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Resistant wild oat, Crookston, MN, 2010. (Stachler) Research plots 11 feet wide and 35 feet long were established in a cooperators field having resistant wild oat. No crop was planted in this field. Treatments were applied 5:00 pm May 19 when the air temperature was 83F, relative humidity was 11%, soil temperature at six inches was 60F, wind velocity was 5 mph, sky was clear and soil moisture was good. All treatments were applied in 17 gpa water at 40 psi through XR8002 nozzles to the center 6.67 feet of each plot 30 feet in length. Wild oat was in the 1 leaf to 1 tiller stage (1-3" tall) with the majority of plants in the 1.5 leaf stage (1.5 inches tall). Wild oat density in the plot area was 238 plants per M². Wild oat control was evaluated June 3 and June 22. All evaluations are a visual estimate of percent weed control in the treated plot compared to the adjacent untreated strips and plots. Ten wild oat plants were flagged in each plot before treatments were applied. These flagged plants were evaluated for mortality June 3 and June 22.

Table. Resistant wild oat, Crookston, MN, 2010. (Stachler)

Treatment ¹	Rate lb ai/A	June 3	June 22	June 3	June 22
		Wioa Cntl	Wioa Cntl	Wioa Mortality	Wioa Mortality
		----- % -----			
Select Max+MSO	0.042 + 1 qt/A	81	75	45	100
Select Max+MSO+AMS	0.042 + 1 qt/A + 1 gal/A	80	74	80	100
Select Max+MSO	0.125 + 1 qt/A	96	85	95	100
Select Max+MSO+AMS	0.125 + 1 qt/A + 1 gal/A	92	84	85	100
Select Max+MSO	0.25 + 1 qt/A	96	92	98	100
Select Max+MSO+AMS	0.25 + 1 qt/A + 1 gal/A	99	94	100	100
Select Max+MSO	0.5 + 1 qt/A	99	95	93	100
Poast+MSO	0.188 + 1 qt/A	85	78	75	100
Achieve Liquid+Supercharge	0.18 + 0.5% v/v	30	18	0	10
Assure II+MSO	0.08 + 1 qt/A	70	62	28	93
Assure II+MSO	0.16 + 1 qt/A	61	53	15	78
Discover NG	0.062	49	35	8	63
Puma	0.082	51	36	8	66
Fusilade DX+MSO	0.188 + 1 qt/A	69	60	10	93
Axial XL	0.027	56	50	30	72
Axial XL	0.053	79	71	63	93
Axial XL	0.107	90	87	65	95
Raptor+MSO+AMS	0.039 + 1 qt/A + 4.4% v/v	86	83	8	100
Silverado+MSO+AMS	0.003 + 1 qt/A + 4.4% v/v	69	57	0	65
Everest+MSO+AMS	0.026 + 1 qt/A + 4.4% v/v	72	57	0	50
PowerFlex+MSO+AMS	0.016 + 1 qt/A + 4.4%v/v	70	53	5	18
LSD (5%)		15	18	20	26

¹AMS=N-Pak AMS (liquid ammonium sulfate from Winfield Solutions), RUPowerMAX=Roundup PowerMAX, MSO=Leci-Tech methylated seed oil from Loveland, Supercharge=methylated seed oil and ammonium sulfate replacement from Syngenta.

Summary: Only Select MAX at ≥ 0.125 lb ai/A, Poast, Axial at 0.107 lb ai/A, and Raptor controlled $\geq 85\%$ wild oat 15 days after treatment (DAT). Wild oat control decreased over time for all treatments due to recovery of plants present at the time of application and new germination after the application. At 34 DAT, only Select Max at > 0.25 lb ai/A controlled greater than 91% wild oat, indicating the effectiveness of plants present at the time of application and residual control.

Only Select Max at ≥ 0.125 lb/A caused $\geq 84\%$ mortality of flagged plants of wild oat 15 DAT. Select Max at 0.042 lb/A without AMS caused only 45% mortality of flagged plants of wild oat 15 DAT, indicating plants may survive if the rate of Select Max is low and/or the environment reduces herbicide activity. Only Select Max (at all rates), Poast, and Raptor caused 100% mortality of flagged plants of wild oat 34 DAT in this population.

At least 5% of flagged wild oat plants survived all “fop” herbicides (Assure II, Discover NG, Puma, and Fusilade) and Axial (a “den” herbicide), indicating the likely presence of cross-resistance to ACCase-inhibiting (Group 1) herbicides. At least 35% of flagged wild oat plants survived ALS-inhibiting (Group 2) herbicides from three classes of chemistry (“SU”, “TPS”, and “SACT”), indicating the likely presence of a cross-resistant biotype. Flagged wild oat plants survived ACCase and ALS-inhibiting herbicides demonstrating the likely presence of a multiple-resistant biotype in this population. At least 5% of flagged wild oat plants survived all cereal grain ACCase- and ALS-inhibiting herbicides tested, demonstrating no postemergence cereal grain herbicide may effectively control wild oat in the near future in this population, making cereal grain production difficult. Current preliminary greenhouse results support the results presented in this report that wild oat in this population are resistant to Puma and PowerFlex, may not be resistant to Axial, but not sure, and are susceptible to Select Max (0.042 and 0.125 lb/A). Sugarbeet growers and other broadleaf crop growers should increase clethodim rates and adopt practices to maximize clethodim activity, otherwise selection of a clethodim-resistant biotype is likely.

Giant ragweed control in Roundup Ready® sugarbeet, SW Hutchinson, MN Site #1, 2010. (Fisher and Stachler). 'Betaseed 95RR03' sugarbeet was seeded April 23, 2010 in 22 inch rows in a grower's field having glyphosate-resistant giant ragweed SW of Hutchinson, MN. Sugarbeet seed was treated with Tachigaren at 45 grams dry product per 100,000 seeds. Herbicide treatment information is provided in the table below. All treatments were applied in 17 gpa water at 40 psi through XR8002 nozzles with a bicycle sprayer to the center four rows of six row plots 40 feet in length. Glyphosate and/or clopyralid were applied according to the treatments in the data table below. Ammonium sulfate as AmStik from West Central was included in all treatments at 2.5 qt/A. Giant ragweed was evaluated 21 days after each application with the most pertinent data presented. Visual evaluations are an estimate of percent control in the treated plot area compared to the adjacent untreated strips and based upon a scale of 0 (no control) to 100% (complete control). Sugarbeet was harvested September 8 from one of the two center rows of each plot. Experiment designed as a randomized complete block having four replications.

Table. Application information.

Application Code	1	2	3	4	5	6	7	8	9
Date of Application	May 18	June 9	June 29	May 27	June 24	July 8	June 2	June 24	July 13
Time of Day	1:30 pm	2:00 pm	1:00 pm	4:30 pm	3:30 pm	12:30 pm	2:30 pm	3:30 pm	11:00 am
Air Temperature (°F)	77	67	70	83	81	80	67	81	75
Relative Humidity (%)	20	70	45	19	58	50	56	58	78
Soil Temp. (°F at 6")	64	57	70	67	69	66	56	69	66
Wind Velocity (mph)	6	10	3	5	3	4	4	3	4
Cloud Cover (%)	15	70	5	0	25	100	30	25	100
Sugarbeet (stage – range)	Cot.-2lf	V6-V13	V10-V24	V2-V5.5	V6-V17	V10-V24	V2-V10	V6-V17	V11-V26.5
Giant Ragweed (stage/height - range)	Cot.-2.5N/ 0.125-1.75"	-	-	Cot.-5N/ 0.5-9"	-	-	Cot.-6N/ 0.5-17.5"	-	-
Giant Ragweed (avg. density)	23/ft ²	-	-	22/ft ²	-	-	23/ft ²	-	-

Summary: Sugarbeet injury increased with increasing rates of Stinger applied once or multiple times, although plants recovered over time with little injury observed at the last evaluation (data not shown). Glyphosate applied once and multiple times inadequately controlled giant ragweed, although multiple glyphosate applications controlled more giant ragweed and increased sugarbeet yield compared to a single application. Glyphosate controlled more giant ragweed 1" in height compared to larger giant ragweed at 21 days after the initial application. The inadequate control with glyphosate is a result of the presence of a glyphosate-resistant biotype in the population.

Stinger controlled more giant ragweed and increased sugarbeet yield as rates of a single application increased. Stinger more effectively controlled smaller giant ragweed plants compared to larger plants at 21 days after the initial application. Stinger controlled more giant ragweed and improved sugarbeet yield when applied multiple times compared to a single application. Giant ragweed control was maximized within each timing when Stinger was applied at 0.94 followed by 0.188 lb ae/A.

Season-long giant ragweed competition caused 84% reduction of sugarbeet root yield compared to removing giant ragweed at 1" in height. Root yield improved when weeds were removed at 1" compared to 3 or 6". Stinger (0.047 lb/A) plus glyphosate (0.75 lb ae/A) applied to giant ragweed 1" in height and followed by the same treatment 21 days later maximized sugarbeet root yield, indicating Stinger should be applied initially to giant ragweed 1" in height and at the lowest effective rate to minimize competition and sugarbeet injury.

Experiment continued on next page.

Table. Giant ragweed control in Roundup Ready® sugarbeet, SW Hutchinson, MN Site #1 (Fisher and Stachler).

Treatment*	Rate (lb ae/A)	Timing	21 DAT	21 DAT	Harvest	
			1,4,7	3,6,9	Root Yield Ton/A	Extr Sucr lb/A
			Girw cntrl %			
Untreated	-	-	0	0	3.9	555
Weed Free Check-1"	-	-	100	100	24.0	2253
Glyt-PM + AMS	0.75	1	53	6	1.0	803
Clpy + Glyt-PM + AMS	0.047 + 0.75	1	70	16	4.2	1896
Clpy + Glyt-PM + AMS	0.094 + 0.75	1	77	48	8.3	1031
Clpy + Glyt-PM + AMS	0.188 + 0.75	1	92	63	18.5	1637
Clpy + Glyt-PM + AMS	0.047 + 0.75	1,2	70	93	25.5	2383
Clpy + Glyt-PM + AMS	0.094 + 0.75	1,2	76	95	21.1	2301
Clpy + Glyt-PM + AMS	0.094 + 0.75	1				
Clpy + Glyt-PM + AMS	0.188 + 0.75	2	78	100	21.5	2330
Clpy + Glyt-PM + AMS	0.047 + 0.75	1,2				
Clpy + Glyt-PM + AMS	0.094 + 0.75	3	66	96	22.5	2053
Clpy + Glyt-PM + AMS	0.094 + 0.75	1,2,3	77	99	22.3	2237
Weed-Free Check-3"	-	-	100	100	17.9	2041
Glyt-PM + AMS	0.75	4	46	21	1.3	1099
Clpy + Glyt-PM + AMS	0.047 + 0.75	4	65	39	9.1	1210
Clpy + Glyt-PM + AMS	0.094 + 0.75	4	71	63	11.0	1406
Clpy + Glyt-PM + AMS	0.188 + 0.75	4	84	88	19.1	1929
Clpy + Glyt-PM + AMS	0.047 + 0.75	4,5	65	82	17.4	1653
Clpy + Glyt-PM + AMS	0.094 + 0.75	4,5	80	96	21.7	2223
Clpy + Glyt-PM + AMS	0.094 + 0.75	4				
Clpy + Glyt-PM + AMS	0.188 + 0.75	5	75	100	16.6	1645
Clpy + Glyt-PM + AMS	0.047 + 0.75	4,5				
Clpy + Glyt-PM + AMS	0.094 + 0.75	6	68	89	22.3	2107
Clpy + Glyt-PM + AMS	0.094 + 0.75	4,5,6	76	97	20.1	2059
Glyt-PM + AMS	0.75	4,5	50	39	8.6	1599
Glyt-PM + AMS	0.75	4,5,6	50	59	11.0	1288
Weed-Free Check-6"	-	-	100	100	18.8	1874
Glyt-PM + AMS	0.75	7	34	15	1.4	1830
Clpy + Glyt-PM + AMS	0.047 + 0.75	7	58	38	4.9	1790
Clpy + Glyt-PM + AMS	0.094 + 0.75	7	64	48	5.8	1641
Clpy + Glyt-PM + AMS	0.188 + 0.75	7	75	81	15.4	1876
Clpy + Glyt-PM + AMS	0.047 + 0.75	7,8	60	81	15.2	1679
Clpy + Glyt-PM + AMS	0.094 + 0.75	7,8	69	96	17.6	1622
Clpy + Glyt-PM + AMS	0.094 + 0.75	7				
Clpy + Glyt-PM + AMS	0.188 + 0.75	8	67	97	16.1	1551
Clpy + Glyt-PM + AMS	0.047 + 0.75	7,8				
Clpy + Glyt-PM + AMS	0.094 + 0.75	9	56	88	16.5	1548
Clpy + Glyt-PM + AMS	0.094 + 0.75	7,8,9	65	95	19.6	1970
LSD (0.05)			6.2	4.6	5.7	1019

*Glyt-PM = Roundup PowerMAX from Monsanto; Clpy = Stinger from Dow AgroSciences; AMS = Amstik from West Central at 2.5 qt/A.

Giant ragweed control in Roundup Ready® sugarbeet, SW Hutchinson, MN Site #2, 2010. (Fisher and Stachler) 'Betaseed 95RR03' sugarbeet was seeded April 23, 2010 in 22 inch rows in a grower's field having glyphosate-resistant giant ragweed southwest of Hutchinson, MN. Sugarbeet seed was treated with Tachigaren at 45 grams dry product per 100,000 seeds. Application information is provided in the table below. All treatments were applied in 17 gpa water at 40 psi through XR8002 nozzles with a bicycle sprayer to the center four rows of six row plots 40 feet in length. Glyphosate and/or clopyralid were applied according to the treatments in the results table below. Ammonium sulfate as AmStik from West Central was included in all treatments at 2.5 qt/A. Giant ragweed was evaluated 21 days after each application. Only selected data is presented in the table below. Visual evaluations are an estimate of percent control in the treated plot area compared to the adjacent untreated strips and based upon a scale of 0 (no control) to 100% (complete control). Sugarbeet was harvested September 8 from one center row of each plot. Experiment designed as a randomized complete block having four replications.

Table. Application information.

Application Code	1	2	3	4	5	6	7	8	9
Date of Application	May 18	June 9	June 29	May 27	June 24	July 8	June 2	June 24	July 13
Time of Day	5:00 pm	5:30 pm	4:00 pm	7:30 pm	7:00 pm	3:30 pm	5:00 pm	7:00 pm	12:00 pm
Air Temperature (°F)	78	70	70	80	77	81	75	77	75
Relative Humidity (%)	13	50	39	24	68	41	36	68	78
Soil Temp. (°F at 6")	73	64	70	72	72	74	63	72	67
Wind Velocity (mph)	5	6	4	4	2	5	3	2	4
Cloud Cover (%)	20	15	0	0	5	20	5	5	100
Sugarbeet (stage - range)	V1-V2	V5-V11	V9-V19.5	V2-V6	V6-V18	V10-V26	V5-V9.3	V6-V18	V9-V25
Giant Ragweed (stage/height -range)	Cot.-2N/ 0.125- 1.5"	-	-	Cot.- 4.5N/ 0.25- 3.5"	-	-	Cot.- 5.5N/ 0.5-8.5"	-	-
Giant Ragweed (avg. density)	3.3/ft ²	-	-	3.4/ft ²	-	-	4.7/ft ²	-	-

Summary: Yield data are not presented due to excessive and variable root and leaf diseases. Sugarbeet injury increased with increasing rates of Stinger applied once or multiple times, although plants recovered over time with little injury observed at the last evaluation (data not shown). Glyphosate applied once and multiple times inadequately controlled giant ragweed, although multiple glyphosate applications controlled more giant ragweed compared to a single application. Glyphosate controlled more giant ragweed at 1" in height compared to giant ragweed 3" in height at 21 days after the initial application. The inadequate control is a result of the presence of glyphosate-resistant biotype(s) in the population.

Stinger applied once controlled more giant ragweed as rates were increased, regardless of plant size. Stinger more effectively controlled smaller giant ragweed plants compared to larger plants at 21 days after the initial application. Stinger controlled more giant ragweed when applied multiple times compared to a single application. Giant ragweed control was maximized within each timing when Stinger was applied at 0.94 followed by 0.188 lb ae/A and three times at 0.94 lb/A per application.

Experiment continued on next page.

Table. Giant ragweed control in Roundup Ready® sugarbeet, SW Hutchinson Site #2, MN (Fisher and Stachler)

Treatment*	Rate (lb ae/A)	Timing	21 DAT	21 DAT
			1,4,7	3,6,9
			Girw	
			cntl	
			%	
Untreated	-	-	0	0
Weed-Free Check-1"	-	-	100	100
Glyt-PM + AMS	0.75	1	46	6
Clpy + Glyt-PM + AMS	0.047 + 0.75	1	70	23
Clpy + Glyt-PM + AMS	0.094 + 0.75	1	83	38
Clpy + Glyt-PM + AMS	0.188 + 0.75	1	91	80
Clpy + Glyt-PM + AMS	0.047 + 0.75	1,2	67	89
Clpy + Glyt-PM + AMS	0.094 + 0.75	1,2	82	93
Clpy + Glyt-PM + AMS	0.094 + 0.75	1		
Clpy + Glyt-PM + AMS	0.188 + 0.75	2	84	100
Clpy + Glyt-PM + AMS	0.047 + 0.75	1,2		
Clpy + Glyt-PM + AMS	0.094 + 0.75	3	75	99
Clpy + Glyt-PM + AMS	0.094 + 0.75	1,2,3	80	100
Weed-Free Check-3"	-	-	100	100
Glyt-PM + AMS	0.75	4	38	10
Clpy + Glyt-PM + AMS	0.047 + 0.75	4	63	53
Clpy + Glyt-PM + AMS	0.094 + 0.75	4	75	76
Clpy + Glyt-PM + AMS	0.188 + 0.75	4	90	92
Clpy + Glyt-PM + AMS	0.047 + 0.75	4,5	64	78
Clpy + Glyt-PM + AMS	0.094 + 0.75	4,5	75	97
Clpy + Glyt-PM + AMS	0.094 + 0.75	4		
Clpy + Glyt-PM + AMS	0.188 + 0.75	5	74	96
Clpy + Glyt-PM + AMS	0.047 + 0.75	4,5		
Clpy + Glyt-PM + AMS	0.094 + 0.75	6	65	89
Clpy + Glyt-PM + AMS	0.094 + 0.75	4,5,6	78	100
Glyt-PM + AMS	0.75	4,5	40	30
Glyt-PM + AMS	0.75	4,5,6	40	50
Weed-Free Check-6"	-	-	100	100
Glyt-PM + AMS	0.75	7	48	16
Clpy + Glyt-PM + AMS	0.047 + 0.75	7	63	36
Clpy + Glyt-PM + AMS	0.094 + 0.75	7	70	50
Clpy + Glyt-PM + AMS	0.188 + 0.75	7	78	79
Clpy + Glyt-PM + AMS	0.047 + 0.75	7,8	63	51
Clpy + Glyt-PM + AMS	0.094 + 0.75	7,8	71	90
Clpy + Glyt-PM + AMS	0.094 + 0.75	7		
Clpy + Glyt-PM + AMS	0.188 + 0.75	8	81	99
Clpy + Glyt-PM + AMS	0.047 + 0.75	7,8		
Clpy + Glyt-PM + AMS	0.094 + 0.75	9	65	87
Clpy + Glyt-PM + AMS	0.094 + 0.75	7,8,9	70	100
LSD (0.05)			6.6	8.5

*Glyt-PM = Roundup PowerMAX from Monsanto; Clpy = Stinger from Dow AgroSciences; AMS = Amstik from West Central at 2.5 qt/A.

Common ragweed control in Roundup Ready® sugarbeet, Mayville, ND, 2010. (Stachler) 'Crystal 539RR' sugarbeet seed treated with 45 grams of Tachigaren per 100,000 seeds was seeded 1.25 inches deep in 22 inch rows May 12. Counter 15G insecticide at 12 pounds product per acre was applied modified in-furrow and drag chain incorporated at planting. Herbicide treatments were applied June 4, June 16, June 23, June 25, July 7, July 15, July 28 and August 4. All treatments were applied with a bicycle sprayer in 17 gpa water at 40 psi through XR8002 nozzles to the center four rows of six row plots 25 feet in length. Ammonium sulfate as AmStik from West Central was included in all treatments at 2.5qt/A. Sugarbeet injury and common ragweed, common lambsquarters and pigweed control were evaluated 21 days after each application and at harvest. Pigweed species was 60% redroot pigweed and the other 40% a mixture of tumble pigweed and prostrate pigweed. Visual evaluations are an estimate of percent control in the treated plot area compared to the adjacent untreated strips and based upon a scale of 0 (no control) to 100% (complete control). Experiment designed as a randomized complete block having four replications. Sugarbeet from the center two rows of 25 foot long plots was counted and harvested September 13.

Table. Application information

Application Code	1	2	3	4	5	6	7	8
Date of Application	June 4	June 16	June 23	June 25	July 7	July 15	July 28	Aug. 4
Time of Day	12:45 pm	3:00 pm	1:00 pm	11:00 am	9:45 am	10:00 am	10:45 am	10:00 am
Air Temperature (°F)	73	78	72	76	68	71	73	75
Relative Humidity (%)	32	57	58	76	79	61	80	77
Soil Temp. (°F at 6")	59	66	66	62	64	57	59	66
Wind Velocity (mph)	14	8	11	3	2	6	5	4
Cloud Cover (%)	5	50	95	95	100	0	0	0
Soil Moisture	good	good	good	good	fair	good	good	fair
Sugarbeet (stage)	V2.0- V5.0	V7.0- V9.0	V6.0- V12.5	V6.0- V13.5	V6-V17	---	---	---
C. Ragweed (stage/height - range)	Cot.-4N/ 0.75-1.0"	Cot.- 6N/0.5-8"	1-14N/ 0.5-15"	---	---	---	---	---
C. Ragweed (avg. density)	214/M ²	246/M ²	216/M ²	---	---	---	---	---
Pigweed (stage/height - range)	Cot.- 8lf/ 0.125- 1.5"	2-14lf/ 0.25-7"	2-21lf/ 0.25-12"	---	---	---	---	---
Pigweed (avg. density)	94/M ²	53/M ²	22/M ²	---	---	---	---	---
C.Lambsquarters (stage/height - range)	Cot.-9 lf/ 0.25-2.5"	Cot.-20 lf/0.25- 13"	2-27 lf/ 0.5-15"	---	---	---	---	---
C.Lambsquarters (avg. density)	52/M ²	108/M ²	87/M ²	---	---	---	---	---

Summary: See last page of report.

Experiment continued on next page.

Common ragweed control in Roundup Ready® sugarbeet, Mayville, ND, 2010. (Stachler)

Treatment*	Rate (lb ae/A)	Timing	21 DAT 1, 2, 3			
			Sgbt	Corw	Colq	Pigw
			Inju	Cntl	Cntl	Cntl
----- % -----						
Untreated Check	0	---	0	0	0	0
Weed Free Check – 1"	0	1	0	100	100	100
Glyt-PM + AMS	0.75	1	0	63	92	94
Clpy + Glyt-PM + AMS	0.047 + 0.75	1	4	82	94	96
Clpy + Glyt-PM + AMS	0.094 + 0.75	1	14	90	93	96
Clpy + Glyt-PM + AMS	0.188 + 0.75	1	28	95	95	96
Clpy + Glyt-PM + AMS	0.047 + 0.75	1, 4	7	85	96	97
Clpy + Glyt-PM + AMS	0.094 + 0.75	1, 4	14	88	95	94
Clpy + Glyt-PM + AMS	0.094 + 0.75	1				
Clpy + Glyt-PM + AMS	0.188 + 0.75	4	14	88	95	95
Clpy + Glyt-PM + AMS	0.047 + 0.75	1, 4				
Clpy + Glyt-PM + AMS	0.094 + 0.75	6	4	81	95	96
Clpy + Glyt-PM + AMS	0.094 + 0.75	1, 4, 6	13	88	96	93
Weed Free Check – 3"	0	2	0	100	100	100
Glyt-PM + AMS	0.75	2	0	64	95	95
Clpy + Glyt-PM + AMS	0.047 + 0.75	2	1	71	91	97
Clpy + Glyt-PM + AMS	0.094 + 0.75	2	4	77	97	97
Clpy + Glyt-PM + AMS	0.188 + 0.75	2	9	83	94	94
Clpy + Glyt-PM + AMS	0.047 + 0.75	2, 5	3	71	94	97
Clpy + Glyt-PM + AMS	0.094 + 0.75	2, 5	5	72	96	98
Clpy + Glyt-PM + AMS	0.094 + 0.75	2				
Clpy + Glyt-PM + AMS	0.188 + 0.75	5	5	77	94	95
Clpy + Glyt-PM + AMS	0.047 + 0.75	2, 5				
Clpy + Glyt-PM + AMS	0.094 + 0.75	7	2	72	95	97
Clpy + Glyt-PM + AMS	0.094 + 0.75	2, 5, 7	8	77	95	94
Glyt-PM + AMS	0.75	2, 5	0	60	93	94
Glyt-PM + AMS	0.75	2, 5, 7	0	66	89	91
Weed Free Check – 6"	0	3	3	99	100	100
Glyt-PM + AMS	0.75	3	0	35	98	100
Clpy + Glyt-PM + AMS	0.047 + 0.75	3	3	50	92	99
Clpy + Glyt-PM + AMS	0.094 + 0.75	3	3	51	98	100
Clpy + Glyt-PM + AMS	0.188 + 0.75	3	9	68	93	100
Clpy + Glyt-PM + AMS	0.047 + 0.75	3, 6	3	50	99	100
Clpy + Glyt-PM + AMS	0.094 + 0.75	3, 6	5	58	98	100
Clpy + Glyt-PM + AMS	0.094 + 0.75	3				
Clpy + Glyt-PM + AMS	0.188 + 0.75	6	4	54	95	100
Clpy + Glyt-PM + AMS	0.047 + 0.75	3, 6				
Clpy + Glyt-PM + AMS	0.094 + 0.75	8	2	50	98	100
Clpy + Glyt-PM + AMS	0.094 + 0.75	3, 6, 8	5	55	97	100
LSD (0.05)			3	5	5	5

*Glyt-PM = Roundup PowerMAX from Monsanto; Clpy = Stinger from Dow AgroSciences; AMS = AmStik from West Central at 2.5qt/A.

Experiment continued on next page.

Common ragweed control in Roundup Ready® sugarbeet, Mayville, ND, 2010. (Stachler) (continued).

Treatment*	Rate (lb ae/A)	Timing	August 25			
			Sgbt	Corw	Colq	Pigw
			Inju	Cntl	Cntl	Cntl
			----- % -----			
Untreated Check	0	---	0	0	0	0
Weed Free Check – 1”	0	1	0	100	100	100
Glyt-PM + AMS	0.75	1	0	16	34	61
Clpy + Glyt-PM + AMS	0.047 + 0.75	1	0	59	29	36
Clpy + Glyt-PM + AMS	0.094 + 0.75	1	2	76	21	33
Clpy + Glyt-PM + AMS	0.188 + 0.75	1	4	97	53	35
Clpy + Glyt-PM + AMS	0.047 + 0.75	1, 4	4	95	94	94
Clpy + Glyt-PM + AMS	0.094 + 0.75	1, 4	9	99	99	96
Clpy + Glyt-PM + AMS	0.094 + 0.75	1				
Clpy + Glyt-PM + AMS	0.188 + 0.75	4	16	100	96	93
Clpy + Glyt-PM + AMS	0.047 + 0.75	1, 4				
Clpy + Glyt-PM + AMS	0.094 + 0.75	6	7	98	98	99
Clpy + Glyt-PM + AMS	0.094 + 0.75	1, 4, 6	14	100	100	99
Weed Free Check – 3 “	0	2	0	100	100	100
Glyt-PM + AMS	0.75	2	0	31	71	79
Clpy + Glyt-PM + AMS	0.047 + 0.75	2	0	55	58	73
Clpy + Glyt-PM + AMS	0.094 + 0.75	2	2	69	64	60
Clpy + Glyt-PM + AMS	0.188 + 0.75	2	6	86	80	56
Clpy + Glyt-PM + AMS	0.047 + 0.75	2, 5	4	88	99	99
Clpy + Glyt-PM + AMS	0.094 + 0.75	2, 5	6	96	99	96
Clpy + Glyt-PM + AMS	0.094 + 0.75	2				
Clpy + Glyt-PM + AMS	0.188 + 0.75	5	9	98	100	95
Clpy + Glyt-PM + AMS	0.047 + 0.75	2, 5				
Clpy + Glyt-PM + AMS	0.094 + 0.75	7	15	96	100	100
Clpy + Glyt-PM+ AMS	0.094 + 0.75	2, 5, 7	17	99	100	100
Glyt-PM+ AMS	0.75	2, 5	0	46	100	99
Glyt-PM + AMS	0.75	2, 5, 7	0	63	100	100
Weed Free Check – 6”	0	3	0	100	100	100
Glyt-PM + AMS	0.75	3	0	23	99	99
Clpy + Glyt-PM + AMS	0.047 + 0.75	3	0	44	75	90
Clpy + Glyt-PM + AMS	0.094 + 0.75	3	2	55	88	96
Clpy + Glyt-PM + AMS	0.188 + 0.75	3	4	73	75	83
Clpy + Glyt-PM + AMS	0.047 + 0.75	3, 6	3	74	100	100
Clpy + Glyt-PM + AMS	0.094 + 0.75	3, 6	7	87	98	88
Clpy + Glyt-PM + AMS	0.094 + 0.75	3				
Clpy + Glyt-PM + AMS	0.188 + 0.75	6	13	91	100	99
Clpy + Glyt-PM + AMS	0.047 + 0.75	3, 6				
Clpy + Glyt-PM + AMS	0.094 + 0.75	8	11	82	100	100
Clpy + Glyt-PM + AMS	0.094 + 0.75	3, 6, 8	18	92	100	100
LSD (0.05)			3	6	15	15

*Glyt-PM = Roundup PowerMAX from Monsanto; Clpy = Stinger from Dow AgroSciences; AMS = AmStik from West Central at 2.5qt/A.

Experiment continued on next page.

Common ragweed control in Roundup Ready® sugarbeet, Mayville, ND, 2010. (Stachler) (continued).

Treatment*	Rate (lb ae/A)	Timing	September 13			
			Sgbt	Corw	Colq	Pigw
			Inju	Cntl	Cntl	Cntl
			----- % -----			
Untreated Check	0	---	0	0	0	0
Weed Free Check – 1”	0	1	0	100	100	100
Glyt-PM + AMS	0.75	1	0	15	49	73
Clpy + Glyt-PM + AMS	0.047 + 0.75	1	1	53	35	40
Clpy + Glyt-PM + AMS	0.094 + 0.75	1	0	82	28	40
Clpy + Glyt-PM + AMS	0.188 + 0.75	1	0	96	48	45
Clpy + Glyt-PM + AMS	0.047 + 0.75	1, 4	1	91	94	90
Clpy + Glyt-PM + AMS	0.094 + 0.75	1, 4	3	98	98	97
Clpy + Glyt-PM + AMS	0.094 + 0.75	1				
Clpy + Glyt-PM + AMS	0.188 + 0.75	4	8	99	96	97
Clpy + Glyt-PM + AMS	0.047 + 0.75	1, 4				
Clpy + Glyt-PM + AMS	0.094 + 0.75	6	6	99	98	98
Clpy + Glyt-PM + AMS	0.094 + 0.75	1, 4, 6	12	100	100	100
Weed Free Check – 3”	0	2	0	100	100	100
Glyt-PM + AMS	0.75	2	0	30	76	84
Clpy + Glyt-PM + AMS	0.047 + 0.75	2	0	51	50	63
Clpy + Glyt-PM + AMS	0.094 + 0.75	2	1	67	66	60
Clpy + Glyt-PM + AMS	0.188 + 0.75	2	2	89	79	58
Clpy + Glyt-PM + AMS	0.047 + 0.75	2, 5	1	86	98	97
Clpy + Glyt-PM + AMS	0.094 + 0.75	2, 5	5	99	98	96
Clpy + Glyt-PM + AMS	0.094 + 0.75	2				
Clpy + Glyt-PM + AMS	0.188 + 0.75	5	9	99	97	94
Clpy + Glyt-PM + AMS	0.047 + 0.75	2, 5				
Clpy + Glyt-PM + AMS	0.094 + 0.75	7	9	99	99	99
Clpy + Glyt-PM + AMS	0.094 + 0.75	2, 5, 7	15	100	99	99
Glyt-PM + AMS	0.75	2, 5	0	46	98	98
Glyt-PM + AMS	0.75	2, 5, 7	0	62	100	100
Weed Free Check – 6”	0	3	0	100	100	100
Glyt-PM + AMS	0.75	3	0	25	96	96
Clpy + Glyt-PM + AMS	0.047 + 0.75	3	0	45	74	88
Clpy + Glyt-PM + AMS	0.094 + 0.75	3	0	52	77	93
Clpy + Glyt-PM + AMS	0.188 + 0.75	3	3	75	71	83
Clpy + Glyt-PM + AMS	0.047 + 0.75	3, 6	2	76	98	97
Clpy + Glyt-PM + AMS	0.094 + 0.75	3, 6	5	85	97	88
Clpy + Glyt-PM + AMS	0.094 + 0.75	3				
Clpy + Glyt-PM + AMS	0.188 + 0.75	6	5	95	99	97
Clpy + Glyt-PM + AMS	0.047 + 0.75	3, 6				
Clpy + Glyt-PM + AMS	0.094 + 0.75	8	11	87	100	100
Clpy + Glyt-PM + AMS	0.094 + 0.75	3, 6, 8	12	97	99	99
LSD (0.05)			2	7	16	14

*Glyt-PM = Roundup PowerMAX from Monsanto; Clpy = Stinger from Dow AgroSciences; AMS = AmStik from West Central at 2.5qt/A.

Experiment continued on next page.

Common ragweed control in Roundup Ready® sugarbeet, Mayville, ND, 2010. (Stachler) (continued).

Treatment*	Rate	Timing	September 13				
			Sgbt	Root	Impurity	Extract	
			Popl	Yield	Index	Sucrose	Sucrose
	(lb ae/A)		(plts/60ft)	(ton/A)		(%)	(lb/A)
Untreated Check	0	---	0	0	---	---	0
Weed Free Check – 1"	0	1	96	11.9	616	14.2	3049
Glyt-PM + AMS	0.75	1	31	2.1	817	13.0	478
Clpy + Glyt-PM + AMS	0.047 + 0.75	1	79	7.3	757	12.9	1748
Clpy + Glyt-PM + AMS	0.094 + 0.75	1	79	8.2	762	13.2	1986
Clpy + Glyt-PM + AMS	0.188 + 0.75	1	79	7.6	719	13.7	1875
Clpy + Glyt-PM + AMS	0.047 + 0.75	1, 4	94	10.1	599	13.9	2572
Clpy + Glyt-PM + AMS	0.094 + 0.75	1, 4	98	10.6	688	13.8	2621
Clpy + Glyt-PM + AMS	0.094 + 0.75	1					
Clpy + Glyt-PM + AMS	0.188 + 0.75	4	101	11.8	622	13.9	2966
Clpy + Glyt-PM + AMS	0.047 + 0.75	1, 4					
Clpy + Glyt-PM + AMS	0.094 + 0.75	6	92	10.8	650	13.8	2702
Clpy + Glyt-PM + AMS	0.094 + 0.75	1, 4, 6	95	10.1	696	13.9	2508
Weed Free Check – 3"	0	2	52	5.4	606	13.7	1356
Glyt-PM + AMS	0.75	2	21	1.7	773	12.9	378
Clpy + Glyt-PM + AMS	0.047 + 0.75	2	38	4.2	615	13.3	1033
Clpy + Glyt-PM + AMS	0.094 + 0.75	2	36	3.2	690	12.8	759
Clpy + Glyt-PM + AMS	0.188 + 0.75	2	58	5.2	705	12.9	1213
Clpy + Glyt-PM + AMS	0.047 + 0.75	2, 5	64	6.3	639	13.2	1498
Clpy + Glyt-PM + AMS	0.094 + 0.75	2, 5	67	6.5	695	13.0	1513
Clpy + Glyt-PM + AMS	0.094 + 0.75	2					
Clpy + Glyt-PM + AMS	0.188 + 0.75	5	70	6.5	720	13.0	1517
Clpy + Glyt-PM + AMS	0.047 + 0.75	2, 5					
Clpy + Glyt-PM + AMS	0.094 + 0.75	7	74	6.7	673	12.7	1542
Clpy + Glyt-PM+ AMS	0.094 + 0.75	2, 5, 7	78	6.5	677	12.7	1492
Glyt-PM+ AMS	0.75	2, 5	26	2.5	744	12.9	557
Glyt-PM + AMS	0.75	2, 5, 7	44	4.2	604	13.2	1223
Weed Free Check – 6"	0	3	53	5.5	562	13.5	1358
Glyt-PM + AMS	0.75	3	7	0	---	---	0
Clpy + Glyt-PM + AMS	0.047 + 0.75	3	7	0.2	873	12.5	50
Clpy + Glyt-PM + AMS	0.094 + 0.75	3	8	0.5	---	---	0
Clpy + Glyt-PM + AMS	0.188 + 0.75	3	8	0.6	900	10.5	39
Clpy + Glyt-PM + AMS	0.047 + 0.75	3, 6	24	2.2	706	12.2	487
Clpy + Glyt-PM + AMS	0.094 + 0.75	3, 6	19	0.9	814	11.5	175
Clpy + Glyt-PM + AMS	0.094 + 0.75	3					
Clpy + Glyt-PM + AMS	0.188 + 0.75	6	25	1.5	766	11.3	305
Clpy + Glyt-PM + AMS	0.047 + 0.75	3, 6					
Clpy + Glyt-PM + AMS	0.094 + 0.75	8	29	2.5	792	11.5	529
Clpy + Glyt-PM + AMS	0.094 + 0.75	3, 6, 8	23	1.3	859	11.6	259
LSD (0.05)			24	3.2	119	0.8	817

*Glyt-PM = Roundup PowerMAX from Monsanto; Clpy = Stinger from Dow AgroSciences; AMS = AmStik from West Central at 2.5qt/A.

Experiment continued on next page.

Summary: Sugarbeet injury 21 days after the initial treatment increased with increasing rate of Clopyralid (Stinger). The greatest injury at this time was observed with the 1" in height common ragweed timing. At harvest, the longer the period of time from the last application, the lower the injury rating. Stinger applied three times and two times totaling 0.282 lb ai/A (12 fl oz/A) caused the greatest sugarbeet injury at harvest regardless of timing of the initial application.

At 21 days after treatment, glyphosate (0.75 lb ae/A) controlled common ragweed similarly when applied to 1 and 3" ragweed with maximum control of 66%, but control decreased when applied to 6" common ragweed. Based upon the poor results of glyphosate at 21 days after treatment and glyphosate applied three times only controlling 62% of common ragweed at harvest, a glyphosate-resistant biotype exists at this location.

Stinger applied once improved common ragweed control as plant size decreased and Stinger rates increased at 21 days after treatment. Maximum common ragweed control 21 days after Stinger was applied once to 1" plants was 95% with the 0.188 lb ae/A (8 fl oz/A) rate. Stinger applied once at the lowest rate and higher improved control of common ragweed 21 days after application compared to glyphosate applied alone at 0.75 lb/A.

Maximum common ragweed control was achieved at harvest when Stinger was applied at a total of 0.188 or 0.282 lb/A (8 or 12 fl oz/A) in two or three applications to 1 and 3" common ragweed. For 6" common ragweed, similar control was only achieved when Stinger was applied at a total of 0.282 lb/A.

Common lambsquarters and pigweed does not appear to be antagonized by Stinger when mixed with glyphosate at 21 days after application. The more times and the later in the season glyphosate plus Stinger is applied, the greater the common lambsquarters and pigweed control.

Maximum sugarbeet root yield and extractable sucrose was achieved when weeds were removed at the 1" timing. Three applications of glyphosate improved extractable sucrose compared to one or two applications of glyphosate. Stinger plus glyphosate applied two or three times to 1" common ragweed maximized sugarbeet root yield and extractable sucrose. Sugarbeet population, root yield, and extractable sucrose decreased as the size of common ragweed at the time of the Stinger plus glyphosate application increased. Stinger plus glyphosate applied two or three times to 1" common ragweed improved sugarbeet root yield and extractable sucrose compared to a single application of Stinger plus glyphosate.

Maximizing UpBeet and glyphosate with adjuvants, Prosper, ND, 2010. (Stachler) ‘Betaseed 87RR38’ Roundup Ready sugarbeet at 63,360 seeds per acre (4.5” spacing in 22 inch rows) was seeded in six row plots 30 feet long May 24. Sugarbeet seed was treated with Tachigaren at 45 grams dry product per 100,000 seeds. ‘DKL 72-55’ Roundup Ready canola at 11 lb/A, ‘Asgrow AG1230’ Roundup Ready soybean at 100 lb/A, ‘DKC 33-54’ Roundup Ready2 corn and quinoa at 14 lb/A were each seeded in a 8 foot wide drill strip perpendicular to the sugarbeet plots May 24. All treatments were applied June 21 and July 6 in 17 gpa water at 40 psi through XR8002 nozzles to the center four rows of six row plots. Sugarbeet injury was evaluated July 6. Quinoa, canola, soybean, corn, and redroot pigweed control were evaluated July 6 and August 2. All evaluations are a visual estimate of percent weed control or percent sugarbeet injury in the treated plot compared to the adjacent untreated strips and plots.

Table. Application information.

Date of Application	June 21	July 6
Time of Day	3:00 pm	11:45 am
Air Temperature (°F)	82	77
Relative Humidity (%)	49	38
Soil Temp. (°F at 6”)	74	64
Wind Velocity (mph)	13	6
Cloud Cover (%)	60	50
Soil Moisture	Good	Good
Sugarbeet Stage (range/Avg)	V 2.0-V8.2/V 6.0	V 6.5-V 14.0/V 10.0
Canola (range/Avg)	2-6 leaf/5 leaf ; 3-7”/6”	3 lf-flower/flower ; 1.5”-39”/27”
Canola (avg. density)	6 plts/foot of row	6 plts/foot of row
Soybean (range/Avg)	1-3 trif/2 trif ; 4-7”/5”	1-12trif/5 trif ; 3-16”/9”
Soybean (avg. density)	6 plts/foot of row	6 plts/foot of row
Corn (range/Avg)	4-7 leaf/6 leaf ; 6-18”/14”	5-11 lf/8 lf ; 6-41”/24”
Corn (avg. density)	5 plts/2 feet of row	6 plts/2 feet of row
Quinoa (range/Avg)	10-18 leaf/14 leaf ; 3-12”/8”	---
Quinoa (avg. density)	25 plts/foot of row	0 plts/foot of row
Redroot Pigweed (range/Avg)	Cot-10 lf/6 leaf ; 0.125”-5”/2”	2-8 leaf/4 leaf ; 0.75-1.5”/1”
Redroot Pigweed (avg. density)	101/M ²	13/M ²

Table. Maximizing UpBeet and glyphosate with adjuvants, Prosper, ND, 2010. (Stachler)

Treatment ¹	Rate ai/A or ae/A	July 6					
		Sgbt Inju	Quin Cntl	Cano ² Cntl	Soyb ² Cntl	Corn ² Cntl	Rrpw Cntl
		----- % -----					
UpBeet+RUPowerMAX	0.25 oz + 0.75 lb	0	95	5	5	5	99
UpBeet+RUPowerMAX+AMS	0.25 oz + 0.75 lb + 2.5% v/v	1	98	19	24	34	100
UpBeet+RUPowerMAX+Destiny HC+AMS	0.25 oz + 0.75 lb + 0.68 pt/A + 2.5% v/v	0	97	38	50	58	100
UpBeet+RUPowerMAX+Destiny HC+AMS	0.25 oz + 0.75 lb + 1.36 pt/A + 2.5% v/v	1	96	46	61	56	100
UpBeet+RUPowerMAX+Destiny HC+AMS	0.25 oz + 0.75 lb + 2 pt/A + 2.5% v/v	1	96	49	63	59	100
UpBeet+RUPowerMAX+Class Act NG	0.25 oz + 0.75 lb + 2.5% v/v	0	97	25	34	37	100
UpBeet+RUPowerMAX+Destiny HC+Class Act NG	0.25 oz + 0.75 lb + 1 pt/A + 2.5% v/v	1	98	38	54	58	100
UpBeet+RUPowerMAX+Destiny HC+Class Act NG	0.25 oz + 0.75 lb + 1.5 pt/A + 2.5% v/v	1	98	48	61	60	100
UpBeet+RUPowerMAX+Destiny HC+AG 02013+Class Act NG	0.25 oz + 0.75 lb + 1 pt/A + 4 fl oz/A + 2.5% v/v	0	96	45	67	60	100
UpBeet+RUPowerMAX+AG 10020 + Destiny HC+AMS	0.25 oz + 0.75 lb + 1% v/v + 1 pt/A + 2.5% v/v	2	99	41	58	63	100

Table continued on next page.

Table. Maximizing UpBeet and glyphosate with adjuvants, Prosper, ND, 2010. (continued)

Treatment ¹	Rate ai/A or ae/A	July 6					
		Sgbt Inju	Quin Cntl	Cano ² Cntl	Soyb ² Cntl	Corn ² Cntl	Rrpw Cntl
		----- % -----					
UpBeet+RUPowerMAX+AG 00041 + Destiny HC+AMS	0.25 oz + 0.75 lb + 1% v/v + 1 pt/A + 2.5% v/v	1	91	36	59	58	100
UpBeet+RUPowerMAX+Savy+AMS	0.25 oz + 0.75 lb + 0.68 pt/A + 2.5% v/v	2	97	39	55	54	100
UpBeet+RUPowerMAX+Savy+AMS	0.25 oz + 0.75 lb + 1.36 pt/A + 2.5% v/v	1	98	45	61	58	100
UpBeet+RUPowerMAX+Savy+AMS	0.25 oz + 0.75 lb + 2 pt/A + 2.5% v/v	0	99	48	61	59	100
UpBeet+RUPowerMAX+Trophy Gold + AMS	0.25 oz + 0.75 lb + 0.5 pt/A + 2.5% v/v	0	97	41	55	53	100
UpBeet+RUPowerMAX+Trophy Gold + Premier 90+AMS	0.25 oz + 0.75 lb + 0.5 pt/A + 0.25% v/v + 2.5% v/v	0	98	41	56	56	100
UpBeet+RUPowerMAX+Linkage+AMS	0.25 oz + 0.75 lb + 1% v/v + 2.5% v/v	1	95	41	54	60	100
UpBeet+RUPowerMAX+Linkage+Soy- Stick+AMS	0.25 oz + 0.75 lb + 1% v/v + 1.36 pt/A + 2.5% v/v	0	94	44	60	60	100
UpBeet+RUPowerMAX+Linkage+Soy- Stick+Premier 90+AMS	0.25 oz + 0.75 lb + 1% v/v + 1.36pt/A+ 0.25% v/v+2.5% v/v	0	41	54	61	56	30
UpBeet+RUPowerMAX+Premier 90+AMS	0.25 oz + 0.75 lb + 0.25% v/v + 2.5% v/v	0	99	30	41	48	100
UpBeet+RUPowerMAX+Soy-Stick+AMS	0.25 oz + 0.75 lb + 2 pt/A + 2.5% v/v	2	93	47	59	59	100
UpBeet+RUPowerMAX+Soy-Stick + Premier 90+AMS	0.25 oz + 0.75 lb + 2 pt/A + 0.25% v/v + 2.5% v/v	1	92	45	62	60	100
UpBeet+RUPowerMAX+Optima+AMS	0.25 oz + 0.75 lb + 0.25% v/v + 2.5% v/v	2	97	33	43	43	100
UpBeet+RUPowerMAX+Dyne-Amic+AMS	0.25 oz + 0.75 lb + 1 pt/A + 2.5% v/v	1	92	43	63	58	100
UpBeet+RUPowerMAX+Dyne-Amic + Optima+AMS	0.25 oz + 0.75 lb + 1 pt/A + 0.25% v/v + 2.5% v/v	0	95	46	64	60	100
UpBeet+RUPowerMAX+Activator 90 + AMS	0.25 oz + 0.75 lb + 0.25% v/v + 2.5% v/v	1	95	27	45	49	100
UpBeet+RUPowerMAX+MSO+AMS	0.25 oz + 0.75 lb + 2 pt/A + 2.5% v/v	0	99	51	65	55	100
UpBeet+RUPowerMAX+MSO+Activator 90+AMS	0.25 oz + 0.75 lb + 2 pt/A + 0.25% v/v + 2.5% v/v	0	96	46	63	59	100
UpBeet+RUPowerMAX+Dyne-Amic + Interactive	0.25 oz + 0.75 lb + 1 pt/A + 1% v/v	1	98	50	65	61	100
UpBeet+RUPowerMAX+Premium MSO + Kinetic	0.25 oz + 0.75 lb + 2 pt/A + 0.5% v/v	0	91	50	67	61	99
UpBeet+RUPowerMAX+Destiny HC+AMS	0.5 oz + 0.75 lb + 2 pt/A + 2.5% v/v	2	97	58	71	63	100
Untreated Check	---	0	0	0	0	0	0
LSD (5%)		NS	4	6	6	6	1

¹AMS=N-Pak AMS (liquid ammonium sulfate from Winfield Solutions), Destiny HC=high surfactant oil concentrate containing methylated seed oil from Winfield Solutions, Class Act NG=non-ionic surfactant and ammonium sulfate from Winfield Solutions, AG02013 & AG10020 & AG00041=experimental adjuvants from Winfield Solutions, Savy= high surfactant oil concentrate containing methylated seed oil from West Central, Trophy Gold=oil based surfactant from West Central, Linkage=basic pH blend adjuvant from West Central, Soy-Stik=methylated seed oil from West Central, Premier 90=non-ionic surfactant from West Central, Optima=multi-functional surfactant and sequesterant from Helena, Dyne-Amic=methylated seed oil and organosilicone surfactant from Helena, MSO=Leci-Tech methylated seed oil from Loveland, Premium MSO=methylated seed oil from Helena, Kinetic=surfactant and silicone from Helena, Interactive=Optima plus water conditioning agent. ²Roundup Ready varieties.

Experiment continued on next page.

Table. Maximizing UpBeet and glyphosate with adjuvants, Prosper, ND, 2010. (continued)

Treatment ¹	Rate ai/A or ae/A	August 2				
		Quin Cntl	Cano ² Cntl	Soyb ² Cntl	Corn ² Cntl	Rrpw Cntl
		----- % -----				
UpBeet+RUPowerMAX	0.25 oz + 0.75 lb	100	5	21	28	100
UpBeet+RUPowerMAX+AMS	0.25 oz + 0.75 lb + 2.5% v/v	100	6	25	42	100
UpBeet+RUPowerMAX+Destiny HC+AMS	0.25 oz + 0.75 lb + 0.68 pt/A + 2.5% v/v	100	24	50	65	100
UpBeet+RUPowerMAX+Destiny HC+AMS	0.25 oz + 0.75 lb + 1.36 pt/A + 2.5% v/v	100	29	65	68	100
UpBeet+RUPowerMAX+Destiny HC+AMS	0.25 oz + 0.75 lb + 2 pt/A + 2.5% v/v	100	34	63	76	100
UpBeet+RUPowerMAX+Class Act NG	0.25 oz + 0.75 lb + 2.5% v/v	100	16	41	47	100
UpBeet+RUPowerMAX+Destiny HC+Class Act NG	0.25 oz + 0.75 lb + 1 pt/A + 2.5% v/v	100	24	56	65	100
UpBeet+RUPowerMAX+Destiny HC+Class Act NG	0.25 oz + 0.75 lb + 1.5 pt/A + 2.5% v/v	100	30	61	69	100
UpBeet+RUPowerMAX+Destiny HC+AG 02013+Class Act NG	0.25 oz + 0.75 lb + 1 pt/A + 4 fl oz/A + 2.5% v/v	100	25	64	65	100
UpBeet+RUPowerMAX+AG 10020 + Destiny HC+AMS	0.25 oz + 0.75 lb + 1% v/v + 1 pt/A + 2.5% v/v	99	37	60	69	100
UpBeet+RUPowerMAX+AG 00041 + Destiny HC+AMS	0.25 oz + 0.75 lb + 1% v/v + 1 pt/A + 2.5% v/v	98	25	57	69	100
UpBeet+RUPowerMAX+Savy+AMS	0.25 oz + 0.75 lb + 0.68 pt/A + 2.5% v/v	100	28	51	60	100
UpBeet+RUPowerMAX+Savy+AMS	0.25 oz + 0.75 lb + 1.36 pt/A + 2.5% v/v	100	25	60	59	100
UpBeet+RUPowerMAX+Savy+AMS	0.25 oz + 0.75 lb + 2 pt/A + 2.5% v/v	100	38	69	75	100
UpBeet+RUPowerMAX+Trophy Gold + AMS	0.25 oz + 0.75 lb + 0.5 pt/A + 2.5% v/v	100	33	68	65	100
UpBeet+RUPowerMAX+Trophy Gold + Premier 90+AMS	0.25 oz + 0.75 lb + 0.5 pt/A + 0.25% v/v + 2.5% v/v	100	40	63	63	100
UpBeet+RUPowerMAX+Linkage+AMS	0.25 oz + 0.75 lb + 1% v/v + 2.5% v/v	100	28	52	68	100
UpBeet+RUPowerMAX+Linkage+Soy-Stick+AMS	0.25 oz + 0.75 lb + 1% v/v + 1.36 pt/A + 2.5% v/v	94	32	71	85	100
UpBeet+RUPowerMAX+Linkage+Soy-Stick+Premier 90+AMS	0.25 oz + 0.75 lb + 1% v/v + 1.36pt/A+ 0.25% v/v+2.5% v/v	83	39	75	86	94
UpBeet+RUPowerMAX+Premier 90+AMS	0.25 oz + 0.75 lb + 0.25% v/v + 2.5% v/v	100	15	36	56	100
UpBeet+RUPowerMAX+Soy-Stick+AMS	0.25 oz + 0.75 lb + 2 pt/A + 2.5% v/v	95	28	63	71	100
UpBeet+RUPowerMAX+Soy-Stick + Premier 90+AMS	0.25 oz + 0.75 lb + 2 pt/A + 0.25% v/v + 2.5% v/v	90	32	65	77	100
UpBeet+RUPowerMAX+Optima+AMS	0.25 oz + 0.75 lb + 0.25% v/v + 2.5% v/v	100	23	36	50	100
UpBeet+RUPowerMAX+Dyne-Amic+AMS	0.25 oz + 0.75 lb + 1 pt/A + 2.5% v/v	98	33	70	66	100
UpBeet+RUPowerMAX+Dyne-Amic + Optima+AMS	0.25 oz + 0.75 lb + 1 pt/A + 0.25% v/v + 2.5% v/v	98	34	73	71	100
UpBeet+RUPowerMAX+Activator 90 + AMS	0.25 oz + 0.75 lb + 0.25% v/v + 2.5% v/v	100	15	41	53	100
UpBeet+RUPowerMAX+MSO+AMS	0.25 oz + 0.75 lb + 2 pt/A + 2.5% v/v	100	34	68	72	100
UpBeet+RUPowerMAX+MSO+Activator 90+AMS	0.25 oz + 0.75 lb + 2 pt/A + 0.25% v/v + 2.5% v/v	98	26	61	70	100
UpBeet+RUPowerMAX+Dyne-Amic + Interactive	0.25 oz + 0.75 lb + 1 pt/A + 1% v/v	100	29	71	75	100
UpBeet+RUPowerMAX+Premium MSO + Kinetic	0.25 oz + 0.75 lb + 2 pt/A + 0.5% v/v	98	35	71	83	100
UpBeet+RUPowerMAX+Destiny HC+AMS	0.5 oz + 0.75 lb + 2 pt/A + 2.5% v/v	100	43	79	84	100
LSD (5%)		4	6	7	7	2

Footnotes for table continued on next page.

¹AMS=N-Pak AMS (liquid ammonium sulfate from Winfield Solutions), Destiny HC=high surfactant oil concentrate containing methylated seed oil from Winfield Solutions, Class Act NG=non-ionic surfactant and ammonium sulfate from Winfield Solutions, AG02013 & AG10020 & AG00041=experimental adjuvants from Winfield Solutions, Savy= high surfactant oil concentrate containing methylated seed oil from West Central, Trophy Gold=oil based surfactant from West Central, Linkage=basic pH blend adjuvant from West Central, Soy-Stik=methylated seed oil from West Central, Premier 90=non-ionic surfactant from West Central, Optima=multi-functional surfactant and sequesterant from Helena, Dyne-Amic=methylated seed oil and organosilicone surfactant from Helena, MSO=Leci-Tech methylated seed oil from Loveland, Premium MSO=methylated seed oil from Helena, Kinetic=surfactant and silicone from Helena, Interactive=Optima plus water conditioning agent. ²Roundup Ready varieties.

Summary: Almost no sugarbeet injury was observed with any treatment. UpBeet (0.5 oz ai/A) maximized control of all Roundup Ready crops compared to most other treatments containing UpBeet (0.25 oz/A).

The addition of NIS improved control of Roundup Ready crops, but not as effectively as MSO based adjuvants. An MSO adjuvant must be mixed with UpBeet plus glyphosate to maximize control of Roundup Ready crops, but antagonism will occur with Soy-Stick and Soy-Stick plus Linkage and may occur with Premium MSO, Dyne-Amic, and MSO Conc. Leci-Tech plus Activator 90 compared to Destiny HC and Savy. Savy is equivalent to Destiny HC for control of all Roundup Ready crops. Increasing the rate of Destiny HC and Savy improved control of all Roundup Ready crops. Linkage plus Soy-Stick plus Premier 90 plus UpBeet (0.25 oz/A) usually maximized control of Roundup Ready crops, but caused severe antagonism of quinoa and redroot pigweed. Trophy Gold + Premier 90 improved control of Roundup Ready canola at 27 days after treatment (DAT) compared to Destiny HC or Savy at 1.36 pt/A, but was similar to Destiny HC and Savy at 2.0 pt/A. Optima improved control of Roundup Ready canola compared to the other NIS products (Class Act NG, Premier 90, and Activator 90), but was similar to them for control of Roundup Ready corn and soybean. MSO Conc. Leci-Tech tended to control Roundup Ready crops and reduce antagonism of quinoa similar to Destiny HC and Savy. Mixing a good quality NIS with a good quality MSO with UpBeet plus glyphosate likely will not reduce antagonism of weed species compared to Destiny HC and Savy (High Surfactant Oil Concentrate, MSO base), but can provide similar or improved control of Roundup Ready crops.

Lay-by herbicides for Roundup Ready sugarbeet, Hector, MN, 2010. (Stachler) ‘Crystal 875’ Roundup Ready sugarbeet at 63,360 seeds per acre (4.5” spacing in 22 inch rows) was seeded in six row plots 30 feet long May 10 in a cooperators field having glyphosate-resistant waterhemp. Sugarbeet seed was treated with Tachigaren at 45 grams dry product per 100,000 seeds. Treatments were applied June 3, June 18, and July 2. All treatments were applied in 17 gpa water at 40 psi through XR8002 nozzles to the center four rows of six row plots. Sugarbeet injury was evaluated June 10 and July 2. Waterhemp control was evaluated June 18, July 2, July 16 and July 28. All evaluations are a visual estimate of percent weed control or percent sugarbeet injury in the treated plot compared to the adjacent untreated strips and plots. Sugarbeet from 10 feet of the center two rows in each plot was counted and harvested September 9.

Table. Application information.

Date of Application	June 3	June 18	July 2
Time of Day	3:00 pm	4:30 pm	2:50 pm
Air Temperature (°F)	79	82	85
Relative Humidity (%)	31	35	56
Soil Temp. (°F at 6”)	65	64	70
Wind Velocity (mph)	8	11	12
Cloud Cover (%)	100	0	0
Soil Moisture	Good	Good	Fair
Sugarbeet Stage (range/Avg)	V 4.2	V5.0-V 11.5/V 9.5	V 14.5-V 17/V 15
Waterhemp (range/Avg)	Cot-8 lf/4 lf; 0.25-1.5”/0.5”	Cot-15 lf/10 lf; 0.25-12”/4.5”	Cot-25 lf/14 lf; 0.25-26”/12”
Waterhemp (avg. density)	97/M ²	101/M ²	34/M ²

Summary: Nortron, Dual Magnum, Sequence, Outlook, and Warrant slightly injured Roundup Ready sugarbeet on June 18th. Sugarbeet injury decreased over time and was negligible for all treatments by July 2nd.

Touchdown Total (glyphosate) applied three times starting at 1.125 lb ae/A controlled 68% waterhemp on July 28th and caused 74% mortality (data not shown) of plants flagged at the time of the initial application, confirming the presence of a glyphosate-resistant biotype in the population. Increasing glyphosate rate and number of applications improved waterhemp control, although still not effectively.

Split-applied Nortron controlled more waterhemp than all other treatments. Split-applied Nortron improved waterhemp control compared to a single application. Nortron, Dual Magnum, Outlook, and Warrant improved waterhemp control for all timings compared to Touchdown Total applied alone at the same time, except for Outlook and Warrant applied on June 18th. Dual Magnum more effectively controlled waterhemp at each application timing compared to Outlook and Warrant. Sequence antagonized waterhemp control compared to Dual Magnum plus Touchdown Total.

Treatment differences could not be determined for sugarbeet population, root yield, sucrose, and extractable sucrose.

Table. Lay-by herbicides for Roundup Ready sugarbeet, Hector, MN, 2010. (Stachler)

Treatment ¹	Rate lb ai/A or lb ae/A	Date of Applic.	June 18		July 2		July 28
			Sgbt Inju	Wahe Cntl	Sgbt Inju	Wahe Cntl	Wahe Cntl
			----- % -----				
Touchdown Total+AMS	1.125 + 2.5% v/v	June 3	0	58	0	21	16
Touchdown Total+AMS	1.125 + 2.5% v/v	June 18	0	0	3	69	64
Touchdown Total+AMS	1.125 + 2.5% v/v	June 3					
Touchdown Total+AMS	0.75 + 2.5% v/v	June 18	1	51	0	65	56
Touchdown Total+AMS	1.125 + 2.5% v/v	June 3					
Touchdown Total+AMS	0.75 + 2.5% v/v	June 18					
Touchdown Total+AMS	0.75 + 2.5% v/v	July 2	2	46	0	60	68
Nortron SC+Touchdown Total+AMS	3.75 + 1.125 + 2.5% v/v	June 3	8	89	4	87	84
Nortron SC+Touchdown Total+AMS	3.75 + 1.125 + 2.5% v/v	June 18	0	0	1	76	85
Nortron SC+Touchdown Total+AMS	2.175 + 1.125 + 2.5% v/v	June 3					
Nortron SC+Touchdown Total+AMS	1.575 + 0.75 + 2.5% v/v	June 18	6	85	1	97	99
Dual Magnum+Touchdown Total+AMS	1.59 + 1.125 + 2.5% v/v	June 3	5	65	0	34	29
Dual Magnum+Touchdown Total+AMS	1.59 + 1.125 + 2.5% v/v	June 18	0	0	0	71	70
Dual Magnum+Touchdown Total+AMS	1.436 + 1.125 + 2.5% v/v	June 3					
Dual Magnum+Touchdown Total+AMS	1.04 + 0.75 + 2.5% v/v	June 18	7	75	2	81	69
Sequence+AMS	2.782 + 2.5% v/v	June 3	6	59	1	26	19
Sequence+AMS	2.782 + 2.5% v/v	June 18	0	0	4	61	57
Sequence+Touchdown Total+AMS	1.61 + 0.5 + 2.5% v/v	June 3					
Sequence+Touchdown Total+AMS	1.172 + 0.25 + 2.5% v/v	June 18	5	52	0	77	58
Outlook+Touchdown Total+AMS	0.984+1.125 + 2.5% v/v	June 3	8	76	2	33	33
Outlook+Touchdown Total+AMS	0.984+1.125 + 2.5% v/v	June 18	0	0	2	77	60
Outlook+Touchdown Total+AMS	0.656+1.125 + 2.5% v/v	June 3					
Outlook+Touchdown Total+AMS	0.469+0.75 + 2.5% v/v	June 18	7	76	3	80	62
Warrant+Touchdown Total+AMS	1.33 + 1.125 + 2.5% v/v	June 3	6	67	0	35	23
Warrant+Touchdown Total+AMS	1.33 + 1.125 + 2.5% v/v	June 18	0	0	2	66	58
Warrant+Touchdown Total+AMS	1.0 + 1.125 + 2.5% v/v	June 3					
Warrant+Touchdown Total+AMS	0.724 + 0.75 + 2.5% v/v	June 18	8	75	0	78	63
Sequence+AMS	1.64 + 2.5% v/v	June 3					
Touchdown Total+AMS	0.75 + 2.5% v/v	June 18					
Touchdown Total+AMS	0.75 + 2.5% v/v	July 2	7	41	1	71	73
Touchdown Total+AMS	0.75 + 2.5% v/v	June 3					
Sequence+AMS	1.64 + 2.5% v/v	June 18					
Touchdown Total+AMS	0.75 + 2.5% v/v	July 2	0	45	3	60	66
Touchdown Total+AMS	0.75 + 2.5% v/v	June 3					
Sequence+AMS	1.64 + 2.5% v/v	July 2	1	30	0	23	35
Touchdown Total+AMS	0.75 + 2.5% v/v	June 3					
Touchdown Total+AMS	0.75 + 2.5% v/v	July 2	5	63	1	33	48
Untreated Check	---	---	0	0	0	0	0
LSD (5%)			3	16	3	7	5

¹AMS=N-Pak AMS (liquid ammonium sulfate from Winfield Solutions).

Experiment continued on next page.

Table. Lay-by herbicides for Roundup Ready sugarbeet, Hector, MN, 2010. (continued)

Treatment ¹	Rate lb ai/A or lb ae/A	Date of Applic.	September 9			
			Sgpt Popl plts/20ft	Root Yield ton/A	Sucrose % %	Extract Sucrose lb/A
Touchdown Total+AMS	1.125 + 2.5% v/v	June 3	49	18.0	14.5	4255
Touchdown Total+AMS	1.125 + 2.5% v/v	June 18	37	16.4	12.9	3406
Touchdown Total+AMS	1.125 + 2.5% v/v	June 3				
Touchdown Total+AMS	0.75 + 2.5% v/v	June 18	48	19.3	14.0	4362
Touchdown Total+AMS	1.125 + 2.5% v/v	June 3				
Touchdown Total+AMS	0.75 + 2.5% v/v	June 18				
Touchdown Total+AMS	0.75 + 2.5% v/v	July 2	48	20.0	12.7	4083
Nortron SC+Touchdown Total+AMS	3.75 + 1.125 + 2.5% v/v	June 3	55	18.7	13.6	4099
Nortron SC+Touchdown Total+AMS	3.75 + 1.125 + 2.5% v/v	June 18	42	18.5	13.6	3994
Nortron SC+Touchdown Total+AMS	2.175 + 1.125 + 2.5% v/v	June 3				
Nortron SC+Touchdown Total+AMS	1.575 + 0.75 + 2.5% v/v	June 18	38	17.0	12.2	3253
Dual Magnum+Touchdown Total+AMS	1.59 + 1.125 + 2.5% v/v	June 3	39	14.9	13.7	3356
Dual Magnum+Touchdown Total+AMS	1.59 + 1.125 + 2.5% v/v	June 18	45	18.4	13.4	4073
Dual Magnum+Touchdown Total+AMS	1.436 + 1.125 + 2.5% v/v	June 3				
Dual Magnum+Touchdown Total+AMS	1.04 + 0.75 + 2.5% v/v	June 18	39	17.2	13.3	3713
Sequence+AMS	2.782 + 2.5% v/v	June 3	41	16.9	14.7	4084
Sequence+AMS	2.782 + 2.5% v/v	June 18	41	15.6	13.1	3303
Sequence+Touchdown Total+AMS	1.61 + 0.5 + 2.5% v/v	June 3				
Sequence+Touchdown Total+AMS	1.172 + 0.25 + 2.5% v/v	June 18	38	17.4	13.8	3819
Outlook+Touchdown Total+AMS	0.984+1.125 + 2.5% v/v	June 3	48	18.5	14.1	4220
Outlook+Touchdown Total+AMS	0.984+1.125 + 2.5% v/v	June 18	43	17.9	14.6	4291
Outlook+Touchdown Total+AMS	0.656+1.125 + 2.5% v/v	June 3				
Outlook+Touchdown Total+AMS	0.469+0.75 + 2.5% v/v	June 18	47	19.3	13.7	4244
Warrant+Touchdown Total+AMS	1.33 + 1.125 + 2.5% v/v	June 3	46	21.1	14.3	4933
Warrant+Touchdown Total+AMS	1.33 + 1.125 + 2.5% v/v	June 18	42	19.3	13.6	4192
Warrant+Touchdown Total+AMS	1.0 + 1.125 + 2.5% v/v	June 3				
Warrant+Touchdown Total+AMS	0.724 + 0.75 + 2.5% v/v	June 18	36	16.3	13.2	3379
Sequence+AMS	1.64 + 2.5% v/v	June 3				
Touchdown Total+AMS	0.75 + 2.5% v/v	June 18				
Touchdown Total+AMS	0.75 + 2.5% v/v	July 2	59	17.9	13.4	3929
Touchdown Total+AMS	0.75 + 2.5% v/v	June 3				
Sequence+AMS	1.64 + 2.5% v/v	June 18				
Touchdown Total+AMS	0.75 + 2.5% v/v	July 2	37	14.9	13.8	3408
Touchdown Total+AMS	0.75 + 2.5% v/v	June 3				
Sequence+AMS	1.64 + 2.5% v/v	July 2	41	15.9	13.8	3641
Touchdown Total+AMS	0.75 + 2.5% v/v	June 3				
Touchdown Total+AMS	0.75 + 2.5% v/v	July 2	46	20.0	12.9	4252
Untreated Check	---	---	---	---	---	---
LSD (5%)			NS	NS	NS	NS

¹AMS=N-Pak AMS (liquid ammonium sulfate from Winfield Solutions).

Preemergence and preplant incorporated herbicides for Roundup Ready sugarbeet, Hector, MN, 2010.

(Stachler) ‘Betaseed 87RR38’ Roundup Ready sugarbeet at 63,360 seeds per acre (4.5” spacing in 22 inch rows) was seeded in six row plots 30 feet long in a cooperators’ field having glyphosate-resistant waterhemp on May 10. Sugarbeet seed was treated with Tachigaren at 45 grams dry product per 100,000 seeds. Preplant incorporated treatments were applied May 5. A C-shank field cultivator with tine harrow was set to a depth of 2 to 3” and driven once at approximately 4 to 5 mph through the center of all plots to incorporate the applied herbicides. Preemergence treatments were applied May 10. Postemergence treatments were applied June 18 and July 2. All treatments were applied in 17 gpa water at 40 psi through XR8002 nozzles to the center four rows of six row plots. Sugarbeet injury was evaluated June 3 and July 2. Waterhemp control was evaluated June 18, July 2, July 16 and July 28. All evaluations are a visual estimate of percent weed control or percent sugarbeet injury in the treated plot compared to the adjacent untreated strips and plots. Study designed as a randomized complete block with 4 replications originally, but one was lost due to an extremely low waterhemp density. Sugarbeet from 10 feet of the center two rows in each plot was counted and harvested September 9.

Table. Application information.

Date of Application	May 5	May 10	June 18	July 2
Time of Day	4:00 pm	2:00 pm	4:30 pm	5:00 pm
Air Temperature (°F)	53	55	82	85
Relative Humidity (%)	56	54	35	56
Soil Temp. (°F at 6”)	56	41	64	70
Wind Velocity (mph)	24	10	17	14
Cloud Cover (%)	90	100	0	0
Soil Moisture	fair	good	good	good
Sugarbeet Stage (range/Avg)	PPI	PRE	V 5 – V12.5/V 10.2	V 6.0 – V 18.5/V 16.8
Waterhemp (range/Avg)	PPI	PRE	Cot-18 lf/10 lf; 0.25-6.5”/3”	4-16lf/14 lf; 1-15.5”/13”
Waterhemp (avg. density)	PPI	PRE	20/M ²	7/M ²

Summary: No substantial sugarbeet injury was observed with any treatments on June 3rd and July 2nd.

On July 28th, Roundup PowerMAX applied twice controlled 73% of waterhemp and caused 78% mortality of 10 plants flagged prior to the initial application, indicating the presence of glyphosate-resistant biotype(s) in the population.

At the time of the first postemergence application (June 18th), Ro-Neet and Nortron applied preplant incorporated controlled more waterhemp than applied preemergence. Waterhemp control was similar for Eptam plus Ro-Neet, Dual 8 EC, and Warrant regardless of type of application. Incorporated Ro-Neet followed by Outlook plus Roundup PowerMAX and followed by Roundup PowerMAX and incorporated Ro-Neet plus Eptam followed by Roundup PowerMAX and followed by Roundup PowerMAX controlled the most waterhemp on July 28th. All treatments controlled waterhemp similarly on July 28th, except Warrant followed by Roundup PowerMAX, Ro-Neet applied preemergence and followed by Roundup PowerMAX, and Roundup PowerMAX alone.

Treatment differences could not be determined for sugarbeet population, root yield, sucrose, and extractable sucrose. Preplant incorporated treatments tended to have reduced root yield compared to preemergence treatments.

Table. Preemergence and preplant incorporated herbicides for Roundup Ready sugarbeet, Hector, MN, 2010. (Stachler)

Treatment ¹	Rate lb ai/A or lb ae/A	Date of Applic.	June 3	June 18	July 2	July 2	July 16	July 28
			Sgbt Inju	Wahe Cntl	Sgbt Inju	Wahe Cntl	Wahe Cntl	Wahe Cntl
			----- % -----					
Untreated Check	0	---	0	0	0	0	0	0
RUPowerMAX+AMS	1.125 + 2.5% v/v	June 18						
RUPowerMAX+AMS	0.75 + 2.5% v/v	July 2	0	0	1	78	81	73
Ro-Neet (PPI)	4	May 5						
RUPowerMAX+AMS	1.125 + 2.5% v/v	June 18						
RUPowerMAX+AMS	0.75 + 2.5% v/v	July 2	0	65	2	89	88	87
Ro-Neet (PRE)	4	May 10						
RUPowerMAX+AMS	1.125 + 2.5% v/v	June 18						
RUPowerMAX+AMS	0.75 + 2.5% v/v	July 2	0	7	2	79	83	80
Ro-Neet (PPI)	4	May 5						
RUPowerMAX+Outlook+AMS	1.125 + 0.984 + 2.5% v/v	June 18						
RUPowerMAX+AMS	0.75 + 2.5% v/v	July 2	0	65	0	97	95	94
Ro-Neet (PRE)	4	May 10						
RUPowerMAX+Outlook+AMS	1.125 + 0.984 + 2.5% v/v	June 18						
RUPowerMAX+AMS	0.75 + 2.5% v/v	July 2	0	12	3	93	92	92
Ro-Neet (PPI)	4	May 5						
RUPowerMAX+Warrant+AMS	1.125 + 1.125 + 2.5% v/v	June 18						
RUPowerMAX+AMS	0.75 + 2.5% v/v	July 2	0	70	2	93	93	91
Ro-Neet (PRE)	4	May 10						
RUPowerMAX+Warrant+AMS	1.125 + 1.125 + 2.5% v/v	June 18						
RUPowerMAX+AMS	0.75 + 2.5% v/v	July 2	0	10	1	89	88	88
Ro-Neet+Eptam (PPI)	2.5 + 2	May 5						
RUPowerMAX+AMS	1.125 + 2.5% v/v	June 18						
RUPowerMAX+AMS	0.75 + 2.5% v/v	July 2	0	83	2	94	94	95
Ro-Neet+Eptam (PRE)	2.5 + 2	May 10						
RUPowerMAX+AMS	1.125 + 2.5% v/v	June 18						
RUPowerMAX+AMS	0.75 + 2.5% v/v	July 2	0	63	2	88	88	88
Nortron (PPI)	3.75	May 5						
RUPowerMAX+AMS	1.125 + 2.5% v/v	June 18						
RUPowerMAX+AMS	0.75 + 2.5% v/v	July 2	0	87	0	90	90	89
Nortron (PRE)	3.75	May 10						
RUPowerMAX+AMS	1.125 + 2.5% v/v	June 18						
RUPowerMAX+AMS	0.75 + 2.5% v/v	July 2	0	60	0	96	95	90
Dual 8 EC (PPI)	1.4	May 5						
RUPowerMAX+AMS	1.125 + 2.5% v/v	June 18						
RUPowerMAX+AMS	0.75 + 2.5% v/v	July 2	0	73	0	88	90	88
Dual 8 EC (PRE)	1.4	May 10						
RUPowerMAX+AMS	1.125 + 2.5% v/v	June 18						
RUPowerMAX+AMS	0.75 + 2.5% v/v	July 2	0	77	2	89	86	87
Warrant (PPI)	1.4	May 5						
RUPowerMAX+AMS	1.125 + 2.5% v/v	June 18						
RUPowerMAX+AMS	0.75 + 2.5% v/v	July 2	0	33	2	81	80	78
Warrant (PRE)	1.4	May 10						
RUPowerMAX+AMS	1.125 + 2.5% v/v	June 18						
RUPowerMAX+AMS	0.75 + 2.5% v/v	July 2	0	20	1	76	81	80
LSD (5%)			0	27	3	15	10	10

¹AMS=N-Pak AMS (liquid ammonium sulfate from Winfield Solutions), RUPowerMAX=Roundup PowerMAX.

Experiment continued on next page.

Table. Preemergence and preplant incorporated herbicides for Roundup Ready sugarbeet, Hector, MN, 2010. (continued)

Treatment ¹	Rate lb ai/A or lb ae/A	Date of Applic.	September 9			
			Sgbt Popl plts/20ft	Sucrose %	Extract Sucrose lb/A	Root Yield ton/A
Untreated Check	0	---	---	---	---	---
RUPowerMAX+AMS	1.125 + 2.5% v/v	June 18				
RUPowerMAX+AMS	0.75 + 2.5% v/v	July 2	34	14.0	5115	22.2
Ro-Neet (PPI)	4	May 5				
RUPowerMAX+AMS	1.125 + 2.5% v/v	June 18				
RUPowerMAX+AMS	0.75 + 2.5% v/v	July 2	29	12.7	3461	16.7
Ro-Neet (PRE)	4	May 10				
RUPowerMAX+AMS	1.125 + 2.5% v/v	June 18				
RUPowerMAX+AMS	0.75 + 2.5% v/v	July 2	34	14.2	5319	22.6
Ro-Neet (PPI)	4	May 5				
RUPowerMAX+Outlook+AMS	1.125 + 0.984 + 2.5% v/v	June 18				
RUPowerMAX+AMS	0.75 + 2.5% v/v	July 2	32	13.3	4090	18.7
Ro-Neet (PRE)	4	May 10				
RUPowerMAX+Outlook+AMS	1.125 + 0.984 + 2.5% v/v	June 18				
RUPowerMAX+AMS	0.75 + 2.5% v/v	July 2	34	13.7	4748	20.6
Ro-Neet (PPI)	4	May 5				
RUPowerMAX+Warrant+AMS	1.125 + 1.125 + 2.5% v/v	June 18				
RUPowerMAX+AMS	0.75 + 2.5% v/v	July 2	32	13.9	4435	19.2
Ro-Neet (PRE)	4	May 10				
RUPowerMAX+Warrant+AMS	1.125 + 1.125 + 2.5% v/v	June 18				
RUPowerMAX+AMS	0.75 + 2.5% v/v	July 2	32	13.9	4429	19.1
Ro-Neet+Eptam (PPI)	2.5 + 2	May 5				
RUPowerMAX+AMS	1.125 + 2.5% v/v	June 18				
RUPowerMAX+AMS	0.75 + 2.5% v/v	July 2	36	13.8	4846	21.4
Ro-Neet+Eptam (PRE)	2.5 + 2	May 10				
RUPowerMAX+AMS	1.125 + 2.5% v/v	June 18				
RUPowerMAX+AMS	0.75 + 2.5% v/v	July 2	35	13.5	5050	22.9
Nortron (PPI)	3.75	May 5				
RUPowerMAX+AMS	1.125 + 2.5% v/v	June 18				
RUPowerMAX+AMS	0.75 + 2.5% v/v	July 2	32	13.8	4409	19.4
Nortron (PRE)	3.75	May 10				
RUPowerMAX+AMS	1.125 + 2.5% v/v	June 18				
RUPowerMAX+AMS	0.75 + 2.5% v/v	July 2	35	13.4	4706	21.5
Dual 8 EC (PPI)	1.4	May 5				
RUPowerMAX+AMS	1.125 + 2.5% v/v	June 18				
RUPowerMAX+AMS	0.75 + 2.5% v/v	July 2	30	12.9	3983	18.9
Dual 8 EC (PRE)	1.4	May 10				
RUPowerMAX+AMS	1.125 + 2.5% v/v	June 18				
RUPowerMAX+AMS	0.75 + 2.5% v/v	July 2	36	14.7	5691	23.0
Warrant (PPI)	1.4	May 5				
RUPowerMAX+AMS	1.125 + 2.5% v/v	June 18				
RUPowerMAX+AMS	0.75 + 2.5% v/v	July 2	31	13.6	5448	24.7
Warrant (PRE)	1.4	May 10				
RUPowerMAX+AMS	1.125 + 2.5% v/v	June 18				
RUPowerMAX+AMS	0.75 + 2.5% v/v	July 2	29	13.5	4558	20.9
LSD (5%)			NS	NS	NS	NS

¹AMS=N-Pak AMS (liquid ammonium sulfate from Winfield Solutions), RUPowerMAX=Roundup PowerMAX.

Weed control in sugarbeet, Crookston, MN, 2010. (Stachler) ‘Crystal 539RR’ Roundup Ready sugarbeet at 63,360 seeds per acre (4.5” spacing in 22 inch rows) was seeded in six row plots 30 feet long May 17. Sugarbeet seed was treated with Tachigaren at 45 grams dry product per 100,000 seeds. Treatments were applied June 4 and June 23. All treatments were applied in 17 gpa water at 40 psi through XR8002 nozzles to the center four rows of six row plots. Sugarbeet injury and wild buckwheat control were evaluated July 7 and July 20. Common lambsquarters and pigweed control were evaluated July 7, July 20, and September 15. Pigweed species were 60% redroot pigweed and 40% prostrate pigweed. All evaluations are a visual estimate of percent weed control or percent sugarbeet injury in the treated plot compared to the adjacent untreated strips and plots. Sugarbeet from 30 feet of the center two rows in each plot were counted and harvested September 15.

Table. Application information.

Date of Application	June 4	June 23
Time of Day	4:00 pm	3:10 pm
Air Temperature (°F)	74	73
Relative Humidity (%)	51	56
Soil Temp. (°F at 6”)	62	71
Wind Velocity (mph)	17	8
Cloud Cover (%)	15	100
Soil Moisture	Good	Good
Sugarbeet Stage (range/Avg)	V 1.0-V 3.8/V2.5	V 4 – V 11.5/V 10
Pigweed (range/Avg)	Cot-5 lf/1 lf; 0.125-0.75”/0.25”	Cot-12 lf/4 lf; 0.125-2.5”/1.3”
Pigweed (avg. density)	53/M ²	11/M ²
Common Lambsquarters (range/Avg)	Cot-7 lf/2 lf; 0.125-0.75”/0.5”	2-14 lf/6 lf; 0.25-3.25”/1.6”
Common Lambsquarters (avg. density)	70/M ²	34/M ²
Wild Buckwheat (range/Avg)	Cot-3.5 lf/2 lf; 0.25-1.3”/0.75”	Cot-10 lf/4 lf; 0.25-7”/3.0”
Wild Buckwheat (avg. density)	18/M ²	13/M ²

Summary: Negligible sugarbeet injury was observed for all treatments, except Stinger plus Touchdown Total on July 7th and 20th.

All treatments applied once on June 23rd or applied as a split-application were similar and effectively controlled lambsquarters at all evaluation times. Only Nortron and Outlook mixed with Touchdown Total and applied on June 4th improved lambsquarters control compared to Touchdown Total alone at all three observations. Nortron plus Touchdown controlled more lambsquarters than Outlook plus Touchdown at harvest when applied on June 4th.

All treatments controlled more pigweed than Touchdown Total applied once on June 4th at all observations. Outlook plus Touchdown Total applied once on June 4th controlled more pigweed than Warrant on July 7th and 20th, but not at harvest.

Touchdown Total applied twice improved the control of wild buckwheat compared to a single application. Split-applied Nortron, Outlook, and Warrant plus Touchdown Total improved wild buckwheat control on July 20th compared to a single application of the same herbicides. Nortron plus Touchdown Total applied on June 4th improved wild buckwheat control compared to Touchdown Total applied alone on the same day.

Treatment differences could not be determined for sugarbeet population, sucrose, root yield, impurity index, and extractable sucrose although Touchdown Total applied on June 4th caused the lowest root yield and extractable sucrose.

Lay-by herbicides are capable of improving control of certain weed species when applied early in the growing season in mixture with glyphosate compared to glyphosate applied alone at the same time. Split-applications of lay-by herbicides should improve long-term control compared to a single application, unless glyphosate effectively controls all plants present at the time of each application.

Table. Weed control in sugarbeet, Crookston, MN, 2010. (Stachler)

Treatment ¹	Rate lb ai/A or lb ae/A	Date of Applic.	July 7				July 20			
			Sgbt Inju	Colq Cntl	Piwe Cntl	Wibw Cntl	Sgbt Inju	Colq Cntl	Piwe Cntl	Wibw Cntl
			----- % -----							
Touchdown Total+AMS	1.125 + 2.5% v/v	June 4	0	64	71	87	0	46	58	55
Touchdown Total+AMS	1.125 + 2.5% v/v	June 23	1	100	100	88	1	96	93	80
Touchdown Total+AMS	1.125 + 2.5% v/v	June 4								
Touchdown Total+AMS	0.75 + 2.5% v/v	June 23	1	100	100	97	0	99	99	95
Nortron SC+Touchdown Total+AMS	3.75 + 1.125 + 2.5% v/v	June 4	4	90	94	91	1	76	89	83
Nortron SC+Touchdown Total+AMS	3.75 + 1.125 + 2.5% v/v	June 23	1	100	100	90	3	99	96	78
Nortron SC+Touchdown Total+AMS	2.175 + 1.125 + 2.5% v/v	June 4								
Nortron SC+Touchdown Total + AMS	1.575 + 0.75 + 2.5% v/v	June 23	2	99	99	99	3	95	98	97
Outlook+Touchdown Total +AMS	0.984+1.125 + 2.5% v/v	June 4	2	89	100	80	3	73	98	68
Outlook+Touchdown Total +AMS	0.984+1.125 + 2.5% v/v	June 23	3	99	100	83	2	98	96	74
Outlook+Touchdown Total +AMS	0.656+1.125 + 2.5% v/v	June 4								
Outlook+Touchdown Total+AMS	0.469+0.75 + 2.5% v/v	June 23	2	100	100	99	2	98	99	94
Warrant+Touchdown Total + AMS	1.33 + 1.125 + 2.5% v/v	June 4	1	76	89	82	1	64	85	63
Warrant+Touchdown Total + AMS	1.33 + 1.125 + 2.5% v/v	June 23	2	98	98	87	1	94	94	79
Warrant+Touchdown Total + AMS	1.0 + 1.125 + 2.5% v/v	June 4								
Warrant+Touchdown Total+AMS	0.724 + 0.75 + 2.5% v/v	June 23	2	99	100	100	1	97	99	98
UpBeet+Touchdown Total +Destiny HC+AMS	0.25 oz ai/A + 1.125 + 1% v/v + 2.5% v/v	June 4								
UpBeet+Touchdown Total +Destiny HC+AMS	0.25 oz ai/A + 0.75 + 1% v/v + 2.5% v/v	June 23	0	100	100	99	0	99	98	98
Stinger+Touchdown Total +AMS	3 fl oz/A + 1.125 + 2.5% v/v	June 4								
Stinger+Touchdown Total+AMS	3 fl oz/A + 0.75 + 2.5% v/v	June 23	10	99	100	100	6	97	99	99
LSD (5%)			4	9	9	9	2	8	8	10

¹AMS=N-Pak AMS (liquid ammonium sulfate from Winfield Solutions), Destiny HC=high surfactant methylated seed oil from Winfield Solutions.

Experiment continued on next page.

Table. Weed control in sugarbeet, Crookston, MN, 2010. (continued)

Treatment ¹	Rate lb ai/A or lb ae/A	Date of Applic.	September 15						
			Colq Cntl	Piwe Cntl	Sgbt Popul	Sucr	Root Yield	Impur Index	Extract Sucrose
			----- % -----	----- % -----	plts/60'	%	ton/A		lb/A
Touchdown Total+AMS	1.125 + 2.5% v/v	June 4	29	46	81	13.9	27.6	1030	6565
Touchdown Total+AMS	1.125 + 2.5% v/v	June 23	98	98	85	14.0	31.5	1036	7429
Touchdown Total+AMS	1.125 + 2.5% v/v	June 4							
Touchdown Total+AMS	0.75 + 2.5% v/v	June 23	99	100	88	14.7	31.9	928	8075
Nortron SC+Touchdown Total+AMS	3.75 + 1.125 + 2.5% v/v	June 4	75	97	82	13.8	30.8	1059	7154
Nortron SC+Touchdown Total+AMS	3.75 + 1.125 + 2.5% v/v	June 23	100	100	80	14.1	31.3	1040	7511
Nortron SC+Touchdown Total+AMS	2.175 + 1.125 + 2.5% v/v	June 4							
Nortron SC+Touchdown Total + AMS	1.575 + 0.75 + 2.5% v/v	June 23	95	100	81	14.0	30.5	1066	7462
Outlook+Touchdown Total +AMS	0.984 + 1.125 + 2.5% v/v	June 4	55	99	73	14.0	29.5	1047	6975
Outlook+Touchdown Total +AMS	0.984 + 1.125 + 2.5% v/v	June 23	100	98	78	14.4	30.1	1053	7307
Outlook+Touchdown Total +AMS	0.656 + 1.125 + 2.5% v/v	June 4							
Outlook+Touchdown Total+AMS	0.469 + 0.75 + 2.5% v/v	June 23	100	100	77	14.1	31.6	1071	7468
Warrant+Touchdown Total + AMS	1.33 + 1.125 + 2.5% v/v	June 4	45	96	78	14.3	31.0	972	7613
Warrant+Touchdown Total + AMS	1.33 + 1.125 + 2.5% v/v	June 23	97	99	81	14.0	30.8	1012	7303
Warrant+Touchdown Total + AMS	1.0 + 1.125 + 2.5% v/v	June 4							
Warrant+Touchdown Total+AMS	0.724 + 0.75 + 2.5% v/v	June 23	98	100	81	13.8	33.0	1104	7541
UpBeet+Touchdown Total +Destiny HC+AMS	0.25 oz ai/A + 1.125 + 1% v/v + 2.5% v/v	June 4							
UpBeet+Touchdown Total +Destiny HC+AMS	0.25 oz ai/A + 0.75 + 1% v/v + 2.5% v/v	June 23	96	98	87	13.7	34.5	1094	7871
Stinger+Touchdown Total +AMS	0.07 + 1.125 + 2.5% v/v	June 4							
Stinger+Touchdown Total+AMS	0.07 + 0.75 + 2.5% v/v	June 23	100	100	90	13.8	33.4	1116	7670
LSD (5%)			20	12	NS	NS	NS	NS	NS

¹AMS=N-Pak AMS (liquid ammonium sulfate from Winfield Solutions), Destiny HC=high surfactant methylated seed oil from Winfield Solutions.

Sharpen carryover to sugarbeet, Prosper, ND, 2010. (Stachler) Research plots 44 feet wide (24 rows) and 60 feet long were established May 28, 2009. 'Dekalb DKC 36-34' corn was seeded in 22 inch rows May 28, 2009. Herbicide treatments were soil applied 11:45 am May 28, 2009 when the air temperature was 71F, relative humidity was 47%, soil temperature at six inches was 60F, wind velocity was 14 mph, soil moisture was good and cloud cover was 5%. Treatments were applied in 17 gpa at 40 psi through XR8002 nozzles to all 24 rows in each plot. All plots were treated with Roundup WeatherMax + Class Act NG + Interlock as needed to control weeds. Corn was harvested November 19, 2009. Fall tillage in 2009 was one pass with a tandem disk operated 4-5 inches deep. All plots were tilled twice May 25, 2010 with a field cultivator and spring tooth harrow operated 2-3 inches deep. 'Crystal 875' Roundup Ready sugarbeet seed at 120,050 seed per acre was seeded in six 22 inch rows through each herbicide plot May 26, 2010. All plots were treated with Roundup WeatherMax + Class Act NG + Interlock as needed to control weeds. Sugarbeet injury was evaluated June 19, June 25 and July 6. Forty feet of the center two rows of each plot was counted and harvested September 21, 2010.

Table. Sharpen carryover to sugarbeet, Prosper, ND, 2010. (Stachler)

Treatment	Rate product/A	June 19	June 25	July 6	September 21				
		Sglt Inju ----- %	Sglt Inju ----- %	Sglt Inju ----- %	Sglt Popul plts/80 ft	Sucrose %	Root Yield ton/A	Impurity Index	Extract Sucrose lb/A
Untreated Check	0	1	0	0	183	16.2	15.7	545	4657
Sharpen	1 fl. oz	0	0	0	176	16.4	17.0	561	5080
Sharpen	2 fl. oz	0	0	0	194	16.0	16.1	562	4692
Sharpen	4 fl. oz	0	0	0	180	16.5	14.7	529	4459
Sharpen	8 fl. oz	0	0	0	177	16.2	14.0	550	4188
LSD (5%)		NS	NS	NS	NS	NS	NS	NS	NS

Summary: Due to the late corn harvest in 2009 and heavy corn residue, soil conditions prior to sugarbeet planting were not optimal. Sugarbeet stand and growth were variable making visual injury ratings difficult. However, no obvious symptomology of Sharpen was observed on sugarbeet in 2010 from any rate applied in 2009. Despite the lack of visible injury symptoms and significant treatment differences, some caution may be warranted in planting sugarbeet the following season after application at high rates due to the trend in declining sugarbeet root yield with increasing rates of Sharpen. It is possible that visible injury symptoms do not exist, yet cause stunting of sugarbeet, resulting in yield losses. Further research should be conducted to ensure safety to sugarbeet from Sharpen applied the previous season.