/a	DE												
	RU PMax	0.75  lb ae/a													e.
	Destiny HC		CDE												
	NPak Dual Mar	2.5 % v/v	CDE		50					4	<u></u>	100	01.5	10.0	
8	Dual Mag	1 pt/a	B	3	58	8	99	99	99	1	91	199	24.6	18.8	8312
	RU PMax	1.125 lb ae/a	C												
	RU PMax	0.844 lb ae/a	D												4
	RU PMax	0.75 lb ae/a	E												3
	Nortron	4 fl oz/a													
	Destiny HC	1.5 pt/a	CDE												
	NPak	2.5 % v/v	CDE												!

Table 2. Management of glyphosate-resistant waterhemp with soil-applied followed by POST herbicides in Roundup Ready® sugarbeet – Holloway, MN – 2012 (Stachler).

Ready® sugarbeet – Holloway, MN – 2012 (Stachler).															
				May 21			July 7			September 5			September 10		
Trt	Treatment	Rate	Appl	Sgbt	Wahe <sup>2</sup>	Sgbt	Wahe	Colq	Rrpw	Sgbt	Wahe		Suga	arbeet	li
No	. Name <sup>1</sup>	Rate Unit	Code	Inju	Cntl	Inju	Cntl	Cntl	Cntl	Inju	Cntl	Stand	Yield	Sucr	Ext Suc
							ĝ	Vo			****	#/100'	ton/A	%	lb/A
9	Dual Mag	1 pt/a	В	1	61	9	99	99	99	3	99	206	25.9	18.7	8770
	Betamix	12 fl oz/a	С												
	Betamix	16 fl oz/a	D												
	Betamix	24 fl oz/a	E												
	Nortron	4 fl oz/a													
	RU PMax	1.125 lb ae/a	С												;
	RU PMax	0.844 lb ae/a	D												1
	RU PMax	0.75 lb ae/a	E												
	Destiny HC	1.5 pt/a	CDE												
	NPak	2.5 % v/v	CDE												
10	Dual Mag	1 pt/a	B	1	60	12	99	99	99	1	99	205	23.3	18.9	7896
	Betamix	12 fl oz/a	С												
	Betamix	16 fl oz/a	D												
	Betamix	24 fl oz/a	E												
	Nortron	4 fl oz/a	CDE												
	Outlook	14 fl oz/a	C												i
	Outlook	10  fl oz/a	D												li di
	RU PMax	1.125 lb ae/a	C												
	RU PMax	0.844  lb ae/a	DE												
	RU PMax Destiny HC	0.75  lb ae/a	E CDE												
	NPak	1.5 pt/a 2.5 % v/v	CDE												
11	Dual Mag	$\frac{2.5 76 \sqrt{7}}{1.5 \text{ pt/a}}$	B	3	60	5	98	99	99	1	97	205	26.8	18.3	8875
11	RU PMax	1.3  pt/a 1.125 lb ae/a	C	5	00	5	90	33	33	1	91	203	20.0	10.5	00/5
	RU PMax	0.844  lb ae/a	D												
	RU PMax	0.75  lb ae/a	Ē												
	Destiny HC	1.5 pt/a	CDE												
	NPak	2.5% v/v	CDE												
12	Dual Mag	1.5 pt/a	B	3	55	5	98	99	99	3	98	203	25.3	18.1	8307
	RU PMax	1.125 lb ae/a	С							_				~ ~ ~ ~	
	RU PMax	0.844 lb ae/a	D												
	RU PMax	0.75 lb ae/a	Ε												
	Nortron	4 fl oz/a	CDE												
	Destiny HC	1.5 pt/a	CDE												
	NPak	2.5 % v/v	CDE												1
13	Dual Mag	1.5 pt/a	В	2	68	13	99	99	99	4	99	191	23.8	18.0	7822
	Betamix	12 fl oz/a	С												đ
	Betamix	16 fl oz/a	D												4
	Betamix	24 fl oz/a	E												
	Nortron	4 fl oz/a													
	RU PMax	1.125 lb ae/a	С												
	RU PMax	0.844 lb ae/a	D												-
	RU PMax	0.75 lb ae/a	E												
	Destiny HC	1.5 pt/a	CDE												ł
	NPak	2.5 % v/v	CDE												

Table 2. Management of glyphosate-resistant waterhemp with soil-applied followed by POST herbicides in Roundup Ready® sugarbeet – Holloway, MN – 2012 (Stachler).

Re	ady® sugarb	eet – Hollowa	ay, MN			er).			** = 1 m		•				E
				y 21		July 7			Septer	mber 5		September 10			
	Treatment	Rate	Appl	Sgbt		Sgbt	Wahe		Rrpw	Sgbt	Wahe		Suga	arbeet	
<u>No</u>	. Name <sup>1</sup>	Rate Unit	Code	Inju	Cntl	Inju	Cntl	Cntl	Cntl	Inju	Cntl	Stand	Yield	Sucr	Ext Suc
14	DualMaa	1 5	ъ		 E (	10		%		4		#/100'	ton/A	%	lb/A
14	Dual Mag Betamix	1.5 pt/a 12 fl oz/a	B C	1	56	10	99	99	99	4	99	208	23.0	19.1	7975
	Betamix	12  fl  oz/a 16  fl  oz/a	D												
	Betamix	24  fl oz/a	E												1
	Nortron	4  fl oz/a													1
	Outlook	14  fl oz/a	CDE												
	Outlook	10  fl oz/a	Ď												
	RU PMax	1.125 lb ae/a	Č												
	RU PMax	0.844 lb ae/a	D												j.
	RU PMax	0.75 lb ae/a													4 4 5
	Destiny HC	1.5 pt/a	CDE												d.
	NPak	2.5% v/v	CDE												2
15	Ro-Neet SB	4 pt/a	Α	2	51	4	99	99	99	1	95	201	25.2	18.9	8636
	RU PMax	1.125 lb ae/a	С												
	RU PMax	0.844 lb ae/a	D												
	RU PMax	0.75 lb ae/a	Е												
	Destiny HC	1.5 pt/a	CDE												
	NPak	2.5 % v/v	CDE												.!
16	Ro-Neet SB		A	3	76	8	99	99	99	3	99	204	26.3	18.3	8714
	RU PMax	1.125 lb ae/a	C												Ĵ.
	RU PMax	0.844 lb ae/a	D												н С
	RU PMax	0.75 lb ae/a	E												200
	Nortron	4  fl oz/a													
	Destiny HC NPak	1.5  pt/a	CDE												
17	Ro-Neet SB	$\frac{2.5\% \text{ v/v}}{4 \text{ pt/a}}$	CDE A	4	60	9	99	99	99	4	99	194	24.4	10.0	0050
17	Betamix	12  fl oz/a	Ċ	4	00	9	77	99	99	4	99	194	24.4	18.6	8258
	Betamix	16 fl oz/a	D												:
	Betamix	24  fl oz/a	E												
	Nortron	4  fl oz/a													
	RU PMax	1.125 lb ae/a	С												4
	RU PMax	0.844 lb ae/a	D												
	RU PMax	0.75 lb ae/a	Е												
	Destiny HC	1.5 pt/a	CDE												
	NPak	2.5% v/v	CDE												
18		4 pt/a	Α	3	70	15	99	99	99	5	99	197	22.9	18.9	7829
	Betamix	12 fl oz/a	С												4
	Betamix	16 fl oz/a	D												
	Betamix	24 fl oz/a	E												
	Nortron	4 fl oz/a													ų.
	Outlook	14  fl oz/a	C												
	Outlook	10  fl oz/a	D												
	RU PMax RU PMax	1.125 lb ae/a 0.844 lb ae/a	C												
	RU PMax	0.844  lb ae/a 0.75 lb ae/a	D E												
	Destiny HC	1.5 pt/a	CDE												
	NPak	2.5% v/v	CDE												
19		$\frac{2.376 \sqrt{7}}{5.3 \text{ pt/a}}$	A	2	65	4	97	99	99	4	97	214	25.3	18.5	8450
17	RU PMax	1.125  lb ae/a	Ĉ	4	05	7	11	27	77	+	71	414	40.0	10.3	0430
	RU PMax	0.844  lb ae/a	D												-
	RU PMax	0.75  lb ae/a	Ē												
	Destiny HC	1.5 pt/a	CDE												4
	NPak	2.5 % v/v	CDE												ï

Table 2. Management of glyphosate-resistant waterhemp with soil-applied followed by POST herbicides in Roundup Ready® sugarbeet – Holloway, MN – 2012 (Stachler).

-

Re	ady® sugarb	eet – Hollowa	iy, MN	- 2012	l (Stachl	er).								4m	
			May 21 July 7						Septe	mber 5	September 10				
	Treatment	Rate	Appl		Wahe <sup>2</sup>	Sgbt		Colq	Rrpw	Sgbt	Wahe		Sug	arbeet	
<u>No</u>	. Name <sup>1</sup>	Rate Unit	Code	Inju	Cntl	Inju	Cntl	Cntl	Cntl	Inju	Cntl	Stand	Yield	Sucr	Ext Suc
20	Do Most CD	5.2 mt/m				· 4		%				#/100'	ton/A	%	lb/A
20	Ro-Neet SB RU PMax		A	8	76	4	99	99	99	2	98	199	24.3	19.0	8407
	RU PMax	1.125 lb ae/a 0.844 lb ae/a	C D												
	RU PMax	0.844  lb ae/a 0.75 lb ae/a	Б Е												i;
	Nortron	$4 \mathrm{fl} \mathrm{oz/a}$													4
	Destiny HC	1.5 pt/a	CDE												1
	NPak	2.5 % v/v	CDE												
$\frac{1}{21}$	Ro-Neet SB	$\frac{2.3 / 6 \sqrt{7}}{5.3 \text{ pt/a}}$	A	5	75	12	99	99	99	1	96	199	23.0	18.6	7709
21	Betamix	12  fl oz/a	Ċ	5	75	12	77	22	22	1	90	199	25.0	10.0	1709
	Betamix	16  fl oz/a	D												
	Betamix	24  fl oz/a	E												
	Nortron	$4 \mathrm{fl} \mathrm{oz/a}$	CDE												
	RU PMax	1.125 lb ae/a	C												19 20
	RU PMax	0.844  lb ae/a	Ď												14 17 - 1 - 1
1.1	RU PMax	0.75  lb ae/a	Ē												
	Destiny HC	1.5 pt/a	CDE												
	NPak	2.5 % v/v	CDE												
22		5.3 pt/a	A	7	80	11	99	99	99	1	99	192	21.8	19.0	7498
	Betamix	12 fl oz/a	Ĉ		00						,,,	172	21.0	17.0	7420
	Betamix	16 fl oz/a	D												
	Betamix	24 fl oz/a	E												
	Nortron	4 fl oz/a													1- 1-
	Outlook	14 fl oz/a	С												
	Outlook	10 fl oz/a	D												4
	RU PMax	1.125 lb ae/a	С												
	RU PMax	0.844 lb ae/a	D												
	RU PMax	0.75 lb ae/a	Е												1
	Destiny HC	1.5 pt/a	CDE												
<u> </u>	NPak	2.5 % v/v	CDE												
23	Nortron	6 pt/a	Α	3	67	5	99	99	99	2	95	201	23.3	19.0	8073
	RU PMax	1.125 lb ae/a	С												
	RU PMax	0.844 lb ae/a	D												
	RU PMax	0.75 lb ae/a	Е												
	Destiny HC	1.5 pt/a	CDE												
	NPak	2.5 % v/v	CDE												
24	Nortron	6 pt/a	А	4	83	6	99	99	99	1	96	205	24.6	18.6	8287
	RU PMax	1.125 lb ae/a	С												
	RU PMax	0.844 lb ae/a	D												
	RU PMax	0.75 lb ae/a	E												4
	Nortron	4 fl oz/a													
	Destiny HC	1.5 pt/a	CDE												ł.
25	NPak	2.5% v/v	CDE												1
25	Nortron	6 pt/a	A	3	73	11	99	99	99	2	99	203	24.2	18.5	8079
	Betamix	12  fl oz/a	C												
	Betamix	16 fl oz/a	D												
	Betamix	24  fl oz/a	E												
	Nortron	4  fl oz/a													
	RU PMax	1.125  lb ae/a	C												
	RU PMax	0.844 lb ae/a	D												
	RU PMax	0.75  lb ae/a	E												
	Destiny HC	1.5  pt/a	CDE												4
	NPak	2.5 % v/v	CDE												

Table 2. Management of glyphosate-resistant waterhemp with soil-applied followed by POST herbicides in Roundup Ready® sugarbeet – Holloway, MN – 2012 (Stachler).
Rea	ady® sugarb	eet – Hollowa	iy, MN	- 2012	c (Stachl	er).									1
					y 21		Jul	у 7		Septe	mber 5		Septer	nber 1	0
Trt	Treatment	Rate	Appl	Sgbt	Wahe <sup>2</sup>	Sgbt	Wahe	Colq	Rrpw	Sgbt	Wahe		Suga	arbeet	:1
No.	Name <sup>1</sup>	Rate Unit	Code	Inju	Cntl	Inju	Cntl	Cntl	Cntl	Inju	Cntl	Stand	Yield	Sucr	Ext Suc
							q	%				#/100'	ton/A	%	lb/A
26	Nortron	6 pt/a	Α	3	74	11	99	99	99	1	99	197	22.7	18.7	7760
	Betamix	12 fl oz/a	С												
	Betamix	16 fl oz/a	D												
	Betamix	24 fl oz/a	Е												
	Nortron	4 fl oz/a	CDE												1
	Outlook	14 fl oz/a	С												i)
	Outlook	10 fl oz/a	D												J
	RU PMax	1.125 lb ae/a	С												1
	RU PMax	0.844 lb ae/a	D												di la construcción de la
	RU PMax	0.75 lb ae/a	Е												÷
	Destiny HC	1.5 pt/a	CDE												
	NPak	2.5 % v/v	CDE												
27	Nortron	7.5 pt/a	Α	4	71	5	99	99	99	1	99	213	25.6	18.8	8783
	RU PMax	1.125 Îb ae/a	С												
	RU PMax	0.844 lb ae/a	D												i.
	RU PMax	0.75 lb ae/a	Е												
	Destiny HC	1.5 pt/a	CDE												j.
	NPak	2.5 % v/v	CDE												
28	Nortron	7.5 pt/a	Α	5	85	4	99	99	99	1	97	207	24.9	18.5	8369
	RU PMax	1.125 lb ae/a	С												
	RU PMax	0.844 lb ae/a	D												
	RU PMax	0.75 lb ae/a	Е												
	Nortron	4 fl oz/a													
	Destiny HC		CDE												1
	NPak	2.5 % v/v	CDE												1
29	Nortron	7.5 pt/a	A	4	83	10	99	99	99	1	98	203	24.6	18.7	8352
	Betamix	12 fl oz/a	С												
	Betamix	16 fl oz/a	D												-
	Betamix	24 fl oz/a	Е												
	Nortron	4 fl oz/a													
	RU PMax	1.125 lb ae/a	С												
	RU PMax	0.844 lb ae/a	D												
	RU PMax	0.75 lb ae/a	Е												
	Destiny HC	1.5 pt/a	CDE												
	NPak	2.5 % v/v	CDE												i.
30	Nortron	7.5 pt/a	Α	3	86	12	99	99	99	3	99	217	25.0	18.6	8478
	Betamix	12 fl oz/a	С									-			
	Betamix	16 fl oz/a	D												i.
	Betamix	24 fl oz/a	Е												
	Nortron	4 fl oz/a	CDE												
	Outlook	14 fl oz/a	С												:
	Outlook	10 fl oz/a	D												i. t
	RU PMax	1.125 lb ae/a	С												1
	RU PMax	0.844 lb ae/a	D												
	RU PMax	0.75 lb ae/a	E												1
	Destiny HC	1.5 pt/a	CDE												
	NPak	2.5 % v/v	CDE												4
		LSD 5%		3.0	20.6	4.2	2.0	0.1	0.1	2.6	5.4	NS	2.86	NS	962
		CV %		78	25	41	2	0	0	102	4	7	8	3	8
1													-	-	

Table 2. Management of glyphosate-resistant waterhemp with soil-applied followed by POST herbicides in Roundup Ready® sugarbeet – Holloway, MN – 2012 (Stachler).

 $^{1}$ RU PMax = Roundup PowerMAX; Dual Mag = Dual Magnum; Destiny HC is a HSMOC from Winfield Solutions; R-11 = a NIS from Wilbur-Ellis; NPak = N-Pak AMS (liquid AMS at 3.4 lbs dry AMS/gal of product from Winfield Solutions).

 $^{2}$ Wahe = Glyphosate-resistant waterhemp.

Management of Glyphosate-Resistant Waterhemp with Cinch, Dual Magnum, and Willowood Ethofumesate Applied to Roundup Ready® Sugarbeet – Moorhead, MN – 2012 (Stachler). A seedbed was prepared using an 11-foot Kongskilde S-tine field cultivator equipped with rolling baskets. Glyphosate-resistant waterhemp from Richland County, ND was spread on May 11. Due to exceptionally dry conditions, sugarbeet was not seeded until May 25. 'Crystal 985 RR' sugarbeet was seeded 1.25 inches deep in 22-inch rows at 60,825 seeds per acre. Sugarbeet was treated with Tachigaren and Poncho Beta at 45 grams and 5.07 fl oz of product, respectively, per 100,000 seeds. Counter 20G insecticide was applied at 8.9 pounds/A in a 5-inch band and drag chain incorporated at planting. Herbicide treatments were applied May 25, June 15 & 28, and July 12. All treatments were applied with a bicycle sprayer in 17 gpa spray solution through 8002 XR flat fan nozzles pressurized with CO<sub>2</sub> at 40 psi to the center four rows of six row plots 30 feet in length. Quadris at 16 fl oz/A was broadcast June 12 & 26 to control Rhizoctonia root rot. Cercospora leaf spot was controlled with Headline at 9 fl oz/A and Inspire XT at 7 fl oz/A broadcast July 18 and August 7, respectively. Sugarbeet was harvested September 20 from the center two rows of each plot and weighed. Twenty to thirty pounds of sugarbeet roots were collected from each plot and analyzed for quality at American Crystal Sugar Quality Lab, East Grand Forks, MN.

Sugarbeet stand was counted in the center two rows of plots on June 28, July 19, and Sept 20. Sugarbeet injury was evaluated on June 15, 21, & 30, July 5, 13, & 16, and Aug 9. Waterhemp, common lambsquarters, and redroot pigweed control was evaluated on June 15 & 30, July 13, and Aug 9 & 30. All evaluations were a visual estimate of percent fresh weight reduction in the four treated rows compared to the adjacent untreated strip. Experimental design was randomized complete block with 4 replications. Data were analyzed with the ANOVA procedure of Agriculture Research Manager, version 8.4.2 software package.

Application code	A (PRE)	B (2 lf sgrbt)	C (13 DAT B)	D (14 DAT C)
Date	May 25	June 15	June 28	July 12
Time of Day	1:00 P	3:35 P	2:45 P	12:00 P
Air Temperature (F)	62	78	87	81
Relative Humidity (%)	41	44	20	59
Wind Velocity (mph)	6	2	10	6
Wind Direction	SW 3	N	N	SSE
Soil Temp. (F at 6")	50	70	78	79
Soil Moisture	Good	Good	Fair	Dry
Cloud Cover	100	30	5	25
Sugarbeet stage (avg)	PRE	V2.5 (2-3 lf)	V8 (8 lf)	V12 (12 lf)
Wahe height (avg/range) – Trt. 2		0.37"/0.125-1"	0.32"/0.125-1"	2"/1-3"
Wahe density (plants/m <sup>2</sup> ) – Trt. 2	-	10	. 1	0.5
Wahe height (avg/range) – Trt. 11	-	0.125"/0.125-0.25"	0.5"/0.25-0.75"	-
Wahe density (plants/m <sup>2</sup> ) – Trt. 11	-	0.25	0.25	
Colq height (avg/range) – Trt. 2	_	0.67"/0.125-2"	0.58"/0.25-1"	N/A
Colq density (plants/m <sup>2</sup> ) – Trt. 2	<b>-</b> ,	56.5	2.3	0 .
Rrpw density (plants/m <sup>2</sup> ) – Trt. 2	-	24	3.8	0

## Table 1. Application Information

**Summary:** This location has glyphosate-resistant waterhemp based upon 55% control of waterhemp following three glyphosate applications in another trial at this location. This is evidenced by the poor waterhemp control (48%) in treatments 8 and 9 because these plants are also resistant to Betamix based upon greenhouse testing. Ethofumesate applied POST three times can provide greater than 91% control of glyphosate-resistant waterhemp. Cinch and Dual Magnum applied PRE control glyphosate-resistant waterhemp very effectively (94% control) at the time of the first POST application. No differences were observed between Cinch and Dual Magnum.

Little injury was observed from any treatment and no sugarbeet root yield or extractable sucrose differences were observed with any treatment.

						June 15	,		Jul	y 13		A	ugust 3	30	Aug 29
Trt			Rate	Applic.							Vol.				Wahe
No.	Treatment <sup>1</sup>	Rate	Unit	Code	Wahe <sup>2</sup>	Colq	Rrpw	Wahe			Canola	Wahe	Colq	Rrpw	plants
1	Ethofumesate	0.75	lb ai/A	BCD	0	0	0	90	% 99	control 99	68	92	99	99	/plot 1
	R.U. P. Max	1.125	lb ae/A	В											
	R.U. P. Max	0.844	lb ae/A	С											
	R.U. P. Max	0.75	lb ae/A												
	Destiny HC	1.5	pt/A	BCD											
	N Pak-AMS	2.5	% v/v	BCD											1
2	Ethofumesate	1.0	lb ai/A	BCD	0	0	0	92	99	99	58	97	99	99	1
	R.U. P. Max	1.125	lb ae/A	В											
	R.U. P. Max		lb ae/A												:
	R.U. P. Max	0.75	lb ae/A												
	Destiny HC	1.5	pt/A	BCD											
	N Pak-AMS	2.5	% v/v	BCD											
3	Ethofumesate		Ib ai/A		0	0	0	92	99	99	65	97	99	99	1
_	R.U. P. Max		lb ae/A		-										
	R.U. P. Max		lb ae/A												
	Ethofumesate		lb ai/A												-
	R.U. P. Max	0.75	lb ae/A												1
	Destiny HC	1.5	pt/A	BCD											
	N Pak-AMS	2.5	% v/v	BCD											1
4	Betamix	12	fl oz/A		0	0	0	92	99	99	70	96	99	99	0
•	Ethofumesate		lb ai/A		Ũ	Ŭ	Ũ	52	55	55	70	50	55	55	<b>.</b>
	Cinch	1.5	pt/A	B											
	R.U. P. Max		lb ae/A												
	Betamix	24	fl oz/A												1
	Cinch	1.0	pt/A	C											
	R.U. P. Max		lb ae/A												
	Ethofumesate		lb ai/A												
	R.U. P. Max	0.75	lb ae/A												
	Destiny HC	1.5	pt/A	BCD											
	N Pak-AMS	2.5	% v/v	BCD											
5	Betamix	12	fl oz/A		0	0	0	92	99	99	62	96	99	99	0
-	Ethofumesate		lb ai/A		-	-	-								
	Cinch	1.5	pt/A	В											4
	R.U. P. Max		lb ae/A												2
	Betamix	24	fl oz/A												
	Cinch	1.0	pt/A	С											4
	R.U. P. Max		lb ae/A												
	Ethofumesate		lb ai/A												: 
	R.U. P. Max	0.75	lb ae/A												
	R-11	0.25	% v/v	BCD											
	N Pak-AMS	2.5	% v/v	BCD											
6	Dual Magnum		pt/A	A	94	60	84	97	99	99	32	94	99	99	1
	R.U. P. Max		lb ae/A												
	R.U. P. Max		lb ae/A												
	N Pak-AMS	2.5	% v/v												
7	Cinch	1.5	pt/A	A	94	64	85	97	99	99	23	93	97	99	1
	R.U. P. Max		lb ae/A					- •					~ •		-
	R.U. P. Max		lb ae/A												1

Table 2. Management of Glyphosate-Resistant Waterhemp with Cinch, Dual Magnum, and Willowood Ethofumesate Applied to Roundup Ready<sup>®</sup> Sugarbeet – Moorhead, MN – 2012 (Stachler).

						lune 15	5		July	/ 13		A	ugust 3	0	Aug 29
Trt			Rate	Applic.							Vol.				Wahe
No.	Treatment <sup>1</sup>	Rate	Unit	Code	Wahe <sup>2</sup>	Colq	Rrpw	Wahe	Colq	Rrpw	Canola	Wahe	Colq	Rrpw	plants
									%	control					/plot
8	Dual Magnum	1.5	pt/A	В	0	0	0	71	99	99	39	48	99	99	26
	Betamix	12	fl oz/A	В											
	R.U. P. Max	1.125	lb ae/A	В											
	Dual Magnum	1.0	pt/A	С											
	Betamix	24	fl oz/A												
	R.U. P. Max	0.844	lb ae/A	. C											
	Destiny HC	1.5	pt/A	BC											
	N Pak-AMS	2.5	% v/v	BC											
9	Cinch	1.5	pt/A	В	0	0	0	76	99	99	35	48	99	99	27,
	Betamix	12	fl oz/A												
	R.U. P. Max		lb ae/A	В											
	Dual Magnum		pt/A	С											
	Betamix	24	fl oz/A												
	R.U. P. Max		lb ae/A												1
	Destiny HC	1.5	pt/A	BC											
	N Pak-AMS	2.5	<u>% v/v</u>	BC											
10	Dual Magnum		pt/A	AB	94	58	85	93	99	99	49	88	99	99	2
	Betamix	12	fl oz/A												
	R.U. P. Max		lb ae/A												-
	Dual Magnum		pt/A	C											I
	Betamix	24	fl oz/A												
	R.U. P. Max		lb ae/A												
	Destiny HC	1.5	pt/A	BC											
44	N Pak-AMS	2.5	<u>% v/v</u>	BC	0.4						27	- 00			
11	Cinch	1.5	pt/A	AB	94	60	86	98	99	99	37	99	99	99	0
	Betamix R.U. P. Max	12	fl oz/A lb ae/A												
			pt/A												
	Dual Magnum Betamix	24	fl oz/A	C											į.
	R.U. P. Max		lb ae/A												~
	Destiny HC	1.5	pt/A	BC											
	N Pak-AMS	2.5	γγΑ % v/v	BC											
12	Dual Magnum		pt/A	A	93	58	86	95	99	99	32	94	99	99	1
12	Betamix	12	fl oz/A		33	50	80	33	55	99	22	34	55	55	± :
	R.U. P. Max		lb ae/A												
	Dual Magnum		pt/A	C											
	Betamix	24	fl oz/A												j.
	R.U. P. Max		lb ae/A												
	Destiny HC	1.5	pt/A	BC											5. 
	N Pak-AMS	2.5	% v/v	BC											1
13	Cinch	1.5	pt/A	Α	93	58	87	97	99	99	27	97	99	99	1
10	Betamix	12	fl oz/A				01	57							-
	R.U. P. Max		lb ae/A												
	Dual Magnum		pt/A	C											
	Betamix	24	fl oz/A												
	R.U. P. Max		lb ae/A												
	Destiny HC	1.5	pt/A	BC											
	N Pak-AMS	2.5	% v/v	BC							-				7
	LSD 5%	6			2.1	5.8	4.3	5.3	NS	NS	22.9	7.3	0.9	NS	13.8
	CV %				3	15	8	4	0	0	33	6	1	0	205

Table 2. Management of Glyphosate-Resistant Waterhemp with Cinch, Dual Magnum, and Willowood Ethofumesate Applied to Roundup Ready<sup>®</sup> Sugarbeet – Moorhead, MN – 2012 (Stachler).

<sup>1</sup>R.U.P. Max = Roundup PowerMAX; Ethofumesate = Ethofumesate 4SC from Willowood; Destiny HC is a HSMOC from Winfield Solutions; R-11 = a NIS from Wilbur-Ellis; N Pak-AMS = N-Pak AMS (liquid AMS at 3.4 lbs dry AMS/gal of product from Winfield Solutions).

 $^{2}$ Wahe = Glyphosate-resistant waterhemp.

Jugarneet	woomeau,	14114 2012 (308	ciner <sub>i</sub> ,					
	June 15	July 13	Aug 9	June 28		Septen	nber 20	
Trt No.	Sgbt	Sgbt	Sgbt	Sgbt Stand	Sgbt Stand	Sugar Conc.	Yield	Ext. Sucrose
		-percent injury-		no/	100'	%	Ton/A	lb/A
1	0	11	6	100	104	16.8	20.8	6231
2	0	10	7	116	120	16.7	25.3	7349
3	0	14	9	114	126	16.9	24.7	7333
4	0	13	9	121	131	16.9	24.1	7146
5	0	13	9	115	120	17.3	22.5	6854
6	7	5	3	110	114	16.4	27.4	7714
7	7	4	4	107	123	16.8	27.6	7958
8	0	10	7	111	122	17.1	23.7	7082
Э	0	12	8	118	128	17.1	24.5	7293
10	9	13	10	107	116	17.1	24.9	7530
11	. 7	9	6	117	130	17.3	25.3	7729
12	8	9	7	112	124	17.4	25.6	7879
13	8	6	3	112	126	16.5	26.6	7578
LSD 5%	1.0	5.1	NS	NS	NS	NS	NS	NS
CV %	20	35	53	12	12	3	8	9

Table 3. Sugarbeet Responses from Cinch, Dual Magnum, and Willowood Ethofumesate Applied to Roundup Ready® Sugarbeet – Moorhead, MN – 2012 (Stachler).

**Management of Glyphosate-Resistant Waterhemp with Soil-Applied Followed by Postemergence Herbicides at Various Times in Roundup Ready® Sugarbeet – Holloway, MN – 2012** (Stachler). Glyphosate-resistant waterhemp seed from Swift County, MN was spread and shallowly incorporated on April 24. 'Hilleshog 4022 RR' sugarbeet was seeded 1.25 inches deep in 22-inch rows at 60,825 seeds/A on April 25. Sugarbeet was treated with Tachigaren and Poncho Beta at 45 grams and 5.07 fl oz of product, respectively, per 100,000 seeds. Counter 20G insecticide was applied at 8.9 pounds/A in a 5-inch band and drag chain incorporated at planting. Herbicide treatments were applied April 24, May 14, 22, June 4, 25, and July 9. All treatments were applied with a bicycle sprayer in 17 gpa spray solution through 8002 XR flat fan nozzles pressurized with  $CO_2$  at 40 psi to the center four rows of six row plots 30 feet in length. Preplant-incorporated treatments were incorporated 1.5 inches deep with an 8-foot 'S-tine' field cultivator equipped with rolling baskets. Quadris was applied in furrow at 9.2 fl oz/A April 25 and broadcast at 16 fl oz/A June 1 to control Rhizoctonia root rot. Cercospora leaf spot was controlled with Topsin + Proline at 7.6 + 5 fl oz/A, Headline at 9 fl oz/A, and Inspire XT at 7 fl oz/A broadcast July 2, July 18, and August 13, respectively. Sugarbeet was harvested September 10 from the center two rows of each plot and weighed. Twenty to thirty pounds of sugarbeet roots were collected from each plot and analyzed for quality at American Crystal Sugar Quality Lab, East Grand Forks, MN.

Sugarbeet stand was counted in the center two rows of plots on May 30 and September 10. Sugarbeet injury was evaluated on May 22, 30, June 12, July 7, 17, and August 7. Waterhemp and common lambsquarters control were evaluated on May 22, July 7, 17, Aug 7, and September 5. All evaluations were a visual estimate of percent fresh weight reduction in the four treated rows compared to the adjacent untreated strip. Experimental design was randomized complete block with 4 replications. Data were analyzed with the ANOVA procedure of Agriculture Research Manager, version 8.4.2 software package.

Application code	A (PPI)	B (V1)	C (V2 sgrbt)	D (13 DAT C)	E (> V8) &	G (14 DAT
					F (21 DAT D)	<b>E</b> )
Date	April 24	May 14	May 22	June 4	June 25	July 9
Time of Day	1:45 P	12:00 P	1:00 P	4:15 P	2:00 P	12:30 P
Air Temperature (F)	76	89	87	84	77	80
Relative Humidity (%)	36	20	31	20	37	44
Wind Velocity (mph)	3	8	15	11	6	4
Wind Direction	ENE	WSW	S	NNW	NE	ENE
Soil Temp. (F at 6")	57	65	70	75	67	78
Soil Moisture	Good	Fair	Good	Good	Good	Dry
Cloud Cover	20	20	60	30	30	10
Sugarbeet stage (avg)	PPI	V1 (cot.)	V2.5 (2-3 lf)	V6.5 (6-7 lf)	V12 (12 lf)	V15 (15 lf)
Wahe height (avg/range) – Trt.2	-	0.12"/0.1-0.2	_	-	2.8"/0.2-8.5	3.6"/1-10.3
Wahe density (plants/m <sup>2</sup> ) – Trt. 2	-	5	0	-	27	6
Colq height (avg/range) – Trt. 2	-	0.3"/0.1-0.5	0.3"/0.2-0.5	-	4.7"/1.7-8.5	5"/ N/A
Colq density (plants/m <sup>2</sup> ) – Trt. 2	-	0.75	0.25	-	1.25	0.25
Wahe height (avg/range) – Trt.7	-	<b>-</b> * .	0.12"/0.1-0.3	0.12"/0.1-0.5	1.2"/0.1-9.5	-
Wahe density (plants/m <sup>2</sup> ) – Trt. 7	-	-	3.75	11.25	19.5	<b>-</b> .:
Colq height (avg/range) – Trt. 7	-	_	0.5"/0.2-0.75	0.3"/0.2-0.5	_	-
Colq density (plants/m <sup>2</sup> ) – Trt. 7	-	_	1.25	1.75	<b>_</b>	- :

Table 1. Application Information

**Summary:** This location has glyphosate-resistant waterhemp as demonstrated by the waterhemp control in treatments 1, 2, and 7 containing glyphosate only. The density of waterhemp and lambsquarters was low in this trial. The more times glyphosate was applied (Trt.1 vs. Trt.2) and the smaller the waterhemp was at the time of each application (Trt.7 vs. Trt.2, the greater the waterhemp control near sugarbeet harvest. Outlook improved waterhemp control when split-applied for most treatments compared to no Outlook. Two applications of Outlook controlled more waterhemp than a single application of Outlook because the single application was delayed too long. Preplant-incorporated Nortron improved waterhemp control for most treatments, but especially compared to glyphosate alone. No treatment caused much injury late into the season. No treatment reduced sugarbeet root yield or extractable sucrose.

var	ious times in Ro	oundu	p Read	ly® sug	garbe										-	-	
						May 2			July 7	and account of the second s		ptembe			Septer	of the second	0
	Treatment		Rate		-	Wahe <sup>2</sup>										arbeet	
<u>No.</u>	Name <sup>1</sup>	Rate	Unit	Code	Inju	Cntl	Cntl	Inju		Cntl	Inju	Cntl	Cntl				Ext Sucr
									%					#/100'		%	lb/A
1	RU PowerMax				10	97	98	4	72	97	1	55	95	201	23.4	19.0	8143
	RU PowerMax																j.
	Destiny HC	1.5	pt/a	BCE													1° 14
	NPak	2.5	% v/v	BCE													
2	RU PowerMax				3	98	98	4	74	99	2	68	97	213	22.6	19.1	7856
	RU PowerMax																
	Destiny HC	1.5		BCEG													
	NPak	2.5	<u>% v/v</u>											• • • •		10.1	
3	Betamix	12	fl oz/a		10	98	98	5	78	99	3	65	97	208	21.6	19.1	7512
	Betamix	16	fl oz/a														· ,
	Nortron	4	fl oz/a														3
	RU PowerMax																
	RU PowerMax		lb ae/a														1
	Destiny HC	1.5	pt/a	BCE													4
	NPak	2.5	<u>% v/v</u>	BCE	10					.00						10.0	
4	Betamix	12	fl oz/a		10	98	. 98	8	98	99	5	95	99	202	21.0	18.9	7211
	Betamix	16	fl oz/a														
	Nortron	4	fl oz/a														
	RU PowerMax																
	RU PowerMax		lb ae/a														
	Destiny HC	1.5	pt/a	BCE													
	NPak	2.5	% v/v	BCE													
	Outlook	14	fl oz/a														.1
5	Outlook	10	$\frac{fl oz/a}{fl oz/a}$		9	97	98	9	99	99	5	99	99	195	19.9	10.1	6028
С	Betamix	12 16	fl oz/a	_	9	97	98	9	99	99	3	99	99	195	19.9	19.1	6938
	Betamix Betamix	24	fl oz/a														
	Nortron	24 4		BCEG	1												1
	RU PowerMax	-			Γ												
	RU PowerMax																
	Destiny HC	1.5	pt/a	BCEG	ŕ												i.
	NPak	2.5		BCEG													
	Outlook	2.5 14	fl oz/a		•												4
	Outlook	10	fl oz/a														4
6	Betamix	12	$\frac{1102/a}{\text{fl oz}/a}$		10	98	98	7	83	99	4	78	99	207	21.0	19.1	7258
v	Betamix	16	fl oz/a		10	20	20	,	05	,,	-1	70	,,	201	1,0	17,1	1230
	Betamix	24	fl oz/a														-
	Nortron	4		BCEG	ì												
	RU PowerMax	-															4
	RU PowerMax																ł.
	Destiny HC	1.5	pt/a	BCEG	ŕ												-
	NPak	2.5		BCEG													i
	Outlook	21	fl oz/a		-												
7	RU PowerMax				0	0	0	2	86	99	2	76	99	201	22.7	19.0	7844
	RU PowerMax				v	5	v	-	50	//	-			-01	,	-2.0	
	RU PowerMax			-													
	Destiny HC	1.5	pt/a	CDF													
	NPak	2.5	% v/v														

Table 2. Management of glyphosate-resistant waterhemp with soil-applied followed by postemergence herbicides at various times in Roundup Ready® sugarbeet - Holloway, MN - 2012 (Stachler).

var	ious times in R	oundu	ip Read	y® su	garbe			MN -	2012	- (Stacl		•					1
						May 2			July 7			ptembe			Septer	nber 1	0 .!
	Treatment		Rate	Appl	Sgbt	Wahe <sup>2</sup>	Colq	Sgbt	Wahe	Colq	Sgbt	Wahe	Colq		Sug	arbeet	
<u>No.</u>	Name <sup>1</sup>	Rate	Unit	Code	Inju	Cntl	Cntl	Inju		Cntl	Inju	Cntl	Cntl			Sucr	Ext Sucr
									%					#/100'		%	lb/A
8	Betamix	12	fl oz/a	С	2	0	0	5	95	99	2	90	99	213	23.6	18.8	8009
	Betamix	16	fl oz/a	D													
	Betamix	24	fl oz/a	F													
	Nortron	4	fl oz/a														
	RU PowerMax																4
	RU PowerMax																
	RU PowerMax																đ
	Destiny HC	1.5	pt/a	CDF													1
	NPak	2.5	<u>% v/v</u>	CDF		-					-						
9	Betamix	12	fl oz/a	C	0	0	0	11	99	99	4	99	99	207	22.4	18.6	7516
	Betamix	16	fl oz/a	D													1
	Betamix	24	fl oz/a	F													
	Nortron	4	fl oz/a														1
	Outlook	14	fl oz/a	C												•	1
	Outlook	10	fl oz/a	D													
	RU PowerMax																
	RU PowerMax																1
	RU PowerMax																
	Destiny HC	1.5	pt/a	CDF													
10	NPak	2.5	<u>% v/v</u>	CDF			-										
10	Betamix	12	fl oz/a	С	0	0	0	7	99	99	1	93	99	209	22.3	18.7	7617
	Betamix	16	fl oz/a														
	Betamix	24	fl oz/a	F													14 14
	Nortron	4	fl oz/a														-
	RU PowerMax																1
	RU PowerMax																
	RU PowerMax																
	Outlook	21	fl oz/a	D													
	Destiny HC	1.5	pt/a	CDF													
11	NPak	2.5	% v/v	CDF		0.0			07			07	07	100	22.5	10.1	
11	Nortron	7.5	pt/a	A	6	98	98	6	97	-99	4	87	97	199	22.5	19.1	7779
	RU PowerMax																
	RU PowerMax																
	Destiny HC	1.5	pt/a	BCE													
10	NPak	2.5	% v/v	BCE	0	00	00	A	00	00	A	0.2	00	205	02.4	10.0	0110
12	Nortron	7.5	pt/a	A	8	98	98	4	98	99	4	92	99	205	23.4	19.0	8119
	RU PowerMax																
	RU PowerMax		lb ae/a														
	Destiny HC	1.5		BCEG													
12	NPak	2.5	% v/v				00	10				01	07	201	20.7	10.1	<b>71</b> 50
13	Nortron	7.5	pt/a	A	16	98	98	13	98	99	4	91	97	201	20.7	19.1	7159
	Betamix	12	fl oz/a														
	Betamix	16	fl oz/a														
	Nortron	4	fl oz/a														
	RU PowerMax																
	RU PowerMax																
	Destiny HC	1.5	pt/a	BCE													
	NPak	2.5	% v/v	BCE													1

Table 2. Management of glyphosate-resistant waterhemp with soil-applied followed by postemergence herbicides a	at
various times in Roundup Ready® sugarbeet - Holloway, MN - 2012 (Stachler).	

			-			et - Holl May 22			July 7			ptembe	er 5		Septer	nber 1	0
Trt	Treatment		Rate	Appl	Sgbt	Wahe <sup>2</sup>		olyport managements		Contraction of the local data and the local data an		Wahe			and the second se	arbeet	
No.	Name <sup>1</sup>	Rate				Cntl	Cntl										Ext Suc
									%					#/100'	ton/A	%	lb/A
14	Nortron	7.5	pt/a	Α	13	98	98	8	99	99	5	99	99	194	23.1	19.0	8033
	Betamix	12	fl oz/a			20	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	v	,,,	,,,	0	//	//	171	43.1	17.0	0055
	Betamix	16	fl oz/a														1
	Nortron	4	fl oz/a														
	RU PowerMax																
	RU PowerMax		lb ae/a														
	Destiny HC	1.5	pt/a	BCE													
	NPak	2.5	% v/v	BCE													P
	Outlook	14	fl oz/a														4
	Outlook	10	fl oz/a	-													ł
15	Nortron	7.5	pt/a	<u>A</u>	17	98	98	7	99	99	4	99	99	201	22.2	18.8	7670
15	Betamix	12	fl oz/a		17	70	90	/	"	77	4	33	77	201	<i>44.4</i>	10.0	7672
	Betamix	16	fl oz/a														1
	Betamix	24	fl oz/a														
	Nortron	2 <del>4</del> 4		BCEG													
	RU PowerMax																
	RU PowerMax		lb ae/a														i G
	Destiny HC	1.5		BCEG													÷
	NPak	2.5		BCEG													4
	Outlook	14	fl oz/a	-													
10	Outlook	10	fl oz/a		1.4			10									
16	Nortron	7.5	pt/a	A	14	98	98	12	98	99	4	96	99	205	22.2	18.9	7640
	Betamix	12	fl oz/a														÷
	Betamix	16	fl oz/a														
	Betamix	24	fl oz/a	G													
	Nortron	4		BCEG													
	RU PowerMax																1
	RU PowerMax																1
	Destiny HC	1.5	-	BCEG													
	NPak	2.5		BCEG													
	Outlook	21	fl oz/a	E													:
17	Nortron	7.5	pt/a	Α	8	98	89	4	98	99	1	93	99	205	24.3	19.0	8383
	RU PowerMax																
	RU PowerMax																1
	RU PowerMax		lb ae/a	F													e e
	Destiny HC	1.5	pt/a	CDF													
	NPak	2.5	% v/v	CDF													.i
18	Nortron	7.5	pt/a	А	6	98	89	5	99	99	1	97	99	199	21.9	18.9	7489
	Betamix	12	fl oz/a	С													
	Betamix	16	fl oz/a	D													
	Betamix	24	fl oz/a	F													.1 1
	Nortron	4	fl oz/a	CDF													
	RU PowerMax	1.125	lb ae/a	С													
	RU PowerMax	0.844	lb ae/a	D													÷
	RU PowerMax																
	Destiny HC	1.5	pt/a	CDF													
	Dostiny IIC	1.0	put														

Table 2. Management of glyphosate-resistant waterhemp with soil-applied followed by postemergence herbicides at various times in Roundup Ready® sugarbeet - Holloway, MN - 2012 (Stachler).

						May 22	2		July 7		Se	ptembe	er 5		Septer	nber 1	0 ;
Trt	Treatment		Rate	Appl	Sgbt	Wahe <sup>2</sup>	Colq	Sgbt	Wahe	Colq	Sgbt	Wahe	Colq		Sug	arbeet	
No.	Name <sup>1</sup>	Rate	Unit	Code	Inju	Cntl	Cntl	Inju	Cntl	Cntl	Inju	Cntl	Cntl	Stand	Yield	Sucr	Ext Sucr
									%					#/100'	ton/A	%	lb/A
19	Nortron	7.5	pt/a	Α	8	98	89	7	99	99	2	99	99	207	22.8	18.9	7873
	Betamix	12	fl oz/a	С													
	Betamix	16	fl oz/a	D													:
	Betamix	24	fl oz/a	F													
	Nortron	4	fl oz/a	CDF													
	Outlook	14	fl oz/a	С													
	Outlook	10	fl oz/a	D													
	RU PowerMax	1.125	5 lb ae/a	С													
	RU PowerMax	0.844	Ib ae/a	D													
	RU PowerMax	0.75	lb ae/a	F													1
	Destiny HC	1.5	pt/a	CDF													1
	NPak	2.5	% v/v	CDF													1
	1	L	SD 5%		4.6	0.8	5.5	4.8	6.2	0.9	NS	8.2	NS	NS	NS	NS	NS
			CV%		41	1	5	52	5	1	83	7	2	6	9	2	9

Table 2. Management of glyphosate-resistant waterhemp with soil-applied followed by postemergence herbicides at various times in Roundup Ready® sugarbeet - Holloway, MN - 2012 (Stachler).

<sup>1</sup>RU PowerMax = Roundup PowerMAX; Destiny HC is a HSMOC from Winfield Solutions; NPak = N-Pak AMS (liquid AMS at 3.4 lbs dry AMS/gal of product from Winfield Solutions). <sup>2</sup>Wahe = Glyphosate-resistant waterhemp. Weed Resistance Management Systems in Roundup Ready® Sugarbeet – Moorhead. MN – 2012 (Stachler). A seedbed was prepared using an 11-foot Kongskilde S-tine field cultivator equipped with rolling baskets. Glyphosate-resistant waterhemp from Richland County, ND was spread on May 11. Due to exceptionally dry conditions, sugarbeet was not seeded until May 25. 'Crystal 985 RR' sugarbeet was seeded 1.25 inches deep in 22-inch rows at 60,825 seeds per acre. Sugarbeet was treated with Tachigaren and Poncho Beta at 45 grams and 5.07 fl oz of product, respectively, per 100,000 seeds. Counter 20G insecticide was applied at 8.9 pounds/A in a 5-inch band and drag chain-incorporated at planting. Herbicide treatments were applied May 25, June 8, 21, and 28. All treatments were applied with a bicycle sprayer in 17 gpa spray solution through 8002 XR flat fan nozzles pressurized with CO<sub>2</sub> at 40 psi to the center four rows of six row plots 30 feet in length. Preplant-incorporated treatments were incorporated 2 inches deep with an 8-foot John Deere 'S-tine' field cultivator equipped with a spring-tooth harrow. Quadris at 16 fl oz/A was broadcast June 12 & 26 to control Rhizoctonia root rot. Cercospora leaf spot was controlled with Headline at 9 fl oz/A and Inspire XT at 7 fl oz/A broadcast July 18 and August 7, respectively. Sugarbeet was harvested September 20 from the center two rows of each plot and weighed. Twenty to thirty pounds of sugarbeet roots were collected from each plot and analyzed for quality at American Crystal Sugar Quality Lab, East Grand Forks, MN.

Sugarbeet stand was counted in the center two rows of plots on June 28, July 19, and Sept 20. Sugarbeet injury was evaluated on June 21, 30, July 5 and 25. Waterhemp, common lambsquarters, and redroot pigweed control was evaluated on June 21, 30, July 13, 25, and Aug 30. All evaluations were a visual estimate of percent fresh weight reduction in the four treated rows compared to the adjacent untreated strip. Experimental design was randomized complete block with 4 replications. Data were analyzed with the ANOVA procedure of Agriculture Research Manager, version 8.4.2 software package.

Application code	A (PPI)	B (1-2 lf sgrbt)	C (4 lf sgrbt)	D (6 lf sgrbt)
Date	May 25	June 8	June 21	June 28
Time of Day	10:50 A	9:30 A	4:20 P	3:30 P
Air Temperature (F)	60	70	78	89
Relative Humidity (%)	41	55	40	21
Wind Velocity (mph)	3	10	7	5
Wind Direction	NW	WNW	NW	NW
Soil Temp. (F at 6")	50	70	68	72
Soil Moisture	Good	Fair	Wet	Fair
Cloud Cover	70	10	35	5
Sugarbeet stage (avg)	PPI	Cot.	V4.5 (4-5 lf)	V7.5 (7-8 lf)
Wahe height (avg/range) – Trt. 17	-		1"/0.25-3.5"	-
Wahe density (plants/m <sup>2</sup> ) – Trt. 17	-	. –	4	•
Colq height (avg/range) – Trt. 17	<b>-</b> .	-	1.54"/0.25-4.5"	-
Colq density (plants/m <sup>2</sup> ) – Trt. 17	-	<b>-</b> .	27	-
Rrpw height (avg/range) – Trt. 17	-	-	1.58"/0.25-5"	-
Rrpw density (plants/m <sup>2</sup> ) – Trt. 17	-	_	17.5	-

#### Table 1. Application Information

**Summary:** Roundup PowerMAX applied twice at 0.75 lb ae/A controlled only 63% of waterhemp on August 30, confirming the presence of glyphosate-resistant waterhemp at this location. Only Nortron followed by Betamix plus Roundup PowerMAX, Eptam plus Ro-Neet followed by Roundup PowerMAX plus/minus Warrant, and Nortron followed by Roundup PowerMAX controlled waterhemp at least 90%.

Treatment 12 provided the greatest extractable sucrose. Treatments 3, 5, 7, 8, 9, 10, and 11 had similar extractable sucrose to treatment 12 while all other treatments had reduced extractable sucrose compared to treatment 12.

Trt	Treatment		Rate	Applic.		June 21			July 13		2	August 3	0
No.	Name <sup>1</sup>	Rate	Unit	Code	Wahe <sup>2</sup>	Colq	Rrpw	Wahe	Colq	Rrpw	Wahe	Colq	Rrpw
								perce	ent contr	·ol			
1	R.U. P. Max	0.75	lb ae/A	BD		<b>-</b> -						_	1
	N Pak-AMS	5	% v/v	BD	78	84	99	73	90	99	63	92	99
2	R.U. P. Max	1.13	lb ae/A										
	R.U. P. Max	0.75	lb ae/A										1
	N Pak-AMS	5	% v/v	BD	81	88	99	76	92	99	66	92	99
3	Eptam	2	lb ai/A	А									
	Ro-Neet	2.5	lb ai/A	А									4
	R.U. P. Max	1.3	lb ae/A	С									
	N Pak-AMS	5	% v/v	С	94	86	81	96	92	97	96	86	96
4	Emptam	2	lb ai/A	А									
	Ro-Neet	2.5	lb ai/A	А									
	Warrant	1.13	lb ai/A	С									
	R.U. P. Max	1.13	lb ae/A	С									
	N Pak-AMS	5	% v/v	С	95	87	80	99	98	99	97	96	99
5	Nortron	3.75	lb ai/A	A									
	R.U. P. Max	1.13	lb ae/A	С									1
	N Pak-AMS	5	% v/v	С	96	59	88	95	94	99	90	88	99
6	R.U. P. Max	0.75	lb ae/A	BD									
	N Pak-AMS	5	% v/v	BD									
	Stinger	0.25	lb ae/A	D	79	88	99	73	92	99	66	95	99
7	R.U. P. Max	0.75	lb ae/A	BD					•				
	N Pak-AMS	5	% v/v	BD									1
	Outlook	0.98	lb ai/A	D	50	50	93	65	95	99	63	99	99
8	R.U. P. Max	0.75	lb ae/A	BD									
-	N Pak-AMS	5	% v/v	BD									
	Warrant	1.13	lb ai/A	D	75	88	99	70	93	99	66	93	99
9	R.U. P. Max	0.75	lb ae/A	BD	,,,			,,,		55	.00		
5	N Pak-AMS	5	% v/v	BD									1
	Dual Magnum	1.6	lb ai/A	D	76	86	99	73	96	99	68	97	99
10	R.U. P. Max	1.13	Ib ae/A	В	70	00		13			- 00	57	
10	N Pak-AMS	5	% v/v	BD				•					:
	Outlook	0.98	lb ai/A	D									
	R.U. P. Max	0.75	lb ae/A		83	92	99	84	98	99	70	99	99
11	R.U. P. Max	1.13	Ib ae/A		00	36	33	04	90	23	70	33	33
тт	N Pak-AMS	1.15 5	10 ae/A % v/v	в BD									
	Warrant	5 1.13	% v/v lb ai/A										1
	R.U. P. Max	0.75	lb al/A		85	91	00	74	01	00	6F	02	00
12					65	91	99	74	91	99	65	93	99
12	R.U. P. Max	1.13 F	lb ae/A										
	N Pak-AMS	5	% v/v	BD									-
	Dual Magnum	1.6	lb ai/A	D	03	02		00	07	66	60	<u>.</u>	
40	R.U. P. Max	0.75	lb ae/A		83	92	99	83	97	99	69	94	99
13	R.U. P. Max	1.13	lb ae/A										-
	N Pak-AMS	5	% v/v	BD									1
	Stinger	0.25	lb ae/A		_	_							
	R.U. P. Max	0.75	lb ae/A		74	90	99	66	96	99	64	97	99
14	Betamix	0.6	lb ai/A	В									
	R.U. P. Max	0.75	lb ae/A										
	N Pak-AMS	5	% v/v	BD	93	97	99	88	94	99	78	93	99

 Table 2. Weed Control using Weed Resistance Management Systems in Roundup Ready® Sugarbeet – Moorhead, MN –

 2012 (Stachler)

Trt	Treatment		Rate	Applic.		June 21			July 13		ļ	August 3	0
No.	Name <sup>1</sup>	Rate	Unit	Code	Wahe <sup>2</sup>	Colq	Rrpw	Wahe	Colq	Rrpw	Wahe	Colq	Rrpw
								perce	ent cont	rol			
15	Betamix	0.6	lb ai/A	В									
	R.U. P. Max	1.13	lb ae/A	В									-
	R.U. P. Max	0.75	lb ae/A	D									
	N Pak-AMS	5	% v/v	BD	94	97	99	93	98	99	85	94	99 <sup>°</sup>
16	Nortron	3.75	lb ai/A	A									-1
	Betamix	0.6	lb ai/A	В									
	R.U. P. Max	1.13	lb ae/A	В									
	R.U. P. Max	0.75	lb ae/A	D									1.1
	N Pak-AMS	5	% v/v	BD	98	99	99	99	99	99	99	99	99
17	Untreated Che	eck			0	0	0	0	0	0	0	0	0
	LSD	5%			8.3	10.9	5.6	8.7	5.6	1.6	10.6	9.1	2.4
	CV	1%			7	9	4	6	4	1	7	6	2

Table 2. Weed Control using Weed Resistance Management Systems in Roundup Ready<sup>®</sup> Sugarbeet – Moorhead, MN – 2012 (Stachler)

<sup>1</sup>R.U. P. Max = Roundup PowerMAX; N Pak-AMS = N-Pak AMS (liquid AMS at 3.4 lbs dry AMS/gal of product from Winfield Solutions).

 $^{2}$ Wahe = Glyphosate-resistant waterhemp.

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Table 3. Sugarbeet Responses using Weed Resistance Management Systems in Roundup Ready<sup>®</sup> Sugarbeet – Moorhead, MN – 2012 (Stachler).

	June 21	July 13	July 19		Septen	nber 20	
Trt No.	Sgbt	Sgbt	Sgbt Stand	Sgbt Stand	Sugar Conc.	Yield	Ext. Sucros
	% inju	ıry	no/	100'	%	Ton/A	lb/A
1	1	1	111	122	17.5	24.4	7253
2	2	3	121	112	17.7	21.9	6609
3	10	5	118	125	16.6	25.5	7383
4	14	11	124	117	17.1	23.5	6957
5	4	4	140	140	17.0	26.7	7900
6	5	17	130	133	17.6	24.2	7291
7	5	4	141	131	17.0	25.3	7432
8	1	6	138	135	17.0	25.8	7604
9	5	6	123	118	17.3	25.2	7542
10	4	5	133	133	17.3	24.9	7502
11	4	5	121	118	17.4	23.6	7337
12	3	7	139	138	17.5	26.5	8183
13	6	17	126	131	17.6	22.5	6963
14	17	8	124	126	16.5	24.3	6782
15	25	10	112	106	17.7	22.1	6947
16	23	9	91	85	17.8	21.3	6653
17	0	0	110	109	17.6	6.5	1978
LSD 5%	6.8	3.9	19.1	21.8	NS	2.74	852
CV %	63	40	11	13	4	8	9

<u>Management of Glyphosate-Resistant Waterhemp with POST Herbicides in an Oat Cover Crop in Roundup</u> <u>Ready® Sugarbeet – Holloway, MN – 2012</u> (Stachler). 'Souris' oat at 1.5 bu/A and glyphosate-resistant waterhemp from Swift County, MN was spread on April 24. Waterhemp and oat were incorporated 0.5 inches deep using an 11-foot Kongskilde S-tine field cultivator equipped with rolling baskets. 'Hilleshog 4022 RR' sugarbeet was seeded 1.25 inches deep in 22-inch rows at 60,825 seeds/A on April 25. Sugarbeet was treated with Tachigaren and Poncho Beta at 45 grams and 5.1 fl oz of product, respectively, per 100,000 seeds. Counter 20G insecticide at 8.9 lbs/A was applied in a 5-inch band and drag chain incorporated at planting. Herbicide treatments were applied May 14, 22, and June 4, 25. All treatments were applied with a bicycle sprayer in 17 gpa spray solution through 8002 XR flat fan nozzles pressurized with  $CO_2$  at 40 psi to the center four rows of six row plots 30 feet in length. Select was applied to treatments 1 and 8 on June 4 to oat that inadvertently was spread to these plots. Quadris was applied in-furrow at 9.2 fl oz/A and broadcast at 16 fl oz/A April 25 & June 1, respectively to control Rhizoctonia root rot. Cercospora leaf spot was controlled with Topsin + Proline at 7.6 + 5 fl oz/A, Headline at 9 fl oz/A, and Inspire XT at 7 fl oz/A broadcast July 2, July 18, and August 7, respectively. Sugarbeet was harvested September 10 from the center two rows of each plot and weighed. Twenty to thirty pounds of sugarbeet roots were collected from each plot and analyzed for quality at American Crystal Sugar Quality Lab, East Grand Forks, MN.

Sugarbeet stand was counted in the center two rows of plots on September 10. Sugarbeet injury was evaluated on May 30, June 7, and August 7. Waterhemp control was evaluated on July 7, August 7, and September 10. All evaluations were a visual estimate of percent fresh weight reduction in the four treated rows compared to the adjacent untreated strip. Experimental design was randomized complete block with 4 replications. Data were analyzed with the ANOVA procedure of Agriculture Research Manager, version 8.4.2 software package.

Application code	X	A (V2 sgrbt)	B (13 DAT A)	C (21 DAT B)
Date	May 14	May 22	June 4	June 25
Time of Day	12:00 P	3:00 P	3:15 P	4:00 P
Air Temperature (F)	89	87	80	78
Relative Humidity (%)	20	29	18	35
Wind Velocity (mph)	8	21	12	7
Wind Direction	WSW	S	NNE	SE
Soil Temp. (F at 6")	65	70	65	65
Soil Moisture	Fair	Good	Good	Good
Cloud Cover	20	60	10	20
Sugarbeet stage (avg)	V1 (cot2 lf)	V 2.5 (2-3 lf)	V6.3 (6-7 lf)	V11 (11 lf)
Wahe density (plants/ $m^2$ ) – Trt. 1	-	16.6	63	-
Wahe height (avg/range) - Trt. 1	_	0.2" / 0.1-0.5"	1.1" / 0.1-4.5"	_ ::
Wahe stage (avg/range) – Trt. 1	-	2 lf / cot5 lf	4.8 lf / cot12 lf	-

#### **Table 1. Application Information**

#### Summary:

This location has glyphosate-resistant waterhemp, but it is at a very low frequency at this time even with seeding additional glyphosate-resistant waterhemp. See other 2012 trials at this location for a better description of the frequency of resistance.

At the time of the first POST application, May  $22^{nd}$ , the oat cover crop only reduced waterhemp density by one plant/m<sup>2</sup> (data not shown), however on July 7<sup>th</sup> the oat cover crop alone (untreated check with oat) visually controlled 69% of waterhemp compared to the untreated check without oat.

The addition of Outlook usually improved waterhemp control for each of the rate structures of Betamix used. When using POST only herbicides to manage glyphosate-resistant waterhemp in Roundup Ready sugarbeet, Outlook should be included.

The addition of an oat cover crop with the use of herbicides (Trt. 5 vs. 8) and the use of conventional rates of Betamix compared to the mid-rate program did not improve waterhemp control. One reason the Betamix may not have improved control is due to the presence of a biotype resistant to Betamix and glyphosate, although this has not been proven in this population, but has in other populations.

No herbicide treatment reduced sugarbeet root yield or extractable sucrose compared to the weed-free check in this trial, only the non-treated checks reduced sugarbeet root yield and extractable sucrose.

				May 30		ly 7		ust 7			ptembe	r 10	-į
	Treatment	Rate	Appl	Sgbt	· ·	Wahe <sup>2</sup>	Sgbt	Wahe		-	Sgbt	Sgbt	Sgbt
No.	Name <sup>1</sup>	RateUnit	Code	Inju	Inju	Cntl	Inju	Cntl	Cntl	Stand		Sucr	Ext Su
				ant pat wit distant in her her her			%			#/100'	ton/A	%	lb/A
1	Non-trt Check-no oat			0	0	0	0	0	0	174	12.6	18.2	4214
2	Non-trtCheck-with oat			0	0	69	0	-	-	150	10.1	17.9	3286
3	Weed-free Ck with oat			1	5	89	3	83	92	195	24.8	18.6	8325
	RU PowerMax	1.1251b ae/a											:
	RU PowerMax	0.751b ae/a	ABC										1
	R-11	0.25% v/v	XABC										
	NPak	2.5% v/v	XABC										-
1	Betamix	12fl oz/a	А	5	5	92	4	87	84	196	23.4	18.9	7943
	Betamix	16fl oz/a	В										
	Betamix	24fl oz/a	С										
	Nortron	4fl oz/a	ABC										
	RU PowerMax	1.1251b ae/a	А										
	RU PowerMax	0.8441b ae/a	В										
	RU PowerMax	0.751b ae/a	С										
	Destiny HC	1.5pt/a	ABC										i. E
	NPak	2.5% v/v	ABC										4
5	Betamix	12fl oz/a	A	9	7	98	3	97	94	205	24.8	18.3	8213
	Betamix	16fl oz/a	В										
	Betamix	24 fl oz/a	С										-
	Nortron	4fl oz/a	ABC										
	Outlook	14fl oz/a	А										
	Outlook	10fl oz/a	В										
	RU PowerMax	1.1251b ae/a	А										
	RU PowerMax	0.8441b ae/a	В										
	RU PowerMax	0.751b ae/a	С										
	Destiny HC	1.5pt/a	ABC										-
	NPak	2.5% v/v	ABC										
5	Betamix	1.5 pt/a	A	6	12	93	4	88	82	192	22.8	18.6	7674
	Betamix	2pt/a	В										:
	Betamix	3pt/a	С										i
	Nortron	0.33pt/a	А										
	Nortron	0.5pt/a	В										
	RU PowerMax	1.125lb ae/a	Α										
	RU PowerMax	0.8441b ae/a	В										
	RU PowerMax	0.751b ae/a	С										
	NPak	2.5% v/v	ABC										
7	Betamix	1.5 pt/a	A	7	10	96	4	92	87	205	24.3	19.2	8462
	Betamix	2pt/a	в						- /				
	Betamix	3 pt/a	Č.										4
	Nortron	0.33 pt/a	A										
	Nortron	0.5 pt/a 0.5 pt/a	B										4
	RU PowerMax	1.125lb ae/a	A										1
	RU PowerMax	0.844lb ae/a	B										
	RU PowerMax	0.34410  ac/a 0.751b ae/a	C										
	Destiny HC	1.5pt/a	ABC										
		1	/ 11/1 /										

Table 2. Management of glyphosate-resistant waterhemp with POST herbicides in an oat cover crop in Roundup Ready® sugarbeet – Holloway, MN – 2012 (Stachler).

				May 30		ly 7	-	ust 7		Se	eptembe	r 10	1
	Treatment	Rate	Appl	Sgbt	Sgbt	Wahe <sup>2</sup>	Sgbt	Wahe	Wahe	Sgbt	Sgbt	Sgbt	Sgbt
No.	Name <sup>1</sup>	RateUnit	Code	Inju	Inju	Cntl	Inju	Cntl	Cntl	Stand	Yield	Sucr	Ext Su
				<b>W W W</b> all all all press			%			#/100'	ton/A	%	lb/A
8	No Oats			3	6	99	3	97	97	205	25.1	18.7	8444
	Betamix	12fl oz/a	Α										
	Betamix	16fl oz/a	В										
	Betamix	24fl oz/a	С										
	Nortron	4fl oz/a	ABC										
	Outlook	14fl oz/a	А										
	Outlook	10fl oz/a	В										
	RU PowerMax	1.125lb ae/a	А										
	RU PowerMax	0.8441b ae/a	В										
	RU PowerMax	0.75lb ae/a	С										:
	Destiny HC	1.5pt/a	ABC										
	NPak	2.5% v/v	ABC										4
9.	Betamix	1.5 pt/a	A	7	11	99	5	97	91	201	23.8	18.9	8168
	Betamix	2pt/a	В										
	Betamix	3 pt/a	С										
	Nortron	0.33pt/a	А										:
	Nortron	0.5pt/a	В										
	Outlook	14fl oz/a	А										-
	Outlook	10fl oz/a	в										4
	RU PowerMax	1.125lb ae/a	А										
	RU PowerMax	0.8441b ae/a	в										
	RU PowerMax	0.751b ae/a	С.,										
	NPak	2.5% v/v	ABC										
10	Betamix	1.5pt/a	A	9	8	98	2	99	95	209	22.3	18.6	7520
	Betamix	2pt/a	В		•		-		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	200		10.0	1020
	Betamix	3 pt/a	C										
	Nortron	0.33  pt/a	A										3
	Nortron	0.5 pt/a	В										
	Outlook	14fl oz/a	Ā										
	Outlook	10fl oz/a	В										
	RU PowerMax	1.125lb ae/a	Ă										
	RU PowerMax	0.8441b  ae/a	В										
	RU PowerMax	0.75 lb ae/a	Č										
	Destiny HC	1.5pt/a	ABC										
	NPak	2.5% v/v	ABC										4
11	Betamix	2.5 / t / t 2pt/a	A	7	13	96	3	88	84	207	23.0	18.6	7689
. 1	Betamix	3 pt/a	B	,	13	90	3	00	04	207	23.0	10.0	10,09
	Betamix	3 pt/a 3 pt/a	Б С										
	Nortron	0.33pt/a	A										
	Nortron	0.55pt/a 0.5pt/a	A B										-
	RU PowerMax	1.125lb ae/a											
	RU PowerMax RU PowerMax		A D										
		0.8441b ae/a	B										-
	RU PowerMax	0.75 lb ae/a	C										
	NPak	2.5% v/v	ABC										

Table 2. Management of glyphosate-resistant waterhemp with POST herbicides in an oat cover crop in Roundup Ready® sugarbeet – Holloway, MN – 2012 (Stachler).

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				May 30		ly 7		ust 7		Se	ptembe	r 10	
	Treatment	Rate	Appl	Sgbt	Sgbt	Wahe <sup>2</sup>	Sgbt	Wahe	Wahe	Sgbt	Sgbt	Sgbt	Sgbt
No.	Name <sup>1</sup>	RateUnit	Code	Inju	Inju	Cntl	Inju	Cntl	Cntl	Stand	Yield	Sucr	Ext Su
						q	%			#/100'	ton/A	%	lb/A
12	Betamix	2 pt/a	Α	8	13	94	3	88	83	201	22.1	18.8	7518
	Betamix	3 pt/a	в										
	Betamix	3pt/a	С										
	Nortron	0.33 pt/a	Α										
	Nortron	0.5 pt/a	в										
	RU PowerMax	1.125lb ae/a	А										
	RU PowerMax	0.8441b ae/a	в										
	RU PowerMax	0.75lb ae/a	$\mathbf{C}^{-1}$										
	Destiny HC	1.5 pt/a	ABC										
	NPak	2.5% v/v	ABC										1
13	Betamix	2pt/a	A	7	13	98	3	94	94	208	23.3	18.5	7775
	Betamix	3pt/a	в										
	Betamix	3pt/a	С										
	Nortron	0.33pt/a	Α										
	Nortron	0.5pt/a	в										
	Outlook	14fl oz/a	Α										
	Outlook	10fl oz/a	в										
	RU PowerMax	1.125lb ae/a	А										
	RU PowerMax	0.8441b ae/a	в										8
	RU PowerMax	0.75lb ae/a	С	•									
	NPak	2.5% v/v	ABC										1
4	Betamix	2pt/a	A	11	14	99	6	99	97	197	23.0	18.6	7712
	Betamix	3pt/a	в										
	Betamix	3pt/a	С										.1
	Nortron	0.33pt/a	А										
	Nortron	0.5pt/a	в										
	Outlook	14fl oz/a	Α										Ŀ
	Outlook	10 fl oz/a	в										
	RU PowerMax	1.125lb ae/a	А			,							4
	RU PowerMax	0.8441b ae/a	В										
	RU PowerMax	0.75lb ae/a	С										
	Destiny HC	1.5pt/a	ABC										
	NPak	2.5% v/v	ABC										
		LSD 5%		2.8	6.4	4.4	NS	8.0	9.3	20.8	4.5	NS	1493
		CV %		36	54	3.5	97	7	8	7	14	3	14

Table 2. Management of glyphosate-resistant waterhemp with POST herbicides in an oat cover crop in Roundup Ready® sugarbeet – Holloway, MN – 2012 (Stachler).

<sup>1</sup>RU PowerMax = Roundup PowerMAX; Dual Mag = Dual Magnum; Destiny HC is a HSMOC from Winfield Solutions; NPak = N-Pak AMS (liquid AMS at 3.4 lbs dry AMS/gal of product from Winfield Solutions). <sup>2</sup>Wahe = Glyphosate-resistant waterhemp. Management of Glyphosate-Resistant Common Ragweed in Roundup Ready® Sugarbeet with UpBeet and Stinger – Mayville, ND – 2012 (Stachler). A seedbed was prepared using an 11-foot Kongskilde S-tine field cultivator equipped with rolling baskets. 'Beta 80RR52' sugarbeet was seeded 1.25 inches deep in 22-inch rows at 60,825 seeds per acre on April 25. Sugarbeet was treated with Tachigaren and Poncho Beta at 20 grams and 5.07 fl oz of product, respectively, per 100,000 seeds. Counter 20G insecticide was applied at 8.9 pounds/A in a 5-inch band and drag chain-incorporated at planting. Herbicide treatments were applied May 24, and June 6, 21. All treatments were applied with a bicycle sprayer in 17 gpa spray solution through 8002 XR flat fan nozzles pressurized with CO<sub>2</sub> at 40 psi to the center four rows of six row plots 30 feet in length. Experiment was destroyed on August 17.

Sugarbeet injury was evaluated July 3. Common ragweed, common lambsquarters, and redroot pigweed control were evaluated on July 3, 16, and August 8. Stinkgrass control was evaluated August 8. All evaluations were a visual estimate of percent fresh weight reduction in the four treated rows compared to the adjacent untreated strip. Experimental design was randomized complete block with 4 replications. Data were analyzed with the ANOVA procedure of Agriculture Research Manager, version 8.4.2 software package.

Application code	A (2 lf sugarbeet)	B (12 DAT A)	C (15 DAT B)	) :
Date	May 24	June 6	June 21	:
Time of Day	12:00 P	5:30 P	9:30 A	÷
Air Temperature (F)	68	82	70	
Relative Humidity (%)	41	35	54	
Wind Velocity (mph)	17	5	8	1
Wind Direction	W	S	NW	
Soil Temp. (F at 6")	61	76	56	I
Soil Moisture	Good	Good	Good	
Cloud Cover	90	70	1	
Sugarbeet stage (avg)	V2.2 (2-3 lf)	V6 (6 lf)	V11 (11 lf)	4
Cora height (avg/range) – Trt. 3	0.46"/0.125-1"		_	
Cora density (plants/m <sup>2</sup> ) – Trt. 3	78	-	-	
Colq height (avg/range) – Trt. 3	0.42"/0.25-1"	÷		
Colq density (plants/m <sup>2</sup> ) – Trt. 3	35	-	-	

#### **Table 1. Application Information**

Summary: UpBeet plus Stinger plus Roundup PowerMAX controlled glyphosate-resistant ragweed and redroot pigweed more effectively than Stinger plus Roundup PowerMAX. Sugarbeet stand establishment was poor at this location due to dry soil conditions at the time of planting, therefore sugarbeet injury could not effectively evaluated.

Trt	Treatment	Rate	Appl		3-July			8-A1	ugust	
No.	Name <sup>1</sup>	Rate Unit	Code	Cora <sup>2</sup>	Colq	Rrpw	Cora	Colq	Rrpw	Stgi
						9	6 Control			
1	Stinger	2 fl oz/a	ABC	93	93	99	96	81	88	40
	UpBeet	0.33 oz/a	ABC							:
	RU PowerMax	1.125 lb ae/a	А							
	Destiny HC	1.5 pt/a	ABC							
	NPak	2.5% v/v	ABC							
	RU PowerMax	0.844 lb ae/a	В							
	RU PowerMax	0.75 lb ae/a	С							
2	Stinger	2 fl oz/a	ABC	92	91	98	95	78	86	46
	UpBeet	0.33 oz/a	ABC							
	RU PowerMax	1.125 lb ae/a	А							
	Cide Winder	1.5 pt/a	ABC							
	NPak	2.5% v/v	ABC							
	RU PowerMax	0.8441b ae/a	в							
	RU PowerMax	0.75 lb ae/a	С							
3	Stinger	3 fl oz/a	BC	86	93	91	88	83	66	29
	RU PowerMax	1.125 lb ae/a	A							
	Destiny HC	1.5 pt/a	BC							-
	NPak	2.5% v/v	ABC							4
	RU PowerMax	0.844 lb ae/a	В							
	RU PowerMax	0.75 lb ae/a	С							
		LSD 5%	1	NS	NS	2.8	2.3	NS	9.9	NS
		CV %	,	5	3	2	1	4	7	31

 Table 2. Management of glyphosate-resistant common ragweed in Roundup Ready® sugarbeet with UpBeet and Stinger- Mayville, ND - 2012 (Stachler).

<sup>1</sup>RU PowerMax = Roundup PowerMAX; Destiny HC is a HSMOC from Winfield Solutions; Cide Winder is a HSMOC from Helena; NPak = N-Pak AMS (liquid AMS at 3.4 lbs dry AMS/gal of product from Winfield Solutions).

 $^{2}$ Cora = Glyphosate-resistant common ragweed.

**Willowood Ethofumesate plus Glyphosate Applied POST to Roundup Ready® Sugarbeet – Crookston, MN – 2012** (Stachler). Kochia and common lambsquarters seeds were seeded in the fall of 2011 prior to chisel plowing. A seedbed was prepared using an 11-foot Kongskilde S-tine field cultivator equipped with rolling baskets. 'Crystal 985 RR' sugarbeet was seeded 1.25 inches deep in 22-inch rows at 60,825 seeds per acre on May 2. Sugarbeet was treated with Tachigaren and Poncho Beta at 45 grams and 5.07 fl oz of product, respectively, per 100,000 seeds. Counter 20G insecticide was applied at 8.9 pounds/A in a 5-inch band and drag chain incorporated at planting. Herbicide treatments were applied May 2, 17, 24, June 6, 20, and July 2. Prior to the May 24 application, ten kochia and lambsquarters plants were flagged in treatments 2-5, 7, 13, and 14 to evaluate plant mortality. All treatments were applied with a bicycle sprayer in 17 gpa spray solution through 8002 XR flat fan nozzles pressurized with CO<sub>2</sub> at 40 psi to the center four rows of six row plots 30 feet in length. Quadris at 16 fl oz/A was broadcast-applied June 7 to control Rhizoctonia root rot. Cercospora leaf spot was controlled with Headline at 9 fl oz/A and Inspire XT at 7 fl oz/A broadcast July 20 and August 15, respectively. Sugarbeet was harvested September 12 from the center two rows of each plot and weighed. Twenty to thirty pounds of sugarbeet roots were collected from each plot and analyzed for quality at American Crystal Sugar Quality Lab, East Grand Forks, MN.

Sugarbeet stand was counted in the center two rows of plots on June 1, July 12, and September 12. Sugarbeet injury was evaluated on May 31, June 7, 14, 20, July 3, 18, and September 7. Annual grass, common lambsquarters, and kochia control was evaluated on June 7, 20, July 3, 18, and September 7. All evaluations were a visual estimate of percent fresh weight reduction in the four treated rows compared to the adjacent untreated strip. Experimental design was randomized complete block with 4 replications. Data were analyzed with the ANOVA procedure of Agriculture Research Manager, version 8.4.2 software package.

Application code	A (PRE)	B (Cot.)	C (2lf sgrbt)	D (20 DAT B) &	F (14 DAT D)	G (12 DAT F)
				E (13 DAT C)		
Date	May 2	May 17	May 24	June 6	June 20	July 2
Time of Day	1:00 P	9:30 A	3:00 P	2:30 P	3:00 P	11:30 A
Air Temperature (F)	73	77	69	86	67	88
Relative Humidity (%)	22	40	40	33	63	68
Wind Velocity (mph)	7	5	11	5	4	4
Wind Direction	NW	S	WNW	S	NW	SE
Soil Temp. (F at 6")	59	65	67	78	65	80
Soil Moisture	Good	Fair	Good	Fair	Good	Fair
Cloud Cover	50	40	95	30	60	70
Sugarbeet stage (avg)	PRE	Cot.	V2.2 (2-3 lf)	V6 (6 lf)	V11 (11 lf)	-
Kocz height (avg/range) – Trt. 3	-	-	0.42"/0.1-1.3	0.19"/0.125-0.5	-	
Kocz density (plants/m <sup>2</sup> ) – Trt. 3	-	-	32	37.3	-	- :
Colq height (avg/range) – Trt. 3	-	-	0.88"/0.2-1.5	0.31"/0.125-0.5	-	-
Colq density (plants/m <sup>2</sup> ) – Trt. 3	-	-	26	6	-	-
Grass density (plants/m <sup>2</sup> ) – Trt.3	-	-	26	43.5	_	-

#### Table 1. Application Information

**Summary:** The rate of Roundup PowerMAX (glyphosate) was reduced to 0.25 lb ae/A to simulate the presence of glyphosate-resistant weeds and to determine the effectiveness of Ethofumesate mixed with glyphosate. Increasing the rate of glyphosate and the number of applications improved control of common lambsquarters and kochia. Glyphosate applied twice at 0.25 lb ae/A only controlled 51% of common lambsquarters compared to three applications controlling 76%. The addition of Ethofumesate at any rate to glyphosate at 0.75 lb ae/A did not significantly improve control of lambsquarters and kochia compared to glyphosate alone, however it usually slightly improved control. The higher the Ethofumesate rate when mixed with glyphosate at 0.25 lb ae/A, the more effective the lambsquarters control with a minimum rate of Ethofumesate at 1.25 lb ai/A based upon mortality and plant counts. The addition of Ethofumesate to glyphosate at 0.25 lb ae/A only improved kochia control when applied three times, not two times.

Betamix plus Outlook plus Ethofumesate plus Roundup PowerMAX caused the greatest visual sugarbeet injury at each evaluation period. The addition of Ethofumesate usually increased visual sugarbeet injury compared to glyphosate alone at each evaluation period. Visual sugarbeet injury declined as time increased following the last application. Despite the visual sugarbeet injury observed early in the season and at harvest, sugarbeet root yield and extractable sucrose was similar to the weed-free check for all treatments.

	Treatment	Rate	Appl		une	20-Jun	*	uly	18	Contraction of the local division of the loc	29-Au		7-Sep
No.	Name <sup>1</sup>	Rate Unit	Code	Mrtl <sup>2</sup>	Cntl	Mrtl	Mrtl	Cntl	Mrtl	Cntl	Above Sgbt		Cntl
							%					plot	%
1	Weed-free Chk	1.10511 (	ъ		96			99		99	0	0	99
	RU PowerMax	1.125 lb ae/a	B										
	R-11	0.25% v/v	BDFG										
	NPak	2.5% v/v	BDFG										
	RU PowerMax		D										
2	RU PowerMax	$\frac{0.75 \text{ lb ae/a}}{0.25 \text{ lb ae/a}}$	FG	00	79	90	90	77	93	78		9	00
2	RU PowerMax Destiny HC	0.25  lb ae/a	CE CE	90	79	90	90	11	93	/8	4	9	86
	NPak	1.5 pt/a 2.5 % v/v	CE										
3	RU PowerMax	0.75 lb ae/a	CE	100	97	100	100	94	100	95	0	2	98
3			CE CE	100	97	100	100	94	100	95	0	Ζ,	98
	Destiny HC NPak	1.5 pt/a 2.5 % v/v	CE										
<u></u>	RU PowerMax	0.25  lb ae/a	CEF	100	95	100	100	90	100	86	2	7	88
4	Destiny HC	1.5 pt/a	CEF	100	95	100	100	90	100	00	2	/	00
	NPak	1.5 pt/a 2.5 % v/v	CEF										
5	RU PowerMax	0.75 lbae/a	CEF	100	96	100	100	98	100	99	0	2	98
5	Destiny HC	1.5  pt/a	CEF	100	90	100	100	90	100	33	U	<u></u>	20
	NPak	2.5% v/v	CEF										
6	RU PowerMax	0.25 lb ae/a			91			90		89	1	3	94
0	Destiny HC	1.5  pt/a	CEFG		71			90		09	1	5	24
	NPak	2.5% v/v	CEFG										1
7	Ethofumesate	1 lb ai/a	CE	80	93	88	98	90	98	84	5	7	78
'	RU PowerMax	0.25  lb ae/a	CE	80	25	00		90	90	0-	5	/	70
	Destiny HC	1.5  pt/a	CE										1
	NPak	2.5 % v/v	CE										9
8	Ethofumesate	1 lb ai/a	CE		97			97		95	1	2	94
U	RU PowerMax	0.75  lb ae/a	CE		71			71		)5	x	2	24
	Destiny HC	1.5 pt/a	CE										
	NPak	2.5% v/v	CE										
9	Ethofumesate	1.5  lb ai/a	CE		96			97		92	4	9	86
1	RU PowerMax	0.25  lb ae/a	CE					21			•	,	
	Destiny HC	1.5  pt/a	CE			:							
	NPak	2.5% v/v	ČĒ										1
10	Ethofumesate	1.5 lb ai/a	CE		98			98		97	1	2	93
20	RU PowerMax	0.75  lb ae/a	CE								-	-	
	Destiny HC	1.5  pt/a	ČĒ										-
	NPak	2.5 % v/v	CE										1
11	Ethofumesate	0.5 lb ai/a	CEF		98			98		97	0	1	99
	RU PowerMax	0.25 lb ae/a	CEF								-	_	
	Destiny HC	1.5 pt/a	CEF										
	NPak	2.5% v/v	CEF										
12	Ethofumesate	0.75 lb ai/a	CEF		94			97		98	0	1	98
	RU PowerMax	0.25 lb ae/a									-		
	Destiny HC	1.5 pt/a	CEF										
	NPak	2.5 % v/v	CEF										!
13	Ethofumesate	1 lb ai/a	CEF	98	92	98	100	98	100	97	1	2	96
	RU PowerMax	0.25  lb ae/a	CEF									_	
	Destiny HC	1.5 pt/a	CEF										
	NPak	2.5% v/v	CEF										
14	Ethofumesate	1.25 lb ai/a	CEF	98	92	98	100	99	100	99	0	1	99
				20	~ ++	20	100		100		~	<u>^</u>	
	RU PowerMax	0.25 lb ae/a	CEF										
	RU PowerMax Destiny HC	0.25 lb ae/a 1.5 pt/a	CEF CEF										1

Table 2. Kochia control from Willowood Ethofumesate plus glyphosate applied POST to Roundup Ready® sugarbeet – Crookston, MN – 2012 (Stachler).

	Treatment	Rate	Appl	7-J		20-Jun		uly	18-	July	29-A	ugust	7-Sep
No.	Name <sup>1</sup>	Rate Unit	Code	Mrtl <sup>2</sup>	Cntl	Mrtl	Mrtl	Cntl	Mrtl	Cntl	Above Sgbt	Below Sgbt	Cntl
							%				No./	plot	%
15	Ethofumesate	0.5 lb ai/a	CEF		98			99		99	0	0	99
	RU PowerMax	0.75 lb ae/a	CEF										
	Destiny HC	1.5 pt/a	CEF										
	NPak	2.5 % v/v	CEF										
16	Ethofumesate	0.75 lb ai/a	CEF		97			99		99	0	0	99
	RU PowerMax	0.75 lb ae/a	CEF										
	Destiny HC	1.5 pt/a	CEF										
	NPak	2.5 % v/v	CEF										1
17	Ethofumesate	1 lb ai/a	CEF		98			99		99	1	1	99
	RU PowerMax	0.75 lb ae/a	CEF										
	Destiny HC	1.5 pt/a	CEF										
	NPak	2.5 % v/v	CEF										
18	Ethofumesate	1.25 lb ai/a	CEF		98			99		99	0	0	99
	RU PowerMax	0.75 lb ae/a	CEF										
	Destiny HC	1.5 pt/a	CEF				an a						
	NPak	2.5 % v/v	CEF		· · ·								20 
19	Ethofumesate	0.5 lb ai/a	CEFG		96			96		98	0	2	98
	RU PowerMax	0.25 lb ae/a	CEFG										
	Destiny HC	1.5 pt/a	CEFG										1
	NPak	2.5 % v/v	CEFG										i.
20	Betamix	12 fl oz/a	С		80			94		98	1	4	91
	Ethofumesate	0.75 lb ai/a	CEF										i.
	Outlook	14 fl oz/a	С										
	RU PowerMax	0.25 lb ae/a	CEF										
	Destiny HC	1.5 pt/a	CEF										
	NPak	2.5 % v/v	CEF										
	Betamix	16 fl oz/a	Е										
	Outlook	10 fl oz/a	Е										
	Betamix	24 fl oz/a	F										4
21	Dual Magnum	1.5 pt/a	Α		93			99		97	0	1	96
	Ethofumesate	0.75 lb ai/a	CEF										
	RU PowerMax	0.25 lb ae/a	CEF										1
	Destiny HC	1.5 pt/a	CEF										
	NPak	2.5 % v/v	CEF										1
		LSD 5 %	)	NS	7.7	NS	NS	4.9	NS	4.6	2.1	5.7	6.4
		CV %	)	14	6	11	5	4	4	3	173	164	5

Table 2. Kochia control from Willowood Ethofumesate plus glyphosate applied POST to Roundup Ready® sugarbeet – Crookston, MN – 2012 (Stachler).

<sup>1</sup>RU PowerMax = Roundup PowerMAX; Ethofumesate = Ethofumesate 4SC from Willowood; Destiny HC is a HSMOC from Winfield Solutions; NPak = N-Pak AMS (liquid AMS at 3.4 lbs dry AMS/gal of product from Winfield Solutions).

 $^{2}$ Mrtl = Mortality of ten plants flagged prior to the first POST application.

		7-June	****	20-June		3-July			18-July		29-A	ugust	7-Sept	ember
Trt	Grass	Colq	Colq	Colq	Grass	Colq	Colq	Grass	Colq	Colq	Colq	Colq	Grass	Colq
No.	Cntl	Cntl	Mrtl	Mrtl	Cntl	Cntl	Mrtl	Cntl	Cntl	Mrtl	Above sgbt	Below sgbt		Cntl
			*****		%	)						/plot		/0
1	95	98			99	99		99	99		0	0	99	99
2	96	79	50	52	73	60	65	73	54	65	33	19	76	51
3	96	98	100	100	73	90	100	71	90	100	3	11	78	82
4	96	91	63	68	99	74	70	98	74	70	5	11	98	76
5	96	98	100	100	99	99	100	99	99	100	0	1	99	98
6	94	90			98	77		99	83		2	12	99	86
7	96	90	50	53	82	84	63	80	83	68	6	13	91	76
8	99	98			84	94		74	94		1	8	86	88
9	99	92			91	95		89	91		5	12	98	89
10	99	99			91	96		88	97		0	9	94	87
- 11	98	93			99	94		99	94		1	7	99	91
12	97	93			99	96		99	98		1	2	99	93
13	98	90	50	63	99	92	70	99	94	78	1	2	99	95
14	98	91	50	58	99	95	70	98	97	85	0	1	99	99
15	97	98			99	99		99	99		0	1	99	99
16	99	98			99	99		99	99		0	0	99	99
17	99	99			99	99		99	99		0	0	99	99
18	98	98			99	99		99	99		0	0	99	98
19	98	94			- 98	94		99	97		0	1	99	98
20	98	94			97	97		99	99		0	. 0	99	99
21	99	91			99	97		99	96		0	2	99	95
LSD 5%	2.8	4.3	24.3	23.8	8.1	3.4	24.1	6.5	4.2	18.8	3.0	8.0	4.8	6.2
CV %	2	3	25	23	6	3	21	5	3	16	77	108	4	5

 Table 3. Common lambsquarters and annual grass control from Willowood Ethofumesate plus glyphosate applied

 POST to Roundup Ready® sugarbeet – Crookston, MN – 2012 (Stachler).

 Table 4. Sugarbeet response to Willowood Ethofumesate applied POST to Roundup Ready® sugarbeet – Crookston,

 MN – 2012 (Stachler).

Trt	31-May	7-June	14-June	3-July	7-Sept	1-Jun		12-Sep	otember	
No.			njury			Stand	Stand	Yield	Sucr	Ext Suci
			%			No.	/ 100'	ton/A	%	lb/A
1	0	0	4	0	1	191	192	25.3	18.3	8467
2	0	0	2	1	0	192	186	24.3	19.1	8521
3	1	0	2	1	0	191	189	27.0	19.0	9422
4	0	0	3	0	1	201	196	26.5	19.2	9376
5	2	0	2	1	1	201	185	24.9	19.1	8747
6	2	0	2	2	1	194	188	25.4	19.1	8952
7	5	12	16	11	0	188	191	23.9	19.1	8435
8	6	14	18	14	3	196	189	25.2	19.1	8896
9	6	14	18	11	5	201	199	22.8	19.5	8233
10	6	8	21	10	3	196	192	22.7	18.9	7892
11	7	5	13	9	3	205	194	26.0	19.1	9114
12	8	5	14	10	4	198	198	23.8	19.2	8444
13	5	5	19	12	7	186	193	23.5	18.9	8173
14	8	14	21	15	6	192	184	23.5	19.0	8188
15	5	1	13	11	8	189	190	25.5	19.2	9006
16	8	6	16	9	2	195	193	24.5	18.8	8433
17	9	9	17	13	3	200	200	25.5	18.9	8851
18	8	10	17	16	3	186	196	26.1	18.9	9095
19	5	5	12	5	4	202	193	24.2	19.1	8496
20	14	33	34	24	10	190	193	22.6	18.8	7790
21	6	11	17	13	3	194	198	24.4	19.0	8506
LSD 5%	3.5	4.1	3.9	5.6	2.9	NS	NS	NS	NS	NS
CV %	47	40	21	45	67	6	7	9	3	9

**Investigating Injury to Roundup Ready® Sugarbeet from Various POST Herbicide Combinations** – <u>**Crookston, MN – 2012</u></u> (Stachler). A seedbed was prepared using an 11-foot Kongskilde S-tine field cultivator equipped with rolling baskets. 'Crystal 985 RR' sugarbeet was seeded 1.25 inches deep in 22-inch rows at 60,825 seeds/A on May 2. Sugarbeet was treated with Tachigaren and Poncho Beta at 45 grams and 5.07 fl oz of product, respectively, per 100,000 seeds. Counter 20G insecticide was applied at 8.9 pounds/A in a 5-inch band and drag chain incorporated at planting. Herbicide treatments were applied May 2, 17, 24, June 6, 20, and July 2. All treatments were applied with a bicycle sprayer in 17 gpa spray solution through 8002 XR flat fan nozzles pressurized with CO\_2 at 40 psi to the center four rows of six row plots 30 feet in length. Quadris at 16 fl oz/A was broadcast June 7 to contol Rhizoctonia root rot. Cercospora leaf spot was controlled with Headline at 9 fl oz/A and Inspire XT at 7 fl oz/A broadcast July 20 and August 15, respectively. Sugarbeet was harvested September 12 from the center two rows of each plot and weighed. Twenty to thirty pounds of sugarbeet roots were collected from each plot and analyzed for quality at American Crystal Sugar Quality Lab, East Grand Forks, MN.**</u>

Sugarbeet stand was counted in the center two rows of plots on June 1, July 12, and September 12. Sugarbeet injury was evaluated on May 31, June 7, 14, 20, July 13, 25, and September 7. Annual grass and common lambsquarters control was evaluated on June 7, 20, July 13, 25, and September 7. All evaluations were a visual estimate of percent fresh weight reduction in the four treated rows compared to the adjacent untreated strip. Experimental design was randomized complete block with 4 replications. Data were analyzed with the ANOVA procedure of Agriculture Research Manager, version 8.4.2 software package.

Application code	A (PRE)	B (V1)	C (V2 sgrbt)	D (20 DAT B) &	F (14 DAT E)	G (14 DAT F)
and the second		i.	N 1	E (13 DAT C)	-	
Date	May 2	May 18	May 24	June 6	June 20	July 2
Time of Day	12:00 P	9:30 A	1:15 P	4:00 P	3:00 P	11:30 A
Air Temperature (F)	73	77	69	78	67	88
Relative Humidity (%)	22	40	40	33	63	68
Wind Velocity (mph)	7	5	11	5	1	4
Wind Direction	NW	S	W	S	NW	SE
Soil Temp. (F at 6")	59	65	67	78	58	80
Soil Moisture	Good	Fair	Good	Fair	Good	Fair
Cloud Cover	50	40	95	30	60	70
Sugarbeet stage (avg)	PRE	V1 (cot.)	V2 (2 lf)	V7 (7 lf)	V11 (11 lf)	- :
Colq height (avg/range) – Trt. 3	-	-	0.94"/0.25-0.75	0.12"/0.12-0.3	0.63/0.25-1	- :
Colq density (plants/m <sup>2</sup> ) – Trt. 3	-	-	16.25	1.5	1.75	- :
Kocz height (avg/range) – Trt. 3	-	-	· _	-	-	
Kocz density (plants/m <sup>2</sup> ) – Trt. 3	-		0	0	0	
Gr/Ye.Fox. height (avg/range) – Trt. 3	-	·-	1"/0.12-1.5"	0.38"/0.12-0.8	0.8"/0.2-2.5	-
Gr/Ye.Fox. density (plants/m <sup>2</sup> ) – Trt.3	-	-	21	20	26.25	_

#### Table 1. Application Information

**Summary:** On June 7, just after the second POST application, those treatments containing Nortron applied POST at 32 fl oz/A and Nortron applied PRE at 7.5 pt/A followed by Betamix plus Outlook plus Nortron plus Roundup caused the greatest sugarbeet injury (>27%). Visual sugarbeet injury declined over time for all treatments with several being similar to the weed-free check on September 7. Most treatments containing high (conventional) rates of Betamix, high POST rates of Nortron, and/or Stinger caused the greatest sugarbeet injury on September 7. Only those treatments having high rates of Nortron and/or Stinger and/or high rates of Betamix (treatments 11, 12, and 14) reduced root yield and extractable sucrose compared to the weed-free check.

On June 7, every treatment containing Betamix at 2 pt/A and treatment 15 reduced kochia control compared to glyphosate alone. All other treatments controlled kochia similarly and no treatment reduced the control of common lambsquarters and green and yellow foxtail. Despite the early antagonism, all treatments controlled 99% of all weeds at harvest.

<u>20</u>	12 (Stachler).		,															!
_	-	_	-	May 31	Annual Social Social	Construction of Construction o	une 7	-	Jun 20	C. C	Jul 25	the second s	Septem	to be a failed and the second s			mber 1	
	Treatment	Rate Bata Unit	Appl		Sgbt		gr/ye fxtl			Sgbt	Sgbt	Sgbt		gr/ye fxtl		Sgbt		Sgbt
INO	Name <sup>1</sup>	Rate Unit	Code	Inju	Inju	Cntl	Cntl	Cntl	Inju %	Inju	Inju	Inju	Cntl	Cntl		ton/A	Sugar %	Ext. Suc Ib/A
1	Non-trt. Check			0	0	0	0	0	0	0	0	0	0	0	124	12.1	18.7	4117
2	Weed-free Chk			0	0	95	88	96	3	2	1	3	99	99	183	26.5	19.0	9185
	RU P. Max	1.125 lb ae/a																
	R-11	0.25 % v/v																
	NPak	2.5% v/v																i.
	RU P. Max RU P. Max	0.844 lb ae/a 0.75 lb ae/a																
3	RU P. Max	1.125 lb ae/a		0	0	98	94	100	2	3	5	0	99	99	185	28.4	19.2	10022
-	Destiny HC	1.5 pt/a	CEF	ů.	Ū	50		100	-	5	5	Ŭ	,,,	,,,	105	20.1	17.2	10022
	NPak	2.5 % v/v	CEF															1
	RU P. Max	0.844 lb ae/a																
	RU P. Max	0.75 lb ae/a			~	07	0.5		0	11					100		10.0	
4	Betamix Nortron	12 fl oz/a 4 fl oz/a		7	5	97	95	98	9	11	5	5	99	99	189	25.2	18.9	8735
	RU P. Max	1.125 lb ae/a																
	Destiny HC	1.5 pt/a	CEF															
	NPak	2.5 % v/v	CEF															Ż
	Betamix	16 fl oz/a																
	RU P. Max	0.844 lb ae/a																
	Betamix RU P. Max	24 fl oz/a 0.75 lb ae/a																
5	Betamix	2 pt/a	C F	11	9	97	92	74	23	20	10	10	99	99	191	24.5	19.2	8601
5	Nortron	4 fl oz/a				71	12	/4	20	20	10	10	"	22	191	24,5	19.4	8001
	RU P. Max	1.125 lb ae/a																
	NPak	2.5 % v/v	CEF															
	Betamix	3 pt/a	E															
	RU P. Max Betamix	0.844 lb ae/a																
	RU P. Max	4 pt/a 0.75 lb ae/a	F F															2
6	Betamix	2 pt/a	C	8	6	99	96	77	10	14	6	5	99	99	187	25.2	19.3	9010
Ť	Nortron	4 fl oz/a		Ų	Ũ		,,,		10		Ũ	5	,,	//	107	23.2	17.5	5010
	RU P. Max	1.125 lb ae/a																
	Destiny HC	1.5 pt/a	CEF															
	NPak	2.5 % v/v																
	Betamix RU P. Max	3 pt/a 0.844 lb ae/a	E E															
	Betamix	4 pt/a	F															
	RU P. Max	0.75 lb ae/a																
7	Betamix	12 fl oz/a	С	12	19	99	100	96	27	17	13	7	99	99	178	25.9	18,5	8720
	Nortron	4 fl oz/a																tr t
	Outlook	14 fl oz/a																4
	RU P. Max Destiny HC	1.125 lb ae/a 1.5 pt/a	C CEF															:
	NPak	2.5 % v/v	CEF															
	Betamix	16 fl oz/a																
	Outlook	10 fl oz/a																
	RU P. Max	0.844 lb ae/a																
	Betamix	24  fl oz/a	F															
8	RUP. Max	0.75  lb ae/a	F C	17	23	100	100	57	25	26	16	1.4			101		10.0	8000
0	Betamix Nortron	2 pt/a 4 fl oz/a		1/	23	100	100	57	35	26	16	14	99	99	181	22.1	19.2	8200
	Outlook	14 fl oz/a	CEF															1
	RU P. Max	1.125 lb ae/a																1
	NPak	2.5 % v/v	CEF															4
	Betamix	3 pt/a	E															
	Outlook	10 fl oz/a	E															
	RU P. Max Betamix	0.844 lb ae/a 4 pt/a	E F															
	RU P. Max	0.75 lbae/a																4
			-															

 Table 2. Investigating Injury to Roundup Ready® Sugarbeet from Various POST Herbicide Combinations – Crookston, MN –

 2012 (Stachler).

<u>20</u>	12 (Stachler).			May 31		,	une 7		Iun 20	L.1 2	In1 25	ŕ	onter	hor 7		Cant		2
Trt	Treatment	Rate	Appl			Colq	gr/ye fxtl	Kocz	Jun 20 Søbt	Jul 3 Sgbt	Jul 25 Sgbt		Cola	gr/ye fxtl	Sabt		ember 1 Sabt	2 Sgbt
	. Name <sup>1</sup>	Rate Unit	Code	Inju	Inju	Cntl	Cntl	Cntl	Inju	Inju	Inju	Inju	Cntl	Cntl				Ext. Suc
9	Determine	2 = + /=	С		24	100	100		%		17				#/100'		%	lb/A
9	Betamix Nortron	2 pt/a 4 fl oz/a	CEF	14	24	100	100	89	32	26	17	7	99	99	189	24.4	18.4	8239
	Outlook	14  fl oz/a	C															
	RU P. Max	1.125 lb ae/a	Č															.]
	Destiny HC	1.5 pt/a	CEF															
	NPak	2.5 % v/v	CEF															
	Betamix Outlook	3 pt/a	E															r
	RU P. Max	10 fl oz/a 0.844 lb ae/a	E E															
	Betamix	4 pt/a	F															
	RU P. Max	0.75 lb ae/a	F															
10	Betamix	12 fl oz/a	С	10	14	100	100	99	18	18	7	5	99	99	186	24.1	19.1	8505
	Nortron	4 fl oz/a	CEF															
	Dual Magnum	1.5 pt/a	C															
	RU P. Max Destiny HC	1.125 lb ae/a 1.5 pt/a	C CEF															1
	NPak	2.5% v/v	CEF															
	Betamix	16 fl oz/a	Е															:
	Dual Magnum	1 pt/a	Ε															
	RU P. Max	0.844 lb ae/a	E															0 1
	Betamix	24 fl oz/a	F															
11	RU P. Max Betamix	0.75 lb ae/a 12 fl oz/a	F C	12	19	100	100	87	30	28	14	13	99	99	182	22.1	19.1	7726
11	Nortron	4 fl oz/a	CEF	12	19	100	100	07	30	20	14	15	99	99	102	22.1	19,1	//20
	Outlook	14 fl oz/a	C															
	Stinger	3 fl oz/a	CEF															
	RU P. Max	1.125 lb ae/a	С															.1
	Destiny HC	1.5 pt/a	CEF															3 .1
	NPak Betamix	2.5 % v/v 16 fl oz/a	CEF E															
	Outlook	10 fl oz/a	E															1
	RU P. Max	0.844 lb ae/a	Ē															
	Betamix	24 fl oz/a	F															
	RU P. Max	0.75 lb ae/a	F															
12	Betamix	12 fl oz/a	C	15	31	100	100	99	41	30	19	12	99	99	180	21.5	18.8	7350
	Nortron Outlook	32 fl oz/a 14 fl oz/a	CEF C															
	Stinger	3  fl oz/a	CEF															
	RU P. Max	1.125 lb ae/a	C															1
	Destiny HC	1.5 pt/a	CEF															
	NPak	2.5 % v/v	CEF															7
	Betamix	16 fl oz/a	E															1
	Outlook RU P. Max	10 fl oz/a 0.844 lb ae/a	E E															
	Betamix	24 fl oz/a	F															1
	RU P. Max	0.75 lb ae/a	F															ŝ
13	Betamix	2 pt/a	С	16	24	99	100	74	33	20	10	5	99	99	181	26.2	18.2	8687
	Nortron	4 fl oz/a																
	Outlook	14 fl oz/a	C															
	Stinger RU P. Max	3 fl oz/a 1.125 lb ae/a	CEF C															
	NPak	2.5% v/v	CEF															
	Betamix	3 pt/a	E															1.1
	Outlook	10 fl oz/a	Е															1.1
	RU P. Max	0.844 lb ae/a	Е															-
	Betamix	4 pt/a	F															
14	RU P. Max Betamix	0.75 lb ae/a 2 pt/a	F C	18	36	100	100	58	48	32	21	15	99	99	102	21.2	10.2	7480
14	Nortron	2 pt/a 32 fl oz/a		18	30	100	100	50	40	52	21	15	77	33	192	21.2	19.2	7480
	Outlook	14 fl oz/a	C															
	Stinger	3 fl oz/a	CEF															
	RU P. Max	1.125 lb ae/a	С															1
	NPak	2.5 % v/v	CEF															
	Betamix	3 pt/a	E															
	Outlook RU P. Max	10 fl oz/a 0.844 lb ae/a	E E															
	Betamix	0.844 10 ae/a 4 pt/a	F															
	RU P. Max	0.75 lb ae/a	F															4
																		4

Table 2. Investigating Injury to Roundup Ready® Sugarbeet from Various POST Herbicide Combinations – Crookston, MN – 2012 (Stachler).

20	12 (Stachler).			May 31		i	June 7		Jun 20	Jul 3	Jul 25	c	Septem	her 7		Sant	ember 1	<u>,</u>
Trt	Treatment	Rate	Appl		The second second	Colq	gr/ye fxtl	Kocz		Sgbt	Sgbt			gr/ye fxtl	Soht			2 Sgbt
	Name <sup>1</sup>	Rate Unit	Code	Inju	Inju	Cntl	Cntl	Cntl	Inju	Inju	Inju	Inju	Cntl	Cntl	Stand	Yield	Sugar	Ext. Suc
15	Betamix	12 fl oz/a	C		13	99	99	73	<u>%</u> 25	15	12	7	99	99	#/100' 186	ton/A 24.8		lb/A
15	Nortron	4  fl oz/a	CEF	11	15	"	,,,	15	20	15	12		99	99	190	24.8	18.4	8282
	Outlook	14 fl oz/a	C															1
	Stinger	4 fl oz/a	CE															
	RU P. Max	1.125 lb ae/a	С															
	Destiny HC NPak	1.5 pt/a 2.5 % v/v	CEF															
	Betamix	2.5 % V/V 16 fl oz/a	CEF E															1
	Outlook	10  fl  oz/a	Ē															
	RU P. Max	0.844 lb ae/a	Ē															ni L
	Betamix	24 fl oz/a	F															1
	Stinger	2.5 fl oz/a	F															
10	RUP. Max	0.75 lb ae/a	F															
16	Betamix Nortron	12 fl oz/a 4 fl oz/a	C CEF	13	15	99	99	99	21	22	13	10	99	99	189	24.7	18.8	8518
	Dual Magnum	1.5  pt/a	CEr															÷
	Stinger	3  fl oz/a																
	RU P. Max	1.125 lb ae/a	С															
	Destiny HC	1.5 pt/a	CEF															. 2
'	NPak	2.5 % v/v	CEF															
1	Betamix	16 fl oz/a	E															
	Dual Magnum RU P. Max	1 pt/a 0.844 lb ae/a	E E															
	Betamix	24  fl oz/a	F															
	RU P. Max	0.75 lb ae/a	F															
17	RU P. Max	1.125 lb ae/a	С	2	1	99	95	99	21	17	14	15	99	99	196	25.3	18.5	8584
	R-11	0.5 % v/v	С															
	NPak	2.5 % v/v	CEF															
	Betamix	3 pt/a	E															
	Nortron Outlook	4 fl oz/a 21 fl oz/a	EF E															
	Stinger	6  fl oz/a	Ē															
	RU P. Max	0.844  lb  ae/a	Ē															
	Betamix	4 pt/a	F															
	Stinger	4.5 fl oz/a	F															
	RUP. Max	0.75 lb ae/a	F															
18	Betamix	12 fl oz/a	C	11	23	100	99	99	31	15	8	5	99	99	183	23.7	18.6	8074
	Nortron Outlook	4 fl oz/a 14 fl oz/a	CEF C															
	Stinger	2  fl oz/a	CE															
	UpBeet	1 oz/a	CE															
	RU P. Max	1.125 lb ae/a																
	Destiny HC	1.5 pt/a	CEF															
	NPak	2.5 % v/v	CEF															
	Betamix Outlook	16 fl oz/a 10 fl oz/a	E E															
	RU P. Max	0.844 lbae/a	E															
	Betamix	24 fl oz/a	F															
	RU P. Max	0.75 lb ae/a	F															4
19	Nortron	7.5 pt/a	Α	3	3	100	100	99	4	3	3	5	99	99	192	27.2	19.3	9686
	RU P. Max	1.125 lb ae/a	С															
	Destiny HC	1.5  pt/a	CEF															1
	NPak RU P. Max	2.5 % v/v 0.844 lb ae/a	CEF E															
	RU P. Max	0.844  lb ae/a 0.75 lb ae/a	F															
	Nortron	7.5 pt/a	A	14	28	100	100	100	32	22	14	8	99	99	185	25.7	18.8	8895
	Betamix	12 fl oz/a	C	- /								0			.00		.0.0	
	Nortron	4 fl oz/a	CEF															,
	Outlook	14 fl oz/a	C															
	RU P. Max	1.125 lb ae/a	C															.1
	Destiny HC NPak	1.5 pt/a	CEF															
	Betamix	2.5 % v/v 16 fl oz/a	CEF E															1
	Outlook	10  fl  oz/a	E															
	RU P. Max	0.844 lb ae/a	Ē															
	Betamix RU P. Max	24 fl oz/a 0.75 lb ae/a	F															

 Table 2. Investigating Injury to Roundup Ready® Sugarbeet from Various POST Herbicide Combinations – Crookston, MN –

 2012 (Stachler).

			May 31		J	une 7		Jun 20	Jul 3	Jul 25	5	Septem	ber 7		Septe	ember 1	2
Trt Treatment	Rate	Appl	Sgbt	Sgbt	Colq	gr/ye fxtl	Kocz	Sgbt	Sgbt	Sgbt	Sgbt	Colq	gr/ye fxtl	Sgbt	Sgbt	Sgbt	Sgbt
No. Name <sup>1</sup>	Rate Unit	Code	Inju	Inju	Cntl	Cntl	Cntl	Inju	Inju	Inju	Inju	Cntl	Cntl	Stand	Yield	Sugar	Ext. Suc
								%					*****	#/100'	ton/A	%	lb/A
21 Nortron	7.5 pt/a	Α	19	34	100	100	84	39	23	14	10	99	99	185	23.6	18.7	8033
Betamix	2 pt/a	С															
Nortron	4 fl oz/a	CEF															
Outlook	14 fl oz/a	С															<i>d</i>
Stinger	3 fl oz/a	CEF															
RU P. Max	1.125 lb ae/a	С															
Betamix	3 pt/a	Е															
Outlook	10 fl oz/a	Е															
RU P. Max	0.844 lb ae/a	E															
NPak	2.5 % v/v	CEF															
Betamix	4 pt/a	F															
RU P. Max	0.75 lb ae/a	F															
LSD 5%	6		2.6	7.4	2.1	2.8	22.2	5.4	5.2	4.6	6.3	NS	NS	16.4	3.57	NS	1139
CV %	6		19	34	2	2	19	17	21	31	58	0	0	6	11	3	10

Table 2. Investigating Injury to Roundup Ready® Sugarbeet from Various POST Herbicide Combinations – Crookston, MN – 2012 (Stachler).

<sup>1</sup>RU P. Max = Roundup PowerMAX; R-11 = a NIS from Wilbur-Ellis; Destiny HC is a HSMOC from Winfield Solutions; NPak = N-Pak AMS (liquid AMS at 3.4 lbs dry AMS/gal of product from Winfield Solutions).

**Investigating Injury to Roundup Ready® Sugarbeet From Various POST Herbicide Combinations** – **Prosper, ND** – **2012** (Stachler). A seedbed was prepared using an 11-foot Kongskilde S-tine field cultivator equipped with rolling baskets. 'Crystal 985 RR' sugarbeet was seeded 1.25 inches deep in 22-inch rows at 60,825 seeds/A on May 17. Sugarbeet was treated with Tachigaren and Poncho Beta at 45 grams and 5.07 fl oz of product, respectively, per 100,000 seeds. Counter 20G insecticide was applied at 8.9 pounds/A in a 5-inch band and incorporated with a drag chain at planting. Herbicide treatments were applied May 17, 31, June 7, 22, and July 5, 12. All treatments were applied with a bicycle sprayer in 17 gpa spray solution through 8002 XR flat fan nozzles pressurized with  $CO_2$  at 40 psi to the center four rows of six row plots 30 feet in length. Quadris at 16 fl oz/A was broadcast June 12 to control Rhizoctonia root rot. Cercospora leaf spot was controlled with Headline at 9 fl oz/A broadcast July 18. Sugarbeet was harvested September 17 from the center two rows of each plot and weighed. Twenty to thirty pounds of sugarbeet roots were collected from each plot and analyzed for quality at American Crystal Sugar Quality Lab, East Grand Forks, MN.

Sugarbeet stand was counted in the center two rows of plots on June 21, July 18, and September 17. Sugarbeet injury was evaluated on June 7, 14, July 2, 5, 14, August 9, and September 17. Powell amaranth (70% Powell and 30% redroot pigweed) control was evaluated on June July 5, August 9, and September 17. All evaluations were a visual estimate of percent fresh weight reduction in the four treated rows compared to the adjacent untreated strip. Experimental design was randomized complete block with 4 replications. Data were analyzed with the ANOVA procedure of Agriculture Research Manager, version 8.4.2 software package.

Application code	A (PRE)	B (V1)	C (V2 sgrbt)	D (22 DAT B) & E (15 DAT C)	F (13 DAT E)	G (20 DAT D)
Date	May 17	May 31	June 7	June 22	July 5	July 12
Time of Day	12:30 P	12:15 P	12:45 P	10:00 A	9:45 A	3:30 P
Air Temperature (F)	80	68	86	77	74	84
Relative Humidity (%)	17	36	45	48	56	58
Wind Velocity (mph)	10	1	2	0	2	6
Wind Direction	S	S	SE	-	NW	SE
Soil Temp. (F at 6")	61	59	78	59	70	81
Soil Moisture	Dry	Good	Fair	Wet	Fair	Fair
Cloud Cover	10	40	20	0	8	25
Sugarbeet stage (avg)	PRE	V1 (cot)	V2.2 (2-3 lf)	V5 (5 lf)	V14 (14 lf)	
Colq height (avg/range) – Trt. 3	-	_	0.33"/0.12-0.5	0.5"/0.25-1	2.5"/N/A	
Colq density (plants/m <sup>2</sup> ) – Trt. 3	-	-	20.3	3.5	0.25	-

#### Table 1. Application Information

Summary: On June 14, 7 days after the second POST application, some of the treatments containing Nortron applied POST at 32 fl oz/A and high rates of Betamix with and without soil-applied Nortron and the treatment with Dual Magnum (treatments 9, 10, 12, and 21) caused the greatest sugarbeet injury (>34%). Visual sugarbeet injury declined quite well over time with several treatments similar to the weed-free check on September 17. Those treatments causing the greatest visual sugarbeet injury on September 17 included most treatments containing high (conventional) rates of Betamix, high POST rates of Nortron, Stinger, and/or Outlook or Dual Magnum. Treatments reducing root yield and extractable sucrose compared to the weed-free check included all treatments containing high (>24 fl oz/A) rates of Betamix with Outlook and/or Destiny HC, Stinger plus Outlook, high POST (32 fl oz/A) rates of Nortron and/or Dual Magnum (treatments 6, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, and 21). On July 5, all treatments containing Nortron applied PRE and two applications of Outlook controlled Powell amaranth (70% Powell, 30% redroot) at 99% with most of the remaining treatments controlling slightly less Powell amaranth. All treatments controlled 100% of all Powell amaranth at harvest.

	) – 2012 (Stac	inter).		Jun 7	Jun 14	Ju	ıly5	July14	Aug. 9			Sept	ember	17	
Trt	Herbicide	Rate	Appl		Sgbt	Sgbt	Poma	Sgbt			Poma	Contraction of the local division of the	1000 March 1	Sgbt	Sgbt
	Name <sup>1</sup>	Rate Unit	Code	Inju	Inju	Inju	Cntl	Iniu	Inju						Ext. Suc
								/0				#/100'		%	lb/A
1	NontrtCheck			0	0	0	0	0	0	0	0	163	10.4	17.1	3332
2	Weed-free			0	2	3	99	0	0	1	100	197	30.0	17.5	9472
	RU P. Max	1.125 lb ae/a	В												
	R-11	0.25 % v/v	BDFG												
	NPak	2.5 % v/v	BDFG												
	RU P. Max	0.844 lb ae/a	D												
	RU P. Max	0.75 lb ae/a	FG												
3	RU P. Max	1.125 lb ae/a	С	0	1	3	98	1	1	2	100	198	27.2	17.2	8404
	Destiny HC	1.5 pt/a	CEF												
	NPak	2.5 % v/v	CEF												
	RU P. Max	0.844 lb ae/a	Е												
	RUP. Max	0.75  lb ae/a	F	0	10			10	6		100	100			
4	Betamix	12  fl oz/a	С	0	13	9	99	10	6	3	100	199	26.9	17.4	8444
	Nortron	4 fl oz/a 1.125 lb ae/a	CEF												
	RU P. Max		C CEF												
	Destiny HC NPak	1.5 pt/a 2.5 % v/v	CEF												
	Betamix	2.5 % v/v 16 fl oz/a	E												
	RU P. Max	0.844  lb ae/a	Ē												
	Betamix	24  fl oz/a	F												
	RU P. Max	0.75  lb ae/a	F												
5	Betamix`	2 pt/a	C	0	-12	10	98	5	3	1	100	198	26.8	17.5	8469
2	Nortron	4 fl oz/a	CEF	v	·1 2	10	20	5	5	I	100	170	20.0	17.5	0409
	RU P. Max	1.125 lb ae/a	C												
	NPak	2.5 % v/v	CEF												
	Betamix	3 pt/a	Е												
	RU P. Max	0.844 lb ae/a	Е												
	Betamix	4 pt/a	F												
	RU P. Max	0.75 lb ae/a	F												
6	Betamix	2 pt/a	С	0	29	20	97	18	14	9	100	191	22.1	17.7	7122
	Nortron	4 fl oz∕a	CEF												
	RU P. Max	1.125 lb ae/a	С												
	Destiny HC	1.5 pt/a	CEF												
	NPak	. 2.5 % v/v	CEF												
	Betamix	3 pt/a	E												
	RU P. Max	0.844 lb ae/a	E												
	Betamix	4 pt/a	F												
	RUP. Max	0.75  lb ae/a	<u> </u>	6	•	10									
7	Betamix	12 fl oz/a	С	0	20	10	99	11	7	6	100	197	26.3	17.8	8455
	Nortron	4 fl oz/a	CEF												
	Outlook	14 fl oz/a	C												
	RUP. Max	1.125  lb ae/a	CEE												
	Destiny HC	1.5 pt/a	CEF												
	NPak Betamix	2.5% v/v	CEF												
	Outlook	16 fl oz/a 10 fl oz/a	E E												
	RU P. Max	0.844  lb ae/a	E E												
	Betamix	24 fl oz/a	E F												,
	RU P. Max	0.75  lb ae/a	F												(
		0.7510 au/a	T												

# Table 2. Investigating Injury to Roundup Ready® Sugarbeet from Various POST Herbicide Combinations – Prosper, ND – 2012 (Stachler).

NI	) – 2012 (Stac	chler).		_	-										* ´
				Jun 7	Jun 14	Ju	ıly5	July14	Aug. 9			Sept	ember	17	
Trt	Herbicide	Rate	Appl	Sgbt	Sgbt	Sgbt	Poma	Sgbt	Sgbt	Sgbt	Poma	Sgbt	Sgbt	Sgbt	Sgbt
No	Name	Rate Unit	Code	Inju	Inju	Inju	Cntl	Inju							Ext. Suc
							9	%				#/100'		%	lb/A
8	Betamix	2 pt/a	С	2	19	15	99	11	6	5	100	185	25.4	17.4	8008
	Nortron	4 fl oz/a	CEF												
	Outlook	14 fl oz/a	С												
	RU P. Max	1.125 lb ae/a	$\mathbf{C}$												
	NPak	2.5 % v/v	CEF												
	Betamix	3 pt/a	E												
	Outlook	10 fl oz/a	E												
	RU P. Max	0.844 lb ae/a	Е												
	Betamix	4 pt/a	F												
	RU P. Max	0.75 lb ae/a	F												
9	Betamix	2 pt/a	С	0	41	32	99	26	14	8	100	165	23.7	17.5	7553
	Nortron	4 fl oz∕a	CEF												
	Outlook	14 fl oz/a	С												
	RU P. Max	1.125 lb ae/a	С												
	Destiny HC	1.5 pt/a	CEF												
	NPak	2.5 % v/v	CEF												
	Betamix	3 pt/a	E												
	Outlook	10 fl oz/a	Е												
	RU P. Max	0.844 lb ae/a	Е												
	Betamix	4 pt/a	F												
	RU P. Max	0.75 lb ae/a	F												
10	Betamix	12 fl oz/a	С	0	38	15	99	18	13	7	100	178	24.9	17.3	7737
	Nortron	4 fl oz/a	CEF												
	Dual Mag	1.5 pt/a	С												
	RU P. Max	1.125 lb ae/a	С												
	Destiny HC	1.5 pt/a	CEF												
	NPak	2.5 % v/v	CEF												
	Betamix	16 fl oz/a	Е												
	Dual Mag	1 pt/a	Е												
	RU P. Max	0.844 lb ae/a	Е												
	Betamix	24 fl oz/a	F												
	RU P. Max	0.75 lb ae/a	F												
11	Betamix	12 fl oz/a	С	0	24	20	99	18	13	6	100	. 191	24.6	17.2	7635
	Nortron	4 fl oz/a	CEF												
	Outlook	14 fl oz/a	С												
	Stinger	3 fl oz/a	CEF												
	RU P. Max	1.125 lb ae/a	С												
	Destiny HC	1.5 pt/a	CEF												
	NPak	2.5 % v/v	CEF												
	Betamix	16 fl oz/a	Е												
	Outlook	10 fl oz/a	Е												
	RU P. Max	0.844 lb ae/a	Е												
	Betamix	24 fl oz/a	F												
	RU P. Max	0.75 lb ae/a	F												

Table 2. Investigating Injury to Roundup Ready® Sugarbeet from Various POST Herbicide Combinations – Prosper, ND – 2012 (Stachler).

				Jun 7	Jun 14	Ju	ly5	July14	Aug. 9			Sept	ember	17	
	Herbicide	Rate	Appl		Sgbt	Sgbt	Poma	Sgbt	Sgbt		Poma			Sgbt	Sgbt
No 1	Vame	Rate Unit	Code	Inju	Inju	Inju	Cntl	Inju	Inju	Inju					Ext. Suc
								%				#/100'	ton/A	%	lb/A
	Betamix	12 fl oz/a	С	0	39	29	99	27	18	10	100	175	20.4	17.2	6313
	Nortron	32 fl oz/a	CEF												
	Dutlook	14 fl oz/a	С												
	Stinger	3 fl oz/a	CEF												
	RU P. Max	1.125 lb ae/a	С												
	Destiny HC	1.5 pt/a	CEF												
	NPak .	2.5 % v/v	CEF												
	Betamix	16 fl oz/a	Е												
	Dutlook	10 fl oz/a	Е												
	RU P. Max	0.844 lb ae/a	Е												
	Betamix	24 fl oz/a	F												
	RU P. Max	0.75 lb ae/a	F												
	Betamix	2 pt/a	С	0	23	15	99	14	12	6	100	180	23.9	17.5	7542
	Nortron	4 fl oz/a	CEF												
	Dutlook	14 fl oz/a	С												
	Stinger	3 fl oz/a	CEF												
	RU P. Max	1.125 lb ae/a	С												
	vPak	2.5 % v/v	CEF												
	Betamix	3 pt/a	Е												
	Dutlook	10 fl oz/a	Е												
	RU P. Max	0.844 lb ae/a	E												
	Betamix	4 pt/a	F												
	RU P. Max	0.75 lb ae/a	F												
	Betamix	2 pt/a	С	0	30	23	99	22	13	10	100	171	23.3	17.2	7199
	Nortron	32 fl oz/a	CEF												
	Dutlook	14 fl oz/a	С												
	Stinger	3 fl oz/a	CEF												
	RU P. Max	1.125 lb ae/a	С												
	VPak	2.5 % v/v	CEF												
	Betamix	3 pt/a	Е												
	Dutlook	10 fl oz/a	Е												
	RU P. Max	0.844 lb ae/a	Е												
	Betamix	4 pt/a	F												
	RU P. Max	0.75 lb ae/a	F												
	Betamix	12 fl oz/a	С	0	30	19	99	18	11	10	100	187	24.2	17.1	7332
	Nortron	4 fl oz/a	CEF												
	Dutlook	14 fl oz/a	С												
	Stinger	4 fl oz/a	CE												
	RU P. Max	1.125 lb ae/a	С												
	Destiny HC	1.5 pt/a	CEF												
	<b>VPak</b>	2.5% v/v	CEF												
	Betamix	16 fl oz/a	E												
	Dutlook	10 fl oz/a	Е												
	RU P. Max	0.844 lb ae/a	E												
	Betamix	24 fl oz/a	F												
	Stinger	2.5 fl oz/a	F												
R	RU P. Max	0.75 lb ae/a	F												

Table 2. Investigating Injury to Roundup Ready® Sugarbeet from Various POST Herbicide Combinations – Prosper, ND – 2012 (Stachler).

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	X	chler).		Jun 7	Jun 14	Л	ıly5	July14	Aug. 9	1		Sent	ember	17	
Trt	Herbicide	Rate	Appl		Sgbt	Sgbt	Poma	Sgbt			Poma	Sgbt		Sgbt	Sgbt
	Name <sup>1</sup>	Rate Unit	Code	Inju	Inju	Inju	Cntl	Inju		Inju	Cntl	Stand	Yield		Ext. Suc
								%				#/100'	ton/A	%	lb/A
16	Betamix	12 fl oz/a	С	0	31	21	99	16	11	9	100	184	22.3	17.1	6714
	Nortron	4 fl oz/a	CEF												
	Dual Mag	1.5 pt/a	С												
	Stinger	3 fl oz/a	CEF												
	RU P. Max	1.125 lb ae/a	С												
	Destiny HC	1.5 pt/a	CEF												
	NPak	2.5 % v/v	CEF												
	Betamix	16 fl oz/a	Е												
	Dual Mag	l pt/a	Е												
	RU P. Max	0.844 lb ae/a	Е												
	Betamix	24 fl oz/a	F												
	RU P. Max	0.75 lb ae/a	F												
17	RU P. Max	1.125 lb ae/a	С	0	9	17	97	16	13	12	100	196	24.6	17.8	7893
	R-11	0.5 % v/v	С												
	NPak	2.5 % v/v	CEF												
	Betamix	3 pt/a	Е												
	Nortron	4 fl oz/a	EF												
	Outlook	21 fl oz/a	Е												
	Stinger	6 fl oz/a	Е												
	RU P. Max	0.844 lb ae/a	Е												
	Betamix	4 pt/a	F												
	Stinger	4.5 fl oz/a	F												
	RU P. Max	0.75 lb ae/a	F												
18	Betamix	12 fl oz/a	С	3	31	16	99	12	5	3	100	182	25.6	17.6	8049
	Nortron	4 fl oz/a	CEF												
	Outlook	14 fl oz/a	С												
	Stinger	2 fl oz/a	CE												
	UpBeet	1 oz/a	CE												
	RU P. Max	1.125 lb ae/a	С												
	Destiny HC	1.5 pt/a	CEF												
_	NPak	2.5 % v/v	CEF												
	Betamix	16 fl oz/a	Е												
	Outlook	10 fl oz/a	E												
	RU P. Max	0.844 lb ae/a	E												
	Betamix	24 fl oz/a	F												
	RU P. Max	0.75 lb ae/a	F			,									
19	Nortron	7.5 pt/a	А	5	14	3	99	2	6	5	100	184	26.2	17.9	8503
	RU P. Max	1.125 lb ae/a	С												
	Destiny HC	1.5 pt/a	CEF												
	NPak	2.5 % v/v	CEF												
	RU P. Max	0.844 lb ae/a	Е												
	RU P. Max	0.75 lb ae/a	F												
20	Nortron	7.5 pt/a	А	5	26	16	99	12	6	8	100	183	26.7	17.7	8578
	Betamix	12 fl oz/a	С												
	Nortron	4 fl oz/a	CEF												
	Outlook	14 fl oz/a	С												
	RU P. Max	1.125 lb ae/a	С												
	Destiny HC	1.5 pt/a	CEF												
	NPak	2.5 % v/v	CEF												
	Betamix	16 fl oz/a	Е												
	Outlook	10 fl oz/a	Е												
	RU P. Max	0.844 lb ae/a	Е												
	Betamix	24 fl oz/a	F												
	RU P. Max	0.75 lb ae/a	F												

Table 2. Investigating Injury to Roundup Ready® Sugarbeet from Various POST Herbicide Combinations – Prosper, ND – 2012 (Stachler).

			Jun 7	Jun 14	Л	ıly5	July14	Aug. 9			Sept	ember	17	
Trt Herbicide	Rate	Appl	Sgbt	Sgbt	Sgbt	Poma	Sgbt	Sgbt	Sgbt	Poma	Sgbt	Sgbt	Sgbt	Sgbt
No Name <sup>1</sup>	Rate Unit	Code	Inju	Inju	Inju	Cntl	Inju	Inju	Inju	Cntl	Stand	Yield	Sugar	Ext. Suc
			~				%				#/100'	ton/A	%	lb/A
21 Nortron	7.5 pt/a	А	6	35	28	99	20	13	8	100	179	23.2	17.0	7039
Betamix	2 pt/a	С												
Nortron	4 fl oz/a	CEF												
Outlook	14 fl oz/a	С												
Stinger	3 fl oz/a	CEF												
RU P. Max	1.125 lb ae/a	С												
Betamix	3 pt/a	Е												
Outlook	10 fl oz/a	Е												
RU P. Max	0.844 lb ae/a	Е												
NPak	2.5 % v/v	CEF												
Betamix	4 pt/a	F												
RU P. Max	0.75 lb ae/a	F												
L	SD 5%	_	1.6	6.4	5.7	1.5	5.2	6.4	6.1	NS	18.7	3.71	NS	984
	CV %		117	21	26	1	28	52	71	0	7	11	3	9

Table 2. Investigating Injury to Roundup Ready® Sugarbeet from Various POST Herbicide Combinations – Prosper, ND – 2012 (Stachler).

<sup>1</sup>RU P. Max = Roundup PowerMAX; Dual Mag = Dual Magnum; R-11 is a NIS from Wilbur-Ellis; Destiny HC is a HSMOC from Winfield Solutions; NPak = N-Pak AMS (liquid AMS at 3.4 lbs dry AMS/gal of product from Winfield Solutions).

# Weed Control Systems Using Soil Residual Herbicides in Roundup Ready® Sugarbeet - Hickson, ND -

**2012** (Stachler). Urea fertilizer was broadcast-applied at 75 pounds per acre and incorporated using an 11-foot Kongskilde S-tine field cultivator equipped with rolling baskets. Redroot pigweed was seeded perpendicular to the plots and shallowly incorporated. 'SV 36917RR' sugarbeet was seeded 1.25 inches deep in 22-inch rows at 60,825 seeds per acre on May 16. Sugarbeet was treated with Tachigaren at 20 grams of product per 100,000 seeds and Nipsit Suite. Counter 20G insecticide at 8.9 lbs/A was applied in a 5-inch band and drag chain incorporated at planting. Herbicide treatments were applied May 16, and June 7, 13, 18, 26. All treatments were applied with a bicycle sprayer in 17 gpa spray solution through 8002 XR flat fan nozzles pressurized with  $CO_2$  at 40 psi to the center four rows of six row plots 30 feet in length. Quadris was applied in furrow at 7.3 fl oz/A May 16 and broadcast at 16 fl oz/A June 8 to control Rhizoctonia root rot. Cercospora leaf spot was controlled with Headline at 9 fl oz/A and Inspire XT at 7 fl oz/A broadcast July 18 and August 13, respectively. Sugarbeet was harvested September 5 from the center two rows of each plot and weighed. Twenty to thirty pounds of sugarbeet roots were collected from each plot and analyzed for quality at American Crystal Sugar Quality Lab, East Grand Forks, MN.

Sugarbeet stand was counted in the center two rows of plots on June 21, July 19, and Sept 5. Sugarbeet injury was evaluated on June 13, 18, and July 10, 25. Common lambsquarters, redroot pigweed, and common purslane control were evaluated on June 18, July 10, 25, and Aug 29. All evaluations were a visual estimate of percent fresh weight reduction in the four treated rows compared to the adjacent untreated strip. Experimental design was randomized complete block with 4 replications. Data were analyzed with the ANOVA procedure of Agriculture Research Manager, version 8.4.2 software package.

Application code	A (PRE)	B (V2 sgrbt)	C (V4 sgrbt)	D (11 DAT B)	E (13 DAT C)
Date	May 16	June 7	June 13	June 18	June 26
Time of Day	10:00 AM	10:30 AM	3:00 PM	10:30 AM	11:15 AM
Air Temperature (F)	62	75	74	74	75
Relative Humidity (%)	35	60	49	48	48
Wind Velocity (mph)	6	8	13	. 7	6
Wind Direction	ΓS	S	SE	NW	SE
Soil Temp. (F at 6")	58	68	60	69	63
Soil Moisture	Fair	Good	Good	Good	Good
Cloud Cover	30	35	25	75	15
Sugarbeet stage (avg)	PRE	V 1.9 (cot2lf)	V 3.6 (3-4 lf)	V 5.5 (5-6 lf)	V 7.2 (7-8 lf)
Rrpw height (avg/range) – Trt.3/6		3=0.2" /0.1-0.5	6=0.3"/0.1-0.8	3=0.2"/0.1-0.33	6=0.2"/0.1-0.5
Rrpw density (plants/m <sup>2</sup> ) – Trt. 3/6	<del>.</del> .	3 = 32	6 = 86	3 = 4.5	6 = 12
Colq height (avg/range) – Trt. 3/6	-	3=0.3" /0.1-0.8	6=0.5"/0.1-1.5	3=0.46"/0.2-0.7	6=0.48"/0.1-2
Colq density (plants/m <sup>2</sup> ) – Trt. 3/6	-	3 = 41	6 = 37	3 = 48	6 = 25

#### Table 1. Application Information

**Summary:** Warrant applied PRE followed by Roundup PowerMAX applied initially at V2 improved control of redroot pigweed and common purslane, but not lambsquarters compared to Roundup PowerMAX applied alone at the same initial timing. There was less of a benefit when Roundup PowerMAX was applied initially at the V4 sugarbeet stage of growth. The most effective treatments for all broadleaf on August 29<sup>th</sup> were those treatments in which Warrant, Outlook, and Dual were applied in the first POST application to V4 sugarbeet and when Warrant was applied PRE and the first POST application started at V4 sugarbeet. Outlook controlled weeds slightly better than Warrant and Dual and there was no difference in whether the Outlook was applied in the first or second POST application regardless of starting at the V2 or V4 sugarbeet stage. Warrant controlled more weeds when applied in the first POST application at both the V2 and V4 sugarbeet stage compared to the second POST application. Dual controlled more weeds when applied in the first POST application, but it did not matter whether the Dual was applied in the first or second POST application when starting at V4 sugarbeet stage. Sugarbeet root yield was similar for all treatments.

	garbeet - II		,		(544511		/ 25			August		July 19		Septe	mber 5	
	t Herbicide		Rate	Appl	Sgbt	Colq	Rrpw	Copu	Colq	Rrpw	Copu	Sgbt	Sgbt	Sgbt	Sgbt	Sgbt
Nc	. Name <sup>1</sup>	Rate	Unit	Code	Inju	cntrl	cntrl	cntrl	cntrl	cntrl	cntrl	Stand	Stand	Yield	Sugar	Ext. Suc
4	147							%				#/1	.00'	Ton/A	%	lb/A
1	Warrant		lb ai/a	A	2	78	90	97	66	82	96	126	116	19.5	15.3	5338
	R.U. P. Max NPak AMS		lb ae/a % v/v	B												
	R.U. P. Max		<sup>76</sup> v/v lb ae/a	BD												
2	Warrant		lb ai/a	<u>D</u> A	4	00	00									
2	R.U. P. Max		lb ae/a	C	4	99	99	99	99	97	99	145	138	23.5	15.4	6475
	NPak AMS		% v/v	CE												
	R.U. P. Max		lb ae/a	E												
3	R.U. P. Max		lb ae/a	 B	3	71	79	71	63	63	76	146	142	24.0	45.7	6604
	NPak AMS		% v/v	BD	0		,,,	, 1	05	05	70	140	142	24.0	15.7	6694
	R.U. P. Max		lb ae/a	D												
4	R.U. P. Max	1.125	lb ae/a	В	3	84	89	92	75	74	94	148	141	21.6	15.0	5765
	NPak AMS	5	% v/v	BD							51	140	141	21.0	10.0	5705
	Warrant	1.13	lb ai/a	В												
	R.U. P. Max	0.84	lb ae/a	D												
5	R.U. P. Max	1.125	lb ae/a	В	3	76	85	90	66	77	92	145	143	23.4	14.6	5974
	NPak AMS	5	% v/v	BD			1									
	R.U. P. Max	0.84	lb ae/a	D												
	Warrant		lb ai/a	D												d a
6	R.U. P. Max		lb ae/a	C	3	92	97	92	85	92	94	145	127	21.6	15.2	5807
	NPak AMS		% v/v	CE												
-	R.U. P. Max		lb ae/a	E												
7	R.U. P. Max		lb ae/a	С	2	98	98	96	97	99	99	145	127	21.6	14.5	5571
	NPak AMS		% v/v	CE												
	Warrant		lb ai/a	С												-
8	R.U. P. Max		lb ae/a	E										·		
0	R.U. P. Max NPak AMS		lb ae/a % v/v	C	5	91	98	96	89	98	96	138	131	23.3	15.0	6224
	R.U. P. Max		<sup>%</sup> v/v lb ae/a	CE												4
	Warrant		lb ai/a	E E												
9	R.U. P. Max		lb ae/a	 B	6	90	98	99	0.7	00		120				
5	NPak AMS		% v/v	BD	U	90	90	99	82	96	98	128	114	21.2	14.0	5149
	Outlook		lb ai/a	B												
	R.U. P. Max		lb ae/a	D												
10	R.U. P. Max		lb ae/a	B	3	92	97	98	85	94	98	136	140	26.6	15.7	7468
	NPak AMS		% v/v	BD	•		5,	50	00	54	50	130	140	20.0	15.7	/408
	R.U. P. Max		lb ae/a	D												
	Outlook	0.91	lb ai/a	D												1
11	R.U. P. Max	1.125	lb ae/a	С	1	96	97	98	97	98	99	158	138	22.8	14.5	5894
	NPak AMS	5	% v/v	CE						-						0007
	Outlook		lb ai/a	С		× .										1
	R.U. P. Max		lb ae/a	E												: :
12	R.U. P. Max		lb ae/a	С	3	97	96	99	98	93	99	143	119	22.5	15.0	6014
	NPak AMS		% v/v	CE												i.
	R.U. P. Max		lb ae/a	E												1
	Outlook		lb ai/a	E												
13	R.U. P. Max		lb ae/a	В	4	86	89	98	75	82	97	137	131	21.9	14.7	5684
	NPak AMS		% v/v	BD												1
	Dual Magnum			B												1
14	R.U. P. Max		lb ae/a	<u>D</u>									<u>`</u>			:
14	R.U. P. Max NPak AMS	1.125	-	B	6	76	86	92	66	.78	94	115	110	21.0	14.8	5472
	R.U. P. Max		% v/v	BD												
	Dual Magnum		lb ae/a Ib ai/a	D												
	eda Magnulli	1.40	in gi/g	D												

Table 2. Sugarbeet response and weed control in systems using soil residual herbicides in Roundup Ready® sugarbeet – Hickson, ND – 2012 (Stachler).

						July	/ 25			August		July 19		Septer	mber 5	
	Herbicide Name <sup>1</sup>	Rate	Rate Unit	Appl Code	Sgbt Inju	Colq cntrl	Rrpw cntrl	Copu cntrl	Colq cntrl	Rrpw cntrl	Copu cntrl	Sgbt Stand	Sgbt Stand	Sgbt Yield	Sgbt Sugar	Sgbt Ext. Suc
		····.						%				#/1	.00'	Ton/A	%	lb/A
15	R.U. P. Max	1.125	lb ae/a	С	3	99	99	99	98	96	99	144	128	22.2	15.3	6059
	NPak AMS	5	% v/v	CE												
	Dual Magnum	1.43	lb ai/a	С												
	R.U. P. Max	0.84	lb ae/a	Е												
16	R.U. P. Max	1.125	lb ae/a	С	7	97	98	94	94	96	95	139	127	23.2	15.1	6179
	NPak AMS	5	% v/v	CE										2012	10.1	01/0
	R.U. P. Max	0.84	lb ae/a	Е												
	Dual Magnum	1.43	lb ai/a	Е												
			LSD 5%		NS	9.7	7.2	7.0	12.4	13.7	6.9	NS	NS	NS	NS	NS
			CV %		91	8	5	5	10	11	5	13	16	16	5	20

Table 2. Sugarbeet response and weed control in systems using soil residual herbicides in Roundup Ready® sugarbeet – Hickson, ND – 2012 (Stachler).

<sup>1</sup>R.U. P. Max = Roundup PowerMAX; NPak AMS = N-Pak AMS (liquid AMS at 3.4 lbs dry AMS/gal of product from Winfield Solutions).

Management of Volunteer Roundup Ready® Canola in Roundup Ready Sugarbeet - Hickson, ND - 2012 (Stachler). Urea fertilizer was broadcast at 75 pounds per acre and volunteer Roundup Ready canola and redroot pigweed seed were spread and all were incorporated using an 11-foot Kongskilde S-tine field cultivator equipped with rolling baskets. 'SV 36917RR' sugarbeet was seeded 1.25 inches deep in 22-inch rows at 60,825 seeds/A on May 16. Sugarbeet was treated with Tachigaren at 20 grams of product per 100,000 seeds and Nipsit Suite. Counter 20G insecticide was applied at 8.9 pounds/A in a 5-inch band and incorporated with a drag chain at planting. Herbicide treatments were applied May 15, 31 and June 7, 13, 20. All treatments were applied with a bicycle sprayer in 17 gpa spray solution through 8002 XR flat fan nozzles pressurized with CO<sub>2</sub> at 40 psi to the center four rows of six row plots 30 feet in length. Roundup PowerMAX was applied at 22 fl oz/A to the entire trial on July 10 to attempt to eliminate yield loss from annual weeds not controlled following two POST herbicide applications. Preplant treatments were incorporated with an 8-foot John Deere S-tine cultivator equipped with a spring tooth harrow. Quadris was applied in furrow at 7.3 fl oz/A May 16 and broadcast at 16 fl oz/A June 8 to control Rhizoctonia root rot. Cercospora leaf spot was controlled with Headline at 9 fl oz/A and Inspire XT at 7 fl oz/A broadcast July 18 and August 13, respectively. Sugarbeet was harvested September 5 from the center two rows of each plot and weighed. Twenty to thirty pounds of sugarbeet roots were collected from each plot and analyzed for quality at American Crystal Sugar Quality Lab, East Grand Forks, MN.

Sugarbeet stand was counted in the center two rows of plots on June 21, July 19, and September 5. Sugarbeet injury was evaluated on May 31, June 13, 18, and July 5. Volunteer RR canola, common lambsquarters, redroot pigweed, or common purslane control was evaluated on May 31, June 13, 18, July 5, 18, and August 29. All evaluations were a visual estimate of percent fresh weight reduction in the four treated rows compared to the adjacent untreated strip. Experimental design was randomized complete block with 4 replications. Data were analyzed with the ANOVA procedure of Agriculture Research Manager, version 8.4.2 software package.

Application code	A (PPI)	B (cot2lf Canola)	C (7 DAT B)	D (13 DAT B OR 6 DAT C)	E (5 DAT D)
Date	May 15	May 31	June 7	June 13	June 18
Time of Day	3:00 P	12:00 P	9:45 A	10:00 A	11:00 A
Air Temperature (F)	68	65	74	72	74
Relative Humidity (%)	14	38	60	50	48
Wind Velocity (mph)	14	4	8	8	7
Wind Direction	NNW	SW	S	S	NW
Soil Temp. (F at 6")	69	53	68	60	60
Soil Moisture	Fair	Good	Good	Good	Good
Cloud Cover	10	30	35	10	75
Sugarbeet stage (avg)	PPI	V1 (cot.)	V1.8 (1-2 lf)	V3.3 (3-4 lf)	V5.5 (5-6 lf)
Cano(RR) stage (avg/range) – Trt. 4	-	Cot./Cot1.5 lf		2.3 lf/Cot4 lf	
Cano(RR) density (plants/m <sup>2</sup> ) – Trt. 4	-	30.3		77	-
Colq height (avg/range) – Trt. 4	-	0.125"/0.12-0.33"	-	0.33"/0.12-0.7"	-
Colq density (plants/m <sup>2</sup> ) – Trt. 4	-	9.5	-	31.5	-
Rrpw density (plants/m <sup>2</sup> ) – Trt. 4	-	1.25	-	38.8	
Copu density (plants/m <sup>2</sup> ) – Trt. 4	-	0	· _	119.8	-

## Table 1. Application Information<sup>1</sup>

<sup>1</sup> Application F was **NOT** applied due to an oversight.

**Summary:** Ro-Neet controlled slightly more volunteer RR canola, lambsquarters, and redroot pigweed on May 31, the day of the first POST application than Nortron, however on August 29<sup>th</sup>, Nortron controlled more volunteer RR canola than Ro-Neet. Treatments 5, 8, 9, and 18 controlled > 90% of volunteer RR canola on July 5, however by August 29<sup>th</sup> control was reduced to below 73% for these treatments with only treatments 8, 11, and 18 controlling  $\geq$  70% of volunteer RR canola. The greater the number of herbicide applications and the shorter the time between applications the greater the control of volunteer RR canola. Increasing the rate of UpBeet marginally improved control of volunteer RR canola. Nortron applied PPI did not appear to improve control of volunteer RR canola compared to total POST treatments. Betamix did not improve control of volunteer RR canola. Cide Winder and Destiny HC controlled volunteer RR canola similarly. Mostly those treatments controlling volunteer RR canola less than 60% reduced sugarbeet root yield and extractable sucrose other than treatment 8 which reduced yield due to stand loss from crop injury caused by the initial POST application.

 Table 2. Management of volunteer Roundup Ready® canola in Roundup Ready sugarbeet - Hickson, ND - 2012

 (Stachler).

Trt Treatment	Rate	Appl		May 31				e 18		<u> </u>	Jul			Aug. 2
No. Name <sup>1</sup>	Rate Unit	Code <sup>2</sup>	Cano <sup>3</sup>	Colq	Rrpw	Cano	Colq			Cano	Colq	Rrpw	Copu	Cano
1 UpDaat	1	DD					0.2	% Co				~ 4		
1 UpBeet Nortron	1 oz/a 4 fl oz/a	BD BD	0	0	0	74	93	99	93	83	78	94	89	60
RU PowerMa														
RU PowerMa		D												
Destiny HC	2  pt/a	BD												1
NPAK	2  pt/a 2.5 % v/v	BD												
2 UpBeet		BD B	0	0		70								4
Nortron	l oz/a 4 fl oz/a	В BD	0	0	0	72	91	99	97	71	73	86	80	54
RU PowerMa		BD												
RU PowerMa		D												4
UpBeet	0.5  oz/a	D												
														1
Destiny HC NPAK	2  pt/a	BD												i
	2.5% v/v	BD	0							~ ~				
3 UpBeet	0.25 oz/a	BCD	0	0	0	90	95	99	98	85	71	76	66	61
Nortron	4 fl oz/a													der.
RU PowerMa		B												, j
RU PowerMa		D												
Destiny HC	2  pt/a	BCD												
NPAK 4. LlaDaat	0.05	BCD					0.0		~~					
4 UpBeet		BD(F)	0	0	0	62	90	98	92	61	69	79	66	31
Nortron	4 fl oz/a	• • •												
RU PowerMa		B												4
RU PowerMa		D												
RU PowerMa		(F)												
Destiny HC		BD(F)												i i
NPAK	$\frac{2.5\% \text{ v/v}}{0.25}$			0										;
5 UpBeet		BCDE	0	0	0	88	89	97	97	93	78	85	87	-66
Nortron	3 fl oz/a													
RU PowerMa		B												
RU PowerMa		D												
Destiny HC		BCDE												
NPAK	2.5% v/v		-											
6 UpBeet	0.25 oz/a	BCD	0	0	0	87	94	99	98	80	69	71	76	53
Nortron	4 fl oz/a													
RU PowerMa		В												
RU PowerMa		D												
Cide Winder	-	BCD												4
NPAK	2.5% v/v													
7 UpBeet		BD(F)	0	0	0	66	87	99	95	64	71	83	71	34
Nortron	4 fl oz/a	BD(F)												
RU PowerMaz		В												
RU PowerMaz		D												
RU PowerMaz		(F)												
Cide Winder		BD(F)												
NPAK	2.5 % v/v							- 1112 - <u>1111 -</u>						
8 UpBeet		BCDE	0	0	0	91	94	99	99	93	76	90	91	70
Nortron	3 fl oz/a	BCDE												4
RU PowerMax		В												
RU PowerMax		D												
Cide Winder		BCDE												-
NPAK	2.5% v/v	DCDE												

 Table 2. Management of volunteer Roundup Ready® canola in Roundup Ready sugarbeet - Hickson, ND - 2012

 (Stachler).

	chler). Treatment	Rate	Appl		May 31			հոր	e 18		·····,	Jul	v 5		Aug. 29
	Name <sup>1</sup>	Rate Unit		Cano <sup>3</sup>	Colq	Rrpw	Cano	States and the second se	the second s	Copu	Cano			Copu	
									% Co	ntrol	Cano	Colq	Kipw	Copu	Cano
9 U	UpBeet	0.25 oz/a	BCD	0	0	0	97	99	99	99	96	71	69	61	68
1	Betamix	1 pt/a	в								,,,		07	01	
	Nortron	4 fl oz/a													:
	RU PowerMax														ą.
	RU PowerMax														
	Betamix	2 pt/a	CD												
	Destiny HC	2 pt/a	BCD												
	NPAK	$\frac{2.5\% \text{ v/v}}{0.25}$	BCD		0										
	UpBeet Nortron	0.25 oz/a 4 fl oz/a	BCD BCD	0	0	0	89	97	99	98	87	84	92	96	66
	RU PowerMax														1
	RU PowerMax														
	Outlook	21  fl oz/a	C												1
	Destiny HC	21 tr 02/ a	BCD												2
	NPAK	2.5% v/v	BCD												1
	UpBeet	0.33 oz/a	BCD	0	0	0	88	99	99	99	87	76	81	89	72
	Nortron	4 fl oz/a	BCD			5					01	70		07	12
	RU PowerMax		в												
	RU PowerMax		$\mathbf{D}$												
	Destiny HC	2 pt/a	BCD												
	NPAK	2.5% v/v	BCD												4
	JpBeet	0.33 oz/a	BD(F)	0	0	0	66	94	99	97	65	74	79	85	51
	Nortron	4 fl oz/a	• • •												
	RU PowerMax		В												1
	RU PowerMax		D												-
	RU PowerMax		• •												
	Destiny HC NPAK	2  pt/a	BD(F)												
	JpBeet	2.5% v/v 0.5 oz/a	BCD	0	0	0	00	07	00	00	0.0				
	Vortron	$4 \mathrm{fl} \mathrm{oz/a}$	BCD	0	0	0	90	97	99	99	88	74	81	88	65
	RU PowerMax		B												1
	RU PowerMax		D												
	Destiny HC	2 pt/a	BCD												
	NPAK .	2.5 % v/v	BCD												
	JpBeet		BD(F)	0	0	0	71	89	99	90	68	71	84	83	40
N	Nortron	4 fl oz/a	BD(F)							20	00	, ,		05	40
R	RU PowerMax	1.131b ae/a	B												
R	RU PowerMax	0.841b ae/a	D												
	RU PowerMax		(F)												-
	Destiny HC	-	BD(F)												
	NPAK	2.5 % v/v													-i
	Nortron	7.5 pt/a	A	19	78	80	88	98	99	99	83	85	98	99	59
	-	0.25 oz/a	BCD												
	Nortron														
	RU PowerMax		B												:
	U PowerMax		D												ì
	Destiny HC IPAK	2  pt/a	BCD												
	Vortron	$\frac{2.5\% \text{ v/v}}{7.5 \text{ pt/s}}$	BCD	22	70	00	70	00	00	00	<i>m</i> 1		0.0		
		7.5 pt/a 0.25 oz/a	A BD(F)	23	79	80	70	99	99	99	71	90	99	99	45
	Vortron	0.2302/a 4 fl oz/a													i.
	U PowerMax		BD(r) B												
	U PowerMax		D												
	U PowerMax		F												
	Destiny HC		BD(F)												
	IPAK	2.5% v/v													
			-~ (x )												

Table 2. Management of volunteer Roundup Ready® canola in Roundup Ready sugarbeet - Hic	kson, ND - 2012
(Stachler).	

Trt Treatment	Rate	Appl		May 31			Jun	e 18			Jul	y 5		Aug. 2
No. Name <sup>1</sup>	Rate Unit	Code <sup>2</sup>	Cano <sup>3</sup>	Colq	Rrpw	Cano	Colq	Rrpw	Copu	Cano	Colq	Rrpw		Cano
								% Co	ntrol					
17 Nortron	7.5 pt/a	Α	20	79	81	68	98	99	99	69	88	96	99	40
UpBeet	0.25 oz/a	BD(F)												
Nortron	4 fl oz/a													
RU PowerMax														
RU PowerMax	x 0.841b ae/a	D												-
RU PowerMax	c 0.75 lb ae/a	F												. i
Cide Winder	2 pt/a	BDF												i
NPAK	2.5 % v/v	BD(F)												1
18 Nortron	7.5 pt/a	Α	21	78	80	87	99	99	99	92	93	98	99	71
UpBeet	0.25 oz/a	BCDE												
Nortron	3 fl oz/a	BCDE												
RU PowerMax	x 1.13 lb ae/a	В												
RU PowerMax	c 0.751b ae/a	D												
Destiny HC	2 pt/a	BCDE												÷
NPAK	2.5 % v/v	BCDE												i
19 Ro-Neet SB	5.3 pt/a	Α	26	84	84	87	99	99	99	77	90	92	99	46
UpBeet	0.25 oz/a	BCD												
Nortron	4 fl oz/a	BCD												
RU PowerMax	: 1.13 lb ae/a	В												
RU PowerMax	. 0.751b ae/a	D												
Destiny HC	2 pt/a	BCD												
NPAK	2.5 % v/v	BCD												
	LSD 5%		2.4	2.7	2.6	5.6	6.2	NS	3.9	4.8	8.2	10.1	14.9	10.4
	CV %		30	9	8	5	5	1	3	4	7	8	12	13

<sup>7</sup>RU PowerMax = Roundup PowerMAX; Cide Winder is a HSMOC from Helena; Destiny HC is a HSMOC from Winfield Solutions; NPAK = N-Pak AMS (liquid AMS at 3.4 lbs dry AMS/gal of product from Winfield Solutions).
 <sup>2</sup>(F) = a planned application, however F was NOT applied due to an oversight.
 <sup>3</sup>Cano = volunteer Roundup Ready canola.

Table 3. Management of volunteer Roundup Ready® canola in Roundup Ready sugarbeet - Hickson, ND - 20	012
(Stachler).	

Trt	May 31	June 18	July 5		Septe	mber 5	1
No.		Injury	*******	Stand	Yield	Sucrose	Ext Sucrose
		%%		# / 100'	ton/A	%	lb/A
1	0	8	8	117	21.0	15.7	5952
2	0	8	9	109	19.7	15.6	5479
3	0	6	8	117	20.2	14.9	5344
4	0	5	7	124	17.3	15.5	4949
5	0	6	10	117	19.4	15.3	5202
6	0	10	10	123	18.0	15.4	5033
7	0	12	10	121	12.4	15.0	3341
8	0	9	13	117	20.7	15.6	5802
9	0	74	73	.34	8.8	14.0	2209
10	0	11	11	133	20.9	16.3	6158
11	0	5	8	138	24.0	16.4	7160
12	0	6	9	125	17.2	15.0	4654
13	0	8	13	107	19.1	15.3	5256
14	0	6	9	122	17.0	15.4	4652
15	0	7	10	.83	18.1	16.3	5266
16	0	3	10	121	17.5	16.1	5121
17	0	13	11	110	17.6	15.8	4883
18	0	12	14	113	21.4	15.7	6007
19	2	8	9	131	18.4	16.3	5454
LSD 5%	0.8	7.9	6.0	33.2	5.3	NS	1728
CV %	534	49	32	21	20	6	24