HERBICIDES ON SUGARBEET AT SEVEN LOCATIONS, 2006.

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Kochia was named as "worst weed" in sugarbeet by 41% of the respondents to the annual survey of eastern North Dakota-Minnesota sugarbeet growers in 2006. Pigweed species was named "worst weed" by 35% of the respondents and common lambsquarters by 18%. These three species constituted the major weed problem in sugarbeet in eastern North Dakota and Minnesota in 2006 and for the previous several years. The experiment was established at seven locations to obtain data from several environments and on several weed species. The objective of the experiment was to compare several registered herbicide treatments for weed control and sugarbeet injury.

Table 1 provides the seven locations, planting dates, treatment dates and conditions at treatment. Sugarbeet injury and weed control were visually evaluated June 19 at Cavalier, June 24 and July 14 at Crookston, June 21 at Hillsboro, June 12 and June 27 at Milan, June 15 and July 8 at Prosper, June 19 at St. Thomas, and June 20 and July 6 at Wahpeton. Counter 15G was applied modified-in-furrow on the planter at Cavalier, Crookston, Hillsboro, St. Thomas and Crookston. Sugarbeet seed was treated with Tachigaren at 45 grams per 100,000 weeds. Herbicides were applied to the center four rows of six-row plots in 17 gpa of water through 8002 nozzles at 3 mph. Roundup Weather Max at 2 qt/A was applied over a Roundup Ready variety on June 20 at St. Thomas to achieve total weed control and allow evaluation of sugarbeet injury from the herbicides without significant weed competition. Eminent fungicide at 13 fl oz/A was applied on August 22 at Crookston and August 9 at St. Thomas. Headline fungicide at 9 fl oz/A was applied on September 1 at Crookston and September 8 at St. Thomas. Treatments were replicated four times. Sugarbeet at Milan, Crookston and St. Thomas were harvested from the center two rows of 30 foot-long by six-row wide plots on September 13, October 10, and September 19, respectively. The treatments in Tables 2 and 3 are numbered for easier reference in the following discussion. Herbicide prices seem to be in a period of change so the costs of the various herbicide treatments were not included in Tables 2 and 3.

Tear-thumb *(Polygonum sagittatum)* looks very similar to ladysthumb *(Polygonum persicaria)* except that tear-thumb has sharp spines on the stems while ladysthumb has smooth stems. PRE Nortron followed by POST Progress + UpBeet + Stinger + Select Max at all rates (Treatments 13-16) gave 97 to 99% control of tear-thumb (Table 2). The best POST alone treatment was the conventional rate of Progress + UpBeet + Stinger + Select Max plus lay-by Outlook (Treatment 11) which gave 99% control. POST treatments plus lay-by Outlook gave better control of tear-thumb than the same POST treatments without added lay-by Outlook. Progress used alone (Treatment 4) gave less tear-thumb control than Progress + UpBeet + Stinger + Select Max (Treatments 1-3). The micro-rate (Treatment 1) gave tear-thumb control similar to the conventional rate POST alone treatment (Treatment 3).

Kochia control was better at Hillsboro than at Wahpeton and Cavalier (Table 2). Hillsboro had a light infestation, Wahpeton had a moderate population and Cavalier had a dense population of kochia. The superior kochia control at Hillsboro probably was due to the low density of kochia which allowed superior spray coverage. However, the possibility that the Hillsboro kochia were more susceptible to the herbicides can not be eliminated. At Hillsboro, eleven treatments gave 99 to 100% kochia control (Treatments 3, 4, 5, 6, 8, 9, 11, 13, 14, 15 and 16). None of the treatments gave 100% kochia control at Wahpeton or Cavalier but five treatments gave over 90% control at both locations (Treatments 3,4,5,9 and 16). All five of these treatments included the conventional rate of Progress or Betamix. PRE Nortron followed by POST Progress + UpBeet + Stinger + Select Max at the conventional rate (Treatment 16) gave 97% kochia control at Wahpeton and Cavalier. Progress alone (Treatment 4) gave kochia control similar to the conventional rate of Progress + UpBeet + Stinger + Select Max (Treatment 3) indicating that the treated kochia were resistant to UpBeet and were not affected by Stinger. The micro-rate (Treatment 1) gave 21 and 28% kochia control at Wahpeton and Cavalier, respectively, while the micro-rate gave 74% control at

Hillsboro. Control of 74% is useful but the higher rates gave superior kochia control at all locations. Adding extra Nortron to the micro-rate (Treatment 7) gave better kochia control than the micro-rate alone (Treatment 1) but less control than the conventional rate treatments (Treatments 3,4,5,9 and 16). Lay-by Outlook had little effect on kochia control as compared to the same POST treatments without Outlook. Adding Ethotron at 3.75 lb/A, the full PRE rate, to the first POST application of the micro-rate (Treatment 17) gave improved control of tear-thumb and kochia compared to the micro-rate alone (Treatment 1, Table 2). However, sugarbeet injury from the micro-rate plus Ethotron at 3.75 lb/A averaged over 7 locations, was 23% as compared to 8% injury from the micro-rate alone. The greatest sugarbeet injury from this treatment was 59% at Crookston. These injury observations suggest a significant risk of sugarbeet injury from adding Ethotron at 3.75 lb/A to the micro-rate.

All treatments that included Stinger gave 100% control of common cocklebur (Table 2). Betanex (Treatment 6) gave better control of common cocklebur than Progress (Treatment 4).

All POST treatments gave 98 to 100% control of quinoa *(Chenopodium quinoa)* and common lambsquarters *(Chenopodium album)* averaged over five locations (Table 2). PRE Ethotron gave poor control of quinoa and common lambsquarters.

All POST treatments gave 96 to 100% control of redroot pigweed and amaranth (pigweed species used as a crop) averaged over five locations. PRE Ethotron gave 51% control averaged over five locations but control ranged from 13% to 100% at various locations. Control was good with adequate rain to activate the Ethotron right after seeding and Ethotron application but control was poor when the weeds emerged prior to an activating rain.

Canola and flax were used as bioassy species at Prosper and Crookston. Control of these species increased as POST herbicide rate increased. Betanex (Treatment 6) gave better control of Canola than Progress (Treatment 5). Adding Nortron at 3 fl oz/A to the micro-rate (Treatment 7) improved control but lay-by Outlook (Treatment 10) did not improve control. The best control of canola and flax was from PRE Nortron followed by the POST conventional rate (Treatment 16).

Sugarbeet was harvested at Milan, MN, Crookston, MN and St. Thomas, ND in 2006. Roundup Ready sugarbeet was seeded at St. Thomas and Roundup was applied on June 20 to achieve total weed control and allow evaluation of the effect of herbicides on sugarbeet yield with minimal effect from weed competition. Herbicides had no significant effect on sugarbeet yield at St. Thomas (Table 3). Surviving weeds were allowed to grow and develop without hand weeding or cultivation at Milan and Crookston. Yields were quite low from the plots where weed control was poor at Milan and Crookston.

The treatment with the numerically greatest sugarbeet yield at Milan was PRE Nortron followed by the POST mid-rate treatment (Treatment 15, Table 3). Treatments that were statistically similar to Treatment 15 were the micro-rate alone (Treatment 1) and the micro-rate plus Ethotron (Treatment 17). Weed control was similar or better from several treatments than from Treatments 1, 15 and 17 so this yield data suggests that the conventional-rate treatments caused sufficient injury to reduce sugarbeet yield even though the injury ratings were low (Table 3). This result was not expected and an explanation for the result is not known.

The treatment with the numerically greatest sugarbeet yield at Crookston was the micro-rate plus lay-by Outlook (Treatment 10, Table 3). Most treatments at Crookston resulted in yields statistically similar to Treatment 10 and only Treatments 2, 3, 11, 12 and 17 had lower yields. PRE Ethotron (Treatment 12) treated plots had low yields because weed competition was high. Weed control was good in Treatments 3, 11 and 17 but sugarbeet injury also was high so sugarbeet injury probably caused yield loss at Crookston in Treatments 3, 11 and 17.

Herbicide treatments tested at seven locations in 2006 generally gave good control of all weeds except kochia (Table 2). PPI Nortron or Ethotron followed by a POST conventional rate of Progress used alone or in combination gave the best kochia control and also gave excellent control of other weeds or bioassay crops. The conventional rate of Progress (Treatment 3) gave similar control of kochia, common

lambsquarters and canola/flax but less control of tear-thumb, common cocklebur and pigweed species as compared to Progress + UpBeet + Stinger + Select Max (Treatment 3). Weed control from PRE Ethotron varied widely depending on how soon rain followed application.

PRE Nortron followed by the POST conventional rate gave the overall best weed control among the treatments (Table 2, Treatment 16). Sugarbeet yield from Treatment 16 averaged 7400 lb/A of sugar over three locations which was only exceeded by 7950 lb/A of sugar from plots treated with PRE Nortron followed by the POST mid-rate (Table 3, Treatment 15).

The results obtained in 2006 suggest that overall weed control can be improved by use of soil-applied Nortron or Ethotron and by increasing application rates of POST herbicides. However, increased POST herbicide rates sometimes cause increased sugarbeet injury and yield loss plus higher rates are more expensive. The sugarbeet grower must consider the difficulty of controlling the weed species present, the density of the population of the target weeds, the risk of sugarbeet injury, the environment at application, the size of the target weeds, labor availability, labor cost, and herbicide treatment cost when designing a weed control program. A large number of factors should be considered and several are out of the control of the grower. The future availability of Roundup Ready sugarbeet will simplify the decisions but growers will still need to decide when to start spraying to avoid yield loss due to early season competition, how long to wait between applications, how many applications will be needed, application rate, and should hand weeding be used to remove escapes which will slow the development of resistant weeds. Sugarbeet grower decisions will continue to be important in weed control in sugarbeet even after Roundup Ready sugarbeet becomes common.

Table 1. Herbicide application dates and conditions, 2006[1]. (Table continued on next page)

MILAN, MN (Harvested 9/13)					
Date	April 24	May 12	May 18	May 29	June 5
Time of day	10:30 A	1:00 P	12:30 P	12:00 P	10:00 A
Air Temperature (F)	42	55	63	80	82
Relative humidity (%)	30	32	26	34	39
6-inch soil temp. (F)	50	52	59	78	70
Soil moisture	good	good	good	good	good
Sugarbeet (Beta 4811)	seed, PRE	V1.0	V1.0-1.5	V2.1-3.5	V5.2-6.2
Common lambsquarters	-	cot	cot-2 lf	4-6 lf	3-6" tall
Waterhemp	-	cot	cot	3-4 lf	2-5" tall
Tear-thumb (smartweed)	-	cot-1 lf	cot-2 lf	3-5 lf	3-6" tall
WAHPETON, ND					
Date	April 25	May 18	May 29	June 7	June 13
Time of day	11:00 A	9:00 A	3:30 P	12:00 P	9:00 A
Air temperature (F)	48	59	82	77	71
Relative humidity (%)	15	38	27	42	46
6-inch soil temp. (F)	42	46	72	65	59
Soil moisture	good	good	good	good	good
Sugarbeet (Beta 4811)	seed, PRE	V1.0-1.1	V2.5-4.5	V7.2-9.8	V9.2-10.8
Kochia	-	0.25-0.75" diam	1-4" tall	8-10" tall	10-16" tall
Common cocklebur	-	cot	3.5 lf	3-6 lf	8-12" tall
PROSPER, ND					
Date	April 25	May 19	May 26	June 2	June 8
Time of day	5:00 P	12:20 P	12:15 P	10:30 A	4:00 P
Air temperature (F)	64	73	67	75	71
Relative humidity (%)	12	22	56	47	30
6-inch soil temp. (F)	43	58	57	61	70

Soil moisture	good	good	good	good	good
Sugarbeet (Beta 3820)	seed, PRE	V1.0-1.2	V1.5-2.8	V5.2-6.5	V8.5-10.5
Amaranth	-	cot	1-2 lf	6 lf	5-7" tall
Canola	-	cot-2 lf	5" tall	6-10" tall	20-24" tall
Flax	-	cot-1" tall	1-3" tall	3-6" tall	10-14" tall
Quinoa	-	cot-2 lf	5" tall	6-12" tall	12-14" tall
Soybean	-	cot	unifol	1-2 trifol	2-3 trifold
Oats	-	2 lf	4 lf	10-14" tall	14-16" tall

[1] = leaf or leaves, cot = cotyledon, 0"= inches, V = number of expanded leaves with decimal indicating partial expansion of the youngest visible leaf.

Table 1. (continued) Herbicide application dates and conditions, 2006[1].

HILLSBORO, ND					
Date	April 27	May 25	May 31	June 7	June 13
Time of day	11:00 A	1:00 P	12:15 P	9:45 A	1:00 P
Air temperature (F)	64	85	73	70	73
Relative humidity (%)	20	35	29	39	33
6-inch soil temp (F)	45	62	63	65	63
Soil moisture	good	good	good	good	good
Sugarbeet (Crystal R431)	seed, PRE	V1.3-2.1	V3.9-4.2	V8.2-9.5	V10.1-12.1
Barley	-	2-3 lf	6-8" tall	8-12" tall	9-12" tall
Kochia	-	cot-0.75" diam	0.75-2" diam	3-8" tall	8-12" tall
Redroot pigweed	-	cot-1	3-5 lf	3-5" tall	6-10" tall

CROOKSTON, MN (Harvested 10/10)					
Date	May 17	June 1	June 8	June 14	June 21
Time of day	1:30 P	12:15 P	12:15 P	10:00 A	10:00 A
Air temperature (F)	70	75	70	73	68
Relative humidity (%)	21	23	30	37	38
6-inch soil temp (F)	59	63	64	63	63
Soil moisture	good	good	good	good	good
Sugarbeet (Crystal R431)	seed, PRE	V1.0-1.5	V2.8-4.1	V4.1-5.2	V8.2
Amaranth	-	cot-1 lf	5 lf	8" tall	16" tall
Canola	-	cot-1 lf	4 lf	7-8" tall	8" tall
Flax	-	0.75" tall	1-3" tall	3-4" tall	6-8" tall
Quinoa	-	cot-4 lf	4-6" tall	8-11" tall	18-22" tall
Soybean	-	cot	1st trifol	1-2 trifol	2 trifol
Oats	-	1-2 lf	4-5 lf	6-10" tall	6-12" tall
Redroot pigweed	-	cot-1 lf	2-6 lf	6 lf	3-8" tall

ST. THOMAS, ND (Harvested 9/19)					
Date	May 14	May 23	May 30	June 6	June 12
Time of day	1:45 P	11:00 A	1:55 P	10:00 A	12:45 P
Air temperature (F)	42	73	75	70	82
Relative humidity (%)	37	38	24	49	31

6-inch soil temp (F)	44	59	70	66	65
Soil moisture	good	good	good	good	good
Sugarbeet (Beta 993 RR)	seed, PRE	V1.1-1.3	V2.2-3.7	V5.8-6.5	V7.2-9.2
Common lambsquarters	-	cot-2 lf	3-5" tall	5-8" tall	8-10" tall
Redroot pigweed	-	cot-2 lf	3-5 lf	2-4" tall	3-6" tall
CAVALIER, ND					
Date	May 4	May 22	May 30	June 6	June 12
Time of day	5:00 P	1:45 P	12:00 P	12:30 P	2:30 P
Air temperature (F)	41	71	73	75	78
Relative humidity (%)	38	15	28	42	28
6-inch soil temp (F)	43	52	62	65	65
Soil moisture	good	good	good	good	good
Sugarbeet (Hilleshog 2467RZ)	seed, PRE	V1.0-1.2	V2.1-2.3	V4.8-6.5	V6.8-7.1
Kochia	-	cot-0.75" diam	cot-2.5" tall	0.5" diam-7"	3-8" tall
Redroot pigweed	-	cot-1 lf	cot-2 lf	1-2 lf	4 lf-4" tall
Common lambsquarters		cot-2 lf	4-6 lf	4-6" tall	6-8" tall

[1] = leaf or leaves, cot = cotyledon, 0"= inches, V = number of expanded leaves with decimal indicating partial expansion of the youngest visible leaf.

Table 2. Weed control from herbicide treatments at seven locations in 2006. (Table continued on next page)

Treatment Rate	Milan, MN	Kochia		
	6/27 Tear-thumb	7/6 Wahpeton	6/21 Hillsboro	6/19 Cavalier
fl oz/A or oz/A	----------% control ----------			
1. Progress + UpBeet + Stinger + Select Max + MSO[1] 5.7 + 0.125 + 1.3 + 3 + 1.5% (T1-T4)[2]	84	21	74	28
2. Progress + UpBeet + Stinger + Select Max + MSO 8.5 (T1, T2)/11.4 (T3)/15.6 (T4) + 0.125 + 1.3 + 3 + 1.5% (T1-T4)	81	65	91	54
3. Progress + UpBeet + Stinger + Select Max 17.8 (T1)/23.5 (T2)/35.6 (T3-T4) + 0.25 + 2.6 + 4	89	91	100	95
4. Progress 17.8 (T1)/23.5 T2)/35.6 (T3-T4)	63	90	100	92
5. Betamix 24.6 (T1)/32.5 (T2)/49.2 (T3-T4)	40	91	100	90
6. Betanex 24.6 (T1)/32.5 (T2)/ 49.2 (T3-T4)	0	91	100	84
7. Progress + UpBeet + Stinger + Select Max + MSO + Nortron 5.7 + 0.125 + 1.3 + 3 + 1.5% + 3 (T1-T4)	84	58	86	36
8. Progress + UpBeet + Stinger + Select Max + MSO 5.7 + 0.125 + 1.3 + 3 + 1.5% (T1-T2) Progress + UpBeet + Stinger + Select Max	89	71	99	84

35.6 + 0.25 + 2.6 + 4 (T3-T4)				
9. Progress 17.8 (T1)/23.5 (T2)/35.6 (T3-T4) Outlook 21 (T3)	73	91	100	93
10. Progress + UpBeet + Stinger + Select Max + MSO 5.7 + 0.125 + 1.3 + 3 + 1.5% (T1-T4) Outlook 21 (T3)	90	25	84	23
11. Progress + UpBeet + Stinger + Select Max 17.8 (T1)/23.5 (T2)/35.6 (T3-T4) + 0.25 + 2.6 + 4 (T1-T4) Outlook 21 (T3)	99	89	100	97
12. Ethotron (PRE) 120	56	51	88	0
13. Nortron (PRE) 120 Progress + UpBeet + Stinger + Select Max + MSO 5.7 + 0.125 + 1.3+ 3 + 1.5% (T1-T4)	97	80	100	25
14. Nortron (PRE) 120 Progress + UpBeet + Stinger + Select Max + MSO 5.7 + 0.125 + 1.3 + 3 + 1.5% (T1-T4) Outlook 21 (T3)	99	74	100	30
15. Nortron (PRE) 120 Progress + UpBeet + Stinger + Select Max + MSO 8.5 (T1, T2)/11.4 (T3)/15.6 (T4) + 0.125 + 1.3 + 3 +1.5% (T1-T4)	99	86	100	53
16. Nortron (PRE) 120 Progress + UpBeet + Stinger + Select Max 17.8 (T1)/23.5 (T2)/35.6 (T3-T4) + 0.25 + 2.6 + 4 (T1-T4)	99	97	100	97
17. Progress + UpBeet + Stinger + Select Max + MSO 5.7 + 0.125 + 1.3 + 3 + 1.5% (T1-T4) Ethotron 120 (T1)	93	66	96	50
LSD (0.05)	8	16	6	8

[1]MSO = methylated seed oil from Loveland. [2]T1 = first POST application, T2 = second POST application, etc.

Table 2. (continued) Weed control from herbicide treatments at seven locations in 2006.

Treatment Rate	Common cockleb ur 7/6 Wahpeto n	Common Lambs quarters Quinoa 5 location s	Redroot pigweed, Amaranth 5 location s	Canola flax, 2 locatio ns
fl oz/A or oz/A	----------%control----------			
1. Progress + UpBeet + Stinger + Select Max + MSO[1] 5.7 + 0.125 + 1.3 + 3 + 1.5% (T1-T4)[2]	100	98	96	80
2. Progress + UpBeet + Stinger + Select Max + MSO 8.5 (T1, T2)/11.4 (T3)/15.6 (T4) + 0.125 + 1.3	100	100	99	87

+ 3 + 1.5% (T1-T4)				
3. Progress + UpBeet + Stinger + Select Max 17.8 (T1)/23.5 (T2)/35.6 (T3-T4) + 0.25 + 2.6 + 4	100	100	100	97
4. Progress 17.8 (T1)/23.5 T2)/35.6 (T3-T4)	88	100	97	96
5. Betamix 24.6 (T1)/32.5 (T2)/49.2 (T3-T4)	92	100	99	98
6. Betanex 24.6 (T1)/32.5 (T2)/ 49.2 (T3-T4)	94	100	100	100
7. Progress + UpBeet + Stinger + Select Max + MSO + Nortron 5.7 + 0.125 + 1.3 + 3 + 1.5% + 3 (T1-T4)	100	99	99	88
8. Progress + UpBeet + Stinger + Select Max + MSO 5.7 + 0.125 + 1.3 + 3 + 1.5% (T1-T2) Progress + UpBeet + Stinger + Select Max 35.6 + 0.25 + 2.6 + 4 (T3-T4)	100	100	100	94
9. Progress 17.8 (T1)/23.5 (T2)/35.6 (T3-T4) Outlook 21 (T3)	95	100	98	93
10. Progress + UpBeet + Stinger + Select Max + MSO 5.7 + 0.125 + 1.3 + 3 + 1.5% (T1-T4) Outlook 21 (T3)	100	98	98	83
11. Progress + UpBeet + Stinger + Select Max 17.8 (T1)/23.5 (T2)/35.6 (T3-T4) + 0.25 + 2.6 + 4 (T1-T4) Outlook 21 (T3)	100	100	100	97
12. Ethotron (PRE) 120	0	13	51	5
13. Nortron (PRE) 120 Progress + UpBeet + Stinger + Select Max + MSO 5.7 + 0.125 + 1.3+ 3 + 1.5% (T1-T4)	100	100	100	89
14. Nortron (PRE) 120 Progress + UpBeet + Stinger + Select Max + MSO 5.7 + 0.125 + 1.3 + 3 + 1.5% (T1-T4) Outlook 21 (T3)	100	100	100	89
15. Nortron (PRE) 120 Progress + UpBeet + Stinger + Select Max + MSO 8.5 (T1, T2)/11.4 (T3)/15.6 (T4) + 0.125 + 1.3 + 3 +1.5% (T1-T4)	100	100	100	91
16. Nortron (PRE) 120 Progress + UpBeet + Stinger + Select Max 17.8 (T1)/23.5(T2)/35.6 (T3-T4) + 0.25 + 2.6 + 4 (T1-T4)	100	100	100	99
17. Progress + UpBeet + Stinger + Select Max + MSO 5.7 + 0.125 + 1.3 + 3 + 1.5% (T1-T4) Ethotron 120 (T1)	100	100	99	90
LSD (0.05)	6	2	2	4

[1]MSO = methylated seed oil from Loveland. [2]T1 = first POST application, T2 = second POST application, etc.

Table 3. Sugarbeet yield at Milan, MN, Crookston, MN and St. Thomas, ND. Plots at St. Thomas were kept free of weeds using glyphosate on Roundup Ready sugarbeet while plots at Milan and Crookston received no cultivation or weed control except for the listed treatments. (Table continued on next page).

Treatment Rate	Milan, MN		Crookston, MN	
	Extractable sucrose	Sugb injury	Extractable sucrose	Sugb injury
fl oz/A or oz/A	lb/A	%	lb/A	%
1. Progress + UpBeet + Stinger + Select Max + MSO[1] 5.7 + 0.125 + 1.3 + 3 + 1.5% (T1-T4)[2]	5720	0	7560	16
2. Progress + UpBeet + Stinger + Select Max + MSO 8.5 (T1, T2)/11.4 (T3)/15.6 (T4) + 0.125 + 1.3 + 3 + 1.5% (T1-T4)	5160	3	7130	30
3. Progress + UpBeet + Stinger + Select Max 17.8 (T1)/23.5 (T2)/35.6 (T3-T4) + 0.25 + 2.6 + 4	4060	13	7360	54
4. Progress 17.8(T1)/23.5 (T2)/35.6 (T3-T4)	2370	5	7810	44
5. Betamix 24.6 (T1)/32.5 (T2)/49.2 (T3-T4)	3130	0	8270	28
6. Betanex 24.6 (T1)/32.5 (T2)/49.2 (T3-T4)	2220	1	8240	18
7. Progress + UpBeet + Stinger + Select Max + MSO + Nortron 5.7 + 0.125 + 1.3 + 3 + 1.5% + 3 (T1-T4)	5150	1	8290	14
8. Progress + UpBeet + Stinger + Select Max + MSO 5.7 + 0.125 + 1.3 + 3 + 1.5% (T1-T2) Progress + UpBeet + Stinger + Select Max 35.6 + 0.25 + 2.6 + 4 (T3-T4)	4540	4	7560	26
9. Progress 17.8 (T1)/23.5 (T2)/35.6 (T3-T4) Outlook 21 (T3)	3600	10	7540	50
10. Progress + UpBeet + Stinger + Select Max + MSO 5.7 + 0.125 + 1.3 + 3 + 1.5% (T1-T4) Outlook 21 (T3)	3270	11	8560	18
11. Progress + UpBeet + Stinger + Select Max 17.8 (T1)/23.5 (T2)/35.6 (T3-T4) + 0.25 + 2.6 + 4 (T1-T4) Outlook 21 (T3)	4160	20	6500	60
12. Ethotron (PRE) 120	4140	0	3510	3
13. Nortron (PRE) 120 Progress + UpBeet + Stinger + Select Max + MSO 5.7 + 0.125 + 1.3 + 3 + 1.5% (T1-T4)	4700	0	7700	19
14. Nortron (PRE) 120 Progress + UpBeet + Stinger + Select Max + MSO 5.7 + 0.125 + 1.3 + 3 + 1.5% (T1-T4) Outlook 21 (T3)	4890	5	8130	25
15. Nortron (PRE) 120 Progress + UpBeet + Stinger + Select Max + MSO 8.5 (T1, T2)/11.4 (T3)/15.6 (T4) + 0.125 + 1.3 + 3 + 1.5% (T1-T4)	6570	4	8300	23
16. Nortron (PRE) 120 Progress + UpBeet + Stinger + Select Max 17.8 (T1)/23.5 (T2)/35.6 (T3-T4) + 0.25 + 2.6 + 4 (T1-T4)	5360	9	8440	56

17. Progress + UpBeet + Stinger + Select Max + MSO 5.7 + 0.125 + 1.3 + 3 + 1.5% (T1-T4) Ethotron 120 (T1)	5670	1	7380	59
LSD (0.05)	1170	5	1110	13

[1]MSO = methylated seed oil from Loveland. [2]T1 = first POST application, T2 = second POST application, etc.

Table 3. (continued) Sugarbeet yield at Milan, MN, Crookston, MN and St. Thomas, ND. Plots at St. Thomas were kept free of weeds using glyphosate on Roundup Ready sugarbeet while plots at Milan and Crookston received no cultivation or weed control except for the listed treatments.

	St. Thomas, ND		7 locations
Treatment Rate	Extractable sucrose	Sugb injury	Sugb injury
fl oz/A or oz/A	lb/A	%	%
1. Progress + UpBeet + Stinger + Select Max + MSO[1] 5.7 + 0.125 + 1.3 + 3 + 1.5% (T1-T4)[2]	8250	8	8
2. Progress + UpBeet + Stinger + Select Max + MSO 8.5 (T1, T2)/11.4 (T3)/15.6 (T4) + 0.125 + 1.3 + 3 + 1.5% (T1-T4)	9440	13	15
3. Progress + UpBeet + Stinger + Select Max 17.8 (T1)/23.5 (T2)/35.6 (T3-T4) + 0.25 + 2.6 + 4	7970	43	32
4. Progress 17.8(T1)/23.5 (T2)/35.6 (T3-T4)	8350	26	23
5. Betamix 24.6 (T1)/32.5 (T2)/49.2 (T3-T4)	8790	25	16
6. Betanex 24.6 (T1)/32.5 (T2)/49.2 (T3-T4)	8540	21	14
7. Progress + UpBeet + Stinger + Select Max + MSO + Nortron 5.7 + 0.125 + 1.3 + 3 + 1.5% + 3 (T1-T4)	8980	8	10
8. Progress + UpBeet + Stinger + Select Max + MSO 5.7 + 0.125 + 1.3 + 3 + 1.5% (T1-T2) Progress + UpBeet + Stinger + Select Max 35.6 + 0.25 + 2.6 + 4 (T3-T4)	8870	24	20
9. Progress 17.8 (T1)/23.5 (T2)/35.6 (T3-T4) Outlook 21 (T3)	8270	33	29
10. Progress + UpBeet + Stinger + Select Max + MSO 5.7 + 0.125 + 1.3 + 3 + 1.5% (T1-T4) Outlook 21 (T3)	8510	15	17
11. Progress + UpBeet + Stinger + Select Max 17.8 (T1)/23.5 (T2)/35.6 (T3-T4) + 0.25 + 2.6 + 4 (T1-T4) Outlook 21 (T3)	8490	51	38
12. Ethotron (PRE) 120	8600	0	0

13.	Nortron (PRE) 120 Progress + UpBeet + Stinger + Select Max + MSO 5.7 + 0.125 + 1.3 + 3 + 1.5% (T1-T4)	9090	8	10
14.	Nortron (PRE) 120 Progress + UpBeet + Stinger + Select Max + MSO 5.7 + 0.125 + 1.3 + 3 + 1.5% (T1-T4) Outlook 21 (T3)	9180	15	16
15.	Nortron (PRE) 120 Progress + UpBeet + Stinger + Select Max + MSO 8.5 (T1, T2)/11.4 (T3)/15.6 (T4) + 0.125 + 1.3 + 3 + 1.5% (T1-T4)	8980	18	17
16.	Nortron (PRE) 120 Progress + UpBeet + Stinger + Select Max 17.8 (T1)/23.5 (T2)/35.6 (T3-T4) + 0.25 + 2.6 + 4 (T1-T4)	8400	46	34
17.	Progress + UpBeet + Stinger + Select Max + MSO 5.7 + 0.125 + 1.3 + 3 + 1.5% (T1-T4) Ethotron 120 (T1)	8570	19	23
	LSD (0.05)	NS	7	3

[1]MSO = methylated seed oil from Loveland. [2]T1 = first POST application, T2 = second POST application, etc.