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REGISTERED SUGARBEET HERBICIDES AT SEVEN LOCATIONS, 2002.

Alan G. Dexter and John L. Luecke

Extension Sugarbeet Specialist and Sugarbeet Research Specialist, North Dakota State University and the University of Minnesota, Fargo.

Sugarbeet fields in eastern North Dakota and Minnesota had too many surviving weeds at harvest, on average, in 2002. The reasons for poor weed control vary from field to field but a primary problem was that weeds germinated and emerged after the last postemergence herbicide treatment. The spring was unusually cool in 2002 and the sugarbeet leaves did not shade the rows as soon as normal. This resulted in an extended period of weed emergence, especially of pigweed spp. Some possible methods of improving weed control and reducing the late emerging weed problem include spraying post herbicides one or two extra times to control late-emerging weeds and to complete control of weeds that were injured but not killed by previous treatments; planting more seed to reduce gaps in sugarbeet stands; use of preemergence Nortron/Etho SC; use of lay-by Outlook; use of a rotary hoe or harrow to control emerging weeds in well established sugarbeet; carefully calibrating the sprayer to apply the desired rate; and band spray only when wind speeds are low so most of the spray droplets hit the target weeds in the band. With the micro-rate, one untimely or incorrect application out of the series of three to five applications can greatly reduce the overall level of weed control.

The objectives of this experiment were to compare micro-rate treatments to conventional rate treatments, compare Betanex, Betamix and Progress in the micro-rate and conventional rate treatments, determine the effect of preemergence Nortron/Etho SC, determine the effect of lay-by Outlook and to determine the effect of Nortron/Etho SC used postemergence in combination with other herbicides.

Dates and conditions for the various locations of the experiment are provided in Table 1. Herbicides were applied to the center four rows of six-row plots in 17 gpa water at 40 psi through 8002 nozzles. The Roundup Ready sugarbeet at St. Thomas were treated with Roundup UltraMax at 3 pt/A on June 20 to control surviving weeds and eliminate weed competition as a yield influencing factor.

Weed control and sugarbeet injury were evaluated visually June 25 at Breckenridge; June 25 and July 8 at Christine; July 4 and July 19 at Crookston; June 28 and July 18 at Fargo; July 6 and July 18 at Glasston; and June 26 and July 9 at Hillsboro. Sugarbeet injury at St. Thomas was evaluated July 6 and sugarbeet was harvested October 2.

Progress + UpBeet + Nortron at 10 fl oz + 0.5 oz + 6 fl oz/A followed by Progress + UpBeet + Nortron + Stinger at 23 fl oz + 0.5 oz + 6 fl oz + 4.7 fl oz/A followed by Progress + UpBeet + Stinger + Outlook at 30 fl oz + 0.5 oz + 4.7 fl oz + 21 fl oz/A caused more sugarbeet injury than any other treatment, gave the best control of redroot pigweed at the second evaluation, and gave 97% control of kochia (Table 2). In this experiment, the previously described treatment gave the best weed control but at a high cost and with the greatest sugarbeet injury.

The level of control of redroot pigweed was less at 3 to 5 weeks after the last postemergence treatment than at 1 to 2 weeks after the last postemergence treatment with all tested treatments (Table 2). A portion of the loss in control was due to weeds that germinated after the last postemergence herbicide application and a portion was due to weeds that recovered from the herbicide injury. Betanex in the micro-rate gave better control of redroot pigweed than Progress in the micro-rate. UpBeet at 0.16 oz/A in the micro-rate gave weed control similar to UpBeet at 0.125 oz/A in the micro-rate. Progress at 5.7 fl oz/A twice in the micro-rate followed by Progress at 8.7 fl oz/ A twice in the micro-rate gave weed control and sugarbeet injury similar to Progress at 5.7 fl oz/A four times in the micro-rate. The addition of Nortron at 4 fl oz/A to the first two of four applications of Progress in the micro-rate did not result in improved redroot pigweed control but kochia control was improved from 60% control to 76% control. The best kochia control from a micro-rate treatment was 76% but this is not a high enough level of control to avoid yield loss from competition in a dense kochia infestation.

Three applications of Betanex + UpBeet + Stinger + Select at conventional rates of 24/32/49 fl oz + 0.25 oz + 2 fl oz + 2.7 fl oz/A gave 73% redroot pigweed control at 3 to 5 weeks after the last herbicide treatment (WALT) and

72% kochia control (Table 2). The Betanex, Betamix or Progress in the micro-rate gave similar control of redroot pigweed but less control of kochia than the Betanex, Betamix or Progress in the conventional rate treatment. Progress + UpBeet + Stinger + Select at 18/23/36 fl oz (same active ingredient/A as Betanex) + 0.25 oz + 2 fl oz + 2.7 fl oz/a gave 63% redroot pigweed control at 3 to 5 WALT and 86% kochia control. The change from Betanex to Progress in the conventional rate reduced redroot pigweed control but increased kochia control.

Nortron or Etho SC preemergence (PRE) followed by postemergence (POST) herbicides generally gave better control of redroot pigweed and kochia than the same POST treatments without Nortron PRE (Table 2). Nortron PRE at 4 pt/A followed by the Progress micro-rate gave 72% redroot pigweed control at 3 to 5 WALT and 72% kochia control. Nortron PRE at 6 pt/A followed by the Progress micro-rate gave 76% redroot pigweed control at 3 to 5 WALT and 91% kochia control; a significant increase in kochia control with the higher Nortron rate. Nortron PRE at 6 pt/A followed by the Progress micro-rate gave control of redroot pigweed and kochia similar to Nortron PRE at 6 pt/A followed by the Progress conventional rate combinations. This result was not expected since Nortron followed by the conventional rate treatments gave better kochia control than Nortron followed by the micro-rate treatments in 2001. However, the density of kochia in the 2001 experiment was much greater than in the 2002 experiment.

Outlook applied in the third of four Progress micro-rate treatments gave improved control of redroot pigweed and kochia as compared to four Progress micro-rate treatments without Outlook (Table 2). The Outlook plus Progress micro-rate treatment gave 12% sugarbeet injury as compared to 9% injury from the micro-rate treatment alone, a statistically significant but relatively small increase in injury averaged over six locations. Sugarbeet at St. Thomas apparently recovered well from herbicide injury since the yield from all plots was statistically similar even though sugarbeet injury varied from 10% to 35% (St. Thomas injury data not shown).

Yellow foxtail control was excellent from any treatment that included Select and methylated seed oil adjuvant (Table 2). Control was poor when Select was not included in the treatments. Treatments with Select and no oil adjuvant often gave slightly less yellow foxtail control then those with both Select and oil adjuvant.

The results of this experiment suggest that weed control in sugarbeet can be increased by lay-by Outlook; PRE Nortron/Etho SC; POST Nortron at 4 fl oz/A added to micro-rate or conventional rate treatments; and increased rates of herbicides. The potential benefits of these practices must be balanced against the increased risk of sugarbeet injury and increased cost of the weed control program.

Table 1 . Conditions when registered herbicides were applied at seven locations, 2002.

BRECKENRIDGE					
Date	April 30	May 23	May 30	June 6	June 17
Time of day	5:00 P	11:00 A	1:30 P	Noon	9:30 A
Air temp (F)	55	42	88	83	72
Relative humidity (%)	29	43	14	32	51
6-inch soil temp (F)	47	52	66	68	68
Soil moisture	good	good	good	good	good
Sugarbeet (H. Resist)	-	cotyl	2 lf	4-6 lf	4-8 lf
Redroot pigweed	-	cotyl	cot-3 lf	1-2 inch	2 lf-3 inch
Common lambsquarters	-	cotyl	cot-6 lf	1-4 inch	2-8 inch
Conter 15G applied MIF at planting					
CHRISTINE					
Date	May 6	May 24	May 30	June 7	June 13
Time of day	5:00 P	10:00 A	11:30 A	9:00 A	12:30 P
Air temp (F)	48	52	87	66	60
Relative humidity (%)	42	31	21	45	56
6-inch soil temp (F)	44	46	63	65	60
Soil moisture	good	good	fair	fair	fair
Sugarbeet (Crystal 999))	-	cotyl	cot-2 lf	2-4 lf	4-6 lf
Redroot pigweed	-	cotyl	cot-2 lf	cot-6 lf	2 lf-1.5 inch
Common lambsquarters	-	cot-2 lf	cot-4 lf	2-3 inch	2-4 inch
Yellow foxtail	-	0.25-1 inch	0.5-1.5 inch	1-2.5 inch	1-4 inch

(Continued)

Table 1 (cont.) . Conditions when registered herbicides were applied at seven locations, 2002.

CROOKSTON					
Date	May 14	June 3	June 12	June 18	June 24
Time of day	1:30 P	1:15 P	9:30 A	11:00 A	3:00 P
Air temp (F)	64	60	62	72	86
Relative humidity (%)	28	34	52	52	40
6-inch soil temp (F)	47	55	61	61	80
Soil moisture	good	fair	good	good	good
Sugarbeet (Crystal 999)	-	cot-2 lf	4 lf	4-6 lf	6-8 lf
Redroot pigweed	-	cot-1 lf	2-8 lf	2 lf-1.5 inch	2-5 inch
Counter 15G applied MIF at planting					
FARGO					
Date	April 26	May 21	May 28	June 4	June 12
Time of day	1:00 P	10:30 A	11:30 A	9:30 A	5:00 P
Air temp (F)	44	66	76	63	70
Relative humidity (%)	9	19	44	37	35
6-inch soil temp (F)	33	48	60	57	67
Soil moisture	good	good	good	good	good
Sugarbeet (Beta 2088)	-	cotyl	cot-2 lf	2-4 lf	4-6 lf
Redroot pigweed	-	cotyl	cot-2 lf	cot-2 lf	2 lf-1 inch
GLASSTON					
Date	May 2	May 29	June 5	June 17	June 28
Time of day	2:15 P	1:15 P	1:00 P	3:00 P	2:00 P
Air temp (F)	48	83	76	76	81
Relative humidity (%)	25	34	27	31	53
6-inch soil temp (F)	35	60	60	68	73
Soil moisture	good	good	poor	good	good
Sugarbeet (S. Gladiator)	-	cotyl	cot-2 lf	4 lf	6-8 lf
Redroot pigweed	-	cotyl	cot-2 lf	2-8 lf	1-6 inch
Kochia	-	cot-0.25 inch rosette	0.5-1.0 inch rosette	1-4 inch tall	4-9 inch tall
Counter 15G applied MIF at planting					
HILLSBORO					
Date	May 3	May 24	May 31	June 12	June 19
Time of day	12:30 P	3:00 P	Noon	2:00 P	3:00 P
Air temp (F)	58	58	86	68	76
Relative humidity (%)	25	16	7	38	87
6-inch soil temp (F)	38	56	66	63	70
Soil moisture	good	good	good	good	good
Sugarbeet (S. Gladiator)	-	cotyl	2 lf	4-6 lf	6-8 lf
Redroot pigweed	-	cot-2 lf	2-4 lf	6 lf-2 inch	2-6 inch
Counter 15G applied MIF at planting					
ST. THOMAS					
Date	May 2	May 29	June 6	June 14	June 28
Time of day	7:30 P	9:00 A	10:30 A	11:00 A	11:00 A
Air temp (F)	48	75	70	66	78
Relative humidity (%)	22	51	36	52	50
6-inch soil temp (F)	52	58	60	57	72
Soil moisture	good	fair	good	good	good
Sugarbeet (H. Horizon RR)	-	cotyl	2-4 lf	4-6 lf	6-10 lf
Counter 15G applied MIF at planting					
Roundup at 3 pt/A applied June 20 broadcast					
Lorsban 4E at 1 qt/A applied June 28 broadcast					
Harvested October 2					

Table 2 . Registered sugarbeet herbicides at Breckenridge, Christine, Crookston, Fargo, Glasston, Hillsboro and St. Thomas, 2002. (Dexter and Luecke)

Treatment	Rate	6 loc. Sugb inj	1-2 WALT[3] 4 loc. Rrpw cntl	3-5 WALT 4 loc. Rrpw cntl	Chris. Yeft cntl	Glass. Kochia cntl	St. Thom[4] Extrac sucrose	Brdcst. trt. cost
	fl. oz. or oz/A	%	%	%	%	%	lb/A	$/A
Betanex + UpBeet + Stinger + Select + MSO[1] (T1[2]-T4)	8 + 0.125 + 1.3 + 2 + 1.5%	8	94	69	100	53	4550	89
Betamix + UpBeet + Stinger + Select + MSO (T1-T4)	8 + 0.125 + 1.3 + 2 + 1.5%	10	92	66	100	58	4500	89
Progress + UpBeet + Stinger + Select + MSO (T1-T4)	5.7 + 0.125 + 1.3 + 2 + 1.5%	7	90	63	100	60	4720	83
Progress + UpBeet + Stinger + Select + MSO (T1-T4)	5.7 + 0.16 + 1.3 + 2 + 1.5%	7	92	67	100	58	4380	95
Progress + UpBeet +Stinger + Select + MSO (T1-T4)	5.7 + 0.125 + 1.3 + 2 + 1.5% (T1, T2) 8.7 + 0.125 + 1.3 + 2 + 1.5% (T3, T4)	9	91	65	100	57	4760	96
Progress + UpBeet + Stinger + Select + MSO (T1-T4) + Nortron at 4 fl oz (T1, T2)	5.7 + 0.125 + 1.3 + 2 + 1.5%	7	91	64	100	76	5280	89
Progress + UpBeet + Stinger + Select + MSO (T1-T4) + Etho SC at 4 fl oz (T1, T2)	5.7 + 0.125 + 1.3 + 2 + 1.5%	8	90	65	100	64	4620	89
Betanex + UpBeet + Stinger + Select (T1-T3)	24 (T1)/32 (T2)/49 (T3) + 0.25 + 2 + 2.7	11	93	73	92	72	4740	165
Betamix + UpBeet + Stinger + Select (T1-T3)	24 (T1)/32 (T2)/49 (T3) + 0.25 + 2 + 2.7	11	91	75	96	76	4810	165
Progress + UpBeet + Stinger + Select (T1-T3)	18 (T1)/23 (T2)/36 (T3) + 0.25 + 2 + 2.7	10	88	63	100	86	4810	147
Progress + UpBeet + Stinger + Select (T1-T3) + Nortron at 4 fl oz (T1, T2)	18 (T1)/23 (T2)/36 (T3) + 0.25 + 2 + 2.7	13	92	70	97	84	4950	154
Progress + UpBeet + Stinger + Select (T1-T3) + Etho SC at 4 fl oz (T1, T2)	18 (T1)/23 (T2)/36 (T3) + 0.25 + 2 + 2.7	12	93	71	98	90	4960	154
Nortron (PRE) 6 pt Progress + UpBeet + Stinger + Select + MSO (T1-T4)	5.7 + 0.125 + 1.3 + 2 + 1.5%	8	95	76	100	91	5410	158
Etho SC (PRE) 6 pt Progress + UpBeet + Stinger + Select + MSO (T1-T4)	5.7 + 0.125 + 1.3 + 2 + 1.5%	9	96	75	100	89	4600	158
Nortron (PRE) 4 pt Progress + UpBeet + Stinger + Select + MSO (T1-T4)	5.7 + 0.125 + 1.3 + 2 + 1.5%	7	92	72	100	72	5020	133
Nortron (PRE) 6 pt Progress + UpBeet + Stinger + Select (T1-T3)	18 (T1)/23 (T2)/36 (T3) + 0.25 + 2 + 2.7	11	96	78	100	90	4700	222

Nortron (PRE) 6 pt Progress + UpBeet + Stinger + Select (T1-T3) 18 + 0.25 + 2 + 2.7		8	95	79	96	89	4880	127

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Table 2. (cont). Registered sugarbeet herbicides at Breckenridge, Christine, Crookston, Fargo, Glasston, Hillsboro and St. Thomas, 2002. (Dexter and Luecke)

Treatment	Rate	6 loc. Sugb inj	1-2 WALT[3] 4 loc. Rrpw cntl	3-5 WALT 4 loc. Rrpw cntl	Chris. Yeft cntl	Glass. Kochia cntl	St. Thom[4] Extrac sucrose	Brdcst. trt. cost
	fl. oz. or oz/A	%	%	%	%	%	lb/A	$/A
Progress + UpBeet + Stinger + Select + MSO (T1-T4) 5.7 (T1, T2)/8.7 (T3, T4) + 0.125 + 1.3 + 2 + 1.5% + Outlook at 21 fl oz (T3)		12	96	76	100	74	4630	118
Progress + UpBeet (T1) 10 + 0.5 Progress + UpBeet + Stinger (T2, T3) 23 (T2)/30 (T3) + 0.5 + 4.7		13	97	84	63	94	4840	156
Progress + UpBeet + Nortron (T1) 10 + 0.5 + 6 Progress + UpBeet + Nortron + Stinger (T2) 23 + 0.5 + 6 + 4.7 Progress + UpBeet + Stinger + Outlook (T3) 30 + 0.5 + 4.7 + 21		23	100	93	72	97	4680	188
	LSD (0.05)	3	4	10	5	11	NS	-

[1]MSO = methylated seed oil adjuvant
[2]T1 = first POST application, T2 = second POST application, etc.
[3]WALT = weeks after last treatment.
[4]Plots at St. Thomas were maintained free of weeds by using Roundup on Roundup Ready sugarbeet.