Conventional and glufosinate tolerant sweet corn herbicide weed management trial at Waseca, MN - 2000. Becker, Roger L., Vincent A. Fritz, James B. Hebel, Douglas W. Miller, and Bradley D. Kinkaid. The objective of this experiment was to evaluate weed management systems with preemergence and postemergence herbicides in conventional sweet corn and glufosinate treatments in glufosinate tolerant sweet corn. This study was conducted on a Webster clay loam soil. 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 22,000 plants/A on May 23, 2000. Rogers "Attribute ™ Insect Protected Sweet Corn" (GH-0937) was planted adjacent to the conventional hybrids at the same seeding rate and planting date. Herbicide application data are provided below. Corn was harvested from a 20 foot row within each plot/subplot. Total ear yield, husked ear yield, and kernel yield were determined. In addition, total ears, 'usable' ears, average ear length, and average ear diameter were measured. 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	Preemergence	Postemergence	Late Postemergence
Date	5/23/00	6/19/00	7/3/00
Air Temp (°F)	70	76	60
Wind (mph)	NW 8-10	SW 15	SW 5
Sky	Partly cloudy	Partly cloudy	Partly cloudy
Sweet corn Stage	--	3 collar	5-6 collar
Grassy weeds Size (inch)	--	1-3	0-2
Cocb Size (inch)	--	1-6	--
Corw Size (inch)	--	1-4	--
Rainfall before Application Week 1 (inch)	3.15	2.18	1.19
Rainfall after Application Week 1 (inch)	1.06	1.43	4.07
Week 2 (inch)	4.92	1.19	0.98

Weed control results.

The study area had extremely heavy pressure of common cocklebur, > 1 plant/ft^2, such that giant foxtail and common ragweed were present at very low populations or not at all unless common cocklebur was controlled with herbicide. Giant foxtail was the least common of the three species. Giant foxtail control was excellent with all treatments with this very low pressure. Where cocklebur control was 70% or higher, the giant foxtail control ratings reflect what would be expected in the field without the severe common cocklebur competition, but giant foxtail control ratings where cocklebur control was 50% or less should be interpreted with caution.

Common cocklebur control generally was poor with nicosulfuron treatments (Table 1.). Of those, the best control was achieved with the nicosulfuron with the addition of 1.0 lb ai/ac atrazine, yet this rate of atrazine was not enough to gain acceptable control. Carfentrazone-ethyl treatments show improved cocklebur control with crop oil concentrate compared to the use of nonionic surfactant and this difference is reflected most in the July 14 ratings. Adding 0.5 lb atrazine to the nicosulfuron plus carfentrazone-ethyl

treatment was not enough atrazine to provide cocklebur control comparable to adding 1.0 lb of atrazine alone by the July 14 ratings.

Halosulfuron at 0.016 or 0.032 lb ai provided excellent common cocklebur control considering the severe pressure. Excellent control was also achieved with the full use rate of the prepackage mixture of bentazon plus atrazine (Laddok). Dicamba + SAN 1269H (Distinct) showed severe visual growth regulator injury symptoms on cocklebur on the June 30 rating and by the July 14 rating, most of the cocklebur plants had died resulting in excellent control as well. All of the glufosinate treatments provided excellent common cocklebur control when applied to glufosinate-tolerant sweet corn (Table 2.). CGA248757 (Action) at 0.0036 lb ai + atrazine at 0.5 lb provided only moderate control of common cocklebur as did the reduced rate of atrazine + bentazon prepackage mix plus carfentrazone-ethyl. As seen with the nicosulfuron tank mixtures, carfentrazone-ethyl plus reduced rates of atrazine applied sequential to soil applied metolachlor did not provide adequate common cocklebur control with the extremely heavy populations of common cocklebur present in this study.

Common ragweed control was excellent with all glufosinate treatments, RPA 201772 (isoxaflutole) treatments, the dicamba + SAN1269H treatment, the full rate of the atrazine plus bentazon package mix, the CGA 248757 + atrazine treatment and both rates of halosulfuron. Atrazine at 1.0 lb provided moderate ragweed control when applied postemergence with nicosulfuron, as did carfentrazone-ethyl plus reduced rates of the atrazine plus bentazon package mixture sequential to s-metolachlor & CGA-154281. Carfentrazone-ethyl plus reduced rates of atrazine provided poor to moderate ragweed control when applied sequential to s-metolachlor & CGA-154281 and poor control of common ragweed when applied tank mixed with nicosulfuron.

Sweet corn tolerance.

A relatively wet and cool period following planting resulted in herbicide injury on the Empire and Jubilee varieties (Tables 3 and 4.). Halosulfuron and nicosulfuron injury was expressed as chlorosis at the leaf collar with subsequent growth showing leaf crinkling and chlorosis as the former collar area moved out with growth expansion of the leaf. Growth reduction occurred with some of these treatments as well. Most of the growth reduction apparent at the June 30 rating was no longer apparent on the July 14 rating. Growth reduction, severe buggy whip, and subsequent leaf expansion showing leaf-crinkling injury occurred with the dicamba & SAN 1269H treatment. Again, most of this growth reduction and visual symptomology was no longer evident by the July rating. The atrazine and bentazon package mixture and carfentrazone-ethyl treatments only caused temporary leaf necrosis.

Yield reductions with both Jubilee and Empire sweet corn most reflects the severe competition from common cocklebur rather than crop injury from herbicides. The dramatic competition is most apparent in the useable ear count for treatments that had severe common cocklebur competition such as nicosulfuron used alone. Jubilee did tend to be more sensitive to nicosulfuron and halosulfuron, but the presumed tolerance of Empire to sulfonylurea herbicides was not as good as expected. Dicamba + SAN1269H and halosulfuron caused growth reduction without any significant leaf chlorosis on Jubilee and Empire varieties. With these two treatments, cocklebur control was good as was control of other species so yield reductions were due to herbicide injury. Most of the herbicide injury where moderate chlorosis and necrosis occurred, such as with carfentrazone-ethyl or nicosulfuron treatments, was confounded with severe cocklebur competition such that a determination of herbicide injury as the cause of yield reduction cannot be made. Total yield and kernel yield showed that the injury that occurred with halosulfuron and that which occurred with dicamba + San 1269H did not result in any reduction of yield with either Jubilee or Empire varieties. With both Jubilee and Empire, there was no significant stand reduction with any treatments.

Glufosinate-tolerant sweet corn did not show any injury with glufosinate treatments and generally resulted in high total yield, kernel yield, and number of useable ears Table 5.). (Department of Agronomy and Plant Genetics, University of Minnesota, St. Paul).

Table 1. Conventional and glufosinate tolerant sweet corn herbicide weed management trial at Waseca, MN - 2000. Weed control results in conventional sweet corn (Becker et al.).

		Weed Control					
		Gift		Cocb		Colq	
Treatment[1]	Rate[1]	6/30	7/14	6/30	7/14	6/30	7/14
	(lb ai/A)	(%)					
Postemergence							
Nicosulfuron + COC[2] + 28%N[3]	0.031 + 1.25% + 0.625%	100	99	28	3	8	0
Nicosulfuron + atrazine + COC + 28%N	0.031 + 1.0 + 1.25% + 0.625%	100	99	52	52	60	67
Carfentrazone-ethyl + nicosulfuron + NIS[4] +28%N	0.008 + 0.031 + 0.25% + 0.625%	100	99	28	7	0	3
Carfentrazone-ethyl + nicosulfuron + COC +28%N	0.008 + 0.031 + 1.25% + 0.625%	100	99	41	13	11	0
Carfentrazone-ethyl + atrazine + nicosulfuron + NIS + 28%N	0.008 + 0.5 + 0.031 + 0.25% + 0.625%	100	99	50	39	44	38
(Preemergence) and Postemergence							
(s-metolachlor)[5] + halosulfuron + NIS	(1.9) + 0.016 + 0.25%	100	98	80	89	100	96
(s-metolachlor) + halosulfuron + NIS	(1.9) + 0.032 + 0.25%	100	97	84	98	100	99
s-metolachlor) + CGA 248757 + atrazine + COC + 28%N	(1.9) + 0.0036+ 0.5 + 1.25% + 0.625%	100	98	77	72	85	98
(s-metolachlor) + carfentrazone-ethyl + NIS	(1.9) + 0.008 + 0.25%	99	99	50	40	30	39
(s-metolachlor) + carfentrazone-ethyl + atrazine + NIS	(1.9) + 0.008 + 0.5 + 0.25%	99	99	56	42	52	55
(s-metolachlor) + carfentrazone-ethyl + atrazine + NIS	(1.9) + 0.008 + 0.75 + 0.25%	98	99	54	54	57	49
(s-metolachlor) + carfentrazone-ethyl + atrazine & bentazon[6] + NIS	(1.9) + 0.008 0.406 & 0.406 + 0.25%	99	99	75	64	93	68
(s-metolachlor) + atrazine & bentazon + COC + 28%N	(1.9) + 0.625 & 0.625 + 1.25% + 0.625%	100	99	99	98	100	99
(s-metolachlor) + dicamba & San 1269H[7] + NIS +28%N	(1.9) + 0.13 & 0.05 0.25% + 0.625%	100	98	66	98	100	99
Premergence							
s-metolachlor + RPA 201772	0.95 + 0.07	100	99	73	70	100	99
s-metolachlor + RPA 201772	0.95 + 0.094	100	99	77	67	100	99
RPA 201772	0.094	100	99	69	48	100	99
Hand weeded check		100	100	100	100	100	100
Weedy check		--	--	--	--	--	--
LSD (0.05)		ns	ns	13	14	23	18

[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] s-metolachlor & CGA-154281 = Dual II Magnum.
[6] Premix = Laddok S-12.
[7] Premix = Distinct.

Table 2. Conventional and glufosinate tolerant sweet corn herbicide weed management trial at Waseca, MN - 2000. Weed control results in glufosinate tolerant sweet corn (Becker et al.).

		Weed Control					
		Gift		Cocb		Colq	
Treatment[1]	Rate[1]	6/30	7/14	6/30	7/14	6/30	7/14
	(lb ai/A)	(%)					
Postemergence							
Glufosinate + AMS[2]	0.27 + 3.0	100	92	99	97	100	96
Glufosinate + AMS	0.36 + 3.0	100	94	99	97	100	97
Glufosinate + atrazine + AMS	0.27 + 0.5 + 3.0	100	97	99	97	100	98
Glufosinate + atrazine + AMS	0.27 + 0.75 + 3.0	100	98	100	99	100	99
Glufosinate + atrazine + AMS	0.27 + 1.0 + 3.0	100	99	100	99	100	99
(Postemergence) + Late Postemergence							
(Glufosinate + AMS) + Glufosinate + AMS	(0.27 + 3.0) + 0.27 + 3.0	100	93	99	99	100	98
Preemergence + (Postemergence)							
RPA 201772 + (Glufosinate + AMS)	0.047 + (0.27 + 3.0)	100	98	100	98	100	98
s-metolachlor & CGA-154281 + (Glufosinate + AMS)	0.95 + (0.27 + 3.0)	100	99	98	98	100	98
Hand weeded check		100	99	100	99	100	99
LSD (0.05)		ns	3	ns	ns	ns	ns

[1] Treatments and rates in parenthesis represent a separate application.
[2] AMS = Spray grade ammonium sulfate. Rate is in pounds per acre.

Table 3. Conventional and glufosinate tolerant sweet corn herbicide weed management trial at Waseca, MN - 2000. Jubilee sweet corn injury and yield. (Becker et al.).

		Jubilee										
		Chlorosis	Injury[1]	G.R.[2]		Total	Husked	Kernel	Total	Usable	Ear	Ear
Treatment[3]	Rate[3]	6/30	6/30	6/30	7/14	Yield	Yield	Yield	Ears	Ears	Length	Dia[4]
	(lb ai/A)	----------(%) ----------				-------- (ton/A) --------			----- (#/A) -----		(inch)	(cm)
Postemergence												
Nicosulfuron + COC[5] + 28%N[6]	0.031 + 1.25% + 0.625%	1	1	3	18	0.2	0.1	0.08	1452	0	4.8	4.0
Nicosulfuron + atrazine + COC + 28%N	0.031 + 1.0 + 1.25% + 0.625%	6	4	3	3	1.2	0.9	0.6	7260	0	5.6	4.2
Carfentrazone-ethyl + nicosulfuron + NIS[7] +28%N	0.008 + 0.031 + 0.25% + 0.625%	0	2	0	8	0.3	0.2	0.1	1742	0	5.7	4.1
Carfentrazone-ethyl + nicosulfuron + COC +28%N	0.008 + 0.031 + 1.25% + 0.625%	0	1	2	8	0.6	0.4	0.2	4646	0	5.2	3.9
Carfentrazone-ethyl + atrazine + nicosulfuron + NIS + 28%N	0.008 + 0.5 + 0.031 + 0.25% + 0.625%	2	2	0	3	0.8	0.7	0.4	5518	0	6.0	4.1
(Preemergence) and Postemergence												
(s-metolachlor)[8] + halosulfuron + NIS	(1.9) + 0.016 + 0.25%	0	2	4	11	3.6	2.9	2.0	15101	3775	6.9	4.7
(s-metolachlor) + halosulfuron + NIS	(1.9) + 0.032 + 0.25%	0	36	12	18	4.8	3.7	2.7	18295	4066	7.3	4.7
(s-metolachlor) + CGA 248757 + atrazine + COC + 28%N	(1.9) + 0.0036+ 0.5 + 1.25% + 0.625%	2	0	0	0	3.1	2.6	1.8	13068	2323	6.9	4.6
(s-metolachlor) + carfentrazone-ethyl + NIS	(1.9) + 0.008 + 0.25%	7	0	0	0	3.1	2.4	1.7	13068	3194	6.8	4.6
(s-metolachlor) + carfentrazone-ethyl + atrazine + NIS	(1.9) + 0.008 + 0.5 + 0.25%	2	2	0	5	2.9	2.2	1.5	13068	2323	6.5	4.5
(s-metolachlor) + carfentrazone-ethyl + atrazine + NIS	(1.9) + 0.008 + 0.75 + 0.25%	2	0	0	0	3.9	3.1	2.0	16843	4646	6.9	4.6
(s-metolachlor) + carfentrazone-ethyl + atrazine & bentazon[9] + NIS	(1.9) + 0.008 0.406 & 0.406 + 0.25%	3	0	0	3	3.7	2.9	2.0	15391	2323	7.0	4.7
(s-metolachlor) + atrazine & bentazon + COC + 28%N	(1.9) + 0.625 & 0.625 + 1.25% + 0.625%	4	0	3	5	5.4	4.3	3.0	19747	9293	7.5	4.7
(s-metolachlor) + dicamba & San 1269H[10] + NIS +28%N	(1.9) + 0.13 & 0.05 0.25% + 0.625%	0	3	18	11	4.4	3.4	2.4	20328	1452	6.7	4.7
Premergence												
s-metolachlor + RPA 201772	0.95 + 0.07	0	0	0	3	3.7	3.0	2.1	15682	2614	7.0	4.7
s-metolachlor + RPA 201772	0.95 + 0.094	0	0	2	7	4.8	2.8	2.0	15391	3485	6.8	4.7
RPA 201772	0.094	0	0	0	13	2.5	2.0	1.4	12197	1742	5.9	4.3
Handweeded check		0	0	0	0	5.2	4.2	2.6	20038	4937	7.3	4.7
Weedy check		0	0	0	13	0.8	0.6	0.4	5518	0	5.4	4.2
LSD (0.05)		ns	5	6	10	1.6	1.2	0.9	5751	3627	0.8	0.3

[1] Injury on 6/30 was buggy whip leaf rolling and subsequent crinkling at the leaf base.
[2] G. R. = Growth reduction.
[3] Treatments and rates in parenthesis represent a separate application.
[4] Dia. = Diameter.
[5] COC = Class Crop Oil Concentrate.
[6] 28%N = 28% UAN fertilizer solution.
[7] NIS = Class Preference nonionic surfactant.
[8] s-metolachlor & CGA-154281 = Dual II Magnum.
[9] Premix = Laddok S-12.
[10] Premix = Distinct.

Table 4. Conventional and glufosinate tolerant sweet corn herbicide weed management trial at Waseca, MN - 2000. Empire sweet corn injury and yield. (Becker et al.).

		Empire										
		Chlorosis	Injury[1]	G.R.[2]		Total	Husked	Kernel	Total	Usable	Ear	Ear
Treatment[3]	Rate[3]	6/30	6/30	6/30	7/14	Yield	Yield	Yield	Ears	Ears	Length	Dia[4]
	(lb ai/A)	----------(%) ----------				-------- (ton/A) --------			----- (#/A) -----		(inch)	(cm)
Postemergence												
Nicosulfuron + COC[5] + 28%N[6]	0.031 + 1.25% + 0.625%	3	12	3	15	0.5	0.4	0.2	3485	0	5.0	3.7
Nicosulfuron + atrazine + COC + 28%N	0.031 + 1.0 + 1.25% + 0.625%	17	33	10	2	2.3	1.8	1.0	11035	1162	6.3	4.3
Carfentrazone-ethyl + nicosulfuron + NIS[7] +28%N	0.008 + 0.031 + 0.25% + 0.625%	0	8	0	5	0.3	0.3	0.2	2033	0	6.1	4.2
Carfentrazone-ethyl + nicosulfuron + COC +28%N	0.008 + 0.031 + 1.25% + 0.625%	0	12	0	7	0.5	0.4	0.2	3194	0	5.8	4.0
Carfentrazone-ethyl + atrazine + nicosulfuron + NIS + 28%N	0.008 + 0.5 + 0.031 + 0.25% + 0.625%	9	21	3	5	1.4	1.0	0.7	7260	0	6.2	4.2
(Preemergence) and Postemergence												
(s-metolachlor)[8] + halosulfuron + NIS	(1.9) + 0.016 + 0.25%	0	6	2	5	5.6	4.4	3.1	20038	4646	7.3	4.7
(s-metolachlor) + halosulfuron + NIS	(1.9) + 0.032 + 0.25%	0	20	6	8	6.4	5.0	3.5	21780	10164	7.2	4.8
(s-metolachlor) + CGA 248757 + atrazine + COC + 28%N	(1.9) + 0.0036+ 0.5 + 1.25% + 0.625%	2	0	0	0	5.9	4.6	3.1	20909	7260	7.2	4.8
(s-metolachlor) + carfentrazone-ethyl + NIS	(1.9) + 0.008 + 0.25%	7	0	0	0	3.6	2.9	2.0	15972	2033	6.5	4.6
(s-metolachlor) + carfentrazone-ethyl + atrazine + NIS	(1.9) + 0.008 + 0.5 + 0.25%	2	0	0	5	3.6	2.7	1.8	15391	871	7.1	4.6
(s-metolachlor) + carfentrazone-ethyl + atrazine + NIS	(1.9) + 0.008 + 0.75 + 0.25%	2	0	0	0	5.7	4.6	3.2	20038	8422	7.2	4.8
(s-metolachlor) + carfentrazone-ethyl + atrazine & bentazon[9] + NIS	(1.9) + 0.008 0.406 & 0.406 + 0.25%	6	0	0	2	5.4	4.2	2.8	20618	6389	7.5	4.7
(s-metolachlor) + atrazine & bentazon + COC + 28%N	(1.9) + 0.625 & 0.625 + 1.25% + 0.625%	4	0	2	3	7.6	6.0	4.2	24394	12197	7.8	4.9
(s-metolachlor) + dicamba & San 1269H[10] + NIS +28%N	(1.9) + 0.13 & 0.05 0.25% + 0.625%	0	3	11	9	6.6	5.3	3.8	21199	13068	7.8	4.9
Premergence												
s-metolachlor + RPA 201772	0.95 + 0.07	0	0	0	0	5.5	4.4	3.1	20618	5518	7.4	4.7
s-metolachlor + RPA 201772	0.95 + 0.094	0	0	1	0	6.4	3.6	3.7	21780	4937	7.7	4.9
RPA 201772	0.094	0	0	0	1	4.0	3.2	2.2	15972	3194	6.6	4.5
Handweeded check		0	0	0	0	7.2	5.7	4.0	21490	13939	7.8	4.9
Weedy check		0	0	0	8	0.4	0.3	0.3	2614	0	4.7	4.1
LSD (0.05)		6	11	4	7	1.6	1.5	1.0	5632	4464	1.0	0.3

[1] Injury on 6/30 was buggy whip leaf rolling and subsequent crinkling at the leaf base.
[2] G. R. = Growth reduction.
[3] Treatments and rates in parenthesis represent a separate application.
[4] Dia. = Diameter.
[5] COC = Class Crop Oil Concentrate.
[6] 28%N = 28% UAN fertilizer solution.
[7] NIS = Class Preference nonionic surfactant.
[8] s-metolachlor & CGA-154281 = Dual II Magnum.
[9] Premix = Laddok S-12.
[10] Premix = Distinct.

Table 5. Conventional and glufosinate tolerant sweet corn herbicide weed management trial at Waseca, MN - 2000. GH-0937 sweet corn injury and yield. (Becker et al.).

		GH-0937										
		Chlorosis	Injury	G.R.[1]		Total	Husked	Kernel	Total	Usable	Ear	Ear
Treatment[2]	Rate[2]	6/30	6/30	6/30	7/14	Yield	Yield	Yield	Ears	Ears	Length	Dia[3]
	(lb ai/A)	---------		(%)	---------	--------	(ton/A)	--------	-----	(#/A)	-----	(inch)	(cm)
Postemergence												
Glufosinate + AMS[4]	0.27 + 3.0	0	0	0	0	8.2	6.2	4.0	25646	17687	7.2	4.8
Glufosinate + AMS	0.36 + 3.0	0	0	0	0	8.0	6.2	4.0	25120	16117	7.4	4.9
Glufosinate + atrazine + AMS	0.27 + 0.5 + 3.0	0	0	0	0	8.2	6.4	4.2	24394	19021	7.4	4.9
Glufosinate + atrazine + AMS	0.27 + 0.75 + 3.0	0	0	0	0	8.1	6.2	3.9	24394	17279	7.4	4.8
Glufosinate + atrazine + AMS	0.27 + 1.0 + 3.0	0	0	0	0	8.3	6.3	4.0	25700	16117	6.5	4.8
(Postemergence) + Late Postemergence												
(Glufosinate + AMS) + Glufosinate + AMS	(0.27 + 3.0) + 0.27 + 3.0	0	0	0	0	8.0	6.1	3.9	24103	16988	7.4	4.8
Preemergence + (Postemergence)												
RPA 201772 + (Glufosinate + AMS)	0.047 + (0.27 + 3.0)	0	0	0	0	8.3	6.3	4.0	26281	16117	7.4	4.8
s-metolachlor & CGA-154281 + (Glufosinate + AMS)	0.95 + (0.27 + 3.0)	0	0	0	0	8.3	6.2	4.0	25265	17279	7.3	4.9
Hand weeded check		0	0	0	0	7.4	5.7	3.6	25555	12778	7.4	4.7
LSD (0.05)		ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns

[1] G. R. = Growth reduction.
[2] Treatments and rates in parenthesis represent a separate application.
[3] Dia. = Diameter
[4] AMS = Spray grade ammonium sulfate. Rate is in pounds per acre.