

Sweet corn herbicide management trial at Waseca, MN - 1997. Becker, Roger L., Vincent A. Fritz, James B. Hebel, and Douglas W. Miller. The objective of this experiment was to evaluate weed management systems with preemergence and postemergence herbicides. This study was conducted on a Webster clay loam soil with pH 6.4. A randomized complete block design with three reps was utilized. Plots were 10 feet by 25 feet (4 rows). 'Jubilee' and 'Empire' sweet corn were seeded (two row subplots per plot) at 24,000 plants/A on May 13, 1997. Herbicide application data are provided below. Corn was harvested on August 25, from a 20 foot row within each subplot. Total ear yield, husked ear yield, and kernel yield were determined. In addition, total ears and 'usable' ears were counted. Usable ears are defined as ears suitable for use as frozen corn-on-the-cob product. Weed control and yield data are provided in the tables below.

Application Data

Treatment Date	Preemergence 5/13/97	Postemergence 6/11/97
Air Temp (°F)	49	71
Sky	cloudy	partly cloudy
Wind (mph)	SE 5-7	S 8-10
Gift		
Density (#/ft ²)	--	15
Size (inch)	--	0.5-4
Cocb		
Density (#/ft ²)	--	0.5
Size (inch)	--	0.5-3
Colq		
Density (#/ft ²)	--	0.05
Size (inch)	--	0.5-3
Corw		
Density (#/ft ²)	--	0.25
Size (inch)	--	0.5-3
Vele		
Density (#/ft ²)	--	1.0
Size (inch)	--	0.5-3
Rainfall before Application		
Week 1 (inch)	0.59	0.19
Rainfall after Application		
Week 1 (inch)	0.32	0.17
Week 2 (inch)	1.69	1.67

Precipitation was 1.5 inches below normal for the month of May preceding planting of sweet corn. Only two light showers (0.2 and 0.1 inch) of precipitation fell during the week following soil applied applications. Preemergence herbicide performance generally reflects lack of moisture to activate herbicides. The giant foxtail pressure was extremely heavy and uniform throughout the study area. Velvetleaf pressure was heavy and cocklebur pressure moderate to heavy with uniform populations throughout the study. Common ragweed and common lambsquarter populations were low to moderate with some patchiness throughout the trial area. Weed control efficacy will be discussed for the August 7th ratings as this best reflects performance. All plots were cultivated following the ratings taken on July 9.

Giant foxtail control was excellent with all total postemergence programs and was excellent for preemergence RPA-201772 (isoxaflutole) used alone or tank mixed with reduced rates of metolachlor (1.5 lb ai/A). Metolachlor at labeled rates (3.0) resulted in fair giant foxtail control when followed with postemergence broadleaf products without grass activity such as bromoxynil, 2,4-D, and bentazon plus atrazine package mix. CGA-152005 (prosulfuron) used alone (0.018) did not enhance preemergence metolachlor grass performance, but resulted in good giant foxtail control with the addition of atrazine (0.9) to CGA-152005 (0.009). Total soil applied programs resulted in lower giant foxtail control, most notably the pendimethalin + cyanazine + atrazine tank mix, compared with total postemergence programs primarily due to inadequate soil moisture preceding and following preemergence applications.

As expected, there was only moderate suppression of broadleaf weeds with nicosulfuron used alone. Tank mixing nicosulfuron (0.031) with atrazine (1.0), or with atrazine (0.5) plus F-8426 (carfentrazone-ethyl) (0.008) provided excellent broadleaf control. Broadleaf herbicide programs sequential to metolachlor (3.0) generally provided excellent broadleaf control with the following caveats. CGA-248757 (Action) (0.0036) plus atrazine (0.5) resulted in poor to fair control of velvetleaf, fair to good control of cocklebur and poor control of common ragweed. F-8426 (0.008) plus atrazine (0.5) resulted in fair to good control of common cocklebur and common ragweed. RPA-201772 resulted in excellent grass and broadleaf control at all rates tested whether tank mixed with metolachlor or not, with the exception of providing only suppression of common cocklebur. It should be noted however, that RPA-201772 provided much better broadleaf control than the standard program, cyanazine + atrazine (2.0 + 0.9) tank mixed with acetanilide herbicides or pendimethalin.

No significant visible crop injury was apparent by the August 7th rating period. At the July 9th rating, visual injury for the variety Empire was not significant at the 5% level (was significant at the 10% level) but there was significant injury for the variety Jubilee (LSD 0.05). Crop injury was generally expressed as growth reduction with occasional leaf chlorosis and was rated visually. There was not a clear trend for an increased in leaf chlorosis with sulfonylurea herbicides. Growth reduction was uneven stunting throughout the plot area.

Compared with hand-weeded checks, there was significant growth reduction with Jubilee with CGA-152005 (0.018), bromoxynil (0.5), and 2,4-D (0.5) all applied postemergence sequential to preemergence metolachlor (3.0), with nicosulfuron (0.031) when tank-mixed with atrazine (1.0), and with safened acetochlor (2.5) tank mixed with cyanazine and atrazine applied preemergence.

Visible injury did not consistently correlate with yield reduction. CGA-152005 (0.018) did reduce cut corn yield of Jubilee when compared with several postemergence treatments and the hand weeded check. CGA-152005 also reduced total number of ears harvested per acre, and the number of corn on the cob usable ears per acre. CGA-248757 reduced the number of corn on the cob usable ears per acre, but not other yield parameters. These herbicides did not reduce ear length or ear diameter. Bromoxynil was misapplied resulting in an over application, and considering bromoxynil tolerance, injury was expected.

The impact of broadleaf weed and grass competition can be seen where metolachlor was used alone at the reduced rate (1.5). This resulted in a significant decrease in all harvest measurements of Jubilee except for that of ear diameter. This phenomenon is also reflected to a more extreme degree in the weedy check for all harvest data collected. Weed competition as a result of poor performance of total soil applied herbicide programs, most notably the pendimethalin tank-mix, resulted in reduced cut corn yield and the number of corn on the cob usable ears per acre. Visual injury earlier in the season with the acetochlor treatment may not have been the primary cause of yield reduction since, as with other soil applied treatments, crop injury was confounded with weed competition.

Weed competition impacts on Empire yield are clear, but herbicide injury impacts were minimal. Reduced harvest values for parameters measured from weed competition were noted similar to that noted with Jubilee with the reduced rate of metolachlor (1.5) used alone, and in the weedy check, with the exception that ear diameter did not differ with Empire. Again, the total soil applied herbicide programs resulted in reduced number of Empire corn on the cob usable ears per acre, likely due to weed competition. With postemergence programs, nicosulfuron (0.031) used alone did reduce cut corn yield and the number of corn on the cob usable ears per acre compared with most of the other postemergence herbicide programs including comparison with the same rate of nicosulfuron tank mixed with atrazine (1.0), which may be indicative of confounding broadleaf weed control and crop injury. The only other notable impact of herbicide use on the variety Empire was reduction in the number of corn on the cob usable ears per acre when CGA-152005 (0.018) was used sequential to a metolachlor compared with the atrazine plus nicosulfuron treatment, but not when compared with other treatments including the handweeded check. It should be noted that yield of the nicosulfuron plus atrazine treatment was the highest of any treatment. (Dept. Of Agronomy and Plant Genetics, University of Minnesota, St. Paul).

Table 1. Sweet corn herbicide weed management trial at Waseca MN - 1997. Weed control results (Becker et al.).

Treatment ¹	Rate ¹ (lb/A)	Weed Control									
		Gift		Cocb		Colq		Corw		Vele	
		7/9	8/7	7/9	8/7	7/9	8/7	7/9	8/7	7/9	8/7
		----- (%) -----									
Postemergence											
Nicosulfuron + COC ² + 28%N ³	0.031 + 1.25% + 2.5%	98	99	45	42	27	42	29	32	62	50
Nicosulfuron + atrazine + COC + 28%N	0.031 + 1.0 + 1.25% + 2.5%	98	99	87	90	96	99	73	83	82	82
F8426 + atrazine + nicosulfuron + NIS ⁴	0.008 + 0.5 + 0.031 + 0.25%	96	98	77	80	95	99	77	86	96	99
Preemergence and Postemergence											
(Metolachlor & safener) + (CGA 248757 + atrazine + COC + 28%N)	(3.0) + (0.0036 + 0.5 + 1.25% + 2.5%)	87	82	58	72	93	93	32	32	35	58
(Metolachlor & safener) + (CGA 152005 + COC + 28%N)	(3.0) + (0.018 + 1.25% + 2.5 %)	73	70	95	98	77	95	96	96	93	94
(Metolachlor & safener) + (CGA 152005 +CGA 248757 + atrazine + COC + 28%N)	(3.0) + (0.009 + 0.0036 + 0.5 + 1.25% + 2.5%)	91	90	92	94	96	99	96	99	95	99
(Metolachlor & safener) + (F8426 + atrazine + NIS)	(3.0) + (0.008 + 0.5 + 0.25%)	95	91	77	74	95	98	79	63	90	94
(Metolachlor & safener) + (F8426 + atrazine + dicamba + NIS)	(3.0) + (0.008 + 0.5 + 0.094 + 0.25%)	89	87	95	98	96	99	96	99	93	99
(Metolachlor & safener) + (bromoxynil)	(3.0) + (0.38)	82	76	96	90	98	99	98	96	98	92
(Metolachlor & safener) + (2,4-D amine)	(3.0) + (0.5)	79	79	96	90	88	90	81	77	76	80
(Metolachlor & safener) + (bentazon & atrazine ⁵ + COC + 28%N)	(3.0) + (0.625 & 0.625 + 1.25% + 2.5%)	86	82	98	96	98	99	98	99	96	96
Preemergence											
Metolachlor & safener	1.5	84	88	0	7	3	42	0	0	0	10
Metolachlor & safener + RPA 201772	1.5 + 0.07	95	98	47	53	90	98	83	98	96	98
Metolachlor & safener +RPA 201772	1.5 + 0.094	97	98	66	67	99	98	98	98	99	98
RPA 201772	0.094	92	94	44	52	99	96	94	89	99	96
Acetochlor & dichlormid ⁶ + cyanazine + atrazine	2.5 + 2.0 + 0.9	87	87	33	42	63	57	33	50	45	45
SAN582H+ cyanazine + atrazine	1.5 + 2.0 + 0.9	91	87	27	57	32	48	12	20	44	58
Pendimethalin + cyanazine + atrazine	1.5 + 2.0 + 0.9	64	51	13	43	57	78	28	18	42	65
Handweeded check		100	100	100	100	100	100	100	100	100	100
Weedy check		--	--	--	--	--	--	--	--	--	--
LSD (0.05)		15	18	28	27	26	13	27	31	22	21

¹ Treatments and rates in parenthesis represent a separate application.

² COC = Class Crop Oil Concentrate.

³ 28%N = 28% UAN fertilizer solution.

⁴ NIS = Class Preference nonionic surfactant.

⁵ Premix= Laddok S-12.

⁶ Surpass 6.4E.

Table 2. Sweet corn herbicide weed management trial at Waseca MN - 1997. Jubilee sweet corn injury and yield. (Becker et al.).

Treatment ¹	Rate ¹ (lb/A)	Jubilee					Total Ears ----- (#/A) -----	Usable Ears -----
		Injury 7/9 (%)	Total Yield ----- (Ton/A) -----	Husked Yield -----	Kernel Yield -----	Total Ears -----		
Postemergence								
Nicosulfuron + COC ² + 28%N ³	0.031 + 1.25% + 2.5%	7	6.7	5.0	3.3	19747	12487	
Nicosulfuron + atrazine + COC + 28%N	0.031 + 1.0 + 1.25% + 2.5%	10	8.0	5.6	3.7	19457	16262	
F8426 + atrazine + nicosulfuron + NIS ⁴	0.008 + 0.5 + 0.031 + 0.25%	3	7.5	5.7	3.9	20909	13068	
Preemergence and Postemergence								
(Metolachlor & safener) + (CGA 248757 + atrazine + COC + 28%N)	(3.0) + (0.0036 + 0.5 + 1.25% + 2.5%)	3	6.7	4.9	3.2	19747	9874	
(Metolachlor & safener) + (CGA 152005 + COC + 28%N)	(3.0) + (0.018 + 1.25% + 2.5 %)	10	5.3	3.4	2.2	13358	6389	
(Metolachlor & safener) + (CGA 152005 +CGA 248757 + atrazine + COC + 28%N)	(3.0) + (0.009 + 0.0036 + 0.5 + 1.25% + 2.5%)	9	7.5	5.2	3.5	18876	11326	
(Metolachlor & safener) + (F8426 + atrazine + NIS)	(3.0) + (0.008 + 0.5 + 0.25%)	2	7.5	5.4	3.6	19457	13649	
(Metolachlor & safener) + (F8426 + atrazine + dicamba + NIS)	(3.0) + (0.008 + 0.5 + 0.094 + 0.25%)	5	7.7	5.4	3.6	20037	11616	
(Metolachlor & safener) + (bromoxynil)	(3.0) + (0.38)	15	6.2	4.3	2.6	17715	9873	
(Metolachlor & safener) + (2,4-D amine)	(3.0) + (0.5)	15	6.3	4.3	2.7	17424	9583	
(Metolachlor & safener) + (bentazon & atrazine ⁵ + COC + 28%N)	(3.0) + (0.625 & 0.625 + 1.25% + 2.5%)	6	7.2	4.5	2.6	16843	10454	
Preemergence								
Metolachlor & safener	1.5	3	1.2	0.7	0.4	4356	0	
Metolachlor & safener +RPA 201772	1.5 + 0.07	7	6.6	4.6	3.0	17714	9293	
Metolachlor & safener +RPA 201772	1.5 + 0.094	7	7.1	5.2	3.4	17715	12197	
RPA 201772	0.094	3	6.4	4.0	2.6	16262	9293	
Acetochlor & dichlormid ⁶ + cyanazine + atrazine	2.5 + 2.0 + 0.9	12	4.7	3.1	1.9	14810	3485	
SAN582H + cyanazine + atrazine	1.5 + 2.0 + 0.9	2	4.0	2.4	1.5	12197	1452	
Pendimethalin + cyanazine + atrazine	1.5 + 2.0 + 0.9	3	3.5	2.3	1.5	11035	2613	
Handweeded check		0	7.1	5.1	3.4	18295	11907	
Weedy check		0	1.0	0.7	0.4	4066	0	
LSD (0.05)		9	2.0	1.5	1.1	5279	5061	

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³ 28%N = 28% UAN fertilizer solution.

⁴ NIS = Class Preference nonionic surfactant.

⁵ Premix= Laddok S-12.

⁶ Surpass 6.4E.

Table 3. Sweet corn herbicide weed management trial at Waseca MN - 1997. Empire sweet corn injury and yield. (Becker et al.).

Treatment ¹	Rate ¹ (lb/A)	Empire					
		Injury 7/9 (%)	Total Yield ----- (Ton/A)	Husked Yield -----	Kernel Yield -----	Total Ears ----- (#/A)	Usable Ears -----
Postemergence							
Nicosulfuron + COC ² + 28%N ³	0.031 + 1.25% + 2.5%	5	5.8	4.2	2.7	16553	9293
Nicosulfuron + atrazine + COC + 28%N	0.031 + 1.0 + 1.25% + 2.5%	3	9.4	7.0	4.7	23813	20038
F8426 + atrazine + nicosulfuron + NIS ⁴	0.008 + 0.5 + 0.031 + 0.25%	0	7.4	5.7	3.3	20909	15391
Preemergence and Postemergence							
(Metolachlor & safener) + (CGA 248757 + atrazine + COC + 28%N)	(3.0) + (0.0036 + 0.5 + 1.25% + 2.5%)	0	7.8	5.9	3.9	23522	13939
(Metolachlor & safener) + (CGA 152005 + COC + 28%N)	(3.0) + (0.018 + 1.25% + 2.5 %)	10	7.5	5.7	3.7	22361	11325
(Metolachlor & safener) + (CGA 152005 +CGA 248757 + atrazine + COC + 28%N)	(3.0) + (0.009 + 0.0036 + 0.5 + 1.25% + 2.5%)	3	8.7	6.5	4.2	22361	14520
(Metolachlor & safener) + (F8426 + atrazine + NIS)	(3.0) + (0.008 + 0.5 + 0.25%)	0	8.9	6.6	4.5	22071	16263
(Metolachlor & safener) + (F8426 + atrazine + dicamba + NIS)	(3.0) + (0.008 + 0.5 + 0.094 + 0.25%)	2	8.7	6.7	4.2	23522	16843
(Metolachlor & safener) + (bromoxynil)	(3.0) + (0.38)	8	7.9	5.9	3.7	22942	13068
(Metolachlor & safener) + (2,4-D amine)	(3.0) + (0.5)	8	8.2	5.9	3.6	23232	12197
(Metolachlor & safener) + (bentazon & atrazine ⁵ + COC + 28%N)	(3.0) + (0.625 & 0.625 + 1.25% + 2.5%)	7	8.2	6.2	3.8	23813	12487
Preemergence							
Metolachlor & safener	1.5	0	2.7	2.0	1.1	12197	290
Metolachlor & safener +RPA 201772	1.5 + 0.07	0	7.4	5.5	3.7	20909	11326
Metolachlor & safener +RPA 201772	1.5 + 0.094	2	7.6	5.6	3.5	20038	11616
RPA 201772	0.094	0	7.7	5.8	3.7	22651	12197
Acetochlor & dichlormid ⁶ + cyanazine + atrazine	2.5 + 2.0 + 0.9	0	5.3	3.9	2.3	18876	5518
SAN582H + cyanazine + atrazine	1.5 + 2.0 + 0.9	0	4.3	2.9	1.7	15972	2904
Pendimethalin + cyanazine + atrazine	1.5 + 2.0 + 0.9	0	4.8	3.6	2.0	18295	2033
Handweeded check		0	8.0	5.9	3.7	21490	13649
Weedy check		0	1.1	0.8	0.5	4937	290
LSD (0.05)		ns	2.2	1.7	1.3	6243	5827

¹ Treatments and rates in parenthesis represent a separate application.

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