Conventional and glufosinate tolerant sweet corn herbicide weed management trial at Waseca, MN - 1999. 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 24,000 plants/A on May 7, 1997. 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 between August 20 and August 25, 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	5/28/99	6/18/99	7-22 -99
Air Temp (°F)	76	67	64
Wind (mph)	S 8	SE 12	SW 4
Sky	Partly cloudy	Cloudy	Clear
Sweet corn			
Stage	--	3-4 collar	6-7 collar
Height (inch)	--	5-8	30
Grassy weeds			
Size (inch)	--	0.5-4.0	0-2
Cocb			
Size (inch)	--	4	--
Vele			
Size (inch)	--	2-3	--
Colq, Corw, Rrpw			
Size (inch)	--	2	--
Rainfall before Application			
Week 1 (inch)	1.13	1.18	2.47
Rainfall after Application			
Week 1 (inch)	0.50	0.61	0.87
Week 2 (inch)	1.73	0.30	0.05

Giant foxtail pressure was heavy and uniform throughout the conventional and glufosinate tolerant sweet corn study. Herbicide management in convention sweet corn resulted in giant foxtail control that was excellent with postemergence applications of nicosulfuron alone or in combination with a reduced rate of atrazine (1.0 lb), and with preemergence RPA 201772 (isoxaflutole, proposed) used alone or in combination with a reduce rate of metolachlor (0.95 lb). The following treatments resulted in only moderate control of giant foxtail: Metolachlor (1.91 lb) preemergence followed by postemergence applications of MON 12000 (halosulfuron, proposed), CGA-248757 (fluthiacet-methyl, proposed), atrazine plus bentazon package mix, or carfentrazone alone or with atrazine.

Carfentrazone added to nicosulfuron and atrazine (treatment 4) appears to have resulted in antagonism of giant foxtail control compared with nicosulfuron applied alone or nicosulfuron plus atrazine (significant at both rating dates). It is less clear, but there may be some antagonism when carfentrazone was added to nicosulfuron (treatment 3) compared with nicosulfuron applied alone or nicosulfuron plus atrazine (significant only at the first rating). Treatments with RPA 201772 or nicosulfuron generally performed better than metolachlor with new chemistries or with standard broadleaf control herbicides such as atrazine plus cyanazine or atrazine plus bentazon package mixes.

Pseudomonas syringae pv. *tageties* (PST) is a potential biological control bacteria active on *Asteraceae*. Two treatments were included with the expectation that common ragweed was present in this trial area. PST is most active on composites such as common ragweed and common sunflower. The species that did emerge should not be controlled by PST treatment, yet PST was sprayed to check crop tolerance. The surfactant system required to gain infection of PST sometimes causes injury on some crop species and we were interested in the potential for crop injury with the rate of Silwet used in this system, 0.3% v/v and 50 gpa. No injury was observed with Silwet or PST on Jubilee or Empire sweet corn, but weed control was poor which reduced sweet corn yield so these treatments are not included in the following discussion of efficacy and yield.

Cocklebur pressure was sporadic in the second and third reps and this spatial distribution pattern is reflected in the variance in control ratings. Of note however is that postemergence application of atrazine, carfentrazone, or atrazine and carfentrazone tank-mixed with nicosulfuron will not provide adequate control of heavy cocklebur infestations. The best treatment of these options was nicosulfuron plus atrazine (1 lb). Of the treatments postemergence sequential to preemergence metolachlor; carfentrazone used alone, with atrazine, or with dicamba plus atrazine, MON 12000, and atrazine plus bentazon tank-mix all resulted in excellent common cocklebur control. Preemergence RPA 201772 and metolachlor plus atrazine plus cyanazine resulted in excellent common cocklebur control. If cocklebur pressure had been extreme, some of these treatments likely would have resulted in moderate control and would have required multiple cultivations to clean up the treatment area.

Redroot pigweed control was excellent with all treatments considering the population was a very low, and sporadic. Control of velvetleaf was good with most. There was a lot of variability in velvetleaf control ratings as evident in the large LSD value. Notable exceptions were total postemergence programs with nicosulfuron. Trends indicate that nicosulfuron and atrazine, with or without carfentrazone at the rates tested would be weak on velvetleaf if pressure is high. The other treatment which showed weakness on velvetleaf was the standard benchmark soil applied treatment, metolachlor plus atrazine plus cyanazine.

Weaknesses in lambsquarter control with MON 12000 in conventional systems and glufosinate in glufosinate tolerant systems was seen by the early ratings. Common lambsquarters control was excellent with the rest of the treatments. Similar results were seen in the late ratings on August 2nd (data is not shown). Sequential application of glufosinate at 0.27 lb did not alleviate the poor lambsquarters control with glufosinate used alone. Neither did applying glufosinate sequential to a reduce preemergence rate of metolachlor (0.95 lb). Excellent control of common lambsquarters resulted from tank-mixing atrazine at 0.5, 0.75 or 1.0 lb with glufosinate, or applying glufosinate sequentially to a reduce rate of RPA 201772 (0.047 lb). Another weakness, but less evident in this study, may be control of redroot pigweed as distinct escapes were present with glufosinate used alone or glufosinate sequential to glufosinate. Redroot pigweed pressure was very sporadic and was only noted where obvious escapes were present at the final rating on August 2nd, (data is not presented). Velvetleaf and common cocklebur control was excellent with all glufosinate treatments whether use alone, tank-mixed, or as sequential treatments. Giant foxtail control was similar with all glufosinate use alone, glufosinate plus atrazine, or glufosinate sequential to glufosinate treatments. The use of glufosinate applied sequentially to a reduced rate of either RPA 201772 or metolachlor improved giant foxtail control. Considering the extreme giant foxtail pressure, all glufosinate treatments provided acceptable giant foxtail control. A single cultivation would have eliminated slight differences where they existed.

Harvest data for Empire generally showed useable ear number was similar across all treatments except for a significant reduction with nicosulfuron, nicosulfuron plus carfentrazone, or nicosulfuron and atrazine. This appears directly related to the injury seen earlier in the season. Additionally, a reduction in the number of useable corn on the cob product was seen with carfentrazone used sequential to metolachlor, but little injury was seen earlier in the season. There may be confounding with weed competition in this case. Empire is listed as a nicosulfuron tolerant treatment on the nicosulfuron label. It appears that there may be some concern for the use of this herbicide in combination with carfentrazone under certain environmental conditions. The variation in useable ear number with the rest of the treatments likely reflects the efficacy of the herbicide program. Injury with carfentrazone used without nicosulfuron also reduced the number of useable ears of Empire sweet corn, but not when compared with other treatments if those treatments resulted in excellent weed control. That is, carfentrazone with atrazine, or atrazine plus dicamba sequential to preemergence metolachlor did not result in the injury noted when carfentrazone was applied postemergence with nicosulfuron.

Jubilee sweet corn, like the Empire cultivar, showed significant injury with the nicosulfuron plus carfentrazone treatments. The expression of injury was more severe on the Julibee cultivar, a cultivar not listed as tolerant to nicosulfuron on the DuPont label. This cultivar has been used as the “test rat” to monitor for nicosulfuron injury when the right environmental conditions are present. This is the first of the last three seasons where this type of injury was seen at Waseca. This injury did result in reduced number of useable ears and a reduced yield of field and husked sweet corn. In addition, nicosulfuron in combination with carfentrazone or carfentrazone plus atrazine significantly reduced ear diameter compared with treatments that did not contain nicosulfuron (treatments 5-18). An extreme reduction in the number of useable ears for corn on the cob product with Jubilee was noted for both nicosulfuron and nicosulfuron plus atrazine if carfentrazone was included in the tank-mix.

The yield of glyphosate tolerance sweet corn cv. GH-0937 was excellent with all treatments. A significant reduction in yield was not seen related to common lambsquarters escapes discussed in the weed control section. The highest yielding treatment, comparing all yield parameters, was glufosinate sequential to the reduced rate of RPA 201772. However, again note that all treatments resulted in excellent yields in the glufosinate tolerant system. (Department of Agronomy and Plant Genetics, University of Minnesota, St. Paul).

Table 1. Conventional sweet corn herbicide weed management trial at Waseca MN - 1999. Weed control results (Becker et al.).

		Weed Control							
		Gift		Cocb		Colq	Rrpw	Vele	
Treatment[1]	Rate[1]	7/13	8/2	7/13	8/2	7/13	7/13	7/13	8/2
	(lb ai/A)	(%)							
Postemergence									
Nicosulfuron + COC[2] + 28%N[3]	0.031 + 1.25% + 2.5%	97	98	45	54	99	99	85	72
Nicosulfuron + atrazine + COC + 28%N	0.031 + 1.0 + 1.25% + 2.5%	98	97	75	82	99	99	93	79
Carfentrazone-ethyl + nicosulfuron + NIS[4]	0.008 + 0.031 + 0.25%	84	89	20	32	86	99	87	92
Carfentrazone-ethyl + atrazine + nicosulfuron + NIS	0.008 + 0.5 + 0.031 + 0.25%	79	82	25	42	99	99	75	78
(Preemergence) and Postemergence									
(Metolachlor)[5] + MON 12000 + NIS	(1.9) + 0.016 + 0.25%	77	77	98	99	67	82	97	99
(Metolachlor) + MON 12000 + NIS	(1.9) + 0.032 + 0.25%	74	77	93	99	69	99	99	99
(Metolachlor) + PST[6] + surf[7]	(1.9) + PST + 0.3%	78	82	32	78	48	48	5	27
(Metolachlor) + PST[8] + surf	(1.9) + PST + 0.3%	83	85	28	80	48	48	5	60
(Metolachlor) + CGA 248757 + atrazine + COC + 28%N	(1.9) + 0.0036+ 0.5 + 1.25% + 2.5%	75	72	98	99	99	99	98	99
(Metolachlor) + carfentrazone-ethyl + NIS	(1.9) + 0.008 + 0.25%	79	76	94	99	99	99	99	99
(Metolachlor) + carfentrazone-ethyl + atrazine + NIS	(1.9) + 0.008 + 0.75 + 0.25%	82	79	89	94	99	99	99	97
(Metolachlor) + carfentrazone-ethyl + atrazine + dicamba + NIS	(1.9) + 0.008 + 0.5 + 0.094 + 0.25%	78	73	99	99	99	99	96	99
(Metolachlor) + atrazine & bentazon[9] + COC + 28%N	(1.9) + 0.625 & 0.625 + 1.25% + 2.5%	83	78	99	98	99	99	97	98
Premergence									
Metolachlor + RPA 201772	0.95 + 0.07	96	97	89	86	99	96	99	99
Metolachlor + RPA 201772	0.95 + 0.094	98	99	93	93	99	98	99	99
RPA 201772	0.094	94	93	95	99	98	94	98	99
Metolachlor + atrazine + cyanazine	1.9 + 2.0 + 0.9	85	79	96	99	99	99	79	80
Hand weeded check		99	99	99	99	99	99	99	99
Weedy check		--	--	--	--	--	--	--	–
LSD (0.05)		10	10	36	31	29	23	13	33

[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] Metolachlor Magnum II isomer.
[6] PST =Pseudomonas syringae var.tagetis. Applied at an estimated 10^9 cfm as fresh culture in 50 gpa.
[7] surf = Silwet.
[8] PST =Pseudomonas syringae var.tagetis. Applied at an estimated 10^7 cfm as frozen material in 50 gpa.
[9] Premix= Laddok S-12.

Table 2. Glufosinate tolerant sweet corn herbicide weed management trial at Waseca MN - 1999. Weed control results (Becker et al.).

		Weed Control							
		Gift		Cocb		Colq	Rrpw	Vele	
Treatment[1]	Rate[1]	7/13	8/2	7/13	8/2	7/13	7/13	7/13	8/2
	(lb ai/A)	(%)							
Postemergence									
Glufosinate + AMS[2]	0.27 + 3.0	80	86	88	99	55	76	95	99
Glufosinate + AMS	0.36 + 3.0	84	87	99	99	68	71	99	98
Glufosinate + atrazine + AMS	0.27 + 0.5 + 3.0	78	84	96	99	93	89	99	99
Glufosinate + atrazine + AMS	0.27 + 0.75 + 3.0	83	84	98	99	99	99	99	99
Glufosinate + atrazine + AMS	0.27 + 1.0 + 3.0	78	82	98	98	99	99	98	94
(Postemergence) + Late Postemergence									
(Glufosinate + AMS) + Glufosinate + AMS	(0.27 + 3.0) + 0.27 + 3.0	82	84	93	96	59	81	98	99
Preemergence + (Postemergence)									
RPA 201772 + (Glufosinate + AMS)	0.047 + (0.27 + 3.0)	98	98	99	99	99	99	99	99
Metolachlor[3] + (Glufosinate + AMS)	0.95 + (0.27 + 3.0)	96	94	92	94	72	89	95	96
Weedy check		--	--	--	--	--	--	--	–
LSD (0.05)		11	10	ns	ns	18	20	ns	ns

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

Table 3. Sweet corn herbicide weed management trial at Waseca MN - 1999. Jubilee sweet corn injury and yield. (Becker et al.).

		Jubilee										
		Chlorosis	S.R.[1]	G.R.[2]		Total	Husked	Kernel	Total	Usable	Ear	Ear
Treatment[3]	Rate[2]	7/13	7/13	7/13	7/9	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% + 2.5%	0	2	29	8	7.0	4.8	2.7	23522	11035	7.8	3.9
Nicosulfuron + atrazine + COC + 28%N	0.031 + 1.0 + 1.25% + 2.5%	3	2	8	2	7.1	4.9	2.8	22361	11616	8.2	4.0
Carfentrazone-ethyl + nicosulfuron + NIS[7]	0.008 + 0.031 + 0.25%	7	2	40	28	3.6	2.3	1.2	12778	2033	7.6	3.8
Carfentrazone-ethyl + atrazine + nicosulfuron + NIS	0.008 + 0.5 + 0.031 + 0.25%	2	0	28	22	4.9	3.3	1.7	18586	5227	7.6	3.8
(Preemergence) and Postemergence												
(Metolachlor)[8] + MON 12000 + NIS	(1.9) + 0.016 + 0.25%	0	0	0	0	7.9	5.7	3.5	25265	15972	7.7	4.2
(Metolachlor) + MON 12000 + NIS	(1.9) + 0.032 + 0.25%	0	0	5	0	7.7	5.4	3.2	25265	14810	7.9	4.2
(Metolachlor) + PST[9] + surf[10]	(1.9) + PST + 0.3%	3	0	0	0	7.1	4.8	3.0	20618	13068	7.7	4.0
(Metolachlor) + PST + surf	(1.9) + PST + 0.3%	2	0	0	0	7.4	5.3	3.2	24684	14810	7.9	4.1
(Metolachlor) + CGA 248757 + atrazine + COC + 28%N	(1.9) + 0.0036+ 0.5 + 1.25% + 2.5%	0	0	0	0	8.0	5.6	2.8	23813	17714	8.2	4.1
(Metolachlor) + carfentrazone-ethyl + NIS	(1.9) + 0.008 + 0.25%	0	0	0	0	8.8	6.4	3.8	27007	20328	8.0	4.0
(Metolachlor) + carfentrazone-ethyl + atrazine + NIS	(1.9) + 0.008 + 0.75 + 0.25%	0	0	0	0	8.5	6.0	3.9	25265	18295	8.0	4.1
(Metolachlor) + carfentrazone-ethyl + atrazine + dicamba + NIS	(1.9) + 0.008 + 0.5 + 0.094 + 0.25%	0	0	0	0	9.3	6.9	4.0	30492	20328	7.9	4.1
(Metolachlor) + atrazine & bentazon[12] + COC + 28%N	(1.9) + 0.625 & 0.625 + 1.25% + 2.5%	2	0	0	0	7.7	5.5	3.3	22942	18005	7.7	4.1
Premergence												
Metolachlor + RPA 201772	0.95 + 0.07	2	0	0	0	9.3	6.6	4.3	25846	20909	8.2	4.1
Metolachlor + RPA 201772	0.95 + 0.094	0	0	0	0	8.8	6.5	4.5	24974	19457	8.2	4.2
RPA 201772	0.094	2	0	0	0	10.3	7.3	4.7	29911	20909	8.1	4.1
Metolachlor + atrazine + cyanazine	1.9 + 2.0 + 0.9	2	0	0	0	8.5	6.2	4.0	26136	18005	8.0	4.2
Handweeded check		0	0	0	0	9.4	7.2	4.7	28459	21780	7.9	4.2
Weedy check		0	0	23	99	0	0	0	0	0	--	--
LSD (0.05)		3	ns	13	8	2.1	1.4	1.0	5520	4792	ns	0.2

[1] S.R. = Stand Reduction.
[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] Metolachlor Magnum II isomer.
[9] PST =Pseudomonas syringae var.tagetis. Applied at an estimated 10^9 cfm as fresh culture in 50 gpa.
[10] surf = Silwet.
[11] PST =Pseudomonas syringae var.tagetis. Applied at an estimated 10^7 cfm as frozen material in 50 gpa.
[12] Premix= Laddok S-12.

Table 4. Sweet corn herbicide weed management trial at Waseca MN - 1999. Empire sweet corn injury and yield. (Becker et al.).

		Empire										
		Chlorosis	S.R.[1]	G.R.[2]		Total	Husked	Kernel	Total	Usable	Ear	Ear
Treatment[3]	Rate[2]	7/13	7/13	7/13	7/9	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% + 2.5%	0	0	11	8	7.4	5.8	3.6	24394	17714	8.2	4.2
Nicosulfuron + atrazine + COC + 28%N	0.031 + 1.0 + 1.25% + 2.5%	0	0	5	0	9.0	6.5	3.9	26717	22651	8.5	4.0
Carfentrazone-ethyl + nicosulfuron + NIS[7]	0.008 + 0.031 + 0.25%	0	0	8	16	6.3	4.7	2.7	23813	12487	7.8	4.0
Carfentrazone-ethyl + atrazine + nicosulfuron + NIS	0.008 + 0.5 + 0.031 + 0.25%	0	0	20	20	5.6	4.2	2.3	22361	11035	7.9	3.9
(Preemergence) and Postemergence												
(Metolachlor)[8] + MON 12000 + NIS	(1.9) + 0.016 + 0.25%	0	0	0	0	8.1	6.5	4.2	25555	22942	8.2	17.2
(Metolachlor) + MON 12000 + NIS	(1.9) + 0.032 + 0.25%	0	0	5	7	8.4	6.7	4.2	27588	20038	8.1	4.3
(Metolachlor) + PST[9] + surf[10]	(1.9) + PST + 0.3%	2	0	0	0	6.8	5.5	3.3	25555	15682	7.8	4.1
(Metolachlor) + PST + surf	(1.9) + PST + 0.3%	1	0	0	0	7.1	5.6	3.5	25265	15391	7.9	4.0
(Metolachlor) + CGA 248757 + atrazine + COC + 28%N	(1.9) + 0.0036+ 0.5 + 1.25% + 2.5%	0	0	0	0	9.1	7.0	4.3	28459	21780	8.3	4.3
(Metolachlor) + carfentrazone-ethyl + NIS	(1.9) + 0.008 + 0.25%	0	0	0	0	6.5	5.1	3.1	22942	15101	8.0	4.2
(Metolachlor) + carfentrazone-ethyl + atrazine + NIS	(1.9) + 0.008 + 0.75 + 0.25%	0	0	0	0	8.3	6.5	4.1	26426	19457	8.3	4.0
(Metolachlor) + carfentrazone-ethyl + atrazine + dicamba + NIS	(1.9) + 0.008 + 0.5 + 0.094 + 0.25%	0	0	0	0	9.0	7.0	4.4	28750	20909	8.0	4.2
(Metolachlor) + atrazine & bentazon[12] + COC + 28%N	(1.9) + 0.625 & 0.625 + 1.25% + 2.5%	0	0	0	0	9.3	6.6	4.5	29911	22651	8.3	4.2
Premergence												
Metolachlor + RPA 201772	0.95 + 0.07	0	0	0	0	10.2	7.5	5.1	31654	23813	8.2	4.2
Metolachlor + RPA 201772	0.95 + 0.094	2	0	0	0	8.9	8.2	5.4	31654	25265	8.2	4.4
RPA 201772	0.094	0	0	0	0	9.4	7.6	4.9	30492	24103	8.1	4.2
Metolachlor + atrazine + cyanazine	1.9 + 2.0 + 0.9	1	0	0	0	8.9	7.2	4.6	28750	24103	8.2	4.3
Handweeded check		2	0	0	0	9.1	7.3	4.7	28750	23522	8.3	4.3
Weedy check		0	0	23	99	0	0	0	0	0	--	--
LSD (0.05)		ns	ns	14	12	2.6	1.9	1.2	6131	6512	ns	ns

[1] S.R. = Stand Reduction.
[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] Metolachlor Magnum II isomer.
[9] PST =Pseudomonas syringae var.tagetis. Applied at an estimated 10^9 cfm as fresh culture in 50 gpa.
[10] surf = Silwet.
[11] PST =Pseudomonas syringae var.tagetis. Applied at an estimated 10^7 cfm as frozen material in 50 gpa.
[12] Premix= Laddok S-12.

Table 5. Glufosinate tolerant sweet corn herbicide weed management trial at Waseca MN - 1999. Sweet corn injury and yield. (Becker et al.).

		GH-0937										
		Chlorosis	S.R.[1]	G.R.[2]		Total	Husked	Kernel	Total	Usable	Ear	Ear
Treatment[3]	Rate[2]	7/13	7/13	7/13	7/9	Yield	Yield	Yield	Ears	Ears	Length	Dia[4]
	(lb ai/A)	--------- (%) ---------				-------- (ton/A) --------			----- (#/A) -----		(inch)	(cm)
Postemergence												
Glufosinate + AMS[4]	0.27 + 3.0	0	0	0	0	10.1	7.6	4.6	30782	25265	7.8	4.3
Glufosinate + AMS	0.36 + 3.0	0	0	0	0	9.3	7.1	4.2	30782	22651	7.4	4.1
Glufosinate + atrazine + AMS	0.27 + 0.5 + 3.0	0	0	0	0	9.1	6.8	4.0	29621	20618	7.8	4.5
Glufosinate + atrazine + AMS	0.27 + 0.75 + 3.0	0	0	0	0	8.8	6.8	4.0	29040	20328	7.5	4.1
Glufosinate + atrazine + AMS	0.27 + 1.0 + 3.0	0	0	0	0	9.4	7.0	4.0	31654	20909	7.4	4.1
(Postemergence) + Late Postemergence												
(Glufosinate + AMS) + Glufosinate + AMS	(0.27 + 3.0) + 0.27 + 3.0	0	0	0	0	9.8	7.2	4.3	31073	22942	7.7	4.3
Preemergence + (Postemergence)												
RPA 201772 + (Glufosinate + AMS)	0.047 + (0.27 + 3.0)	0	0	0	0	10.8	8.2	4.9	33106	26717	7.7	4.3
Metolachlor[5] + (Glufosinate + AMS)	0.95 + (0.27 + 3.0)	0	0	0	0	9.7	7.1	4.2	30202	21490	7.6	4.2
Weedy check		0	0	38	99	0	0	0	0	0	--	--
LSD (0.05)		ns	ns	3	ns	1.7	1.5	1.0	4860	7026	0.3	0.2

[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.
[5] Metolachlor Magnum II isomer.