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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.

Table 1. Application Information

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^2) – Trt. 2	-	-	-	-	119.3	25.3
Wahe height (avg/range) – Trt. 13	-	-	-	-	0.63"/0.12-2.8"	-
Wahe density (plants/m^2) – 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^2) – Trt. 18	-	-	-	-	12.5	1.8

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.

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

					June 4		September 10					
Trt No.	Treatment Name[1]	Rate	Rate Unit	Appl Code	Wahe[2] Cntl	Sgbt Inju	Wahe Cntl	Sgbt Inju	Sgbt Stand	Sgbt Yield	Sgbt Sucr	Sgbt Ext. Sucr
					----------%----------				#/100'	ton/A	%	lb/A
1	Non-treatedCheck				0	0	0	0	186	19.1	18.2	6355
2	PowerMax	1.125	lb ae/a	C	0	0	68	0	196	29.0	18.5	9739
	N-Pak AMS	2.5	% v/v	C D								
	PowerMax	0.75	lb ae/a	D								
3	Ro-Neet	5.33	pt/a	A	76	11	94	0	206	31.0	18.6	10475
	PowerMax	1.125	lb ae/a	C								
	N-Pak AMS	2.5	% v/v	C D								
	PowerMax	0.75	lb ae/a	D								
4	Ro-Neet SB	5.33	pt/a	A	75	12	80	1	204	28.9	18.6	9812
	PowerMax	1.125	lb ae/a	C								
	N-Pak AMS	2.5	% v/v	C D								
	PowerMax	0.75	lb ae/a	D								
5	Ro-Neet	5.33	pt/a	B	33	4	82	0	208	29.0	18.7	9820
	PowerMax	1.125	lb ae/a	C								
	N-Pak AMS	2.5	% v/v	C D								
	PowerMax	0.75	lb ae/a	D								
6	Ro-Neet SB	5.33	pt/a	B	40	7	95	0	188	29.6	18.0	9649
	PowerMax	1.125	lb ae/a	C								
	N-Pak AMS	2.5	% v/v	C D								
	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	lb ae/a	C								
	Outlook	21	fl oz/a	C								
	N-Pak AMS	2.5	% v/v	C D								
	PowerMax	0.75	lb ae/a	D								
8	Ro-Neet	5.33	pt/a	B	35	5	94	1	204	29.2	18.9	9998
	PowerMax	1.125	lb ae/a	C								
	Outlook	21	fl oz/a	C								
	N-Pak AMS	2.5	% v/v	C D								
	PowerMax	0.75	lb ae/a	D								
9	Ro-Neet	5.33	pt/a	A	75	9	89	0	198	28.1	18.9	9595
	PowerMax	1.125	lb ae/a	C								
	Warrant	1.5	qt/a	C								
	N-Pak AMS	2.5	% v/v	C D								
	PowerMax	0.75	lb ae/a	D								
10	Ro-Neet	5.33	pt/a	B	45	6	89	0	204	30.3	18.5	10214
	PowerMax	1.125	lb ae/a	C								
	Warrant	1.5	qt/a	C								
	N-Pak AMS	2.5	% v/v	C D								
	PowerMax	0.75	lb ae/a	D								
11	Ro-Neet	2.33	pt/a	A	87	13	91	0	187	28.1	18.6	9488
	Eptam	2.3	pt/a	A								
	PowerMax	1.125	lb ae/a	C								
	N-Pak AMS	2.5	% v/v	C D								
	PowerMax	0.75	lb ae/a	D								

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

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

[1]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.

[2]Wahe = Glyphosate-resistant waterhemp.

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_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 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.

Table 1. Application Information

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^2) – 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^2) – Trt. 14	-	-	2.75	0.25	0
Colq density (plants/m^2) – Trt. 2	-	-	39	7.25	0.5
Rrpw density (plants/m^2) – Trt. 2	-	-	9	13.3	0

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

Trt No.	Treatment Name[1]	Rate	Rate Unit	Appl Code	June 15			July 13				Aug. 9	Aug. 29		
					Wahe[2]	Colq	Rrpw	Wahe	Colq	Rrpw	Cano[3]	Wahe	Wahe	Colq	Rrpw
					% Control										
1	Non-trt Check				0	0	0	0	0	0	0	0	0	0	0
2	RU P.Max	1.125	lb ae/a	B	0	0	0	71	99	99	11	69	62	99	99
	Destiny HC	1.5	pt/a	BCD											
	N-Pak AMS	2.5	% v/v	BCD											
	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).

Trt No.	Treatment Name[1]	Rate Rate	Rate Unit	Appl Code	June 15 Wahe[2]	June 15 Colq	June 15 Rrpw	July 13 Wahe	July 13 Colq	July 13 Rrpw	July 13 Cano[3]	Aug. 9 Wahe	Aug. 29 Wahe	Aug. 29 Colq	Aug. 29 Rrpw
					% Control										
3	Betanex	12	fl oz/a	B	0	0	0	71	99	99	48	69	60	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											
	Betanex	16	fl oz/a	C											
	Betanex	24	fl oz/a	D											
	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	B											
	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	B	0	0	0	84	99	99	19	80	72	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											
	Outlook	10	fl oz/a	C											
	RU P.Max	0.75	lb ae/a	CD											
6	Betanex	12	fl oz/a	B	0	0	0	76	99	99	61	74	66	99	99
	Outlook	14	fl oz/a	B											
	RU P.Max	1.125	lb ae/a	B											
	Destiny HC	1.5	pt/a	BCD											
	N-Pak AMS	2.5	% v/v	BCD											
	Betanex	16	fl oz/a	C											
	Outlook	10	fl oz/a	C											
	Betanex	24	fl oz/a	D											
	RU P.Max	0.75	lb ae/a	CD											
7	Betamix	12	fl oz/a	B	0	0	0	86	99	99	54	82	74	99	99
	Nortron	4	fl oz/a	BCD											
	Outlook	14	fl oz/a	B											
	RU P.Max	1.125	lb ae/a	B											
	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	C											
	Betamix	24	fl oz/a	D											
	RU P.Max	0.75	lb ae/a	CD											
8	Dual Magnum	1.5	pt/a	B	0	0	0	85	99	99	14	80	69	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											
	Dual Magnum	1	pt/a	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).

Trt No.	Treatment Name[1]	Rate	Rate Unit	Appl Code	June 15			July 13				Aug. 9	Aug. 29		
					Wahe[2]	Colq	Rrpw	Wahe	Colq	Rrpw	Cano[3]	Wahe	Wahe	Colq	Rrpw
					% Control										
9	Betanex	12	fl oz/a	B	0	0	0	73	99	99	47	70	60	99	99
	Dual Magnum	1.5	pt/a	B											
	RU P.Max	1.125	lb ae/a	B											
	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											
	RU P.Max	0.75	lb ae/a	CD											
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	1.5	pt/a	B											
	RU P.Max	1.125	lb ae/a	B											
	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	C											
	Betamix	24	fl oz/a	D											
	RU P.Max	0.75	lb ae/a	CD											
11	Warrant	1.5	qt/a	B	0	0	0	84	99	99	14	81	68	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	1	qt/a	C											
	RU P.Max	0.75	lb ae/a	CD											
12	Betanex	12	fl oz/a	B	0	0	0	81	99	99	54	79	68	99	99
	Warrant	1.5	qt/a	B											
	RU P.Max	1.125	lb ae/a	B											
	Destiny HC	1.5	pt/a	BCD											
	N-Pak AMS	2.5	% v/v	BCD											
	Betanex	16	fl oz/a	C											
	Warrant	1	qt/a	C											
	Betanex	24	fl oz/a	D											
	RU P.Max	0.75	lb ae/a	CD											
13	Betamix	12	fl oz/a	B	0	0	0	87	99	99	67	83	74	99	99
	Nortron	4	fl oz/a	BCD											
	Warrant	1.5	qt/a	B											
	RU P.Max	1.125	lb ae/a	B											
	Destiny HC	1.5	pt/a	BCD											
	N-Pak AMS	2.5	% v/v	BCD											
	Betamix	16	fl oz/a	C											
	Warrant	1	qt/a	C											
	Betamix	24	fl oz/a	D											
	RU P.Max	0.75	lb ae/a	CD											
14	Ro-Neet SB	5.3	pt/a	A	82	82	76	98	99	99	19	99	99	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											
	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).

Trt No.	Treatment Name[1]	Rate Rate	Rate Unit	Appl Code	June 15 Wahe[2]	June 15 Colq	June 15 Rrpw	July 13 Wahe	July 13 Colq	July 13 Rrpw	July 13 Cano[3]	Aug. 9 Wahe	Aug. 29 Wahe	Aug. 29 Colq	Aug. 29 Rrpw
					% Control										
15	Ro-Neet SB	5.3	pt/a	A	85	81	79	98	99	99	75	99	96	99	99
	Betanex	12	fl oz/a	B											
	RU P.Max	1.125	lb ae/a	B											
	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											
	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	B											
	Nortron	4	fl oz/a	BCD											
	RU P.Max	1.125	lb ae/a	B											
	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											
17	Ro-Neet SB	5.3	pt/a	A	87	81	77	99	99	99	21	98	98	99	99
	Outlook	14	fl oz/a	B											
	RU P.Max	1.125	lb ae/a	B											
	Destiny HC	1.5	pt/a	BCD											
	N-Pak AMS	2.5	% v/v	BCD											
	Outlook	10	fl oz/a	C											
	RU P.Max	0.75	lb ae/a	CD											
18	Ro-Neet SB	5.3	pt/a	A	86	82	76	99	99	99	44	99	98	99	99
	Betanex	12	fl oz/a	B											
	Outlook	14	fl oz/a	B											
	RU P.Max	1.125	lb ae/a	B											
	Destiny HC	1.5	pt/a	BCD											
	N-Pak AMS	2.5	% v/v	BCD											
	Betanex	16	fl oz/a	C											
	Outlook	10	fl oz/a	C											
	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	B											
	Nortron	4	fl oz/a	BCD											
	Outlook	14	fl oz/a	B											
	RU P.Max	1.125	lb ae/a	B											
	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	C											
	Betamix	24	fl oz/a	D											
	RU P.Max	0.75	lb ae/a	CD											
20	Ro-Neet SB	5.3	pt/a	A	88	82	78	98	99	99	17	99	99	99	99
	Dual Magnum	1.5	pt/a	B											
	RU P.Max	1.125	lb ae/a	B											
	Destiny HC	1.5	pt/a	BCD											
	N-Pak AMS	2.5	% v/v	BCD											
	Dual Magnum	1	pt/a	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).

Trt No.	Treatment Name[1]	Rate Rate	Rate Unit	Appl Code	June 15 Wahe[2]	June 15 Colq	June 15 Rrpw	July 13 Wahe	July 13 Colq	July 13 Rrpw	July 13 Cano[3]	Aug. 9 Wahe	Aug. 29 Wahe	Aug. 29 Colq	Aug. 29 Rrpw
					% Control										
21	Ro-Neet SB	5.3	pt/a	A	86	81	78	97	99	99	59	97	96	99	99
	Betanex	12	fl oz/a	B											
	Dual Magnum	1.5	pt/a	B											
	RU P.Max	1.125	lb ae/a	B											
	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											
	RU P.Max	0.75	lb ae/a	CD											
22	Ro-Neet SB	5.3	pt/a	A	86	82	78	99	99	99	44	98	95	99	99
	Betamix	12	fl oz/a	B											
	Nortron	4	fl oz/a	BCD											
	Dual Magnum	1.5	pt/a	B											
	RU P.Max	1.125	lb ae/a	B											
	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	C											
	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
	Warrant	1.5	qt/a	B											
	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	1	qt/a	C											
	RU P.Max	0.75	lb ae/a	CD											
24	Ro-Neet SB	5.3	pt/a	A	88	82	78	99	99	99	55	99	99	99	99
	Betanex	12	fl oz/a	B											
	Warrant	1.5	qt/a	B											
	RU P.Max	1.125	lb ae/a	B											
	Destiny HC	1.5	pt/a	BCD											
	N-Pak AMS	2.5	% v/v	BCD											
	Betanex	16	fl oz/a	C											
	Warrant	1	qt/a	C											
	Betanex	24	fl oz/a	D											
	RU P.Max	0.75	lb ae/a	CD											
25	Ro-Neet SB	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	B											
	Destiny HC	1.5	pt/a	BCD											
	N-Pak AMS	2.5	% v/v	BCD											
	Betamix	16	fl oz/a	C											
	Warrant	1	qt/a	C											
	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).

Trt No.	Treatment Name[1]	Rate	Unit	Appl Code	June 15			July 13				Aug. 9	Aug. 29		
					Wahe[2]	Colq	Rrpw	Wahe	Colq	Rrpw	Cano[3]	Wahe	Wahe	Colq	Rrpw
					% Control										
26	Weed-freeChk				90	91	99	99	99	99	-	99	93	99	99
	RU P.Max	1.125	lb ae/a	X											
	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**

[1]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.
[2]Wahe = Glyphosate-resistant waterhemp.
[3]Cano = Natural population of volunteer RR canola.

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

Trt No.	15-June	13-July	9-August	19-July		20-September		
	Sugarbeet Injury			Sugarbeet 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_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 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.

Table 1. Application Information

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^2) – Trt. 14	-	-	1.5	11.5	6.3
Colq density (plants/m^2) – Trt. 2	-	-	1.75	0.5	0
Colq density (plants/m^2) – Trt. 14	-	-	0	0.25	0

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.

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			July 17		September 5			September 10			
Trt No.	Treatment Name[1]	Rate Rate Unit	Appl Code	Sgbt Inju	Wahe[2] Cntl	Colq Cntl	Sgbt Inju	Wahe Cntl	Colq Cntl	Sgbt Inju	Wahe Cntl	Sgbt Inju	Wahe Cntl	Colq Cntl	Sgbt Stand	Sgbt Yield	Sgbt Sucr	Ext Sucr
				%											#/100'	ton/A	%	lb/A
1	NontrtCheck			0	0	0	0	0	0	0	0	0	0	0	177	16.6	18.4	5533
2	RU PMax	1.13 lb ae/a	B	0	0	0	0	70	99	0	80	0	67	99	200	26.2	18.1	8690
	Destiny HC	1.5 pt/a	BCD															
	NPak	2.5 % v/v	BCD															
	RU PMax	0.75 lb ae/a	CD															
3	Betanex	12 fl oz/a	B	0	0	0	9	87	99	5	96	1	87	99	200	25.3	18.5	8434
	RU PMax	1.13 lb ae/a	B															
	Destiny HC	1.5 pt/a	BCD															
	NPak	2.5 % v/v	BCD															
	Betanex	16 fl oz/a	C															
	Betanex	24 fl oz/a	D															
	RU PMax	0.75 lb ae/a	CD															
4	Betamix	12 fl oz/a	B	0	0	0	7	86	99	5	96	2	89	99	214	25.9	18.7	8759
	Nortron	4 fl oz/a	BCD															
	RU PMax	1.13 lb ae/a	B															
	Destiny HC	1.5 pt/a	BCD															
	NPak	2.5 % v/v	BCD															
	Betamix	16 fl oz/a	C															
	Betamix	24 fl oz/a	D															
	RU PMax	0.75 lb ae/a	CD															
5	Outlook	14 fl oz/a	B	0	0	0	3	97	99	4	99	0	91	99	193	26.1	19.0	9038
	RU PMax	1.13 lb ae/a	B															
	Destiny HC	1.5 pt/a	BCD															
	NPak	2.5 % v/v	BCD															
	Outlook	10 fl oz/a	C															
	RU PMax	0.75 lb ae/a	CD															
6	Betanex	12 fl oz/a	B	0	0	0	15	98	99	9	98	2	96	99	196	25.5	18.5	8598
	Outlook	14 fl oz/a	B															
	RU PMax	1.13 lb ae/a	B															
	Destiny HC	1.5 pt/a	BCD															
	NPak	2.5 % v/v	BCD															
	Betanex	16 fl oz/a	C															
	Outlook	10 fl oz/a	C															
	Betanex	24 fl oz/a	D															
	RU PMax	0.75 lb ae/a	CD															
7	Betamix	12 fl oz/a	B	0	0	0	15	96	99	5	99	2	97	99	199	25.0	19.0	8647
	Nortron	4 fl oz/a	BCD															
	Outlook	14 fl oz/a	B															
	RU PMax	1.13 lb ae/a	B															
	Destiny HC	1.5 pt/a	BCD															
	NPak	2.5 % v/v	BCD															
	Betamix	16 fl oz/a	C															
	Outlook	10 fl oz/a	C															
	Betamix	24 fl oz/a	D															
	RU PMax	0.75 lb ae/a	CD															
8	Dual Mag	1.5 pt/a	B	0	0	0	7	92	99	6	95	2	88	99	183	25.5	19.3	8955
	RU PMax	1.13 lb ae/a	B															
	Destiny HC	1.5 pt/a	BCD															
	NPak	2.5 % v/v	BCD															
	Dual Mag	1 pt/a	C															
	RU PMax	0.75 lb ae/a	CD															
9	Betanex	12 fl oz/a	B	0	0	0	14	93	99	5	96	2	90	99	200	24.5	18.8	8525
	Dual Mag	1.5 pt/a	B															
	RU PMax	1.13 lb ae/a	B															
	Destiny HC	1.5 pt/a	BCD															
	NPak	2.5 % v/v	BCD															
	Betanex	16 fl oz/a	C															
	Dual Mag	1 pt/a	C															
	Betanex	24 fl oz/a	D															
	RU PMax	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 – Holloway, MN – 2012 (Stachler).

				May 22			June 27			July 17		September 5			September 10			
Trt No.	Treatment Name[1]	Rate	Appl Code	Sgbt Inju	Wahe[2] Cntl	Colq Cntl	Sgbt Inju	Wahe Cntl	Colq Cntl	Sgbt Inju	Wahe Cntl	Sgbt Inju	Wahe Cntl	Colq Cntl	Sgbt Stand	Sgbt Yield	Sgbt Sucr	Ext Sucr
				%											#/100'	ton/A	%	lb/A
10	Betamix	12 fl oz/a	B	0	0	0	16	94	99	8	98	2	89	99	201	26.2	18.9	9075
	Nortron	4 fl oz/a	BCD															
	Dual Mag	1.5 pt/a	B															
	RU PMax	1.13 lb ae/a	B															
	Destiny HC	1.5 pt/a	BCD															
	NPak	2.5 % v/v	BCD															
	Betamix	16 fl oz/a	C															
	Dual Mag	1 pt/a	C															
	Betamix	24 fl oz/a	D															
	RU PMax	0.75 lb ae/a	CD															
11	Warrant	1.5 qt/a	B	0	0	0	6	94	99	4	99	1	91	99	193	26.5	18.9	9072
	RU PMax	1.13 lb ae/a	B															
	Destiny HC	1.5 pt/a	BCD															
	NPak	2.5 % v/v	BCD															
	Warrant	1 qt/a	C															
	RU PMax	0.75 lb ae/a	CD															
12	Betanex	12 fl oz/a	B	0	0	0	11	97	99	5	99	2	93	99	192	27.1	18.7	9202
	Warrant	1.5 qt/a	B															
	RU PMax	1.13 lb ae/a	B															
	Destiny HC	1.5 pt/a	BCD															
	NPak	2.5 % v/v	BCD															
	Betanex	16 fl oz/a	C															
	Warrant	1 qt/a	C															
	Betanex	24 fl oz/a	D															
	RU PMax	0.75 lb ae/a	CD															
13	Betamix	12 fl oz/a	B	0	0	0	10	96	99	5	97	2	93	99	205	26.7	19.2	9329
	Nortron	4 fl oz/a	BCD															
	Warrant	1.5 qt/a	B															
	RU PMax	1.13 lb ae/a	B															
	Destiny HC	1.5 pt/a	BCD															
	NPak	2.5 % v/v	BCD															
	Betamix	16 fl oz/a	C															
	Warrant	1 qt/a	C															
	Betamix	24 fl oz/a	D															
	RU PMax	0.75 lb ae/a	CD															
14	Ro-Neet SB	5.3 pt/a	A	8	72	79	5	90	99	4	93	1	93	99	189	27.2	19.0	9370
	RU PMax	1.13 lb ae/a	B															
	Destiny HC	1.5 pt/a	BCD															
	NPak	2.5 % v/v	BCD															
	RU PMax	0.75 lb ae/a	CD															
15	Ro-Neet SB	5.3 pt/a	A	8	73	83	13	89	99	8	97	2	88	99	194	26.8	19.2	9396
	Betanex	12 fl oz/a	B															
	RU PMax	1.13 lb ae/a	B															
	Destiny HC	1.5 pt/a	BCD															
	NPak	2.5 % v/v	BCD															
	Betanex	16 fl oz/a	C															
	Betanex	24 fl oz/a	D															
	RU PMax	0.75 lb ae/a	CD															
16	Ro-Neet SB	5.3 pt/a	A	6	71	80	13	94	99	6	96	3	90	99	198	26.0	19.0	8993
	Betamix	12 fl oz/a	B															
	Nortron	4 fl oz/a	BCD															
	RU PMax	1.13 lb ae/a	B															
	Destiny HC	1.5 pt/a	BCD															
	NPak	2.5 % v/v	BCD															
	Betamix	16 fl oz/a	C															
	Betamix	24 fl oz/a	D															
	RU PMax	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 – Holloway, MN – 2012 (Stachler).

				May 22			June 27			July 17		September 5			September 10			
Trt No.	Treatment Name[1]	Rate	Appl Code	Sgbt Inju	Wahe[2] Cntl	Colq Cntl	Sgbt Inju	Wahe Cntl	Colq Cntl	Sgbt Inju	Wahe Cntl	Sgbt Inju	Wahe Cntl	Colq Cntl	Sgbt Stand	Sgbt Yield	Sgbt Sucr	Ext Sucr
				%											#/100'	ton/A	%	lb/A
17	Ro-Neet SB	5.3 pt/a	A	8	72	80	9	99	99	7	99	1	97	99	196	27.7	18.9	9530
	Outlook	14 fl oz/a	B															
	RU PMax	1.13 lb ae/a	B															
	Destiny HC	1.5 pt/a	BCD															
	NPak	2.5 % v/v	BCD															
	Outlook	10 fl oz/a	C															
	RU PMax	0.75 lb ae/a	CD															
18	Ro-Neet SB	5.3 pt/a	A	9	71	81	11	99	99	9	99	4	97	99	189	25.5	18.8	8684
	Betanex	12 fl oz/a	B															
	Outlook	14 fl oz/a	B															
	RU PMax	1.13 lb ae/a	B															
	Destiny HC	1.5 pt/a	BCD															
	NPak	2.5 % v/v	BCD															
	Betanex	16 fl oz/a	C															
	Outlook	10 fl oz/a	C															
	Betanex	24 fl oz/a	D															
	RU PMax	0.75 lb ae/a	CD															
19	Ro-Neet SB	5.3 pt/a	A	9	72	81	14	99	99	5	99	2	97	99	187	26.6	18.6	9043
	Betamix	12 fl oz/a	B															
	Nortron	4 fl oz/a	BCD															
	Outlook	14 fl oz/a	B															
	RU PMax	1.13 lb ae/a	B															
	Destiny HC	1.5 pt/a	BCD															
	NPak	2.5 % v/v	BCD															
	Betamix	16 fl oz/a	C															
	Outlook	10 fl oz/a	C															
	Betamix	24 fl oz/a	D															
	RU PMax	0.75 lb ae/a	CD															
20	Ro-Neet SB	5.3 pt/a	A	8	73	82	11	98	99	5	99	1	94	99	197	26.4	18.3	8818
	Dual Mag	1.5 pt/a	B															
	RU PMax	1.13 lb ae/a	B															
	Destiny HC	1.5 pt/a	BCD															
	NPak	2.5 % v/v	BCD															
	Dual Mag	1 pt/a	C															
	RU PMax	0.75 lb ae/a	CD															
21	Ro-Neet SB	5.3 pt/a	A	9	74	82	16	99	99	5	99	1	94	99	188	26.2	19.1	9199
	Betanex	12 fl oz/a	B															
	Dual Mag	1.5 pt/a	B															
	RU PMax	1.13 lb ae/a	B															
	Destiny HC	1.5 pt/a	BCD															
	NPak	2.5 % v/v	BCD															
	Betanex	16 fl oz/a	C															
	Dual Mag	1 pt/a	C															
	Betanex	24 fl oz/a	D															
	RU PMax	0.75 lb ae/a	CD															
22	Ro-Neet SB	5.3 pt/a	A	8	73	81	20	99	99	9	99	2	99	99	198	26.1	19.3	9180
	Betamix	12 fl oz/a	B															
	Nortron	4 fl oz/a	BCD															
	Dual Mag	1.5 pt/a	B															
	RU PMax	1.13 lb ae/a	B															
	Destiny HC	1.5 pt/a	BCD															
	NPak	2.5 % v/v	BCD															
	Betamix	16 fl oz/a	C															
	Dual Mag	1 pt/a	C															
	Betamix	24 fl oz/a	D															
	RU PMax	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 – Holloway, MN – 2012 (Stachler).

Trt No.	Treatment Name[1]	Rate Rate Unit	Appl Code	May 22 Sgbt Inju	May 22 Wahe[2] Cntl	May 22 Colq Cntl	June 27 Sgbt Inju	June 27 Wahe Cntl	June 27 Colq Cntl	July 17 Sgbt Inju	July 17 Wahe Cntl	September 5 Sgbt Inju	September 5 Wahe Cntl	September 5 Colq Cntl	September 10 Sgbt Stand	September 10 Sgbt Yield	September 10 Sgbt Sucr	Ext Sucr
				%											#/100'	ton/A	%	lb/A
23	Ro-Neet SB	5.3 pt/a	A	8	75	81	7	99	99	4	99	2	99	99	189	26.8	18.7	9155
	Warrant	1.5 qt/a	B															
	RU PMax	1.13 lb ae/a	B															
	Destiny HC	1.5 pt/a	BCD															
	NPak	2.5 % v/v	BCD															
	Warrant	1 qt/a	C															
	RU PMax	0.75 lb ae/a	CD															
24	Ro-Neet SB	5.3 pt/a	A	8	75	82	8	98	99	5	99	1	96	99	194	27.2	19.1	9533
	Betanex	12 fl oz/a	B															
	Warrant	1.5 qt/a	B															
	RU PMax	1.13 lb ae/a	B															
	Destiny HC	1.5 pt/a	BCD															
	NPak	2.5 % v/v	BCD															
	Betanex	16 fl oz/a	C															
	Warrant	1 qt/a	C															
	Betanex	24 fl oz/a	D															
	RU PMax	0.75 lb ae/a	CD															
25	Ro-Neet SB	5.3 pt/a	A	10	71	82	14	99	99	7	99	2	98	99	188	25.9	18.6	8758
	Betamix	12 fl oz/a	B															
	Nortron	4 fl oz/a	BCD															
	Warrant	1.5 qt/a	B															
	RU PMax	1.13 lb ae/a	B															
	Destiny HC	1.5 pt/a	BCD															
	NPak	2.5 % v/v	BCD															
	Betamix	16 fl oz/a	C															
	Warrant	1 qt/a	C															
	Betamix	24 fl oz/a	D															
	RU PMax	0.75 lb ae/a	CD															
26	Weed-free			9	77	83	3	87	99	2	99	1	92	99	192	26.1	18.9	8978
	RU PMax	1.13 lb ae/a	X															
	RU PMax	0.75 lb ae/a	BCD															
	R-11	0.25 % v/v	XBCD															
	NPak	2.5 % v/v	XBCD															
	LSD 5%			**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**
	CV %			**32**	**10**	**4**	**36**	**5**	**0**	**52**	**4**	**111**	**7**	**0**	**6**	**8**	**4**	**9**

[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-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_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 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.

Table 1. Application Information

Application code	A (PPI)	B (PRE)	X	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	-	-	-	0.33" / 0.1-0.75	4" / 0.25-13	14" / 1.2-39
Wahe density (plants/m^2) – 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^2) – Trt. 1	-	-	-	308	134	193

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 (≥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.

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.

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

Trt No	Treatment Name[1]	Rate Rate	Rate Unit	Appl Code	June 12 Wahe	June 12 Colq	June 12 An.Gras	July 25 Wahe	July 25 Colq	July 25 An.Gras	September 11 Wahe	September 11 Colq	September 11 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	X									
	RU PowerMax	0.75	lb ae/a	CDE									
	R-11	0.25	% v/v	XCDE									
	NPak	2.5	% v/v	XCDE									
3	RU PowerMax	1.125	lb ae/a	C	0	0	0	99	98	98	98	91	90
	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									
4	RU PowerMax	1.125	lb ae/a	C	0	0	0	99	99	99	97	95	93
	RU PowerMax	0.844	lb ae/a	D									
	RU PowerMax	0.75	lb ae/a	E									
	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	C	0	0	0	99	98	98	98	95	87
	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									
	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									
6	Betamix	12	fl oz/a	C	0	0	0	99	99	98	99	97	98
	Betamix	16	fl oz/a	D									
	Betamix	24	fl oz/a	E									
	Nortron	4	fl oz/a	CDE									
	Outlook	14	fl oz/a	C									
	Outlook	10	fl oz/a	D									
	RU PowerMax	1.125	lb ae/a	C									
	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									
7	Dual Magnum	1	pt/a	B	85	54	71	99	98	99	98	92	91
	RU PowerMax	1.125	lb ae/a	C									
	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									

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

Trt No	Treatment Name[1]	Rate Rate	Rate Unit	Appl Code	June 12 Wahe	June 12 Colq	June 12 An.Gras	July 25 Wahe	July 25 Colq	July 25 An.Gras	September 11 Wahe	September 11 Colq	September 11 An.Gras
					% Cntl								
8	Dual Magnum	1	pt/a	B	88	50	56	99	99	97	99	98	92
	RU PowerMax	1.125	lb ae/a	C									
	RU PowerMax	0.844	lb ae/a	D									
	RU PowerMax	0.75	lb ae/a	E									
	Nortron	4	fl oz/a	CDE									
	Destiny HC	1.5	pt/a	CDE									
	NPak	2.5	% v/v	CDE									
9	Dual Magnum	1	pt/a	B	90	55	64	99	99	99	99	95	95
	Betamix	12	fl oz/a	C									
	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									
	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									
10	Dual Magnum	1	pt/a	B	94	55	69	99	99	99	99	99	99
	Betamix	12	fl oz/a	C									
	Betamix	16	fl oz/a	D									
	Betamix	24	fl oz/a	E									
	Nortron	4	fl oz/a	CDE									
	Outlook	14	fl oz/a	C									
	Outlook	10	fl oz/a	D									
	RU PowerMax	1.125	lb ae/a	C									
	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									
11	Dual Magnum	1.5	pt/a	B	88	62	72	99	98	99	99	95	91
	RU PowerMax	1.125	lb ae/a	C									
	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									
12	Dual Magnum	1.5	pt/a	B	93	63	64	99	99	98	99	98	89
	RU PowerMax	1.125	lb ae/a	C									
	RU PowerMax	0.844	lb ae/a	D									
	RU PowerMax	0.75	lb ae/a	E									
	Nortron	4	fl oz/a	CDE									
	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).

Trt No	Treatment Name[1]	Rate Rate	Rate Unit	Appl Code	June 12 Wahe	June 12 Colq	June 12 An.Gras	July 25 Wahe	July 25 Colq	July 25 An.Gras	September 11 Wahe	September 11 Colq	September 11 An.Gras
					% Cntl								
13	Dual Magnum	1.5	pt/a	B	93	65	71	99	99	99	99	99	93
	Betamix	12	fl oz/a	C									
	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									
	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									
14	Dual Magnum	1.5	pt/a	B	95	63	71	99	99	99	99	99	99
	Betamix	12	fl oz/a	C									
	Betamix	16	fl oz/a	D									
	Betamix	24	fl oz/a	E									
	Nortron	4	fl oz/a	CDE									
	Outlook	14	fl oz/a	C									
	Outlook	10	fl oz/a	D									
	RU PowerMax	1.125	lb ae/a	C									
	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									
15	Ro-Neet SB	4	pt/a	A	83	73	71	99	98	97	99	96	91
	RU PowerMax	1.125	lb ae/a	C									
	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									
16	Ro-Neet SB	4	pt/a	A	88	70	71	99	99	98	99	94	93
	RU PowerMax	1.125	lb ae/a	C									
	RU PowerMax	0.844	lb ae/a	D									
	RU PowerMax	0.75	lb ae/a	E									
	Nortron	4	fl oz/a	CDE									
	Destiny HC	1.5	pt/a	CDE									
	NPak	2.5	% v/v	CDE									
17	Ro-Neet SB	4	pt/a	A	87	71	68	99	98	98	99	99	94
	Betamix	12	fl oz/a	C									
	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									
	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									

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

Trt No	Treatment Name[1]	Rate Rate Unit	Appl Code	June 12			July 25			September 11		
				Wahe	Colq	An.Gras	Wahe	Colq	An.Gras	Wahe	Colq	An.Gras
				% Cntl								
18	Ro-Neet SB	4 pt/a	A	91	70	69	99	99	99	99	99	99
	Betamix	12 fl oz/a	C									
	Betamix	16 fl oz/a	D									
	Betamix	24 fl oz/a	E									
	Nortron	4 fl oz/a	CDE									
	Outlook	14 fl oz/a	C									
	Outlook	10 fl oz/a	D									
	RU PowerMax	1.125 lb ae/a	C									
	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									
19	Ro-Neet SB	5.3 pt/a	A	83	76	80	99	99	97	99	96	94
	RU PowerMax	1.125 lb ae/a	C									
	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									
20	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									
	RU PowerMax	0.844 lb ae/a	D									
	RU PowerMax	0.75 lb ae/a	E									
	Nortron	4 fl oz/a	CDE									
	Destiny HC	1.5 pt/a	CDE									
	NPak	2.5 % v/v	CDE									
21	Ro-Neet SB	5.3 pt/a	A	91	77	79	99	99	99	99	96	96
	Betamix	12 fl oz/a	C									
	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									
	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									
22	Ro-Neet SB	5.3 pt/a	A	92	75	75	99	99	99	99	97	98
	Betamix	12 fl oz/a	C									
	Betamix	16 fl oz/a	D									
	Betamix	24 fl oz/a	E									
	Nortron	4 fl oz/a	CDE									
	Outlook	14 fl oz/a	C									
	Outlook	10 fl oz/a	D									
	RU PowerMax	1.125 lb ae/a	C									
	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									

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

Trt No	Treatment Name[1]	Rate Rate Unit	Appl Code	June 12			July 25			September 11		
				Wahe	Colq	An.Gras	Wahe	Colq	An.Gras	Wahe	Colq	An.Gras
				% Cntl								
23	Nortron	6 pt/a	A	86	66	65	99	99	98	99	96	95
	RU PowerMax	1.125 lb ae/a	C									
	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									
24	Nortron	6 pt/a	A	93	61	68	99	99	99	99	96	97
	RU PowerMax	1.125 lb ae/a	C									
	RU PowerMax	0.844 lb ae/a	D									
	RU PowerMax	0.75 lb ae/a	E									
	Nortron	4 fl oz/a	CDE									
	Destiny HC	1.5 pt/a	CDE									
	NPak	2.5 % v/v	CDE									
25	Nortron	6 pt/a	A	91	68	71	99	99	99	99	97	97
	Betamix	12 fl oz/a	C									
	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									
	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									
26	Nortron	6 pt/a	A	94	61	65	99	99	98	99	99	98
	Betamix	12 fl oz/a	C									
	Betamix	16 fl oz/a	D									
	Betamix	24 fl oz/a	E									
	Nortron	4 fl oz/a	CDE									
	Outlook	14 fl oz/a	C									
	Outlook	10 fl oz/a	D									
	RU PowerMax	1.125 lb ae/a	C									
	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									
27	Nortron	7.5 pt/a	A	85	68	70	99	99	99	99	98	95
	RU PowerMax	1.125 lb ae/a	C									
	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									
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									
	RU PowerMax	0.75 lb ae/a	E									
	Nortron	4 fl oz/a	CDE									
	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).

Trt No	Treatment Name[1]	Rate Rate	Rate Unit	Appl Code	June 12 Wahe	June 12 Colq	June 12 An.Gras	July 25 Wahe	July 25 Colq	July 25 An.Gras	September 11 Wahe	September 11 Colq	September 11 An.Gras
					----------% Cntl----------								
29	Nortron	7.5	pt/a	A	95	71	66	99	99	99	99	99	97
	Betamix	12	fl oz/a	C									
	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									
	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									
30	Nortron	7.5	pt/a	A	93	69	71	99	99	99	99	99	98
	Betamix	12	fl oz/a	C									
	Betamix	16	fl oz/a	D									
	Betamix	24	fl oz/a	E									
	Nortron	4	fl oz/a	CDE									
	Outlook	14	fl oz/a	C									
	Outlook	10	fl oz/a	D									
	RU PowerMax	1.125	lb ae/a	C									
	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									
	LSD 5%				**5.5**	**11.6**	**13.6**	**NS**	**1.2**	**1.8**	**1.5**	**5.5**	**7.1**
	CV %				**5**	**15**	**17**	**-**	**1**	**1**	**1**	**4**	**5**

[1]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)

Trt	Jun 12 Inju	Jun 30 Inju	July 25 Inju	September 11 Stand	Yield	Sucr	Ext. Sucr
	----------%----------			#/100'	ton/A	%	lb/A
1	0	0	0	77	1.1	5.3	173
2	0	0	0	151	26.3	17.2	8257
3	0	3	3	153	23.3	17.2	7229
4	0	8	3	158	24.6	17.3	7855
5	0	16	6	145	21.4	17.6	6977
6	0	17	7	156	21.0	17.5	6791
7	14	7	3	145	24.4	18.0	7961
8	13	8	5	138	21.2	17.3	6806
9	14	22	5	145	20.3	18.2	6799
10	18	29	12	147	22.9	17.3	7247
11	20	7	3	155	20.7	17.5	6769
12	20	13	5	115	21.3	17.4	6896
13	19	17	6	132	20.9	17.3	6605
14	23	31	8	148	21.1	17.6	6708
15	12	5	3	143	25.5	17.2	8019
16	11	5	4	145	22.5	17.8	7365

Table 3. Sugarbeet response - Dwight, ND – 2012 (Stachler)

Trt	Jun 12 Inju	Jun 30 Inju	July 25 Inju	September 11 Stand	Yield	Sucr	Ext. Sucr
	----------%----------			#/100'	ton/A	%	lb/A
17	10	16	7	157	22.3	18.0	7360
18	14	25	11	138	22.5	17.7	7334
19	12	4	1	124	22.9	17.0	7110
20	16	7	6	130	21.9	17.6	7131
21	14	15	11	146	22.3	17.1	7016
22	17	29	13	130	19.4	17.5	6277
23	12	5	2	154	23.7	17.7	7761
24	11	8	5	170	24.8	18.1	8331
25	11	15	7	151	23.2	17.6	7564
26	10	21	8	144	22.6	17.0	7087
27	13	4	2	156	24.5	17.3	7817
28	19	8	4	154	23.8	17.4	7677
29	14	18	5	156	24.7	17.7	8081
30	16	29	13	125	19.7	17.1	6215
LSD 5%	5.5	6.5	4.8	24.1	3.9	2.9	1259
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_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 John Deere 'S-tine' 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.

Table 1. Application Information

Application code	A (PPI)	B (PRE)	X	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^2) – Trt. 1	-	-	-	51	33	38

Summary: This location has glyphosate-resistant waterhemp based upon the 55% control on August 29th 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.

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

					June 15				Jun 30	July 25					Aug. 29		September 20			
Trt No.	Treatment Name[1]	Rate	Rate Unit	Appl Code	Sgbt Inj	Wahe[2] Cntl	Colq Cntl	Rrpw Cntl	Sgbt Inj	Sgbt Inj	Wahe Cntl	Colq Cntl	Rrpw Cntl	Cano Cntl	Wahe Cntl	Colq Cntl	Sgbt Stnd	Sgbt Yield	Sgbt Sucr	Ext. Sucr
					----------%----------												#/100'	ton/A	%	lb/A
1	Non-trt. Check				0	0	0	0	0	0	0	0	0	0	0	0	81	4.7	16.3	1514
2	Weed-freeChk				0	87	95	99	0	4	96	99	99	99	94	99	106	25.9	16	7143
	RU P.Max	1.13	lb ae/a	X																
	RU P.Max	0.75	lb ae/a	CDE																
	R-11	0.25	% v/v	XCDE																
	N-Pak AMS	2.5	% v/v	XCDE																
3	RU P.Max	1.13	lb ae/a	C	0	0	0	0	0	1	60	99	99	16	55	99	102	24.2	16.2	6817
	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																
4	RU P.Max	1.13	lb ae/a	C	0	0	0	0	7	7	71	99	99	31	61	99	101	24.3	15.9	6662
	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																
5	Betamix	12	fl oz/a	C	0	0	0	0	17	11	65	99	99	43	51	99	103	22.6	16.1	6285
	Betamix	16	fl oz/a	D																
	Betamix	24	fl oz/a	E																
	Nortron	4	fl oz/a	CDE																
	RU P.Max	1.13	lb ae/a	C																
	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																
6	Betamix	12	fl oz/a	C	0	0	0	0	20	16	73	99	99	39	61	99	100	22.4	15.7	5996
	Betamix	16	fl oz/a	D																
	Betamix	24	fl oz/a	E																
	Nortron	4	fl oz/a	CDE																
	Outlook	14	fl oz/a	C																
	Outlook	10	fl oz/a	D																
	RU P.Max	1.13	lb ae/a	C																
	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																
7	Dual Mag	1	pt/a	B	7	83	45	83	7	4	90	99	99	18	84	99	99	25.7	16.6	7382
	RU P.Max	1.13	lb ae/a	C																
	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																
8	Dual Mag	1	pt/a	B	6	87	43	76	7	5	93	99	99	34	90	99	99	25.1	16.6	7208
	RU P.Max	1.13	lb ae/a	C																
	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																

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

					June 15				Jun 30	July 25					Aug. 29		September 20			
Trt No.	Treatment Name[1]	Rate	Rate Unit	Appl Code	Sgbt Inj	Wahe[2] Cntl	Colq Cntl	Rrpw Cntl	Sgbt Inj	Sgbt Inj	Wahe Cntl	Colq Cntl	Rrpw Cntl	Cano Cntl	Wahe Cntl	Colq Cntl	Sgbt Stnd	Sgbt Yield	Sgbt Sucr	Ext. Sucr
					----------												#/100'	ton/A	%	lb/A
9	Dual Mag	1	pt/a	B	8	84	41	78	17	11	91	99	99	44	86	99	90	23.4	15.7	6226
	Betamix	12	fl oz/a	C																
	Betamix	16	fl oz/a	D																
	Betamix	24	fl oz/a	E																
	Nortron	4	fl oz/a	CDE																
	RU P.Max	1.13	lb ae/a	C																
	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																
10	Dual Mag	1	pt/a	B	6	87	38	77	18	10	95	99	99	47	91	99	109	25.2	15.9	6874
	Betamix	12	fl oz/a	C																
	Betamix	16	fl oz/a	D																
	Betamix	24	fl oz/a	E																
	Nortron	4	fl oz/a	CDE																
	Outlook	14	fl oz/a	C																
	Outlook	10	fl oz/a	D																
	RU P.Max	1.13	lb ae/a	C																
	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																
11	Dual Mag	1.5	pt/a	B	8	88	48	87	7	4	94	99	99	18	90	99	101	25.2	16.4	7078
	RU P.Max	1.13	lb ae/a	C																
	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																
12	Dual Mag	1.5	pt/a	B	8	91	60	85	7	2	97	99	99	35	95	99	109	25.4	16.8	7359
	RU P.Max	1.13	lb ae/a	C																
	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																
13	Dual Mag	1.5	pt/a	B	10	90	60	82	13	11	94	99	99	45	94	99	101	25.1	16.8	7335
	Betamix	12	fl oz/a	C																
	Betamix	16	fl oz/a	D																
	Betamix	24	fl oz/a	E																
	Nortron	4	fl oz/a	CDE																
	RU P.Max	1.13	lb ae/a	C																
	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																

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

					June 15				Jun 30		July 25				Aug. 29		September 20			
Trt No.	Treatment Name[1]	Rate	Rate Unit	Appl Code	Sgbt Inj	Wahe[2] Cntl	Colq Cntl	Rrpw Cntl	Sgbt Inj	Sgbt Inj	Wahe Cntl	Colq Cntl	Rrpw Cntl	Cano Cntl	Wahe Cntl	Colq Cntl	Sgbt Stnd	Sgbt Yield	Sgbt Sucr	Ext. Sucr
					----------												#/100'	ton/A	%	lb/A
14	Dual Mag	1.5	pt/a	B	8	94	65	84	17	15	97	99	99	50	96	99	97	23.9	16	6531
	Betamix	12	fl oz/a	C																
	Betamix	16	fl oz/a	D																
	Betamix	24	fl oz/a	E																
	Nortron	4	fl oz/a	CDE																
	Outlook	14	fl oz/a	C																
	Outlook	10	fl oz/a	D																
	RU P.Max	1.13	lb ae/a	C																
	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																
15	Ro-Neet SB	4	pt/a	A	6	64	60	58	5	2	81	99	99	16	73	99	96	25.1	16.3	7102
	RU P.Max	1.13	lb ae/a	C																
	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	A	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	C																
	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	12	fl oz/a	C																
	Betamix	16	fl oz/a	D																
	Betamix	24	fl oz/a	E																
	Nortron	4	fl oz/a	CDE																
	RU P.Max	1.13	lb ae/a	C																
	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																
18	Ro-Neet SB	4	pt/a	A	9	72	71	63	17	16	91	99	99	56	85	99	102	22.9	16.3	6521
	Betamix	12	fl oz/a	C																
	Betamix	16	fl oz/a	D																
	Betamix	24	fl oz/a	E																
	Nortron	4	fl oz/a	CDE																
	Outlook	14	fl oz/a	C																
	Outlook	10	fl oz/a	D																
	RU P.Max	1.13	lb ae/a	C																
	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																

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

					June 15				Jun 30	July 25					Aug. 29		September 20			
Trt No.	Treatment Name[1]	Rate	Rate Unit	Appl Code	Sgbt Inj	Wahe[2] Cntl	Colq Cntl	Rrpw Cntl	Sgbt Inj	Sgbt Inj	Wahe Cntl	Colq Cntl	Rrpw Cntl	Cano Cntl	Wahe Cntl	Colq Cntl	Sgbt Stnd	Sgbt Yield	Sgbt Sucr	Ext. Sucr
					----------%----------												#/100'	ton/A	%	lb/A
19	Ro-Neet SB	5.3	pt/a	A	8	82	77	71	6	3	93	99	99	25	90	99	107	25.6	16.5	7359
	RU P.Max	1.13	lb ae/a	C																
	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																
20	Ro-Neet SB	5.3	pt/a	A	11	81	76	74	11	8	95	99	99	38	86	99	94	23.2	16.1	6439
	RU P.Max	1.13	lb ae/a	C																
	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																
21	Ro-Neet SB	5.3	pt/a	A	11	77	73	69	16	13	89	99	99	44	81	99	87	24.4	16.1	6826
	Betamix	12	fl oz/a	C																
	Betamix	16	fl oz/a	D																
	Betamix	24	fl oz/a	E																
	Nortron	4	fl oz/a	CDE																
	RU P.Max	1.13	lb ae/a	C																
	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																
22	Ro-Neet SB	5.3	pt/a	A	11	84	77	71	20	14	96	99	99	62	97	99	109	23.1	16.1	6355
	Betamix	12	fl oz/a	C																
	Betamix	16	fl oz/a	D																
	Betamix	24	fl oz/a	E																
	Nortron	4	fl oz/a	CDE																
	Outlook	14	fl oz/a	C																
	Outlook	10	fl oz/a	D																
	RU P.Max	1.13	lb ae/a	C																
	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																
23	Nortron	6	pt/a	A	7	95	58	94	8	2	99	99	99	31	99	99	104	25.9	16.5	7439
	RU P.Max	1.13	lb ae/a	C																
	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																
24	Nortron	6	pt/a	A	9	94	59	92	9	3	99	99	99	36	99	99	112	28.4	16	7856
	RU P.Max	1.13	lb ae/a	C																
	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																

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

					June 15				Jun 30		July 25				Aug. 29		September 20			
Trt No.	Treatment Name[1]	Rate	Rate Unit	Appl Code	Sgbt Inj	Wahe[2] Cntl	Colq Cntl	Rrpw Cntl	Sgbt Inj	Sgbt Inj	Wahe Cntl	Colq Cntl	Rrpw Cntl	Cano Cntl	Wahe Cntl	Colq Cntl	Sgbt Stnd	Sgbt Yield	Sgbt Sucr	Ext. Sucr
					----------%----------												#/100'	ton/A	%	lb/A
25	Nortron	6	pt/a	A	6	95	50	88	13	6	95	99	99	63	95	99	130	26.1	16.5	7455
	Betamix	12	fl oz/a	C																
	Betamix	16	fl oz/a	D																
	Betamix	24	fl oz/a	E																
	Nortron	4	fl oz/a	CDE																
	RU P.Max	1.13	lb ae/a	C																
	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																
26	Nortron	6	pt/a	A	5	90	58	83	17	15	98	99	99	68	96	99	111	24.9	16	6884
	Betamix	12	fl oz/a	C																
	Betamix	16	fl oz/a	D																
	Betamix	24	fl oz/a	E																
	Nortron	4	fl oz/a	CDE																
	Outlook	14	fl oz/a	C																
	Outlook	10	fl oz/a	D																
	RU P.Max	1.13	lb ae/a	C																
	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																
27	Nortron	7.5	pt/a	A	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	C																
	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																
28	Nortron	7.5	pt/a	A	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	C																
	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	A	11	98	62	96	17	11	96	99	99	57	93	99	107	24.9	16.1	6870
	Betamix	12	fl oz/a	C																
	Betamix	16	fl oz/a	D																
	Betamix	24	fl oz/a	E																
	Nortron	4	fl oz/a	CDE																
	RU P.Max	1.13	lb ae/a	C																
	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																

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

					June 15				Jun 30	July 25					Aug. 29		September 20			
Trt No.	Treatment Name[1]	Rate	Rate Unit	Appl Code	Sgbt Inj	Wahe[2] Cntl	Colq Cntl	Rrpw Cntl	Sgbt Inj	Sgbt Inj	Wahe Cntl	Colq Cntl	Rrpw Cntl	Cano Cntl	Wahe Cntl	Colq Cntl	Sgbt Stnd	Sgbt Yield	Sgbt Sucr	Ext. Sucr
					--------------------							%				--------------------	#/100'	ton/A	%	lb/A
30	Nortron	7.5	pt/a	A	6	95	58	91	17	13	99	99	99	77	99	99	116	24.1	16.3	6744
	Betamix	12	fl oz/a	C																
	Betamix	16	fl oz/a	D																
	Betamix	24	fl oz/a	E																
	Nortron	4	fl oz/a	CDE																
	Outlook	14	fl oz/a	C																
	Outlook	10	fl oz/a	D																
	RU P.Max	1.13	lb ae/a	C																
	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																
		LSD 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**
		CV %			**38**	**9**	**16**	**12**	**20**	**53**	**6**	**0**	**0**	**20**	**10**	**0**	**13**	**13**	**4**	**13.78**

[1]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_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 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.

Table 1. Application Information

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/cot.-4 lf	4.8 lf/cot.-10 lf	7.5 lf/2-18 lf

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 5th, 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.

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

Trt No.	Treatment Name[1]	Rate	Rate Unit	Appl Code	May 21 Sgbt Inju	May 21 Wahe[2] Cntl	July 7 Sgbt Inju	July 7 Wahe Cntl	July 7 Colq Cntl	July 7 Rrpw Cntl	September 5 Sgbt Inju	September 5 Wahe Cntl	September 10 Sugarbeet Stand	Sugarbeet Yield	Sugarbeet Sucr	Sugarbeet Ext Suc
					%								#/100'	ton/A	%	lb/A
1	Non-treated 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	X												
	RU PMax	0.75	lb ae/a	CDE												
	R-11	0.25	% v/v	XCDE												
	NPak	2.5	% v/v	XCDE												
3	RU PMax	1.125	lb ae/a	C	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	1.5	pt/a	CDE												
	NPak	2.5	% v/v	CDE												
4	RU PMax	1.125	lb ae/a	C	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	E												
	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	C	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	CDE												
	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												
	NPak	2.5	% v/v	CDE												
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	CDE												
	Outlook	14	fl oz/a	C												
	Outlook	10	fl oz/a	D												
	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												
	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	D												
	RU PMax	0.75	lb ae/a	E												
	Destiny HC	1.5	pt/a	CDE												
	NPak	2.5	% v/v	CDE												
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												
	RU PMax	0.75	lb ae/a	E												
	Nortron	4	fl oz/a	CDE												
	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).

				May 21		July 7				September 5		September 10			
Trt	Treatment	Rate	Appl	Sgbt	Wahe[2]	Sgbt	Wahe	Colq	Rrpw	Sgbt	Wahe	Sugarbeet			
No.	Name[1]	Rate Unit	Code	Inju	Cntl	Inju	Cntl	Cntl	Cntl	Inju	Cntl	Stand	Yield	Sucr	Ext Suc
				----------%----------								#/100'	ton/A	%	lb/A
9	Dual Mag	1 pt/a	B	1	61	9	99	99	99	3	99	206	25.9	18.7	8770
	Betamix	12 fl oz/a	C												
	Betamix	16 fl oz/a	D												
	Betamix	24 fl oz/a	E												
	Nortron	4 fl oz/a	CDE												
	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												
	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	C												
	Betamix	16 fl oz/a	D												
	Betamix	24 fl oz/a	E												
	Nortron	4 fl oz/a	CDE												
	Outlook	14 fl oz/a	C												
	Outlook	10 fl oz/a	D												
	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												
	NPak	2.5 % v/v	CDE												
11	Dual Mag	1.5 pt/a	B	3	60	5	98	99	99	1	97	205	26.8	18.3	8875
	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												
	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	C												
	RU PMax	0.844 lb ae/a	D												
	RU PMax	0.75 lb ae/a	E												
	Nortron	4 fl oz/a	CDE												
	Destiny HC	1.5 pt/a	CDE												
	NPak	2.5 % v/v	CDE												
13	Dual Mag	1.5 pt/a	B	2	68	13	99	99	99	4	99	191	23.8	18.0	7822
	Betamix	12 fl oz/a	C												
	Betamix	16 fl oz/a	D												
	Betamix	24 fl oz/a	E												
	Nortron	4 fl oz/a	CDE												
	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												
	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).

				May 21		July 7				September 5		September 10			
Trt	Treatment	Rate	Appl	Sgbt	Wahe[2]	Sgbt	Wahe	Colq	Rrpw	Sgbt	Wahe	Sugarbeet			
No.	Name[1]	Rate Unit	Code	Inju	Cntl	Inju	Cntl	Cntl	Cntl	Inju	Cntl	Stand	Yield	Sucr	Ext Suc
				----------%----------								#/100'	ton/A	%	lb/A
14	Dual Mag	1.5 pt/a	B	1	56	10	99	99	99	4	99	208	23.0	19.1	7975
	Betamix	12 fl oz/a	C												
	Betamix	16 fl oz/a	D												
	Betamix	24 fl oz/a	E												
	Nortron	4 fl oz/a	CDE												
	Outlook	14 fl oz/a	C												
	Outlook	10 fl oz/a	D												
	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												
	NPak	2.5 % v/v	CDE												
15	Ro-Neet SB	4 pt/a	A	2	51	4	99	99	99	1	95	201	25.2	18.9	8636
	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												
	NPak	2.5 % v/v	CDE												
16	Ro-Neet SB	4 pt/a	A	3	76	8	99	99	99	3	99	204	26.3	18.3	8714
	RU PMax	1.125 lb ae/a	C												
	RU PMax	0.844 lb ae/a	D												
	RU PMax	0.75 lb ae/a	E												
	Nortron	4 fl oz/a	CDE												
	Destiny HC	1.5 pt/a	CDE												
	NPak	2.5 % v/v	CDE												
17	Ro-Neet SB	4 pt/a	A	4	60	9	99	99	99	4	99	194	24.4	18.6	8258
	Betamix	12 fl oz/a	C												
	Betamix	16 fl oz/a	D												
	Betamix	24 fl oz/a	E												
	Nortron	4 fl oz/a	CDE												
	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												
	NPak	2.5 % v/v	CDE												
18	Ro-Neet SB	4 pt/a	A	3	70	15	99	99	99	5	99	197	22.9	18.9	7829
	Betamix	12 fl oz/a	C												
	Betamix	16 fl oz/a	D												
	Betamix	24 fl oz/a	E												
	Nortron	4 fl oz/a	CDE												
	Outlook	14 fl oz/a	C												
	Outlook	10 fl oz/a	D												
	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												
	NPak	2.5 % v/v	CDE												
19	Ro-Neet SB	5.3 pt/a	A	2	65	4	97	99	99	4	97	214	25.3	18.5	8450
	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												
	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).

				May 21		July 7				September 5		September 10			
Trt	Treatment	Rate	Appl	Sgbt	Wahe[2]	Sgbt	Wahe	Colq	Rrpw	Sgbt	Wahe	Sugarbeet			
No.	Name[1]	Rate Unit	Code	Inju	Cntl	Inju	Cntl	Cntl	Cntl	Inju	Cntl	Stand	Yield	Sucr	Ext Suc
				----------	----------	----------	----------	----------	----------	----------	----------	#/100'	ton/A	%	lb/A
20	Ro-Neet SB	5.3 pt/a	A	8	76	4	99	99	99	2	98	199	24.3	19.0	8407
	RU PMax	1.125 lb ae/a	C												
	RU PMax	0.844 lb ae/a	D												
	RU PMax	0.75 lb ae/a	E												
	Nortron	4 fl oz/a	CDE												
	Destiny HC	1.5 pt/a	CDE												
	NPak	2.5 % v/v	CDE												
21	Ro-Neet SB	5.3 pt/a	A	5	75	12	99	99	99	1	96	199	23.0	18.6	7709
	Betamix	12 fl oz/a	C												
	Betamix	16 fl oz/a	D												
	Betamix	24 fl oz/a	E												
	Nortron	4 fl oz/a	CDE												
	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												
	NPak	2.5 % v/v	CDE												
22	Ro-Neet SB	5.3 pt/a	A	7	80	11	99	99	99	1	99	192	21.8	19.0	7498
	Betamix	12 fl oz/a	C												
	Betamix	16 fl oz/a	D												
	Betamix	24 fl oz/a	E												
	Nortron	4 fl oz/a	CDE												
	Outlook	14 fl oz/a	C												
	Outlook	10 fl oz/a	D												
	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												
	NPak	2.5 % v/v	CDE												
23	Nortron	6 pt/a	A	3	67	5	99	99	99	2	95	201	23.3	19.0	8073
	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												
	NPak	2.5 % v/v	CDE												
24	Nortron	6 pt/a	A	4	83	6	99	99	99	1	96	205	24.6	18.6	8287
	RU PMax	1.125 lb ae/a	C												
	RU PMax	0.844 lb ae/a	D												
	RU PMax	0.75 lb ae/a	E												
	Nortron	4 fl oz/a	CDE												
	Destiny HC	1.5 pt/a	CDE												
	NPak	2.5 % v/v	CDE												
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	CDE												
	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												
	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).

				May 21		July 7				September 5		September 10			
Trt	Treatment	Rate	Appl	Sgbt	Wahe[2]	Sgbt	Wahe	Colq	Rrpw	Sgbt	Wahe	Sugarbeet			
No.	Name[1]	Rate Unit	Code	Inju	Cntl	Inju	Cntl	Cntl	Cntl	Inju	Cntl	Stand	Yield	Sucr	Ext Suc
				----------%----------								#/100'	ton/A	%	lb/A
26	Nortron	6 pt/a	A	3	74	11	99	99	99	1	99	197	22.7	18.7	7760
	Betamix	12 fl oz/a	C												
	Betamix	16 fl oz/a	D												
	Betamix	24 fl oz/a	E												
	Nortron	4 fl oz/a	CDE												
	Outlook	14 fl oz/a	C												
	Outlook	10 fl oz/a	D												
	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												
	NPak	2.5 % v/v	CDE												
27	Nortron	7.5 pt/a	A	4	71	5	99	99	99	1	99	213	25.6	18.8	8783
	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												
	NPak	2.5 % v/v	CDE												
28	Nortron	7.5 pt/a	A	5	85	4	99	99	99	1	97	207	24.9	18.5	8369
	RU PMax	1.125 lb ae/a	C												
	RU PMax	0.844 lb ae/a	D												
	RU PMax	0.75 lb ae/a	E												
	Nortron	4 fl oz/a	CDE												
	Destiny HC	1.5 pt/a	CDE												
	NPak	2.5 % v/v	CDE												
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	C												
	Betamix	16 fl oz/a	D												
	Betamix	24 fl oz/a	E												
	Nortron	4 fl oz/a	CDE												
	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												
	NPak	2.5 % v/v	CDE												
30	Nortron	7.5 pt/a	A	3	86	12	99	99	99	3	99	217	25.0	18.6	8478
	Betamix	12 fl oz/a	C												
	Betamix	16 fl oz/a	D												
	Betamix	24 fl oz/a	E												
	Nortron	4 fl oz/a	CDE												
	Outlook	14 fl oz/a	C												
	Outlook	10 fl oz/a	D												
	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												
	NPak	2.5 % v/v	CDE												
	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]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_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 & 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.

Table 1. Application Information

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	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^2) – 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^2) – 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^2) – Trt. 2	-	56.5	2.3	0
Rrpw density (plants/m^2) – Trt. 2	-	24	3.8	0

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.

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

					June 15			July 13				August 30			Aug 29
Trt No.	Treatment[1]	Rate	Rate Unit	Applic. Code	Wahe[2]	Colq	Rrpw	Wahe	Colq	Rrpw	Vol. Canola	Wahe	Colq	Rrpw	Wahe plants
					% control										/plot
1	Ethofumesate	0.75	lb ai/A	BCD	0	0	0	90	99	99	68	92	99	99	1
	R.U. P. Max	1.125	lb ae/A	B											
	R.U. P. Max	0.844	lb ae/A	C											
	R.U. P. Max	0.75	lb ae/A	D											
	Destiny HC	1.5	pt/A	BCD											
	N Pak-AMS	2.5	% v/v	BCD											
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	B											
	R.U. P. Max	0.844	lb ae/A	C											
	R.U. P. Max	0.75	lb ae/A	D											
	Destiny HC	1.5	pt/A	BCD											
	N Pak-AMS	2.5	% v/v	BCD											
3	Ethofumesate	1.5	lb ai/A	BCD	0	0	0	92	99	99	65	97	99	99	1
	R.U. P. Max	1.125	lb ae/A	B											
	R.U. P. Max	0.844	lb ae/A	C											
	Ethofumesate	1.0	lb ai/A	D											
	R.U. P. Max	0.75	lb ae/A	D											
	Destiny HC	1.5	pt/A	BCD											
	N Pak-AMS	2.5	% v/v	BCD											
4	Betamix	12	fl oz/A	B	0	0	0	92	99	99	70	96	99	99	0
	Ethofumesate	1.0	lb ai/A	BC											
	Cinch	1.5	pt/A	B											
	R.U. P. Max	1.125	lb ae/A	B											
	Betamix	24	fl oz/A	CD											
	Cinch	1.0	pt/A	C											
	R.U. P. Max	0.844	lb ae/A	C											
	Ethofumesate	1.5	lb ai/A	D											
	R.U. P. Max	0.75	lb ae/A	D											
	Destiny HC	1.5	pt/A	BCD											
	N Pak-AMS	2.5	% v/v	BCD											
5	Betamix	12	fl oz/A	B	0	0	0	92	99	99	62	96	99	99	0
	Ethofumesate	1.0	lb ai/A	BC											
	Cinch	1.5	pt/A	B											
	R.U. P. Max	1.125	lb ae/A	B											
	Betamix	24	fl oz/A	CD											
	Cinch	1.0	pt/A	C											
	R.U. P. Max	0.844	lb ae/A	C											
	Ethofumesate	1.5	lb ai/A	D											
	R.U. P. Max	0.75	lb ae/A	D											
	R-11	0.25	% v/v	BCD											
	N Pak-AMS	2.5	% v/v	BCD											
6	Dual Magnum	1.5	pt/A	A	94	60	84	97	99	99	32	94	99	99	1
	R.U. P. Max	1.125	lb ae/A	B											
	R.U. P. Max	0.844	lb ae/A	C											
	N Pak-AMS	2.5	% v/v	BC											
7	Cinch	1.5	pt/A	A	94	64	85	97	99	99	23	93	97	99	1
	R.U. P. Max	1.125	lb ae/A	B											
	R.U. P. Max	0.844	lb ae/A	C											
	N Pak-AMS	2.5	% v/v	BC											

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

					June 15			July 13				August 30			Aug 29
Trt No.	Treatment[1]	Rate	Rate Unit	Applic. Code	Wahe[2]	Colq	Rrpw	Wahe	Colq	Rrpw	Vol. Canola	Wahe	Colq	Rrpw	Wahe plants
					---% control---										/plot
8	Dual Magnum	1.5	pt/A	B	0	0	0	71	99	99	39	48	99	99	26
	Betamix	12	fl oz/A	B											
	R.U. P. Max	1.125	lb ae/A	B											
	Dual Magnum	1.0	pt/A	C											
	Betamix	24	fl oz/A	C											
	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	B	0	0	0	76	99	99	35	48	99	99	27
	Betamix	12	fl oz/A	B											
	R.U. P. Max	1.125	lb ae/A	B											
	Dual Magnum	1.0	pt/A	C											
	Betamix	24	fl oz/A	C											
	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											
10	Dual Magnum	1.5	pt/A	AB	94	58	85	93	99	99	49	88	99	99	2
	Betamix	12	fl oz/A	B											
	R.U. P. Max	1.125	lb ae/A	B											
	Dual Magnum	1.0	pt/A	C											
	Betamix	24	fl oz/A	C											
	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											
11	Cinch	1.5	pt/A	AB	94	60	86	98	99	99	37	99	99	99	0
	Betamix	12	fl oz/A	B											
	R.U. P. Max	1.125	lb ae/A	B											
	Dual Magnum	1.0	pt/A	C											
	Betamix	24	fl oz/A	C											
	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											
12	Dual Magnum	1.5	pt/A	A	93	58	86	95	99	99	32	94	99	99	1
	Betamix	12	fl oz/A	B											
	R.U. P. Max	1.125	lb ae/A	B											
	Dual Magnum	1.0	pt/A	C											
	Betamix	24	fl oz/A	C											
	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											
13	Cinch	1.5	pt/A	A	93	58	87	97	99	99	27	97	99	99	1
	Betamix	12	fl oz/A	B											
	R.U. P. Max	1.125	lb ae/A	B											
	Dual Magnum	1.0	pt/A	C											
	Betamix	24	fl oz/A	C											
	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											
	LSD 5%				**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**

[1]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.

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

	June 15	July 13	Aug 9	June 28		September 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
9	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**

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.

Table 1. Application Information

Application code	A (PPI)	B (V1)	C (V2 sgrbt)	D (13 DAT C)	E (> V8) & F (21 DAT D)	G (14 DAT E)
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^2) – 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^2) – Trt. 2	-	0.75	0.25	-	1.25	0.25
Wahe height (avg/range) – Trt.7	-	-	0.12"/0.1-0.3	0.12"/0.1-0.5	1.2"/0.1-9.5	-
Wahe density (plants/m^2) – Trt. 7	-	-	3.75	11.25	19.5	-
Colq height (avg/range) – Trt. 7	-	-	0.5"/0.2-0.75	0.3"/0.2-0.5	-	-
Colq density (plants/m^2) – Trt. 7	-	-	1.25	1.75	-	-

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.

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			July 7			September 5			September 10			
Trt	Treatment		Rate	Appl	Sgbt	Wahe[2]	Colq	Sgbt	Wahe	Colq	Sgbt	Wahe	Colq	Sugarbeet			
No.	Name[1]	Rate	Unit	Code	Inju	Cntl	Cntl	Inju	Cntl	Cntl	Inju	Cntl	Cntl	Stand	Yield	Sucr	Ext Sucr
					----------	----------	----------	----------	----------	----------	----------	----------	----------	#/100'	ton/A	%	lb/A
1	RU PowerMax	0.984	lb ae/a	BC	10	97	98	4	72	97	1	55	95	201	23.4	19.0	8143
	RU PowerMax	0.75	lb ae/a	E													
	Destiny HC	1.5	pt/a	BCE													
	NPak	2.5	% v/v	BCE													
2	RU PowerMax	0.984	lb ae/a	BC	3	98	98	4	74	99	2	68	97	213	22.6	19.1	7856
	RU PowerMax	0.75	lb ae/a	EG													
	Destiny HC	1.5	pt/a	BCEG													
	NPak	2.5	% v/v	BCEG													
3	Betamix	12	fl oz/a	B	10	98	98	5	78	99	3	65	97	208	21.6	19.1	7512
	Betamix	16	fl oz/a	CE													
	Nortron	4	fl oz/a	BCE													
	RU PowerMax	0.984	lb ae/a	BC													
	RU PowerMax	0.75	lb ae/a	E													
	Destiny HC	1.5	pt/a	BCE													
	NPak	2.5	% v/v	BCE													
4	Betamix	12	fl oz/a	B	10	98	98	8	98	99	5	95	99	202	21.0	18.9	7211
	Betamix	16	fl oz/a	CE													
	Nortron	4	fl oz/a	BCE													
	RU PowerMax	0.984	lb ae/a	BC													
	RU PowerMax	0.75	lb ae/a	E													
	Destiny HC	1.5	pt/a	BCE													
	NPak	2.5	% v/v	BCE													
	Outlook	14	fl oz/a	C													
	Outlook	10	fl oz/a	E													
5	Betamix	12	fl oz/a	B	9	97	98	9	99	99	5	99	99	195	19.9	19.1	6938
	Betamix	16	fl oz/a	CE													
	Betamix	24	fl oz/a	G													
	Nortron	4	fl oz/a	BCEG													
	RU PowerMax	0.984	lb ae/a	BC													
	RU PowerMax	0.75	lb ae/a	EG													
	Destiny HC	1.5	pt/a	BCEG													
	NPak	2.5	% v/v	BCEG													
	Outlook	14	fl oz/a	C													
	Outlook	10	fl oz/a	E													
6	Betamix	12	fl oz/a	B	10	98	98	7	83	99	4	78	99	207	21.0	19.1	7258
	Betamix	16	fl oz/a	CE													
	Betamix	24	fl oz/a	G													
	Nortron	4	fl oz/a	BCEG													
	RU PowerMax	0.984	lb ae/a	BC													
	RU PowerMax	0.75	lb ae/a	EG													
	Destiny HC	1.5	pt/a	BCEG													
	NPak	2.5	% v/v	BCEG													
	Outlook	21	fl oz/a	E													
7	RU PowerMax	1.125	lb ae/a	C	0	0	0	2	86	99	2	76	99	201	22.7	19.0	7844
	RU PowerMax	0.844	lb ae/a	D													
	RU PowerMax	0.75	lb ae/a	F													
	Destiny HC	1.5	pt/a	CDF													
	NPak	2.5	% v/v	CDF													

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			July 7			September 5			September 10			
Trt	Treatment		Rate	Appl	Sgbt	Wahe[2]	Colq	Sgbt	Wahe	Colq	Sgbt	Wahe	Colq	Sugarbeet			
No.	Name[1]	Rate	Unit	Code	Inju	Cntl	Cntl	Inju	Cntl	Cntl	Inju	Cntl	Cntl	Stand	Yield	Sucr	Ext Sucr
					----------	----------	----------	----------	%----------	----------	----------	----------	----------	#/100'	ton/A	%	lb/A
8	Betamix	12	fl oz/a	C	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	CDF													
	RU PowerMax	1.125	lb ae/a	C													
	RU PowerMax	0.844	lb ae/a	D													
	RU PowerMax	0.75	lb ae/a	F													
	Destiny HC	1.5	pt/a	CDF													
	NPak	2.5	% v/v	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													
	Betamix	24	fl oz/a	F													
	Nortron	4	fl oz/a	CDF													
	Outlook	14	fl oz/a	C													
	Outlook	10	fl oz/a	D													
	RU PowerMax	1.125	lb ae/a	C													
	RU PowerMax	0.844	lb ae/a	D													
	RU PowerMax	0.75	lb ae/a	F													
	Destiny HC	1.5	pt/a	CDF													
	NPak	2.5	% v/v	CDF													
10	Betamix	12	fl oz/a	C	0	0	0	7	99	99	1	93	99	209	22.3	18.7	7617
	Betamix	16	fl oz/a	D													
	Betamix	24	fl oz/a	F													
	Nortron	4	fl oz/a	CDF													
	RU PowerMax	1.125	lb ae/a	C													
	RU PowerMax	0.844	lb ae/a	D													
	RU PowerMax	0.75	lb ae/a	F													
	Outlook	21	fl oz/a	D													
	Destiny HC	1.5	pt/a	CDF													
	NPak	2.5	% v/v	CDF													
11	Nortron	7.5	pt/a	A	6	98	98	6	97	99	4	87	97	199	22.5	19.1	7779
	RU PowerMax	0.984	lb ae/a	BC													
	RU PowerMax	0.75	lb ae/a	E													
	Destiny HC	1.5	pt/a	BCE													
	NPak	2.5	% v/v	BCE													
12	Nortron	7.5	pt/a	A	8	98	98	4	98	99	4	92	99	205	23.4	19.0	8119
	RU PowerMax	0.984	lb ae/a	BC													
	RU PowerMax	0.75	lb ae/a	EG													
	Destiny HC	1.5	pt/a	BCEG													
	NPak	2.5	% v/v	BCEG													
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	B													
	Betamix	16	fl oz/a	CE													
	Nortron	4	fl oz/a	BCE													
	RU PowerMax	0.984	lb ae/a	BC													
	RU PowerMax	0.75	lb ae/a	E													
	Destiny HC	1.5	pt/a	BCE													
	NPak	2.5	% v/v	BCE													

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			July 7			September 5			September 10			
Trt	Treatment		Rate	Appl	Sgbt	Wahe[2]	Colq	Sgbt	Wahe	Colq	Sgbt	Wahe	Colq	Sugarbeet			
No.	Name[1]	Rate	Unit	Code	Inju	Cntl	Cntl	Inju	Cntl	Cntl	Inju	Cntl	Cntl	Stand	Yield	Sucr	Ext Sucr
					----------				%-					#/100'	ton/A	%	lb/A
14	Nortron	7.5	pt/a	A	13	98	98	8	99	99	5	99	99	194	23.1	19.0	8033
	Betamix	12	fl oz/a	B													
	Betamix	16	fl oz/a	CE													
	Nortron	4	fl oz/a	BCE													
	RU PowerMax	0.984	lb ae/a	BC													
	RU PowerMax	0.75	lb ae/a	E													
	Destiny HC	1.5	pt/a	BCE													
	NPak	2.5	% v/v	BCE													
	Outlook	14	fl oz/a	C													
	Outlook	10	fl oz/a	E													
15	Nortron	7.5	pt/a	A	17	98	98	7	99	99	4	99	99	201	22.2	18.8	7672
	Betamix	12	fl oz/a	B													
	Betamix	16	fl oz/a	CE													
	Betamix	24	fl oz/a	G													
	Nortron	4	fl oz/a	BCEG													
	RU PowerMax	0.984	lb ae/a	BC													
	RU PowerMax	0.75	lb ae/a	EG													
	Destiny HC	1.5	pt/a	BCEG													
	NPak	2.5	% v/v	BCEG													
	Outlook	14	fl oz/a	C													
	Outlook	10	fl oz/a	E													
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	B													
	Betamix	16	fl oz/a	CE													
	Betamix	24	fl oz/a	G													
	Nortron	4	fl oz/a	BCEG													
	RU PowerMax	0.984	lb ae/a	BC													
	RU PowerMax	0.75	lb ae/a	EG													
	Destiny HC	1.5	pt/a	BCEG													
	NPak	2.5	% v/v	BCEG													
	Outlook	21	fl oz/a	E													
17	Nortron	7.5	pt/a	A	8	98	89	4	98	99	1	93	99	205	24.3	19.0	8383
	RU PowerMax	1.125	lb ae/a	C													
	RU PowerMax	0.844	lb ae/a	D													
	RU PowerMax	0.75	lb ae/a	F													
	Destiny HC	1.5	pt/a	CDF													
	NPak	2.5	% v/v	CDF													
18	Nortron	7.5	pt/a	A	6	98	89	5	99	99	1	97	99	199	21.9	18.9	7489
	Betamix	12	fl oz/a	C													
	Betamix	16	fl oz/a	D													
	Betamix	24	fl oz/a	F													
	Nortron	4	fl oz/a	CDF													
	RU PowerMax	1.125	lb ae/a	C													
	RU PowerMax	0.844	lb ae/a	D													
	RU PowerMax	0.75	lb ae/a	F													
	Destiny HC	1.5	pt/a	CDF													
	NPak	2.5	% v/v	CDF													

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			July 7			September 5			September 10			
Trt	Treatment		Rate	Appl	Sgbt	Wahe[2]	Colq	Sgbt	Wahe	Colq	Sgbt	Wahe	Colq	Sugarbeet			
No.	Name[1]	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	A	8	98	89	7	99	99	2	99	99	207	22.8	18.9	7873
	Betamix	12	fl oz/a	C													
	Betamix	16	fl oz/a	D													
	Betamix	24	fl oz/a	F													
	Nortron	4	fl oz/a	CDF													
	Outlook	14	fl oz/a	C													
	Outlook	10	fl oz/a	D													
	RU PowerMax	1.125	lb ae/a	C													
	RU PowerMax	0.844	lb ae/a	D													
	RU PowerMax	0.75	lb ae/a	F													
	Destiny HC	1.5	pt/a	CDF													
	NPak	2.5	% v/v	CDF													
	LSD 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**

[1]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).
[2]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_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 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.

Table 1. Application Information

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^2) – Trt. 17	-	-	4	-
Colq height (avg/range) – Trt. 17	-	-	1.54"/0.25-4.5"	-
Colq density (plants/m^2) – Trt. 17	-	-	27	-
Rrpw height (avg/range) – Trt. 17	-	-	1.58"/0.25-5"	-
Rrpw density (plants/m^2) – Trt. 17	-	-	17.5	-

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.

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			August 30		
No.	Name[1]	Rate	Unit	Code	Wahe[2]	Colq	Rrpw	Wahe	Colq	Rrpw	Wahe	Colq	Rrpw
					percent control								
1	R.U. P. Max	0.75	lb ae/A	BD									
	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	B									
	R.U. P. Max	0.75	lb ae/A	D									
	N Pak-AMS	5	% v/v	BD	81	88	99	76	92	99	66	92	99
3	Eptam	2	lb ai/A	A									
	Ro-Neet	2.5	lb ai/A	A									
	R.U. P. Max	1.3	lb ae/A	C									
	N Pak-AMS	5	% v/v	C	94	86	81	96	92	97	96	86	96
4	Emptam	2	lb ai/A	A									
	Ro-Neet	2.5	lb ai/A	A									
	Warrant	1.13	lb ai/A	C									
	R.U. P. Max	1.13	lb ae/A	C									
	N Pak-AMS	5	% v/v	C	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	C									
	N Pak-AMS	5	% v/v	C	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									
	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									
	N Pak-AMS	5	% v/v	BD									
	Dual Magnum	1.6	lb ai/A	D	76	86	99	73	96	99	68	97	99
10	R.U. P. Max	1.13	lb ae/A	B									
	N Pak-AMS	5	% v/v	BD									
	Outlook	0.98	lb ai/A	D									
	R.U. P. Max	0.75	lb ae/A	D	83	92	99	84	98	99	70	99	99
11	R.U. P. Max	1.13	lb ae/A	B									
	N Pak-AMS	5	% v/v	BD									
	Warrant	1.13	lb ai/A	D									
	R.U. P. Max	0.75	lb ae/A	D	85	91	99	74	91	99	65	93	99
12	R.U. P. Max	1.13	lb ae/A	B									
	N Pak-AMS	5	% v/v	BD									
	Dual Magnum	1.6	lb ai/A	D									
	R.U. P. Max	0.75	lb ae/A	D	83	92	99	83	97	99	69	94	99
13	R.U. P. Max	1.13	lb ae/A	B									
	N Pak-AMS	5	% v/v	BD									
	Stinger	0.25	lb ae/A	D									
	R.U. P. Max	0.75	lb ae/A	D	74	90	99	66	96	99	64	97	99
14	Betamix	0.6	lb ai/A	B									
	R.U. P. Max	0.75	lb ae/A	BD									
	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			August 30		
No.	Name[1]	Rate	Unit	Code	Wahe[2]	Colq	Rrpw	Wahe	Colq	Rrpw	Wahe	Colq	Rrpw
					percent control								
15	Betamix	0.6	lb ai/A	B									
	R.U. P. Max	1.13	lb ae/A	B									
	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
16	Nortron	3.75	lb ai/A	A									
	Betamix	0.6	lb ai/A	B									
	R.U. P. Max	1.13	lb ae/A	B									
	R.U. P. Max	0.75	lb ae/A	D									
	N Pak-AMS	5	% v/v	BD	98	99	99	99	99	99	99	99	99
17	Untreated Check				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 %				**7**	**9**	**4**	**6**	**4**	**1**	**7**	**6**	**2**

[1]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.

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

	June 21	July 13	July 19	September 20			
Trt No.	Sgbt	Sgbt	Sgbt Stand	Sgbt Stand	Sugar Conc.	Yield	Ext. Sucrose
	% injury		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**

Management of Glyphosate-Resistant Waterhemp with POST Herbicides in an Oat Cover Crop in Roundup Ready® Sugarbeet – Holloway, MN – 2012 (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.

Table 1. Application Information

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 (cot.-2 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 / cot.-5 lf	4.8 lf / cot.-12 lf	-

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 22nd, the oat cover crop only reduced waterhemp density by one plant/m^2 (data not shown), however on July 7th 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.

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	July 7		August 7			September 10			
Trt No.	Treatment Name[1]	Rate RateUnit	Appl Code	Sgbt Inju	Sgbt Inju	Wahe[2] Cntl	Sgbt Inju	Wahe Cntl	Wahe Cntl	Sgbt Stand	Sgbt Yield	Sgbt Sucr	Sgbt Ext Suc
				----------%----------						#/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	1.125 lb ae/a	X										
	RU PowerMax	0.75 lb ae/a	ABC										
	R-11	0.25% v/v	XABC										
	NPak	2.5% v/v	XABC										
4	Betamix	12 fl oz/a	A	5	5	92	4	87	84	196	23.4	18.9	7943
	Betamix	16 fl oz/a	B										
	Betamix	24 fl oz/a	C										
	Nortron	4 fl oz/a	ABC										
	RU PowerMax	1.125 lb ae/a	A										
	RU PowerMax	0.844 lb ae/a	B										
	RU PowerMax	0.75 lb ae/a	C										
	Destiny HC	1.5 pt/a	ABC										
	NPak	2.5% v/v	ABC										
5	Betamix	12 fl oz/a	A	9	7	98	3	97	94	205	24.8	18.3	8213
	Betamix	16 fl oz/a	B										
	Betamix	24 fl oz/a	C										
	Nortron	4 fl oz/a	ABC										
	Outlook	14 fl oz/a	A										
	Outlook	10 fl oz/a	B										
	RU PowerMax	1.125 lb ae/a	A										
	RU PowerMax	0.844 lb ae/a	B										
	RU PowerMax	0.75 lb ae/a	C										
	Destiny HC	1.5 pt/a	ABC										
	NPak	2.5% v/v	ABC										
6	Betamix	1.5 pt/a	A	6	12	93	4	88	82	192	22.8	18.6	7674
	Betamix	2 pt/a	B										
	Betamix	3 pt/a	C										
	Nortron	0.33 pt/a	A										
	Nortron	0.5 pt/a	B										
	RU PowerMax	1.125 lb ae/a	A										
	RU PowerMax	0.844 lb ae/a	B										
	RU PowerMax	0.75 lb ae/a	C										
	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	2 pt/a	B										
	Betamix	3 pt/a	C										
	Nortron	0.33 pt/a	A										
	Nortron	0.5 pt/a	B										
	RU PowerMax	1.125 lb ae/a	A										
	RU PowerMax	0.844 lb ae/a	B										
	RU PowerMax	0.75 lb ae/a	C										
	Destiny HC	1.5 pt/a	ABC										
	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).

				May 30	July 7		August 7			September 10			
Trt No.	Treatment Name[1]	Rate RateUnit	Appl Code	Sgbt Inju	Sgbt Inju	Wahe[2] Cntl	Sgbt Inju	Wahe Cntl	Wahe Cntl	Sgbt Stand	Sgbt Yield	Sgbt Sucr	Sgbt Ext Suc
				----------%----------						#/100'	ton/A	%	lb/A
8	No Oats			3	6	99	3	97	97	205	25.1	18.7	8444
	Betamix	12fl oz/a	A										
	Betamix	16fl oz/a	B										
	Betamix	24fl oz/a	C										
	Nortron	4fl oz/a	ABC										
	Outlook	14fl oz/a	A										
	Outlook	10fl oz/a	B										
	RU PowerMax	1.125lb ae/a	A										
	RU PowerMax	0.844lb ae/a	B										
	RU PowerMax	0.75lb ae/a	C										
	Destiny HC	1.5pt/a	ABC										
	NPak	2.5% v/v	ABC										
9	Betamix	1.5pt/a	A	7	11	99	5	97	91	201	23.8	18.9	8168
	Betamix	2pt/a	B										
	Betamix	3pt/a	C										
	Nortron	0.33pt/a	A										
	Nortron	0.5pt/a	B										
	Outlook	14fl oz/a	A										
	Outlook	10fl oz/a	B										
	RU PowerMax	1.125lb ae/a	A										
	RU PowerMax	0.844lb ae/a	B										
	RU PowerMax	0.75lb ae/a	C										
	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	B										
	Betamix	3pt/a	C										
	Nortron	0.33pt/a	A										
	Nortron	0.5pt/a	B										
	Outlook	14fl oz/a	A										
	Outlook	10fl oz/a	B										
	RU PowerMax	1.125lb ae/a	A										
	RU PowerMax	0.844lb ae/a	B										
	RU PowerMax	0.75lb ae/a	C										
	Destiny HC	1.5pt/a	ABC										
	NPak	2.5% v/v	ABC										
11	Betamix	2pt/a	A	7	13	96	3	88	84	207	23.0	18.6	7689
	Betamix	3pt/a	B										
	Betamix	3pt/a	C										
	Nortron	0.33pt/a	A										
	Nortron	0.5pt/a	B										
	RU PowerMax	1.125lb ae/a	A										
	RU PowerMax	0.844lb ae/a	B										
	RU PowerMax	0.75lb 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).

				May 30	July 7		August 7		September 10				
Trt No.	Treatment Name[1]	Rate RateUnit	Appl Code	Sgbt Inju	Sgbt Inju	Wahe[2] Cntl	Sgbt Inju	Wahe Cntl	Wahe Cntl	Sgbt Stand	Sgbt Yield	Sgbt Sucr	Sgbt Ext Suc
				----------%----------						#/100'	ton/A	%	lb/A
12	Betamix	2pt/a	A	8	13	94	3	88	83	201	22.1	18.8	7518
	Betamix	3pt/a	B										
	Betamix	3pt/a	C										
	Nortron	0.33pt/a	A										
	Nortron	0.5pt/a	B										
	RU PowerMax	1.125lb ae/a	A										
	RU PowerMax	0.844lb ae/a	B										
	RU PowerMax	0.75lb ae/a	C										
	Destiny HC	1.5pt/a	ABC										
	NPak	2.5% v/v	ABC										
13	Betamix	2pt/a	A	7	13	98	3	94	94	208	23.3	18.5	7775
	Betamix	3pt/a	B										
	Betamix	3pt/a	C										
	Nortron	0.33pt/a	A										
	Nortron	0.5pt/a	B										
	Outlook	14fl oz/a	A										
	Outlook	10fl oz/a	B										
	RU PowerMax	1.125lb ae/a	A										
	RU PowerMax	0.844lb ae/a	B										
	RU PowerMax	0.75lb ae/a	C										
	NPak	2.5% v/v	ABC										
14	Betamix	2pt/a	A	11	14	99	6	99	97	197	23.0	18.6	7712
	Betamix	3pt/a	B										
	Betamix	3pt/a	C										
	Nortron	0.33pt/a	A										
	Nortron	0.5pt/a	B										
	Outlook	14fl oz/a	A										
	Outlook	10fl oz/a	B										
	RU PowerMax	1.125lb ae/a	A										
	RU PowerMax	0.844lb ae/a	B										
	RU PowerMax	0.75lb ae/a	C										
	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**

[1]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).
[2]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_2 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.

Table 1. Application Information

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
Wind Direction	W	S	NW
Soil Temp. (F at 6")	61	76	56
Soil Moisture	Good	Good	Good
Cloud Cover	90	70	1
Sugarbeet stage (avg)	V2.2 (2-3 lf)	V6 (6 lf)	V11 (11 lf)
Cora height (avg/range) – Trt. 3	0.46"/0.125-1"	-	-
Cora density (plants/m^2) – Trt. 3	78	-	-
Colq height (avg/range) – Trt. 3	0.42"/0.25-1"	-	-
Colq density (plants/m^2) – Trt. 3	35	-	-

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.

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

Trt No.	Treatment Name[1]	Rate	Rate Unit	Appl Code	3-July			8-August			
					Cora[2]	Colq	Rrpw	Cora	Colq	Rrpw	Stgr
					----------% 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	A							
	Destiny HC	1.5	pt/a	ABC							
	NPak	2.5	% v/v	ABC							
	RU PowerMax	0.844	lb ae/a	B							
	RU PowerMax	0.75	lb ae/a	C							
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	A							
	Cide Winder	1.5	pt/a	ABC							
	NPak	2.5	% v/v	ABC							
	RU PowerMax	0.844	lb ae/a	B							
	RU PowerMax	0.75	lb ae/a	C							
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							
	RU PowerMax	0.844	lb ae/a	B							
	RU PowerMax	0.75	lb ae/a	C							
		LSD 5%			**NS**	**NS**	**2.8**	**2.3**	**NS**	**9.9**	**NS**
		CV %			**5**	**3**	**2**	**1**	**4**	**7**	**31**

[1]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_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-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.

Table 1. Application Information

Application code	**A (PRE)**	**B (Cot.)**	**C (2lf sgrbt)**	**D (20 DAT B) & E (13 DAT C)**	**F (14 DAT D)**	**G (12 DAT F)**
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^2) – 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^2) – Trt. 3	-	-	26	6	-	-
Grass density (plants/m^2) – Trt.3	-	-	26	43.5	-	-

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.

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

Trt	Treatment	Rate		Appl	7-June		20-Jun	3-July		18-July		29-August		7-Sep
No.	Name[1]	Rate	Unit	Code	Mrtl[2]	Cntl	Mrtl	Mrtl	Cntl	Mrtl	Cntl	Above Sgbt	Below Sgbt	Cntl
					----------%----------							--------No./plot--------		%
1	Weed-free Chk					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	0.844	lb ae/a	D										
	RU PowerMax	0.75	lb ae/a	FG										
2	RU PowerMax	0.25	lb ae/a	CE	90	79	90	90	77	93	78	4	9	86
	Destiny HC	1.5	pt/a	CE										
	NPak	2.5	% v/v	CE										
3	RU PowerMax	0.75	lb ae/a	CE	100	97	100	100	94	100	95	0	2	98
	Destiny HC	1.5	pt/a	CE										
	NPak	2.5	% v/v	CE										
4	RU PowerMax	0.25	lb ae/a	CEF	100	95	100	100	90	100	86	2	7	88
	Destiny HC	1.5	pt/a	CEF										
	NPak	2.5	% v/v	CEF										
5	RU PowerMax	0.75	lb ae/a	CEF	100	96	100	100	98	100	99	0	2	98
	Destiny HC	1.5	pt/a	CEF										
	NPak	2.5	% v/v	CEF										
6	RU PowerMax	0.25	lb ae/a	CEFG		91			90		89	1	3	94
	Destiny HC	1.5	pt/a	CEFG										
	NPak	2.5	% v/v	CEFG										
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										
	Destiny HC	1.5	pt/a	CE										
	NPak	2.5	% v/v	CE										
8	Ethofumesate	1	lb ai/a	CE		97			97		95	1	2	94
	RU PowerMax	0.75	lb ae/a	CE										
	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
	RU PowerMax	0.25	lb ae/a	CE										
	Destiny HC	1.5	pt/a	CE										
	NPak	2.5	% v/v	CE										
10	Ethofumesate	1.5	lb ai/a	CE		98			98		97	1	2	93
	RU PowerMax	0.75	lb ae/a	CE										
	Destiny HC	1.5	pt/a	CE										
	NPak	2.5	% v/v	CE										
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	CEF										
	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
	RU PowerMax	0.25	lb ae/a	CEF										
	Destiny HC	1.5	pt/a	CEF										
	NPak	2.5	% v/v	CEF										

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

Trt	Treatment	Rate	Appl	7-June		20-Jun	3-July		18-July		29-August		7-Sep
No.	Name[1]	Rate Unit	Code	Mrtl[2]	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										
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										
	NPak	2.5 % v/v	CEF										
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										
	NPak	2.5 % v/v	CEFG										
20	Betamix	12 fl oz/a	C		80			94		98	1	4	91
	Ethofumesate	0.75 lb ai/a	CEF										
	Outlook	14 fl oz/a	C										
	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	E										
	Outlook	10 fl oz/a	E										
	Betamix	24 fl oz/a	F										
21	Dual Magnum	1.5 pt/a	A		93			99		97	0	1	96
	Ethofumesate	0.75 lb ai/a	CEF										
	RU PowerMax	0.25 lb ae/a	CEF										
	Destiny HC	1.5 pt/a	CEF										
	NPak	2.5 % v/v	CEF										
		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**

[1]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.

Table 3. Common lambsquarters and annual grass control from Willowood Ethofumesate plus glyphosate applied POST to Roundup Ready® sugarbeet – Crookston, MN – 2012 (Stachler).

	7-June			20-June	3-July			18-July			29-August		7-September	
Trt No.	Grass Cntl	Colq Cntl	Colq Mrtl	Colq Mrtl	Grass Cntl	Colq Cntl	Colq Mrtl	Grass Cntl	Colq Cntl	Colq Mrtl	Colq Above sgbt	Colq Below sgbt	Grass Cntl	Colq Cntl
	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	------No./plot------		------%	-------
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 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-September			
No.	---------- Injury ----------					Stand	Stand	Yield	Sucr	Ext Sucr
	----------%----------					-----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 – Crookston, MN – 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 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.

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.

Table 1. Application Information

Application code	A (PRE)	B (V1)	C (V2 sgrbt)	D (20 DAT B) & E (13 DAT C)	F (14 DAT E)	G (14 DAT F)
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^2) – Trt. 3	-	-	16.25	1.5	1.75	-
Kocz height (avg/range) – Trt. 3	-	-	-	-	-	-
Kocz density (plants/m^2) – 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^2) – Trt.3	-	-	21	20	26.25	-

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.

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

				May 31	June 7				Jun 20	Jul 3	Jul 25	September 7			September 12			
Trt No.	Treatment Name[1]	Rate	Appl Code	Sgbt Inju	Sgbt Inju	Colq Cntl	gr/ye fxtl Cntl	Kocz Cntl	Sgbt Inju	Sgbt Inju	Sgbt Inju	Sgbt Inju	Colq Cntl	gr/ye fxtl Cntl	Sgbt Stand	Sgbt Yield	Sgbt Sugar	Sgbt Ext. Suc
		Rate Unit		----------%----------											#/100'	ton/A	%	lb/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	B															
	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	C	0	0	98	94	100	2	3	5	0	99	99	185	28.4	19.2	10022
	Destiny HC	1.5 pt/a	CEF															
	NPak	2.5 % v/v	CEF															
	RU P. Max	0.844 lb ae/a	E															
	RU P. Max	0.75 lb ae/a	F															
4	Betamix	12 fl oz/a	C	7	5	97	95	98	9	11	5	5	99	99	189	25.2	18.9	8735
	Nortron	4 fl oz/a	CEF															
	RU P. Max	1.125 lb ae/a	C															
	Destiny HC	1.5 pt/a	CEF															
	NPak	2.5 % v/v	CEF															
	Betamix	16 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															
5	Betamix	2 pt/a	C	11	9	97	92	74	23	20	10	10	99	99	191	24.5	19.2	8601
	Nortron	4 fl oz/a	CEF															
	RU P. Max	1.125 lb ae/a	C															
	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															
	RU P. Max	0.75 lb ae/a	F															
6	Betamix	2 pt/a	C	8	6	99	96	77	10	14	6	5	99	99	187	25.2	19.3	9010
	Nortron	4 fl oz/a	CEF															
	RU P. Max	1.125 lb ae/a	C															
	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															
	RU P. Max	0.75 lb ae/a	F															
7	Betamix	12 fl oz/a	C	12	19	99	100	96	27	17	13	7	99	99	178	25.9	18.5	8720
	Nortron	4 fl oz/a	CEF															
	Outlook	14 fl oz/a	C															
	RU P. Max	1.125 lb ae/a	C															
	Destiny HC	1.5 pt/a	CEF															
	NPak	2.5 % v/v	CEF															
	Betamix	16 fl oz/a	E															
	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															
8	Betamix	2 pt/a	C	17	23	100	100	57	35	26	16	14	99	99	181	22.7	19.2	8200
	Nortron	4 fl oz/a	CEF															
	Outlook	14 fl oz/a	C															
	RU P. Max	1.125 lb ae/a	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	E															
	Betamix	4 pt/a	F															
	RU P. Max	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	June 7				Jun 20	Jul 3	Jul 25	September 7			September 12			
Trt No.	Treatment Name[1]	Rate Rate Unit	Appl Code	Sgbt Inju	Sgbt Inju	Colq Cntl	gr/ye fxtl Cntl	Kocz Cntl	Sgbt Inju	Sgbt Inju	Sgbt Inju	Sgbt Inju	Colq Cntl	gr/ye fxtl Cntl	Sgbt Stand	Sgbt Yield	Sgbt Sugar	Sgbt Ext. Suc
				---%											#/100'	ton/A	%	lb/A
9	Betamix	2 pt/a	C	14	24	100	100	89	32	26	17	7	99	99	189	24.4	18.4	8239
	Nortron	4 fl oz/a	CEF															
	Outlook	14 fl oz/a	C															
	RU P. Max	1.125 lb ae/a	C															
	Destiny HC	1.5 pt/a	CEF															
	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	E															
	Betamix	4 pt/a	F															
	RU P. Max	0.75 lb ae/a	F															
10	Betamix	12 fl oz/a	C	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	1.125 lb ae/a	C															
	Destiny HC	1.5 pt/a	CEF															
	NPak	2.5 % v/v	CEF															
	Betamix	16 fl oz/a	E															
	Dual Magnum	1 pt/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															
11	Betamix	12 fl oz/a	C	12	19	100	100	87	30	28	14	13	99	99	182	22.1	19.1	7726
	Nortron	4 fl oz/a	CEF															
	Outlook	14 fl oz/a	C															
	Stinger	3 fl oz/a	CEF															
	RU P. Max	1.125 lb ae/a	C															
	Destiny HC	1.5 pt/a	CEF															
	NPak	2.5 % v/v	CEF															
	Betamix	16 fl oz/a	E															
	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															
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	32 fl oz/a	CEF															
	Outlook	14 fl oz/a	C															
	Stinger	3 fl oz/a	CEF															
	RU P. Max	1.125 lb ae/a	C															
	Destiny HC	1.5 pt/a	CEF															
	NPak	2.5 % v/v	CEF															
	Betamix	16 fl oz/a	E															
	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															
13	Betamix	2 pt/a	C	16	24	99	100	74	33	20	10	5	99	99	181	26.2	18.2	8687
	Nortron	4 fl oz/a	CEF															
	Outlook	14 fl oz/a	C															
	Stinger	3 fl oz/a	CEF															
	RU P. Max	1.125 lb ae/a	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	E															
	Betamix	4 pt/a	F															
	RU P. Max	0.75 lb ae/a	F															
14	Betamix	2 pt/a	C	18	36	100	100	58	48	32	21	15	99	99	192	21.2	19.2	7480
	Nortron	32 fl oz/a	CEF															
	Outlook	14 fl oz/a	C															
	Stinger	3 fl oz/a	CEF															
	RU P. Max	1.125 lb ae/a	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	E															
	Betamix	4 pt/a	F															
	RU P. Max	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	June 7				Jun 20	Jul 3	Jul 25	September 7			September 12			
Trt No.	Treatment Name[1]	Rate Rate Unit	Appl Code	Sgbt Inju	Sgbt Inju	Colq Cntl	gr/ye fxtl Cntl	Kocz Cntl	Sgbt Inju	Sgbt Inju	Sgbt Inju	Sgbt Inju	Colq Cntl	gr/ye fxtl Cntl	Sgbt Stand	Sgbt Yield	Sgbt Sugar	Sgbt Ext. Suc
				----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	#/100'	ton/A	%	lb/A
15	Betamix	12 fl oz/a	C	11	13	99	99	73	25	15	12	7	99	99	186	24.8	18.4	8282
	Nortron	4 fl oz/a	CEF															
	Outlook	14 fl oz/a	C															
	Stinger	4 fl oz/a	CE															
	RU P. Max	1.125 lb ae/a	C															
	Destiny HC	1.5 pt/a	CEF															
	NPak	2.5 % v/v	CEF															
	Betamix	16 fl oz/a	E															
	Outlook	10 fl oz/a	E															
	RU P. Max	0.844 lb ae/a	E															
	Betamix	24 fl oz/a	F															
	Stinger	2.5 fl oz/a	F															
	RU P. Max	0.75 lb ae/a	F															
16	Betamix	12 fl oz/a	C	13	15	99	99	99	21	22	13	10	99	99	189	24.7	18.8	8518
	Nortron	4 fl oz/a	CEF															
	Dual Magnum	1.5 pt/a	C															
	Stinger	3 fl oz/a	CEF															
	RU P. Max	1.125 lb ae/a	C															
	Destiny HC	1.5 pt/a	CEF															
	NPak	2.5 % v/v	CEF															
	Betamix	16 fl oz/a	E															
	Dual Magnum	1 pt/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															
17	RU P. Max	1.125 lb ae/a	C	2	1	99	95	99	21	17	14	15	99	99	196	25.3	18.5	8584
	R-11	0.5 % v/v	C															
	NPak	2.5 % v/v	CEF															
	Betamix	3 pt/a	E															
	Nortron	4 fl oz/a	EF															
	Outlook	21 fl oz/a	E															
	Stinger	6 fl oz/a	E															
	RU P. Max	0.844 lb ae/a	E															
	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	C	11	23	100	99	99	31	15	8	5	99	99	183	23.7	18.6	8074
	Nortron	4 fl oz/a	CEF															
	Outlook	14 fl oz/a	C															
	Stinger	2 fl oz/a	CE															
	UpBeet	1 oz/a	CE															
	RU P. Max	1.125 lb ae/a	C															
	Destiny HC	1.5 pt/a	CEF															
	NPak	2.5 % v/v	CEF															
	Betamix	16 fl oz/a	E															
	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	A	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	C															
	Destiny HC	1.5 pt/a	CEF															
	NPak	2.5 % v/v	CEF															
	RU P. Max	0.844 lb ae/a	E															
	RU P. Max	0.75 lb ae/a	F															
20	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															
	Nortron	4 fl oz/a	CEF															
	Outlook	14 fl oz/a	C															
	RU P. Max	1.125 lb ae/a	C															
	Destiny HC	1.5 pt/a	CEF															
	NPak	2.5 % v/v	CEF															
	Betamix	16 fl oz/a	E															
	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															

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

				May 31	June 7				Jun 20	Jul 3	Jul 25	September 7			September 12			
Trt No.	Treatment Name[1]	Rate	Rate Unit	Appl Code	Sgbt Inju	Sgbt Inju	Colq Cntl	gr/ye fxtl Cntl	Kocz Cntl	Sgbt Inju	Sgbt Inju	Sgbt Inju	Sgbt Inju	Colq Cntl	gr/ye fxtl Cntl	Sgbt Stand	Sgbt Yield	Sgbt Sugar	Sgbt Ext. Suc
					----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	#/100'	ton/A	%	lb/A
21	Nortron	7.5	pt/a	A	19	34	100	100	84	39	23	14	10	99	99	185	23.6	18.7	8033
	Betamix	2	pt/a	C															
	Nortron	4	fl oz/a	CEF															
	Outlook	14	fl oz/a	C															
	Stinger	3	fl oz/a	CEF															
	RU P. Max	1.125	lb ae/a	C															
	Betamix	3	pt/a	E															
	Outlook	10	fl oz/a	E															
	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%				**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 %				**19**	**34**	**2**	**2**	**19**	**17**	**21**	**31**	**58**	**0**	**0**	**6**	**11**	**3**	**10**

[1]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.

Table 1. Application Information

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^2) – Trt. 3	-	-	20.3	3.5	0.25	-

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.

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

				Jun 7	Jun 14	July5		July14	Aug. 9	September 17					
Trt No	Herbicide Name[1]	Rate Rate Unit	Appl Code	Sgbt Inju	Sgbt Inju	Sgbt Inju	Poma Cntl	Sgbt Inju	Sgbt Inju	Sgbt Inju	Poma Cntl	Sgbt Stand	Sgbt Yield	Sgbt Sugar	Sgbt Ext. Suc
				%								#/100'	ton/A	%	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	B												
	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	C	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	E												
	RU P. Max	0.75 lb ae/a	F												
4	Betamix	12 fl oz/a	C	0	13	9	99	10	6	3	100	199	26.9	17.4	8444
	Nortron	4 fl oz/a	CEF												
	RU P. Max	1.125 lb ae/a	C												
	Destiny HC	1.5 pt/a	CEF												
	NPak	2.5 % v/v	CEF												
	Betamix	16 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												
5	Betamix	2 pt/a	C	0	12	10	98	5	3	1	100	198	26.8	17.5	8469
	Nortron	4 fl oz/a	CEF												
	RU P. Max	1.125 lb ae/a	C												
	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												
	RU P. Max	0.75 lb ae/a	F												
6	Betamix	2 pt/a	C	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	C												
	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												
	RU P. Max	0.75 lb ae/a	F												
7	Betamix	12 fl oz/a	C	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												
	RU P. Max	1.125 lb ae/a	C												
	Destiny HC	1.5 pt/a	CEF												
	NPak	2.5 % v/v	CEF												
	Betamix	16 fl oz/a	E												
	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												

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

				Jun 7	Jun 14	July5		July14	Aug. 9	September 17					
Trt No	Herbicide Name[1]	Rate Rate Unit	Appl Code	Sgbt Inju	Sgbt Inju	Sgbt Inju	Poma Cntl	Sgbt Inju	Sgbt Inju	Sgbt Inju	Poma Cntl	Sgbt Stand	Sgbt Yield	Sgbt Sugar	Sgbt Ext. Suc
				---------- % ----------								#/100'	ton/A	%	lb/A
8	Betamix	2 pt/a	C	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	C												
	RU P. Max	1.125 lb ae/a	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	E												
	Betamix	4 pt/a	F												
	RU P. Max	0.75 lb ae/a	F												
9	Betamix	2 pt/a	C	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	C												
	RU P. Max	1.125 lb ae/a	C												
	Destiny HC	1.5 pt/a	CEF												
	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	E												
	Betamix	4 pt/a	F												
	RU P. Max	0.75 lb ae/a	F												
10	Betamix	12 fl oz/a	C	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	C												
	RU P. Max	1.125 lb ae/a	C												
	Destiny HC	1.5 pt/a	CEF												
	NPak	2.5 % v/v	CEF												
	Betamix	16 fl oz/a	E												
	Dual Mag	1 pt/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												
11	Betamix	12 fl oz/a	C	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	C												
	Stinger	3 fl oz/a	CEF												
	RU P. Max	1.125 lb ae/a	C												
	Destiny HC	1.5 pt/a	CEF												
	NPak	2.5 % v/v	CEF												
	Betamix	16 fl oz/a	E												
	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												

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

				Jun 7	Jun 14	July5		July14	Aug. 9			September 17			
Trt No	Herbicide Name[1]	Rate Rate Unit	Appl Code	Sgbt Inju	Sgbt Inju	Sgbt Inju	Poma Cntl	Sgbt Inju	Sgbt Inju	Sgbt Inju	Poma Cntl	Sgbt Stand	Sgbt Yield	Sgbt Sugar	Sgbt Ext. Suc
				%								#/100'	ton/A	%	lb/A
12	Betamix	12 fl oz/a	C	0	39	29	99	27	18	10	100	175	20.4	17.2	6313
	Nortron	32 fl oz/a	CEF												
	Outlook	14 fl oz/a	C												
	Stinger	3 fl oz/a	CEF												
	RU P. Max	1.125 lb ae/a	C												
	Destiny HC	1.5 pt/a	CEF												
	NPak	2.5 % v/v	CEF												
	Betamix	16 fl oz/a	E												
	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												
13	Betamix	2 pt/a	C	0	23	15	99	14	12	6	100	180	23.9	17.5	7542
	Nortron	4 fl oz/a	CEF												
	Outlook	14 fl oz/a	C												
	Stinger	3 fl oz/a	CEF												
	RU P. Max	1.125 lb ae/a	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	E												
	Betamix	4 pt/a	F												
	RU P. Max	0.75 lb ae/a	F												
14	Betamix	2 pt/a	C	0	30	23	99	22	13	10	100	171	23.3	17.2	7199
	Nortron	32 fl oz/a	CEF												
	Outlook	14 fl oz/a	C												
	Stinger	3 fl oz/a	CEF												
	RU P. Max	1.125 lb ae/a	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	E												
	Betamix	4 pt/a	F												
	RU P. Max	0.75 lb ae/a	F												
15	Betamix	12 fl oz/a	C	0	30	19	99	18	11	10	100	187	24.2	17.1	7332
	Nortron	4 fl oz/a	CEF												
	Outlook	14 fl oz/a	C												
	Stinger	4 fl oz/a	CE												
	RU P. Max	1.125 lb ae/a	C												
	Destiny HC	1.5 pt/a	CEF												
	NPak	2.5 % v/v	CEF												
	Betamix	16 fl oz/a	E												
	Outlook	10 fl oz/a	E												
	RU P. Max	0.844 lb ae/a	E												
	Betamix	24 fl oz/a	F												
	Stinger	2.5 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	July5		July14	Aug. 9			September 17			
Trt No	Herbicide Name[1]	Rate Rate Unit	Appl Code	Sgbt Inju	Sgbt Inju	Sgbt Inju	Poma Cntl	Sgbt Inju	Sgbt Inju	Sgbt Inju	Poma Cntl	Sgbt Stand	Sgbt Yield	Sgbt Sugar	Sgbt Ext. Suc
				---------- % ----------								#/100'	ton/A	%	lb/A
16	Betamix	12 fl oz/a	C	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	C												
	Stinger	3 fl oz/a	CEF												
	RU P. Max	1.125 lb ae/a	C												
	Destiny HC	1.5 pt/a	CEF												
	NPak	2.5 % v/v	CEF												
	Betamix	16 fl oz/a	E												
	Dual Mag	1 pt/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												
17	RU P. Max	1.125 lb ae/a	C	0	9	17	97	16	13	12	100	196	24.6	17.8	7893
	R-11	0.5 % v/v	C												
	NPak	2.5 % v/v	CEF												
	Betamix	3 pt/a	E												
	Nortron	4 fl oz/a	EF												
	Outlook	21 fl oz/a	E												
	Stinger	6 fl oz/a	E												
	RU P. Max	0.844 lb ae/a	E												
	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	C	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	C												
	Stinger	2 fl oz/a	CE												
	UpBeet	1 oz/a	CE												
	RU P. Max	1.125 lb ae/a	C												
	Destiny HC	1.5 pt/a	CEF												
	NPak	2.5 % v/v	CEF												
	Betamix	16 fl oz/a	E												
	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	A	5	14	3	99	2	6	5	100	184	26.2	17.9	8503
	RU P. Max	1.125 lb ae/a	C												
	Destiny HC	1.5 pt/a	CEF												
	NPak	2.5 % v/v	CEF												
	RU P. Max	0.844 lb ae/a	E												
	RU P. Max	0.75 lb ae/a	F												
20	Nortron	7.5 pt/a	A	5	26	16	99	12	6	8	100	183	26.7	17.7	8578
	Betamix	12 fl oz/a	C												
	Nortron	4 fl oz/a	CEF												
	Outlook	14 fl oz/a	C												
	RU P. Max	1.125 lb ae/a	C												
	Destiny HC	1.5 pt/a	CEF												
	NPak	2.5 % v/v	CEF												
	Betamix	16 fl oz/a	E												
	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												

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

				Jun 7	Jun 14	July5		July14	Aug. 9			September 17			
Trt No	Herbicide Name[1]	Rate	Rate Unit	Appl Code	Sgbt Inju	Sgbt Inju	Sgbt Inju	Poma Cntl	Sgbt Inju	Sgbt Inju	Sgbt Inju	Poma Cntl	Sgbt Stand	Sgbt Yield	Sgbt Sugar	Sgbt Ext. Suc
					%								#/100'	ton/A	%	lb/A
21	Nortron	7.5	pt/a	A	6	35	28	99	20	13	8	100	179	23.2	17.0	7039
	Betamix	2	pt/a	C												
	Nortron	4	fl oz/a	CEF												
	Outlook	14	fl oz/a	C												
	Stinger	3	fl oz/a	CEF												
	RU P. Max	1.125	lb ae/a	C												
	Betamix	3	pt/a	E												
	Outlook	10	fl oz/a	E												
	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%				**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**

[1]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.

Table 1. Application Information

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	S	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 (cot.-2lf)	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^2) – Trt. 3/6	-	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^2) – Trt. 3/6	-	3 = 41	6 = 37	3 = 48	6 = 25

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 29th 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 at V2 sugarbeet stage compared to the second 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.

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

Trt No.	Herbicide Name[1]	Rate	Rate Unit	Appl Code	July 25 Sgbt Inju	July 25 Colq cntrl	July 25 Rrpw cntrl	July 25 Copu cntrl	August Colq cntrl	August Rrpw cntrl	August Copu cntrl	July 19 Sgbt Stand	September 5 Sgbt Stand	September 5 Sgbt Yield	September 5 Sgbt Sugar	September 5 Sgbt Ext. Suc
					----------%----------							-----#/100'-----		Ton/A	%	lb/A
1	Warrant	1.13	lb ai/a	A	2	78	90	97	66	82	96	126	116	19.5	15.3	5338
	R.U. P. Max	1.125	lb ae/a	B												
	NPak AMS	5	% v/v	BD												
	R.U. P. Max	0.84	lb ae/a	D												
2	Warrant	1.13	lb ai/a	A	4	99	99	99	99	97	99	145	138	23.5	15.4	6475
	R.U. P. Max	1.125	lb ae/a	C												
	NPak AMS	5	% v/v	CE												
	R.U. P. Max	0.84	lb ae/a	E												
3	R.U. P. Max	1.125	lb ae/a	B	3	71	79	71	63	63	76	146	142	24.0	15.7	6694
	NPak AMS	5	% v/v	BD												
	R.U. P. Max	0.84	lb ae/a	D												
4	R.U. P. Max	1.125	lb ae/a	B	3	84	89	92	75	74	94	148	141	21.6	15.0	5765
	NPak AMS	5	% v/v	BD												
	Warrant	1.13	lb ai/a	B												
	R.U. P. Max	0.84	lb ae/a	D												
5	R.U. P. Max	1.125	lb ae/a	B	3	76	85	90	66	77	92	145	143	23.4	14.6	5974
	NPak AMS	5	% v/v	BD												
	R.U. P. Max	0.84	lb ae/a	D												
	Warrant	1.13	lb ai/a	D												
6	R.U. P. Max	1.125	lb ae/a	C	3	92	97	92	85	92	94	145	127	21.6	15.2	5807
	NPak AMS	5	% v/v	CE												
	R.U. P. Max	0.84	lb ae/a	E												
7	R.U. P. Max	1.125	lb ae/a	C	2	98	98	96	97	99	99	145	127	21.6	14.5	5571
	NPak AMS	5	% v/v	CE												
	Warrant	1.13	lb ai/a	C												
	R.U. P. Max	0.84	lb ae/a	E												
8	R.U. P. Max	1.125	lb ae/a	C	5	91	98	96	89	98	96	138	131	23.3	15.0	6224
	NPak AMS	5	% v/v	CE												
	R.U. P. Max	0.84	lb ae/a	E												
	Warrant	1.13	lb ai/a	E												
9	R.U. P. Max	1.125	lb ae/a	B	6	90	98	99	82	96	98	128	114	21.2	14.0	5149
	NPak AMS	5	% v/v	BD												
	Outlook	0.91	lb ai/a	B												
	R.U. P. Max	0.84	lb ae/a	D												
10	R.U. P. Max	1.125	lb ae/a	B	3	92	97	98	85	94	98	136	140	26.6	15.7	7468
	NPak AMS	5	% v/v	BD												
	R.U. P. Max	0.84	lb ae/a	D												
	Outlook	0.91	lb ai/a	D												
11	R.U. P. Max	1.125	lb ae/a	C	1	96	97	98	97	98	99	158	138	22.8	14.5	5894
	NPak AMS	5	% v/v	CE												
	Outlook	0.91	lb ai/a	C												
	R.U. P. Max	0.84	lb ae/a	E												
12	R.U. P. Max	1.125	lb ae/a	C	3	97	96	99	98	93	99	143	119	22.5	15.0	6014
	NPak AMS	5	% v/v	CE												
	R.U. P. Max	0.84	lb ae/a	E												
	Outlook	0.91	lb ai/a	E												
13	R.U. P. Max	1.125	lb ae/a	B	4	86	89	98	75	82	97	137	131	21.9	14.7	5684
	NPak AMS	5	% v/v	BD												
	Dual Magnum	1.43	lb ai/a	B												
	R.U. P. Max	0.84	lb ae/a	D												
14	R.U. P. Max	1.125	lb ae/a	B	6	76	86	92	66	78	94	115	110	21.0	14.8	5472
	NPak AMS	5	% v/v	BD												
	R.U. P. Max	0.84	lb ae/a	D												
	Dual Magnum	1.43	lb ai/a	D												

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

Trt No.	Herbicide Name[1]	Rate	Rate Unit	Appl Code	July 25 Sgbt Inju	July 25 Colq cntrl	July 25 Rrpw cntrl	July 25 Copu cntrl	August Colq cntrl	August Rrpw cntrl	August Copu cntrl	July 19 Sgbt Stand	September 5 Sgbt Stand	September 5 Sgbt Yield	September 5 Sgbt Sugar	September 5 Sgbt Ext. Suc
					----------%----------							-----#/100'-----		Ton/A	%	lb/A
15	R.U. P. Max	1.125	lb ae/a	C	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	C												
	R.U. P. Max	0.84	lb ae/a	E												
16	R.U. P. Max	1.125	lb ae/a	C	7	97	98	94	94	96	95	139	127	23.2	15.1	6179
	NPak AMS	5	% v/v	CE												
	R.U. P. Max	0.84	lb ae/a	E												
	Dual Magnum	1.43	lb ai/a	E												
	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**

[1]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).

(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_2 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.

Table 1. Application Information[1]

Application code	A (PPI)	B (cot.-2lf 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./Cot.-1.5 lf	-	2.3 lf/Cot.-4 lf	-
Cano(RR) density (plants/m^2) – 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^2) – Trt. 4	-	9.5	-	31.5	-
Rrpw density (plants/m^2) – Trt. 4	-	1.25	-	38.8	-
Copu density (plants/m^2) – Trt. 4	-	0	-	119.8	-

[1] 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 29th, Nortron controlled more volunteer RRcanola than Ro-Neet. Treatments 5, 8, 9, and 18 controlled > 90% of volunteer RR canola on July 5, however by August 29th control was reduced to below 73% for these treatments with only treatments 8, 11, and 18 controlling ≥ 70% of volunteer RR canola. The greater the number of herbicide applications and the shorter the time between applications the greater the control of volunterr 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 No.	Treatment Name[1]	Rate Rate Unit	Appl Code[2]	May 31			June 18				July 5				Aug. 29
				Cano[3]	Colq	Rrpw	Cano	Colq	Rrpw	Copu	Cano	Colq	Rrpw	Copu	Cano
				% Control											
1	UpBeet	1 oz/a	BD	0	0	0	74	93	99	93	83	78	94	89	60
	Nortron	4 fl oz/a	BD												
	RU PowerMax	1.13 lb ae/a	B												
	RU PowerMax	0.84 lb ae/a	D												
	Destiny HC	2 pt/a	BD												
	NPAK	2.5 % v/v	BD												
2	UpBeet	1 oz/a	B	0	0	0	72	91	99	97	71	73	86	80	54
	Nortron	4 fl oz/a	BD												
	RU PowerMax	1.13 lb ae/a	B												
	RU PowerMax	0.84 lb ae/a	D												
	UpBeet	0.5 oz/a	D												
	Destiny HC	2 pt/a	BD												
	NPAK	2.5 % v/v	BD												
3	UpBeet	0.25 oz/a	BCD	0	0	0	90	95	99	98	85	71	76	66	61
	Nortron	4 fl oz/a	BCD												
	RU PowerMax	1.13 lb ae/a	B												
	RU PowerMax	0.75 lb ae/a	D												
	Destiny HC	2 pt/a	BCD												
	NPAK	2.5 % v/v	BCD												
4	UpBeet	0.25 oz/a	BD(F)	0	0	0	62	90	98	92	61	69	79	66	31
	Nortron	4 fl oz/a	BD(F)												
	RU PowerMax	1.13 lb ae/a	B												
	RU PowerMax	0.84 lb ae/a	D												
	RU PowerMax	0.75 lb ae/a	(F)												
	Destiny HC	2 pt/a	BD(F)												
	NPAK	2.5 % v/v	BD(F)												
5	UpBeet	0.25 oz/a	BCDE	0	0	0	88	89	97	97	93	78	85	87	66
	Nortron	3 fl oz/a	BCDE												
	RU PowerMax	1.13 lb ae/a	B												
	RU PowerMax	0.75 lb ae/a	D												
	Destiny HC	2 pt/a	BCDE												
	NPAK	2.5 % v/v	BCDE												
6	UpBeet	0.25 oz/a	BCD	0	0	0	87	94	99	98	80	69	71	76	53
	Nortron	4 fl oz/a	BCD												
	RU PowerMax	1.13 lb ae/a	B												
	RU PowerMax	0.75 lb ae/a	D												
	Cide Winder	2 pt/a	BCD												
	NPAK	2.5 % v/v	BCD												
7	UpBeet	0.25 oz/a	BD(F)	0	0	0	66	87	99	95	64	71	83	71	34
	Nortron	4 fl oz/a	BD(F)												
	RU PowerMax	1.13 lb ae/a	B												
	RU PowerMax	0.84 lb ae/a	D												
	RU PowerMax	0.75 lb ae/a	(F)												
	Cide Winder	2 pt/a	BD(F)												
	NPAK	2.5 % v/v	BD(F)												
8	UpBeet	0.25 oz/a	BCDE	0	0	0	91	94	99	99	93	76	90	91	70
	Nortron	3 fl oz/a	BCDE												
	RU PowerMax	1.13 lb ae/a	B												
	RU PowerMax	0.75 lb ae/a	D												
	Cide Winder	2 pt/a	BCDE												
	NPAK	2.5 % v/v	BCDE												

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

Trt No.	Treatment Name[1]	Rate Rate Unit	Appl Code[2]	May 31 Cano[3]	May 31 Colq	May 31 Rrpw	June 18 Cano	June 18 Colq	June 18 Rrpw	June 18 Copu	July 5 Cano	July 5 Colq	July 5 Rrpw	July 5 Copu	Aug. 29 Cano
				% Control											
9	UpBeet	0.25 oz/a	BCD	0	0	0	97	99	99	99	96	71	69	61	68
	Betamix	1 pt/a	B												
	Nortron	4 fl oz/a	BCD												
	RU PowerMax	1.13 lb ae/a	B												
	RU PowerMax	0.75 lb ae/a	D												
	Betamix	2 pt/a	CD												
	Destiny HC	2 pt/a	BCD												
	NPAK	2.5 % v/v	BCD												
10	UpBeet	0.25 oz/a	BCD	0	0	0	89	97	99	98	87	84	92	96	66
	Nortron	4 fl oz/a	BCD												
	RU PowerMax	1.13 lb ae/a	B												
	RU PowerMax	0.75 lb ae/a	D												
	Outlook	21 fl oz/a	C												
	Destiny HC	2 pt/a	BCD												
	NPAK	2.5 % v/v	BCD												
11	UpBeet	0.33 oz/a	BCD	0	0	0	88	99	99	99	87	76	81	89	72
	Nortron	4 fl oz/a	BCD												
	RU PowerMax	1.13 lb ae/a	B												
	RU PowerMax	0.75 lb ae/a	D												
	Destiny HC	2 pt/a	BCD												
	NPAK	2.5 % v/v	BCD												
12	UpBeet	0.33 oz/a	BD(F)	0	0	0	66	94	99	97	65	74	79	85	51
	Nortron	4 fl oz/a	BD(F)												
	RU PowerMax	1.13 lb ae/a	B												
	RU PowerMax	0.84 lb ae/a	D												
	RU PowerMax	0.75 lb ae/a	(F)												
	Destiny HC	2 pt/a	BD(F)												
	NPAK	2.5 % v/v	BD(F)												
13	UpBeet	0.5 oz/a	BCD	0	0	0	90	97	99	99	88	74	81	88	65
	Nortron	4 fl oz/a	BCD												
	RU PowerMax	1.13 lb ae/a	B												
	RU PowerMax	0.75 lb ae/a	D												
	Destiny HC	2 pt/a	BCD												
	NPAK	2.5 % v/v	BCD												
14	UpBeet	0.5 oz/a	BD(F)	0	0	0	71	89	99	90	68	71	84	83	40
	Nortron	4 fl oz/a	BD(F)												
	RU PowerMax	1.13 lb ae/a	B												
	RU PowerMax	0.84 lb ae/a	D												
	RU PowerMax	0.75 lb ae/a	(F)												
	Destiny HC	2 pt/a	BD(F)												
	NPAK	2.5 % v/v	BD(F)												
15	Nortron	7.5 pt/a	A	19	78	80	88	98	99	99	83	85	98	99	59
	UpBeet	0.25 oz/a	BCD												
	Nortron	4 fl oz/a	BCD												
	RU PowerMax	1.13 lb ae/a	B												
	RU PowerMax	0.75 lb ae/a	D												
	Destiny HC	2 pt/a	BCD												
	NPAK	2.5 % v/v	BCD												
16	Nortron	7.5 pt/a	A	23	79	80	70	99	99	99	71	90	99	99	45
	UpBeet	0.25 oz/a	BD(F)												
	Nortron	4 fl oz/a	BD(F)												
	RU PowerMax	1.13 lb ae/a	B												
	RU PowerMax	0.84 lb ae/a	D												
	RU PowerMax	0.75 lb ae/a	F												
	Destiny HC	2 pt/a	BD(F)												
	NPAK	2.5 % v/v	BD(F)												

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

Trt No.	Treatment Name[1]	Rate	Rate Unit	Appl Code[2]	May 31			June 18				July 5				Aug. 29
					Cano[3]	Colq	Rrpw	Cano	Colq	Rrpw	Copu	Cano	Colq	Rrpw	Copu	Cano
					% Control											
17	Nortron	7.5	pt/a	A	20	79	81	68	98	99	99	69	88	96	99	40
	UpBeet	0.25	oz/a	BD(F)												
	Nortron	4	fl oz/a	BD(F)												
	RU PowerMax	1.13	lb ae/a	B												
	RU PowerMax	0.84	lb ae/a	D												
	RU PowerMax	0.75	lb ae/a	F												
	Cide Winder	2	pt/a	BDF												
	NPAK	2.5	% v/v	BD(F)												
18	Nortron	7.5	pt/a	A	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	1.13	lb ae/a	B												
	RU PowerMax	0.75	lb ae/a	D												
	Destiny HC	2	pt/a	BCDE												
	NPAK	2.5	% v/v	BCDE												
19	Ro-Neet SB	5.3	pt/a	A	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	B												
	RU PowerMax	0.75	lb 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**

[1]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).
[2](F) = a planned application, however F was **NOT** applied due to an oversight.
[3]Cano = volunteer Roundup Ready canola.

Table 3. Management of volunteer Roundup Ready® canola in Roundup Ready sugarbeet - Hickson, ND - 2012 (Stachler).

Trt No.	May 31	June 18	July 5	September 5			
	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**