Mesotrione use in Oat. Kirk Howatt, Ronald Roach, and Janet Harrington. Oat was seeded May 18 near Fargo, North Dakota. Preemergence treatments were applied May 18 with 61°F, 29% RH, 100% cloud cover, wind velocity of 0 mph, and damp soil at 51°F. Post treatments were applied to 3-leaf to tillering oat, 4- to 8-leaf redroot pigweed and common lambsquarters, and 2-leaf yellow foxtail on June 12 with 69°F, 33% RH, 5% cloud cover, wind velocity of 7 mph at 225°, and dry soil at 62°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 35 psi through 11001 TT nozzles to a 7-ft wide area the length of 10 by 30 ft plots. The experiment was a randomized, complete block design with four replicates. Plots were harvested for yield on August 3.

		Oat			6/15			6/30	8/3
Treatment	Rate	6/8	6/15	6/30	Rrpw	Colq	Yeft	Rrpw	Yield
	oz ai/A	% injury			% control				bu/A
Untreated	0	0	0	0	0	0	0	0	11
Mesotrione	1.5	0	0	0	95	80	74	80	23
Mesotrione	3	0	0	0	97	77	79	86	18
Mesotrione	6	0	0	0	97	86	86	94	29
Mesotrione+NIS	1.5+0.25%	0	5	5	7	3	10	90	17
Mesotrione+NIS	3+0.25%	0	9	10	20	9	17	97	22
Mesotrione+PO	1.5+1%	0	7	1	17	4	17	93	23
Mesotrione+PO	3+1%	0	9	11	17	6	20	94	23
Mesotrione+Bromoxynil+NIS	1.5+2+0.25%	0	16	17	52	40	22	98	19
Mesotrione+Brox+MCPA+NIS	1.5+2+2+0.25%	0	12	15	55	40	20	99	15
Mesotrione+MCPA+NIS	1.5+4+0.25%	0	6	6	4	40	20	99	21
MCPA+NIS	4+0.25%	0	0	1	45	42	0	81	21
Bromoxynil+NIS	4+0.25%	0	5	0	60	65	4	62	21
Mesotrione+PO+UAN	1.5+1%+2.5%	0	10	4	12	5	17	99	23
LSD (P=.05)		0	2	7	7	7	6	5	12
CV		0	24	93	12	14	16	4	40

Mesotrione at rates of 1.5 to 6 oz/A did not cause injury to oat when applied PRE, but POST application at 1.5 or 3 oz/A caused bleached streaks to appear on leaf tissue. Injury caused by mesotrione applied POST was generally less than 10% and persisted for about 3 weeks but did not result in less yield compared with MCPA or bromoxynil controls. Bromoxynil increased the expression of injury to as much as 17%, and MCPA tended to reduce the amount of injury caused by mesotrione plus bromoxynil. Bromoxynil improved the control of pigweed initially compared with other POST treatments, but bromoxynil alone only gave 62% control of pigweed. Control of lambsquarters and foxtail did not improve between the June 15 and June 30 evaluations.

Barley response to Pinoxaden. Kirk Howatt, Ronald Roach, and Janet Harrington. Six-row 'Lacy', 'Tradition', and 'Stellar' and two-row 'Conlon', 'Rawson', and 'ND21863' barley varieties were seeded in adjacent strips on May 17 at Fargo, North Dakota. Treatments 1 through 6 were applied to 2-leaf barley on June 1 with 70°F, 45% RH, 30% cloud cover, wind velocity of 4 mph at 100°, and moist soil at 60°F. Treatments 7 through 12 were applied to 5-leaf barley on June 14 with 73°F, 43% RH, 20% cloud cover, wind velocity of 8 mph at 105°, and dry soil at 62°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 35 psi through 11001 TT nozzles to a 7-ft wide area the length of 20 by 40 ft plots. The experiment was a randomized, complete bock design with four replicates.

		Lacy			Tradition			Stellar			Conlon		
Treatment[a]	Rate	Yield	moisture	Test weight	Yield	moisture	Test weight	Yield	moisture	Test weight	Yield	moisture	Test weight
	oz ai/A	bu/A	%	lb/bu	bu/A	%	lb/bu	bu/A	%	lb/bu	bu/a	%	lb/b
Fenoxaprop+Brox&MCPA5	1.32+8	73	8	44	66	7	43	64	7	41	70	8	46
Fenoxaprop+Brox&MCPA5	2.64+8	70	7	43	62	7	42	58	6	40	61	8	44
Tral+Brox&MCPA5+Supercharge+AMS	2.9+8+0.5%+9.5	65	7	42	51	7	42	51	6	39	55	7	44
Tral+Brox&MCPA5+Supercharge+AMS	5.8+8+0.5%+9.5	66	7	42	53	7	41	49	6	39	53	7	39
Pinoxaden+Brox&MCPA5+Adigor	0.86+8+0.075G	63	8	44	56	7	43	58	6	40	59	8	45
Pinoxaden+Brox&MCPA5+Adigor	1.7+8+0.075G	59	7	42	53	7	42	47	6	38	45	8	44
Fenx+Brox&MCPA5	1.32+8	69	7	43	62	7	42	50	6	40	63	7	41
Fenx+Brox&MCPA5	2.64+8	62	7	45	52	7	42	54	6	40	61	8	46
Tral+Brox&MCPA5+Supercharge+AMS	2.9+8+0.5%+9.5	59	7	43	45	7	42	56	6	40	53	8	45
Tral+Brox&MCPA5+Supercharge+AMS	5.8+8+0.5%+9.5	56	7	43	56	7	42	61	6	37	54	6	39
Pinoxaden+Brox&MCPA5+Adigor	0.86+8+0.075G	65	7	44	56	7	42	52	6	40	48	7	43
Pinoxaden+Brox&MCPA5+Adigor	1.7+8+0.075G	55	7	44	51	7	44	52	6	41	58	7	45
Untreated	0	56	8	42	51	7	42	44	6	39	46	6	39
LSD (P=.05)		21	1	2	17	1	2	17	1	3	17	1	8
CV		24	6	4	22	6	3	23	8	6	21	13	1[illegible]

		Rawson			ND21863			All varieties			
Treatment	Rate	Yield	moisture	Test weight	Yield	moisture	Test weight	6/7	6/14	6/28	7/25
		bu/A	%	lb/bu	bu/A	%	lb/bu	% injury			
Fenoxaprop+Brox&MCPA5	1.32+8	54	9	41	60	12	44	0	0	0	0
Fenx+Brox&MCPA5	2.64+8	51	8	40	62	9	43	0	0	0	0
Tral+Brox&MCPA5+Supercharge+AMS	2.9+8+0.5%+9.5	54	8	42	62	9	42	8	0	0	0
Tral+Brox&MCPA5+Supercharge+AMS	5.8+8+0.5%+9.5	49	9	40	56	10	43	3	0	0	0
Pinoxaden+Brox&MCPA5+Adigor	0.86+8+0.075G	49	9	40	61	9	43	0	0	0	0
Pinoxaden+Brox&MCPA5+Adigor	1.7+8+0.075G	44	8	39	51	9	40	0	0	0	0
Fenx+Brox&MCPA5	1.32+8	54	8	40	56	9	43	0	0	0	0
Fenx+Brox&MCPA5	2.64+8	49	9	42	69	9	43	0	0	0	0
Tral+Brox&MCPA5+Supercharge+AMS	2.9+8+0.5%+9.5	45	7	42	50	8	42	0	0	0	0
Tral+Brox&MCPA5+Supercharge+AMS	5.8+8+0.5%+9.5	37	7	35	40	9	41	0	0	0	0
Pinoxaden+Brox&MCPA5+Adigor	0.86+8+0.075G	40	7	38	38	8	40	0	0	0	0
Pinoxaden+Brox&MCPA5+Adigor	1.7+8+0.075G	42	8	40	36	8	38	0	0	0	0
Untreated	0	34	7	31	38	7	32	0	0	0	0
LSD (P=.05)		18	2	7	28	2	9	1	0	0	0
CV		27	16	13	32	15	13	77	0	0	0

Tralkoxydim applied to 2-leaf barley were the only treatments to cause visible injury, and the injury was temporary. According to yields, barley tended to tolerate tralkoxydim more than the other herbicides, although no significant damage was obvious even with 2X rates of the herbicides applied at the 5-leaf stage.

Wheat response to new herbicides. Kirk Howatt, Ronald Roach, and Janet Harrington. 'Alsen' hard red spring wheat was seeded May 18 near Fargo, North Dakota. Treatments 1 through 8 were applied preemergence on May 18 with 57°F, 32% RH, 100% cloud cover, variable wind velocity at 2 mph, and damp soil at 52°F. Treatment 8 was applied to 3- to 4-leaf wheat on June 8 with 61°F, 44% RH, 5% cloud cover, wind velocity of 8 mph at 45°, and dry soil at 60°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 35 psi through 11001 TT nozzles to a 7-ft wide area the length of 10 by 30 ft plots. The experiment was a randomized, complete block design with four replicates.

		Wht		
Treatment	Rate	6/9	6/15	6/21
	oz ai/A	—	% injury	—
KIH-485	1	0	0	0
KIH-485	1.5	0	0	0
KIH-485	2	0	0	0
KIH-485	2.8	0	0	0
KIH-485	3.5	0	0	0
Tembotrione	2	0	0	0
Tembotrione	4	0	0	0
Tembotrione+MSO+UAN (POST)	2+1%+2.5%	6	85	80
Untreated	0	0	0	0
LSD (P=.05)		0.7	0	0
CV		78.3	0	0

KIH-485 and tembotrione did not cause injury to wheat when applied preemergence. Post emergence application of tembotrione caused excessive bleaching of wheat. Within a few days of post application of tembotrione, wheat lost all pigmentation from the top of the plants to about 0.5 inch of the soil surface. Wheat did not recover very much during the season.

Hard red spring wheat and durum response to triallate. Angela Kazmierczak, Kirk Howatt, Ronald Roach, and Janet Harrington. Treatments were applied pre-plant on May 17 and incorporated with two passes of a field cultivator made in perpendicular directions. Three passes with a 7-ft wide backpack sprayer, delivering 8.5 gpa at 35 psi through 11001 TT nozzles, was used for treatment application to plots that were 20 by 60 ft. Wheat varieties were seeded in adjacent strips on May 17. Visual injury was evaluated for all varieties. Plots were machine harvested for yield, grain moistures, and test weight on August 9. The experiment was a randomized, complete block design with four replicates but only three were harvested.

		Alsen			Glenn			Briggs			Reeder			Granite		
Treatment	Rate	Yield	moisture	Test weight	Yield	moisture	Test weight	Yield	moisture	Test weight	Yield	moisture	Test weight	Yield	moisture	Test weight
		bu/A	%	lb/bu	bu/A	%	lb/bu	bu/A	%	lb/bu	bu/A	%	lb/bu	bu/A	%	lb/b
Triallate	16	27	16	57	39	16	56	46	18	54	27	12	55	30	15	55
Triallate	32	24	16	55	37	16	56	43	18	54	28	16	58	28	17	57
Triallate+GWN 047	16+0.16	25	17	57	40	16	57	46	20	53	28	16	58	29	16	57
Untreated	0	24	15	56	41	16	57	47	19	54	30	15	56	29	16	57
LSD (P=0.05)		16	.	.	8	1	3	17	5	2	14	.	.	9	2	7
CV		33	.	.	10	3	3	19	13	2	25	.	.	16	6	6

		Knudson			Divide			Mountrail			Lebsock			All varieties		
Treatment	Rate	Yield	moisture	Test weight	Yield	moisture	Test weight	Yield	moisture	Test weight	Yield	moisture	Test weight	6/7	6/14	7/2
		bu/A	%	lb/bu	bu/A	%	lb/bu	bu/A	%	lb/bu	bu/A	%	lb/bu	— % injury —		
Triallate	16	18	.	.	34	17	55	38	17	58	39	20	55	0	0	0
Triallate	32	27	19	56	34	17	57	39	17	57	40	20	55	0	0	0
Triallate+GWN 047	16+0.16	22	.	.	35	17	58	38	17	56	36	19	56	0	0	0
Untreated	0	21	.	.	35	17	57	36	16	56	33	18	56	0	0	0
LSD (P=0.05)		.	.	.	7	1	2	5	1	3	9	3	3	0	0	0
CV		.	.	.	10	3	2	6	1	2	12	8	2	0	0	0

Wheat cultivars were not visibly affected by triallate as indicated by visual evaluations of wheat injury (21, 28, and 70 d after treatment). The growing season was drier than normal. However, areas of this large study retained slightly more soil moisture than other areas, which contributed to larger LSDs. Wheat yield, grain moisture, and test weight did not differ among treatments within wheat cultivar. Missing LSD, CV, moisture, and test weight values resulted from mechanical error in combine yield monitor and/or small grain sample size.

Hard red spring wheat and durum response to Pinoxaden. Kirk Howatt, Ronald Roach, and Janet Harrington. 'Alsen', 'Glenn', 'Briggs', 'Reeder', 'Granite', and 'Knudson' hard red spring wheat and 'Divide', 'Mountrail', and 'Lebsock' durum wheat were seeded in adjacent strips on May 17 near Fargo, North Dakota. Treatments 1 through 6 were applied to 2-leaf wheat and durum on June 1 with 70°F, 45% RH, 30% cloud cover, wind velocity at 4 mph at 180°, and moist soil at 60°F. Treatments 7 through 12 were applied to 5-leaf wheat and durum on June 14 with 74°F, 44% RH, 15% cloud cover, wind velocity at 13 mph at 105°, and dry soil at 63°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 35 psi through 11001 TT nozzles to a 7-ft wide area the length of 20 by 50 ft plots. All varieties were visually evaluated for injury. Plots were machine harvested and grain moistures were assessed on August 9. The experiment was a randomized, complete block design with four replications.

		Alsen			Glenn			Briggs			Reeder		
Treatment[a]	Rate	Yield	moisture	Test weight	Yield	moisture	Test weight	Yield	moisture	Test weight	Yield	moisture	Test weight
	oz ai/A	bu/A	%	lb/bu	bu/A	%	lb/bu	bu/A	%	lb/bu	bu/A	%	lb/bu
Fenx+Brox&MCPA5	1.32+8	23	16	58	36	16	58	42	18	56	36	16	59
Pxdn+Brox&MCPA5	0.86+8	30	16	59	30	16	56	33	18	54	36	15	58
Pxdn+Brox&MCPA5	1.7+8	21	17	59	35	17	59	39	17	55	34	15	59
Pxdn+Brox&2,4-D	0.86+9	29	16	56	34	16	57	38	18	55	34	16	58
Pxdn+Flox&MCPA +Thif-sg+Trib-sg	0.86+8+ 0.24+0.06	24	16	59	31	16	58	34	17	55	33	16	57
Pxdn+Clpy&Flox +Thif-sg	0.86+3 +0.3	21	17	59	30	16	58	35	18	56	32	16	59
Fenx+Brox&MCPA5	1.32+8	33	16	57	35	16	58	33	18	49	29	16	58
Pxdn+Brox&MCPA5	0.86+8	35	16	59	36	17	57	37	20	53	30	16	58
Pxdn+Brox&MCPA5	1.7+8	30	16	57	34	17	58	35	19	54	29	16	58
Pxdn+Brox&2,4-D	0.86+9	24	16	55	27	16	59	28	18	52	26	14	53
Pxdn+Flox&MCPA +Thif-sg+Trib-sg	0.86+8+ 0.24+0.06	28	16	56	30	16	57	35	19	54	28	16	55
Pxdn+Clpy&Flox +Thif-sg	0.86+3 +0.3	29	16	56	36	17	56	36	20	51	32	14	55
Untreated	0	30	16	57	33	17	55	30	19	46	27	11	-
LSD (P=.05)		10	1	3	10	1	3	12	4	5	7	2	4
CV		22	4	3	19	3	3	20	12	6	13	9	4

[a] All pinoxaden treatments, Pxdn, included Adigor at 9.6 oz/A.

Additional data tables follow on the subsequent page.

Pinoxaden tank-mixes did not cause visible injury to hard red spring or durum wheat at either application growth stage. Teatments applied at the 2-leaf stage resulted in very similar yield across all varieties. Application of pinoxaden with 2,4-D at the 5-leaf application stage tended to reduce yield of wheat relative to other treatments. This trend did not hold for all varieties and seldom was different than other treatments applied at the 5-leaf stage.

HRS wheat and durum response to pinoxaden continued.

		Granite			Knudson			Divide			Mountrail		
Treatment[a]	Rate	Yield	moisture	Test weight	Yield	Moisture	Test weight	Yield	moisture	Test weight	Yield	moisture	Test weight
	oz ai/A	bu/A	%	lb/bu	bu/A	%	lb/bu	bu/A	%	lb/bu	bu/A	%	lb/bu
Fenx+Brox&MCPA5	1.32+8	30	16	60	31	20	55	41	17	58	42	16	57
Pxdn+Brox&MCPA5	0.86+8		11	59	28	-	-	31	16	57	31	17	57
Pxdn+Brox&MCPA5	1.7+8	31	15	53	30	20	57	39	16	56	41	17	57
Pxdn+Brox&2,4-D	0.86+9	27	16	55	26	20	57	33	17	58	34	17	59
Pxdn+Flox&MCPA +Thif-sg+Trib-sg	0.86+8 +0.24+0.06	27	16	58	31	20	57	35	18	58	36	17	58
Pxdn+Clpy&Flox +Thif-sg	0.86+3 +0.3	26	13	58	31	20	57	31	18	59	33	17	60
Fenx+Brox&MCPA5	1.32+8	27	15	44	19	-	-	28	17	57	28	17	59
Pxdn+Brox&MCPA5	0.86+8	24	16	59	18	-	-	28	17	56	26	16	56
Pxdn+Brox&MCPA5	1.7+8	23	16	59	20	-	-	25	15	56	25	16	55
Pxdn+Brox&2,4-D	0.86+9	22	13		20	-	-	21	-	-	19	-	-
Pxdn+Flox&MCPA +Thif-sg+Trib-sg	0.86+8 +0.24+0.06	21	-	-	23	18	49	23	-	-	20	-	-
Pxdn+Clpy&Flox +Thif-sg	0.86+3 +0.3	22	16	58	22	20	57	29	17	57	26	17	57
Untreated	0	21	-	-	20	-	-	23	17	55	18	-	-
LSD (P=.05)		9	11	6	12	-	-	14	2	3	17	1	6

[a] All pinoxaden treatments, Pxdn, included Adigor at 9.6 oz/A.

		Lebsock			All varieties			
Treatment[a]	Rate	Yield	moisture	Test weight	6/7	6/14	6/26	7/25
	oz ai/A	bu/A	%	lb/bu				
Fenx+Brox&MCPA5	1.32+8	38	19	57	0	0	0	0
Pxdn+Brox&MCPA5	0.86+8	23	19	56	0	0	0	0
Pxdn+Brox&MCPA5	1.7+8	41	20	56	0	0	0	0
Pxdn+Brox&2,4-D	0.86+9	35	20	55	0	0	0	0
Pxdn+Flox&MCPA +Thif-sg+Trib-sg	0.86+8 +0.24+0.06	39	20	55	0	0	0	0
Pxdn+Clpy&Flox +Thif-sg	0.86+3 +0.3	30	20	57	0	0	0	0
Fenx+Brox&MCPA5	1.32+8	32	19	54	0	0	0	0
Pxdn+Brox&MCPA5	0.86+8	25	17	58	0	0	0	0
Pxdn+Brox&MCPA5	1.7+8	28	19	55	0	0	0	0
Pxdn+Brox&2,4-D	0.86+9	19	-	-	0	0	0	0
Pxdn+Flox&MCPA +Thif-sg+Trib-sg	0.86+8 +0.24+0.06	23	-	-	0	0	0	0
Pxdn+Clpy&Flox +Thif-sg	0.86+3 +0.3	27	18	57	0	0	0	0
Untreated	0	26	18	52	0	0	0	0
LSD (P=.05)		17	3	4	0	0	0	0

[a] All pinoxaden treatments, Pxdn, included Adigor at 9.6 oz/A.

2006 Durum Tolerance to Axial Herbicide at Hettinger, ND

Eric Eriksmoen

Fifteen varieties of durum wheat were seeded on April 10. 10 oz/A Axial herbicide + 10 oz/A Adigor adjuvant were applied on May 25 to 5 leaf durum with 75° F, 36% RH, clear sky and 6 mph W wind. Application was made with a pickup mounted sprayer delivering 10 gpa at 40 psi to 5 foot wide by 10 foot long unreplicated strips. The strips were evaluated for crop injury on May 31, June 7 and on June 15. No injury was observed on any of the varieties.

Variety	Inj1	Inj2	Inj3
Ben	0	0	0
Mountrail	0	0	0
Lebsock	0	0	0
Alkabo	0	0	0
Grenora	0	0	0
Divide	0	0	0
Rugby	0	0	0
Belzer	0	0	0
Maier	0	0	0
Plaza	0	0	0
Pierce	0	0	0
Dilse	0	0	0
Primo D'oro	0	0	0
Grande Doro	0	0	0
DG13141	0	0	0

Wild oat control with triallate. Angela Kazmierczak, Kirk Howatt, Ronald Roach, and Janet Harrington. Triallate treatments were applied preplant and incorporated with 2 two passes using a field cultivator on April 26 with 62°F, 20% RH, 0% cloud cover, wind velocity of 8 mph at 270°, and dry soil at 48°F. 'Alsen' hard red spring wheat was seeded April 27. Post treatments were applied to 3-leaf wheat and 3- to 4-leaf wild oat on May 30 with 80°F, 24% RH, 20% cloud cover, wind velocity of 6 mph at 270°, and dry soil at 64°F. All treatments were applied with a backpack sprayer delivering 8.5 gpa at 35 psi through 11001 TT nozzles to a 7-ft wide area the length of 10 by 30 ft plots. The experiment was a randomized, complete block design with three replicates. The study was sprayed with bromoxynil and MCPA at 8 oz/A to control broadleaf weeds.

		6/7	Wioa			8/1
Treatment[a]		Wht	6/7	6/17	6/27	Yield
	Rate	% injury	—	% control	—	bu/A
Triallate	16	0	96	98	91	32
Triallate	12	0	93	97	91	35
Triallate	8	0	85	96	87	34
Triallate/Fenoxaprop	8/1	0	97	98	94	43
Fenoxaprop	1	0	75	93	82	35
Triallate/Pinoxaden+Adigor	8/0.4+0.075G	0	98	99	99	53
Pinoxaden+Adigor	0.4+0.075G	0	77	93	99	41
Triallate/Flucarbazone+Basic Blend	8/0.21+1%	0	96	98	99	49
Flucarbazone+Basic Blend	0.21+1%	0	67	87	90	34
Untreated	0	0	0	0	0.	20
LSD (P=.05)		0	5.1	3.8	3.1	15.7
CV		0	3.8	2.6	2.2	24.2 7

[a] All post emergence treatments included bromoxynil and MCPA at 8 oz/A.

Triallate plus any postemergence herbicide provided greater than 94% wild oat control throughout the season. Triallate at 840 and 1120 g/ha maintained wild oat control greater than 90% throughout the growing season, although yields were reduced by as much as 40% compared to treatments of triallate plus a postemergence herbicide. A yield increase of 25-55% was observed in triallate treatments that included a postemergence grass herbicide compared with triallate at 560 g/ha alone. Postemergence grass herbicides alone provided greater than 85% wild oat control 14 d after treatment, but early season competition resulted in yield losses of up to 30% compared with combination treatments of triallate followed by a postemergence grass herbicide.

Growth stage at initiation of split treatment. Kirk Howatt, Ronald Roach, and Janet Harrington. 'Alsen' hard red spring wheat was seeded April 26 near Fargo, North Dakota. Treatment applications were applied as follows:

Treatment stage	1 leaf	2 leaf	10DAT-1L	3 leaf	10DAT-2L	4 leaf	10DAT-3L	10DAT-4L
Date	5/16	5/22	5/26	5/30	6/1	6/2	6/8	6/12
Temperature (°F)	54	54	66	61	69	74	59	68
Humidity (%)	55	29	50	40	47	64	44	48
Sky (% cloud cover)	0	95	0	20	0	0	0	5
Wind velocity (mph)	7	8	1	3.5	1	2	6	1
Wind direction (°)	0	135	270	270	-	270	45	180
Soil temp (°F)	50	52	60	60	58	64	60	60
Soil moisture	damp	dry	damp	dry	moist	damp	dry	dry
Crop stage (leaf)	1	2	2.5	3	4-5	5	6	6
Wild oat stage (leaf)	spike-1	2-2.5	1-2	3-4	3	5	4	5

Treatments were applied with a backpack sprayer delivering 8.5 gpa at 35 psi through 11001 TT nozzles to a 7-ft wide area the length of 10 by 30 ft plots. The experiment was a randomized, complete block design with three replicates. Plots were harvest for yield on August 1.

Treatment	Rate	Treatment stage	6/7 Wht	Wioa 6/7	Wioa 6/27	Wioa 7/10	8/1 Yield
	oz ai/a		% injury	—% control	—	—	bu/A
Clodinafop+DSV	0.8+1%	4 leaf	0	53	98	99	16
Clodinafop+DSV	0.4+1%	4 leaf	0	53	97	98	21
Clodinafop+DSV	0.2+1%	1 leaf	0	92	92	95	29
Clodinafop+DSV/Clfp+DSV	0.2+1%/0.2+1%	1 leaf/10 DAT	0	94	99	99	36
Clodinafop+DSV/Clfp+DSV	0.2+1%/0.2+1%	2 leaf/10 DAT	0	87	99	99	33
Clodinafop+DSV/Clfp+DSV	0.2+1%/0.2+1%	3 leaf/10 DAT	0	73	97	97	20
Clodinafop+DSV/Clfp+DSV	0.2+1%/0.2+1%	4 leaf/10 DAT	0	53	96	98	19
Untreated	0		0	0	0	0	13
LSD (P=.05)			0	7	1	1	6
CV			0	7	1	1	17

Treatments did not cause injury to wheat. Wild oat emergence occurred early in the season and did not occur over an extended period or in multiple flushes because of dry conditions. The majority of wild oat had emerged by the 1-leaf application leading to very good control from a single application at the 1-leaf stage. Two applications starting at the 1-leaf stage improved weed control over the single application, eliminated competition from weakly surviving plants, and maximized yield at 36 bu/A. Delaying the initiation of spraying resulted in less weed control, especially on June 7, and less yield. The increments in the yield trend indicate that it is critical to control wild oat before the 3-leaf stage. Reducing competition before the third leaf may be so important because of tiller development. It should be noted that a single application of grass herbicide at 1X has been more effective at controlling resistant wild oat than three applications at 1/3X. Reduced applications can enhance resistance development if the plants do not all die.

Interval between split applications. Kirk Howatt, Ronald Roach, and Janet Harrington. 'Alsen' hard red spring wheat was seeded April 26 near Fargo, North Dakota. Treatments were applied as follows:

Treatment stage	2 leaf	9DAT-2L	4 leaf	12DAT-2L	15DAT-2L	18DAT-2L	21DAT-2L
Date	5/22	5/31	6/2	6/5	6/9	6/12	6/15
Temperature (°F)	54	61	74	74	58	68	66
Humidity (%)	29	54	64	54	71	48	79
Wind velocity (mph)	8	6	2	7	4	4	9
Wind direction (°)	135	225	270	135	90	180	135
Soil temp (°F)	52	60	64	62	62	60	68
Soil moisture	dry	dry	damp	dry	moist	dry	moist
Crop stage (leaf)	2	3.5	4	5	6	6	6
Wild oat stage (leaf)	2-2.5	3	4	3	3	3	3

Treatments were applied with a backpack sprayer delivering 8.5 gpa at 35 psi through 11001 TT nozzles to a 7 ft wide area the length of 10 by 30 ft plots. The experiment was a randomized complete block design with three replicates. Harvest for yield was August 1.

Treatment	Rate	Treatment stage	6/14 Wht	Wild oat 6/14	Wild oat 6/27	Wild oat 7/10	8/1 Yield
	oz ai/A		% injury	— % control —			bu/A
Clodinafop+DSV	0.8+1%	4 leaf	0	70	98	99	19
Clodinafop+DSV	0.4+1%	4 leaf	0	60	94	98	17
Clodinafop+DSV	0.2+1%	2 leaf	0	94	98	98	27
Clodinafop+DSV/Clfp+DSV	0.2+1%/0.2+1%	2L/6DAT	0	96	99	99	31
Clodinafop+DSV/Clfp+DSV	0.2+1%/0.2+1%	2L/9DAT	0	94	99	98	28
Clodinafop+DSV/Clfp+DSV	0.2+1%/0.2+1%	2L/12DAT	0	92	99	99	30
Clodinafop+DSV/Clfp+DSV	0.2+1%/0.2+1%	2L/15DAT	0	90	98	98	24
Clodinafop+DSV/Clfp+DSV	0.2+1%/0.2+1%	2L/18DAT	0	90	99	99	26
Clodinafop+DSV/Clfp+DSV	0.2+1%/0.2+1%	2L/21DAT	0	83	98	99	23
Untreated	0		0	0	0	0	12
LSD (P=.05)			0	4	1	1	6
CV			0	3	1	1	15

Treatments did not cause injury to wheat. Wild oat emerged during a short period early in the season. Additional or extended emergence was not favored because of dry conditions. Because of lack of late emergence all split treatments provided very similar wild oat control by June 27. Control of wild oat at the 2-leaf stage of wheat resulted in greater yield than application at the 4-leaf stage.

Grass control in small grains, Fargo. Kirk Howatt, Ronald Roach, and Janet Harrington. 'Alsen' hard red spring wheat was seeded April 26 near Fargo, North Dakota. Treatments were applied to 3-leaf wheat and 3- to 5-leaf wild oat on May 30 with 78°F, 40% RH, 20% cloud cover, wind velocity of 2 mph at 270°, and dry soil with 60°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 35 psi through 11001 TT nozzles to a 7-ft wide area the length of 10 by 30 ft plots. The experiment was a randomized, complete block design with three replicates.

		6/14		6/27	8/1
Treatment	Rate	Wht	Wioa	Wioa	Yield
	oz ai/A	% inj	— % control—		bu/A
Mess+Brox&MCPA5+Basic Blend	0.036+8+1%	0	77	75	26
Flcz+Brox&MCPA5+Basic Blend	0.32+8+1%	0	77	95	25
Prcz&Mess+Brox&MCPA5+Basic Blend	0.178+8+1%	0	80	91	27
Immb+Bromoxynil&MCPA5+MSO	5+8+0.19G	0	62	63	23
Tral-SC+Brox&MCPA5+Supercharge+AMS	2.9+8+0.5%+9.5	0	78	90	25
Fenoxaprop+Bromoxynil&MCPA5	0.8+8	0	68	60	21
Fenoxaprop+Bromoxynil&MCPA5	1.32+8	0	82	83	31
Clodinafop-ng+Bromoxynil&MCPA5	0.8+8	0	85	98	29
Untreated	0	0	0	0	20
LSD (P=.05)		0	7	6	7
CV		0	8	6	17

Teatments did not cause visible injury to wheat. Imazamethabenz and fenoxaprop at 0.8 oz/A gave the least control of wild oat June 27 at 63 and 60%, respectively. Wild oat was rather developed for adequate control with imazamethabenz, and the oat population was too large to expect control with a reduced rate of fenoxaprop. Flucarbazone and propoxycarbazone plus mesosulfuron provided 95 and 91% control of wild oat, respectively. The drier conditions of this year's growing season were favorable to the activity of these ALS-inhibitors. Mesosulfuron alone did not perform as well, giving 75% control. Mesosulfuron activity may have been improved with use of methylated seed oil rather than basic blend, but our past studies have shown inconsistent preference for the better adjuvant and control has not always been statistically different between the two adjuvant types. Fenoxaprop at gave 83% control of wild oat, which was less than several treatments, but resulted in the greatest numerical yield value. Even though wild oat were not completely killed by June 27, competition with wheat had been reduced so that yield was similar to clodinafop, which provided 98% control.

GRASS CONTROL IN SMALL GRAINS

Grass control in HRS wheat, Williston 2006. Neil Riveland. 'Reeder' spring wheat was planted on recrop (land cropped to wheat in 2005) in 7 inch rows at 80 lbs/a on May 9. All treatments were applied on June 2 with 62 F., 48% RH, soil temp 63 F, 95% clear sky and wind at 1-3mph from S to 3-3.5 leaf wheat, 1-4 leaf wild oats (most in the 2 to 3-leaf), 1-4 leaf green foxtail and 0.5-1 inch Russian thistle. WE used a small plot sprayer with wind cones, mounted on a G-Allis Chalmers tractor to apply the treatments, delivering 8.5 gals/a at 30 psi through 8001vs flat fan nozzles to a 6.67 ft wide area the length of 10 by 24 ft plots. First rain received after application was 0.13 inches on June 4. Experimental design was a randomized complete block design with four replications. Wild oat density averaged 4-6 plants/ft2, green foxtail density was 15-25 plants/ft2 and Russian thistle density was 3-4 plants/yd2. Plots were evaluated for crop injury on June 12 and 20. Weed control ratings were taken on June 20 (Russian thistle and green foxtail), July 8 (wild oats) and August 20 (wild oats). Wheat was machine harvested for yield on August 21.

		Crop inj				Wioa control		control	
Treatment [a]	Rate oz/a	6/12	6/20	Test Weight	Yield	7/8	8/20	Grft	Ruth
		%	%	lb/bu	bu/A	%	%	%	%
Mess+Brox&MCPA5+Basic Blend	0.036+8+1%	0	0	53.7	18.5	94	97	87	98
Flcz+Brox&MCPA5+Basic Blend	0.32+8+1%	0	0	52.8	19.4	98	99	97	99
Prcz&Mess+Brox&MCPA5+Basic Blend	0.18+8+1%	0	0	53.5	19.4	97	98	84	99
Immb+Brox&MCPA5+MSO	5+8+0.19G	0	0	53.0	19.5	96	95	77	99
Tral+Brox&MCPA5+Supercharge+AMS	2.9+8+0.5%+9.5	0	0	53.2	19.6	94	96	95	99
Fenoxaprop+Brox&MCPA5	0.8+8	0	0	52.8	19.2	70	80	94	99
Fenoxaprop+Brox&MCPA5	1.32+8	0	0	53.5	20.0	92	94	96	99
Clodinafop-ng+Brox&MCPA5	0.8+8	0	0	53.4	20.6	99	97	97	99
Pinoxaden+Brox&MCPA5+Adigor	0.86+8+0.075G	0	0	53.0	20.7	95	98	97	97
Difenzoquat+Brox&MCPA5	16+8	21	68	53.9	10.8	64	66	36	96
Untreated	0	0	0	52.4	15.1	0	0	0	0
EXP MEAN		2	2	53.2	18.4	82	84	78	89
C.V. %		75	25	.9	7.7	9	7	7	1
LSD 5%		2	2	NS	2.0	11	8	8	2

[a] MSO, a methylated seed oil from Loveland Quad 7 used as the basic blend adjuvant Russian thistle control was greater than 95% for all treatments (except the untreated check) and is not reported.

Summary: Difenzoquat applied to Reeder spring wheat caused major crop injury. Yields were reduced by more than 50% compared to the highest yielding treatment (Pinoxaden) because of crop injury and less than adequate grassy weed control. Fenoxyprop applied 0.8 oz/a gave lower wild oat control than when applied 1.32 oz/a but crop yield was not affected.

Wild oat control with pinoxaden tank-mixes. Kirk Howatt, Ronald Roach, and Janet Harrington. 'Alsen' hard red spring wheat was seeded April 26 near Fargo, North Dakota. Treatments were applied to 3-leaf wheat and 3- to 4-leaf wild oat on May 30 with 80° F, 21% RH, 10% cloud cover, wind velocity of 2 mph at 270°, and dry soil at 60°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 35 psi through 11001 TT nozzles to a 7-ft wide area the length of 10 by 30 ft plots. The experiment was a randomized, complete block design with three replicates. Plots were harvested on August 1.

Treatment[a]	Rate	6/14 Wht	Wild oat 6/14	Wild oat 6/27	8/1 Yield
	oz ai/A	% injury	% control		bu/a
Pinoxaden	0.64	0	87	99	32
Pinoxaden+2,4-D	0.64+8	0	83	99	34
Pinoxaden+Brox&2,4-D	0.64+9	0	87	99	30
Pinoxaden+Brox&MCPA5	0.64+8	0	88	99	28
Pinoxaden+Brox+Clpy+MCPA	0.64+4+1.5+4	0	83	99	28
Pinoxaden+Clpy&MCPA+Thif-sg+Trib-sg	0.64+9.5+0.24+0.06	0	82	99	34
Pinoxaden+Clpy&2,4-D+Thif-sg+Trib-sg	0.64+9.5+0.24+0.06	0	83	99	37
Pinoxaden+Clopyralid&Fluroxypyr+MCPA	0.64+3+4	0	85	99	32
Pinoxaden+Clpy&Flox+Thif-sg+Trib-sg	0.64+3+0.24+0.06	0	87	99	26
Pinoxaden+Clpy&Fluroxypyr+Carf	0.64+3+0.125	0	83	99	30
Pinoxaden+Dicamba+Carf	0.64+1.5+0.125	0	82	99	29
Pinoxaden+MCPA+Carf	0.64+4+0.125	0	87	99	34
Pinoxaden+Thif-sg+Trib-sg+MCPA	0.64+0.24+0.06+4	0	87	99	32
Pinoxaden+Thif-sg+Trib-sg+2,4-D	0.64+0.24+0.06+4	0	82	99	35
Pinoxaden+Thif-sg+Trib-sg+Flox&MCPA	0.64+0.24+0.06+8	0	82	99	28
Pinoxaden+Thif-sg+Trib-sg+Dicamba	0.64+0.24+0.06+1.5	0	82	99	30
Untreated	0	0	0	0	24
LSD (P=.05)		0	4	0	8
CV		0	3	0	16

[a] Adigore adjuvant was included in allpinoxaden treatments at 9.6 fl oz/A.

Treatments did not cause injury to wheat. Pinoxaden rate was descreased from the labeled rate of 0.86 oz/A to enhance the effect of antagonism. Pinoxaden at 0.64 oz/A provided 87% control of wild oat 15 d after application. Several herbicide combinations for broadleaf weed control antagonized the control of wild oat by 4 or 5% at this evaluation, but all herbicide treatments provided 99% control of wild oat by 28 d after application. Wheat grain yield did not correlate with initial weed control ratings. None of the wheat yields for herbicide-treated plots differed from wheat treated with pinoxaden alone.

Axial for Wild Oat Control in Spring Wheat (Terry D. Gregoire, 2006) Alsen HRS wheat was planted May 6. Wheat was sprayed May 31st between 7:00 am and 7:30 am near Devils Lake, North Dakota. The temperature during application was 57°F, relative humidity near 75%, with partly cloudy sky. The leaf stages of the wheat and weeds were: wheat 3 ½ leaf, wild oat 2-4 leaf. Treatments were applied with a CO_2 pressurized back pack sprayer using 8.5 gpa at 40 psi and 8001 nozzles. Treatments were arranged in RCBD and replicated 3 times. Treatment evaluation dates were June 5th, 16th, and July 11th 2006. Wheat injury was measured on a scale of 1-4. 1= light yellow, 3 leaf blotches evident, 4= some stunting.

Trt No.	Treatment Name	Rate	Rate Unit	Wheat Injury June 5	Wheat Injury June 16	July 11 Wild Oat % control
1	untreated			0	0	0
2	Axial	8.2	OZ/A	0	0	100
	Adigor	9.6	OZ/A			
3	Axial	8.2	OZ/A	1.3	0	100
	Adigor	9.6	OZ/A			
	Bronate Advanced	0.8	PT/A			
4	Axial	8.2	OZ/A	1.0	0	100
	MCPA Ester	0.5	PT/A			
	Affinity Tankmix	0.6	OZ WT/A			
	Adigor	9.6	OZ/A			
5	Axial	8.2	OZ/A	2.0	0	100
	Adigor	9.6	OZ/A			
	MCPA Ester	0.5	PT/A			
	Widematch	1.0	PT/A			
6	Axial	8.2	OZ/A	0.7	0	100
	Adigor	9.6	OZ/A			
	MCPA Ester	0.5	PT/A			
	Affinity Tankmix	0.6	OZ WT/A			
7	Axial	8.2	OZ/A	0.7	0	98
	Adigor	9.6	OZ/A			
	Affinity Tankmix	0.6	OZ WT/A			
	Starane	0.33	PT/A			
8	Axial	0.52	OZ/A	2.7	0	100
	Adigor	9.6	OZ/A			
	Curtail M	1.75	PT/A			
9	Axial	8.2	OZ/A	1.9	0	100
	Adigor	9.6	OZ/A			
	Express	0.375	OZ WT/A			
	Mcpa Ester	0.5	PT/A			
10	Puma	0.5	PT/A	0.7	0	80
	Bronate Advanced	0.8	PT/A			
11	Everest	0.4	OZ WT/A	2.3	0	100
	Bronate Advanced	0.8	PT/A			
12	Silverado	1.78	OZ WT/A	2.7	0	90
	Bronate Advanced	0.8	PT/A			
	Destiny	1.5	PT/A			
	LSD (P=.05)			0.8		11.4
	CV			36		7.5

Puma was significantly lower for Wild Oat control than other treatments. Other treatments were not different from one another for percent Wild Oat control. Herbicide tank mixes varied from one another and generally increased wheat injury compared to Axial applied without other herbicides. However, no injury was visible 17 days after application.

AXIAL FOR WILD OAT CONTROL IN HRS WHEAT

Axial for wild oat control in HRS wheat, Williston 2006. Neil Riveland. 'Reeder' spring wheat was planted on recrop (land cropped to wheat in 2005) in 7 inch rows at 80 lbs/a on May 9. All treatments were applied on June 1 with 79 F., 23% RH, 50% clear sky and wind at 2-4 mph from SSE to 3-3.5 leaf wheat, 1-4 leaf wild oats (most in the 2 to 3-leaf), 1-4 leaf green foxtail. We used a small plot sprayer with wind cones, mounted on a G-Allis Chalmers tractor to apply the treatments, delivering 10 gals/a at 40 psi through 8001vs flat fan nozzles to a 6.67 ft wide area the length of 10 by 24 ft plots. First rain received after application was 0.13 inches on June 4. Experimental design was a randomized complete block design with four replications. Wild oat density averaged 2-3 plants/ft2 and green foxtail density was about 25 plants/ft2. Plots were evaluated for crop injury on June 12 and 17. Weed control ratings were taken on June 17 (green foxtail), July 9 (wild oats) and August 20 (wild oats). Wheat was machine harvested for yield on August 21.

Treatment[a]	Rate	Test Weight	Yield	Grain Protein	--- Control --- --Wioa-- 7/9	8/20	Grft 6/17
	oz product/A	lb/bu	bu/A	%	------	%	------
Axial+Adigor	8.2+9.6	52.2	19.2	16.1	99	98	97
Axial+Adigor+Bronate Advanced	8.2+9.6+12.8	52.2	18.2	16.6	98	97	95
Axial+Adigor+Affinity TM+MCPA e	8.2+9.6+0.6+8	52.5	17.9	16.0	97	96	95
Axial+Adigor+WideMatch+MCPA e	8.2+9.6+16+8	53.8	18.7	16.0	99	98	95
Axial+Adigor+WideMatch+Affin TM	8.2+9.6+16+0.6	54.0	18.4	16.0	99	99	93
Axial+Adigor+Affin TM+Starane	8.2+9.6+0.6+5.3	53.6	18.8	16.2	95	97	93
Axial+Adigor+Curtail M	8.2+9.6+16	53.9	19.1	16.1	99	98	97
Axial+Adigor+Express XP+MCPA e	8.2+9.6+0.25+8	52.7	17.9	16.8	97	98	88
Puma+Bronate Advanced	8.0+12.8	53.3	20.3	16.3	90	95	90
Everest+Bronate Advanced	0.4+12.8	53.0	19.7	16.7	98	98	95
Rimfire+Bronate Advanced	2.25+12.8	53.5	18.9	16.0	91	93	83
Silverado+Bronate Advance+MSO	1.75+12.8+24	53.1	19.0	16.3	94	97	85
Discover NG+Bronate Advanced	12.8+12.8	52.8	19.5	16.3	99	98	95
Untreated Check	0	53.0	17.9	16.0	0	0	0
EXP MEAN		53.1	18.8	16.2	90	90	86
C.V. %		1.1	6.6	3.4	4	4	6
LSD 5%		NS	NS	NS	6	6	7

[a]MSO - methylated seed oil from Loveland

Summary: No crop injury occurred. Generally all treatments gave good control of wild oats. Axial in combination with Express gave reduced control of green foxtail compared to using Axial alone.

AXIAL FOR WILD OAT CONTROL IN DURUM WHEAT

Axial for wild oat control in durum wheat, Williston 2006. Neil Riveland. 'Pierce' durum wheat was planted on recrop (land cropped to durum wheat in 2005) in 7 inch rows at 90 lbs/a on May 12. All treatments were applied on June 1 with 80 F., 21% RH, 50% clear sky and wind at 2-4mph from 311 degrees to 3-3.5 leaf wheat, 1-3.5 leaf wild oats (most in the 2-leaf), 1-4 leaf green foxtail. We used a small plot sprayer with wind cones, mounted on a G-Allis Chalmers tractor to apply the treatments, delivering 10 gals/a at 40 psi through 8001vs flat fan nozzles to a 6.67 ft wide area the length of 10 by 24 ft plots. First rain received after application was 0.13 inches on June 4. Experimental design was a randomized complete block design with four replications. Wild oat density averaged 0.5-1 plant/ft2 and green foxtail density averaged about 15 plants/ft2. Plots were evaluated for crop injury on June 12 and July 19. Weed control ratings were taken on June 20 (green foxtail) and on July 19 (wild oats). Durum was machine harvested for yield on August 21.

Treatment a	Rate	Test Weight	Yield	- Control - Grft 6/20	Wioa 7/19
	oz product/a	lbs/b	bus/a	---- %	----
Axial+Adigor	8.2+9.6	57.1	16.1	95	82
Axial+Adigor+Bronate Adv	8.2+9.6+12.8	57.4	17.2	92	92
Axial+Adigor+Affinity TM+MCPA e	8.2+9.6+0.6+8	56.9	15.9	91	91
Axial+Adigor+WideMatch+MCPA e	8.2+9.6+16+8	56.9	14.8	96	96
Axial+Adigor+Affin TM+Starane	8.2+9.6+0.6+0	57.0	16.0	94	97
Axial+Adigor+Curtail M	8.2+9.6+16	57.4	13.2	89	96
Axial+Adigor+Express XP+MCPA e	8.2+9.6+0.25+8	56.8	13.9	93	96
Puma+Bronate Advanced	8.0+12.8	56.8	14.7	77	75
Silverado+Bronate Advance+MSO	1.75+12.8+24	57.0	14.5	83	85
Discover NG+Bronate Advanced	12.8+12.8	56.6	15.7	98	97
Untreated Check	0	56.8	11.9	0	0
EXP MEAN		56.9	14.8	82	82
C.V. %		.6	13.3	14	11
LSD 5%		NS	2.8	16	13

Summary: Though weed pressure was light to moderate, durum yields increased when wild oats and green foxtail were controlled. No crop injury was noted on June 12 but on June 19 10-15% crop injury (reduced plant height) was noted in one rep only when Widematch or Curtail M was applied in combination with Axial.

Wild oat control with Axial in spring wheat. Jenks, Willoughby, and Mazurek. 'Steele' spring wheat was seeded May 9 at 90 lb/A into 7.5 inch rows. Herbicide treatments were applied postemergence (POST) on June 1 with wheat at the 4-leaf stage, and on June 6 with wheat at the 4-5-leaf stage. On June 1, wild oat was 3.5-leaf with 2-4 plants/ft². On June 6, wild oat was at the 3-leaf stage with 1-3 plants/ft². Individual plots were 10 x 30 ft and replicated three times.

Only Everest caused significant visible crop injury in the form of stunting. All Axial and Everest treatments provided excellent wild oat control. Puma did not control wild oat, but was only applied at 0.4 pt, rather than the normal wild oat rate of 0.67 pt.

Table. Wild oat control with Axial in spring wheat.

			Wheat			Wioa			Wheat	
Treatment	Rate	Timing	Jun 10	Jun 23	Aug 2	Jun 23	Jul 8	Aug 2	Yield	Test wt.
			---% injury---			--% control--			bu/A	lb/bu
Untreated			0	0	0	0	0	0	21.3	56.4
Axial + Adigor / Bronate[a]	8.2 fl oz + 9.6 fl oz / 0.8 pt	4-lf / + 5 day	3	4	0	98	97	96	49.2	58.9
Axial + Adigor + Bronate	8.2 fl oz + 9.6 fl oz + 0.8 pt	4-lf	1	0	0	97	94	95	53.4	59.1
Axial + Adigor + Affinity	8.2 fl oz + 9.6 fl oz + 0.6 oz	4-lf	0	0	0	96	96	96	52.9	58.8
Puma / Bronate	0.4 pt / 0.8 pt	4-lf / + 5 day	3	4	0	75	70	72	48.9	58.5
Puma + Bronate	0.4 pt + 0.8 pt	4-lf	1	0	0	43	35	37	33.1	58.0
Puma + AffinityTM +	0.4 pt + 0.6 oz + 0.33 pt	4-lf	0	0	0	57	61	61	41.2	58.5
Everest / Bronate	0.6 oz / 0.8 pt	4-lf / + 5 day	6	17	6	87	91	93	42.9	59.8
Everest + Bronate	0.6 oz + 0.8 pt	4-lf	6	11	6	86	95	95	48.2	59.5
Everest + Affitinty TM +	0.6 oz + 0.6 oz + 0.33 pt	4-lf	9	13	7	88	95	96	48.4	59.7
LSD (0.05)			2	2	2	11	18	17	10.8	0.9
CV			42	24	52	8	14	13	14.3	0.9

[a] The Bronate formulation used was Bronate Advanced.

Herbicide antagonism of wild oat control with fenoxaprop or pinoxaden. Kirk Howatt, Ronald Roach, and Janet Harrington. 'Alsen' hard red spring wheat was seeded April 26 near Fargo, North Dakota. Treatments were applied to 3-leaf wheat and wild oat on June 2 with 74°F, 64% RH, 0% cloud cover, wind velocity of 2 mph at 270°, and damp soil with 64°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 35 psi through 11001 TT nozzles to a 7-ft wide area the length of 10 by 30 ft plots. The experiment was a randomized, complete block design with three replicates. Plots were harvested August 1.

Treatment	Rate	6/16 Wht	Wild oat 6/16	Wild oat 6/28	8/1 Yield
	oz ai/A	% injury	% control		bu/a
Fenoxaprop	1.32	0	92	98	44
Fenoxaprop	1	0	83	94	35
Fenoxaprop+bromoxynil&2,4-D	1.32+9	0	95	60	43
Fenoxaprop+bromoxynil&2,4-D	1+9	0	82	88	33
Fenx+Clopyralid&Fluroxypyr +Thif-sg+Trib-sg	132+3 +0.24+0.06	0	85	93	34
Fenoxaprop+Clopyralid&Fluroxypyr +Thif-sg+Trib-sg	1+3 +0.24+0.06	0	82	88	24
Pinoxaden+Adigor	0.86+0.075G	0	83	98	32
Pinoxaden+Adigor	0.6+0.075G	0	85	98	39
Pinoxaden+bromoxynil&2,4-D+Adigor	0.86+9+0.075G	0	78	96	37
Pinoxaden+bromoxynil&2,4-D+Adigor	0.6+9+0.075G	0	80	97	30
Pinoxaden+Clpy&Flox +Thif-sg+Trib-sg+Adigor	0.86+3 +0.24+0.06+0.075G	0	85	98	29
Pinoxaden+Clpy&Flox +Thif-sg+Trib-sg+Adigor	0.6+3 +0.24+0.06+0.075G	0	88	99	36
LSD (P=.05)		0	7	24	18
CV		0	5	15	30

Treatments did not cause injury to wheat. Broadleaf herbicides did not antagonize pinoxaden control of wild oat.

Efficacy with fenoxaprop tank-mixes. Kirk Howatt, Ronald Roach, and Janet Harrington. 'Alsen' hard red spring wheat was seeded April 26 near Fargo, North Dakota. Treatments were applied to 3- to 4-leaf wheat and 3- to 5-leaf wild oat on May 30 with 82°F, 25% RH, 10% cloud cover, wind velocity of 3 mph at 270°, and dry soil at 61°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 35 psi through 11001 TT nozzles to a 7-ft wide area the length of 10 by 30 ft plots. The experiment was a randomized, complete block design with three replicates.

Treatment	Rate	6/14 Wht	Wild oat 6/14	Wild oat 6/27	Wild oat 8/3
	oz ai/A	% injury	— % control —		
Fenoxaprop	1.32	0	82	91	96
Fenoxaprop+Bromoxynil&MCPA5	1.32+8	0	82	78	75
Fenx+Brox&MCPA5+Clpy&Flox	1.32+6+1.5	0	80	78	77
Fenx+Broxl&MCPA5+Thif-sg+Trib-sg	1.32+6+0.08+0.02	0	77	73	75
Fenoxaprop+MCPA+Fluroxypyr	1.32+6+1	0	82	85	85
Fenx+Clpy&Flox+MCPA	1.32+2.3+6	0	80	89	92
Fenx+Clpy&Flox+Thif-sg+Trib-sg	1.32+2.3+0.08+0.02	0	82	88	94
Untreated	0	0	0	0	0
LSD (P=.05)		0	6	5	8
CV		0	5	4	6

Treatments did not injure wheat. Control of wild oat was similar across tank-mixes on June 14. Fenoxaprop alone provided 91% control of wild oat on June 27. Treatments that included clopyralid and fluroxypyr were not different than fenoxaprop alone, but bromoxynil and MCPA reduced control with fenoxaprop to 73 to 78%. Bromoxynil and MCPA plus thifensulfuron and tribenuron caused the most antagonism. Results did not indicate a rate effect on antagonism of wild oat control with bromoxynil and MCPA as has been observed in the past. Control tended to improve for treatments containing fenoxaprop alone or fenoxaprop with clopyralid and fluroxypyr between June 27 and August 3, while treatments that contained bromoxynil and MCPA held steady or tended to declined.

<u>Preemergence weed control with flucarbazone.</u> Kirk Howatt, Ronald Roach, and Janet Harrington. 'Alsen' hard red spring wheat was seeded May 18, near Fargo, North Dakota. Preemergence treatments were applied on May 18 with 53°F, 46% RH, 100% cloud cover, wind velocity of 4 mph at 0°, and damp soil at 50°F. Post emergence components of treatments (4 through 8 following /) were applied to 3-leaf wheat, bolting Canada thistle, 7-leaf wild mustard, 2-leaf wild buckwheat, 2- to 3-leaf pigweed, and 2-leaf wild oat on June 1 with 67°F, 51% RH, 0% cloud cover, wind velocity of 3.5 mph at 225°, and wet soil. Late post emergence treatment (9 following /) was applied to 4-leaf wheat, bolting Canada thistle, flowering wild mustard, and 12-leaf wild buckwheat on June 12 with 60°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 35 psi through 11001 TT nozzles to a 7-ft wide area the length of 10 by 30 ft plots. The experiment was a randomized, complete block design with four replicates.

		6/7					6/16				6/30					7/10	8/8
Treatment[a]	Rate	Wht	Cath	Wibw	Rrpw	Wioa	Cath	Wibw	Rrpw	Wioa	Cath	Wibw	Rrpw	Wimu	Rrpw	Height	Yield
	oz ai/A							%								cm	bu/A
Glyt-WM+NIS+AMS	6+0.25%+16	0	62	62	0	94	17	7	0	99	32	15	0	32	79	82	31
Glyt-WM+Flcz+NIS+AMS	6+0.28+0.25%+16	0	70	76	92	95	37	35	95	99	65	50	96	80	88	81	35
Glyt-WM+Flcz+NIS+AMS	6+0.42+0.25%+16	0	67	82	96	96	40	40	95	99	50	42	95	77	96	82	32
Glyt-WM+Flcz+NIS+AMS/ Flcz+Brox&MCPA+BB	6+0.21+0.25%+16/ 0.21+8+1%	0	86	92	97	96	92	97	99	99	96	99	99	99	99	79	39
Glyt-WM+Flcz+NIS+AMS/ Flcz+Brox&MCPA+BB	6+0.14+0.25%+16/ 0.28+8+1%	0	82	84	94	96	92	97	99	99	93	98	99	99	99	74	35
Glyt-WM+NIS+AMS/ Flcz+Brox&MCPA+BB	6+0.25%+16/ 0.28+8+1%	0	65	62	0	97	93	97	99	99	93	99	99	99	99	80	37
Glyt-WM+NIS+AMS/ Fenx+Brox&MCPA	6+0.25%+16/ 1.32+8	0	62	62	0	92	15	60	25	99	52	40	15	64	99	82	33
Glyt-WM+NIS+AMS/ Fenx+Brox&MCPA	6+0.25%+16/ 1.32+8	0	62	60	0	91	76	81	67	99	88	90	81	93	98	75	40
Untreated	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	81	25
LSD (P=.05)		0	6	5	2	3	9	10	5	0	13	15	10	12	8	5	7
CV		0	7	5	4	2	12	12	6	0	14	18	10	11	6	4	13

[a] BB was a basic blend adjuvant.

Treatments did not cause visible injury to wheat. Weed control was improved when flucarbazone was included in the preemergence application with glyphosate. Flucarbazone provided excellent residual control of pigweed and enhances the activity on other weeds compared with glyphosate alone. Even though substantial weed pressure was present in wheat receiving primarily post emergence herbicides, yield was not reduced compared with treatments that included preemergence flucarbazone. But plots with preemergence flucarbazone looked significantly better and likely would have been easier to manage weed pressure in the subsequent season.

Wild oat conrol with Everest applied preemergence and/or early POST. Jenks, Willoughby, and Mazurek. 'Steele' spring wheat was seeded May 9 at 90 lb/A into 7.5 inch rows. Herbicide treatments were applied preemergence (PRE) on May 11, postemergence at wheat 2-3 leaf stage on May 23, and at wheat 4-5 leaf stage on June 12. On May 11, no weeds were present. On May 23, wild oat was at the 2-leaf stage with approximately 6-8 plants/ft^2. On June 12, wild oat was 3-4-leaf with 1-12 plants/ft^2. Individual plots were 10 x 30 ft and replicated three times.

We received no rainfall until May 24, almost 2 weeks after the preemergence application. The rain we received seemed only enough to settle the dust and was probably not enough to solidly incorporate and activate the herbicide. Very little injury was visible from the PRE treatments. At least 10% injury was visible during the month of June in the form of stunting from the POST treatments. Crop injury was less apparent in July. Wheat height as measured on July 3 showed Everest treatments generally slightly shorter (~1-4 inches) compared to the untreated or Puma.

The PRE treatments provided much less wild oat control compared to the POST treatments. The two PRE rates provided similar wild oat control through mid-June. We received our first significant rain in mid-June. By the end of June, the 0.6 oz rate was clearly providing more wild oat control than the 0.4 oz rate, but not as much as the POST treatments. The PRE treatments only reduced wild oat stand by about 25% compared to treatments receiving only POST applications. The 0.6 oz PRE and all POST treatments provided slightly higher wheat yield than Puma and the untreated. It is not clear why the Puma treatment performed so poorly in this study.

Table. Wild oat conrol with Everest applied preemergence and/or early POST.

			Wheat				Wild oat					Wheat		
Treatment	Rate	Timing	May 30	Jun 12	Jun 27	Jul 12	May 30	Jun 12	Jun 27	Jul 12	Aug 2	Ht. Jul 3	Yield	Test wt.
			-----% injury-----				-------% control-------					in.	bu/	lb/bu
Untreated			0	0	0	0	0	0	0	0	0	29.2	37.9	57.6
Bronate[a]	0.8 pt	4-5 lf	0	0	0	0	0	0	0	0	0	28.1	40.3	59.0
Everest / Bronate	0.4 oz/0.8 pt	PRE/4-5 lf	2	0	0	0	33	33	38	37	37	26.6	46.0	59.5
Everest / Bronate	0.6 oz/0.8 pt	PRE/4-5 lf	4	0	0	0	38	37	53	57	63	27.3	52.5	59.5
Everest / Everest	0.3 oz/0.3 oz	PRE/2-3 lf	10	15	10	4	84	95	95	95	95	25.6	49.8	59.2
Everest / Everest	0.2 oz/0.4 oz	PRE/2-3 lf	10	15	11	5	87	96	95	97	96	25.4	50.6	59.8
Everest +	0.4 oz+0.8 pt	2-3 lf	12	12	11	4	85	95	95	96	94	25.2	53.0	60.3
Puma + Bronate	0.66 pt+0.8pt	4-5 lf	0	0	0	0	0	0	53	48	55	26.5	45.2	59.3
LSD (0.05)			2	2	1	1	4	4	10	11	12	2.0	9.5	1.0
CV			28	20	15	49	6	5	10	11	12	4.2	11.5	1.0

[a] The Bronate formulation used was Bronate Advanced.

Flucarbazone Residual Activity. Kirk Howatt, Ronald Roach, and Janet Harrington. 'Alsen' hard red spring wheat was seeded April 26 near Fargo, North Dakota. Treatments 1 through 5 were applied to 2-leaf wheat and 2- to 2.5-leaf wild oat on May 22 with 59°F, 29% RH, 50% cloud cover, and dry soil with 52°F. Treatment 6 was applied to 5-leaf wheat and wild oat on June 5 with 74°F, 54% RH, 95% cloud cover, wind velocity of 7 mph at 135°, and dry soil at 62°F. All treatments were applied with a backpack sprayer delivering 8.5 gpa at 35 psi through 11001 TT nozzles to a 7-ft wide area the length of 10 by 30 ft plots. The experiment was a randomized, complete block design with three replicates.

			6/7	Wioa			8/1
Treatment	Rate	Timing	Wht	6/7	6/19	7/6	Yield
	oz ai/A		% injury	% control			bu/A
Flucarbazone+Basic Blend	0.28+1%		0	88	96	96	36
Flucarbazone+Basic Blend	0.42+1%		0	93	98	99	40
Flcz+Brox&MCPA+BB	0.28+8+1%		0	92	96	95	33
Flcz+Brox&MCPA+BB	0.42+8+1%		0	93	94	98	37
Fenoxaprop+Brox&MCPA	1.32+8		0	83	97	97	41
Fenx+Bromoxynil&MCPA	1.32+8		0	50	87	88	28
Untreated	0		0	0	0	0	14
LSD (P=.05)			0	4	2	5	4
CV			0	3	2	3	8

Treatments did not cause visible injury. All flucarbazone treatments and fenoxaprop applied at the 2-leaf stage provided similar wild oat control of 95 to 99% on July 7. Secondary flushes of wild oat were not promoted because of limited moisture during the season. This fact limited the success of achieving information on the residual activity of flucarbazone. However, the study demonstrated a slight rate response of flucarbazone under very high wild oat pressure and the benefit of early application to remove competition and preserve grain yield potential.

EVEREST FOR GRASSY WEED CONTROL IN DURUM WHEAT

Everest for wild oat control in durum wheat, Williston 2006. Neil Riveland. 'Pierce' durum wheat was planted on recrop (land cropped to durum wheat in 2005) in 7 inch rows at 90 lbs/a on May 12. All 2-leaf treatments were applied on May 25 1 with 76 F., 31% RH, 95% clear sky, soil temperature at 77 F.and wind at 0-3 mph from 152 degrees to 2 leaf wheat, 1-2 leaf wild oats (most in the 2-leaf), and 1-2 leaf green foxtail. On June 12 the 6-leaf Puma + Bronate treatment was applied to 5.8 leaf wheat, 1-5 leaf green foxtail, and 2-6 leaf wild oats with 66 F, 78% RH, 95% clear sky, soil temp 62 F and wind 3-5 mph from 27 degrees. We used a small plot sprayer with wind cones, mounted on a G-Allis Chalmers tractor to apply the treatments, delivering 10 gals/a at 40 psi through 8001vs flat fan nozzles to a 6.67 ft wide area the length of 10 by 24 ft plots. First rain received after application was 0.13 inches on June 4. Experimental design was a randomized complete block design with four replications. Wild oat density averaged 0.5-1 plant/ft2 and green foxtail density averaged about 5 plants/ft2. Plots were evaluated for crop injury on June 5, June 12, June 20 and July 8. Weed control ratings were taken on green foxtail on June 5, June 20 and July 8. Wild oat control was rated June 5 and July 8. Durum was machine harvested for yield on August 21.

				Control								
				Crop Injury				Grft			Wioa	
Treatment[a]	Product Rate	Test Weight	Yield	6/5	6/12	6/20	7/8	6/5	6/20	7/8	6/5	7/8
	oz/a		bus/a	%				%				
Untreated Check	0	56.9	15.7	0	0	0	0	0	0	0	0	0
Everest+Quad 7	0.4+1%v/v	56.6	17.5	18	8	6	8	94	88	94	80	92
Everest+Quad 7	0.6+1%v/v	56.5	17.8	18	10	8	6	90	91	93	80	92
Everest+Quad 7+Bronate	0.4+1%+16	56.9	17.9	15	8	5	6	97	90	95	88	93
Everest+Quad 7+Bronate	0.6+1%+16	56.9	16.8	16	9	10	11	97	94	94	88	94
Puma+Bronate 2 LF	10.5+16	57.0	17.9	3	3	1	0	94	85	83	78	83
Puma+Bronate 6 lf	10.5+16	56.6	16.6	0	0	1	0	0	95	98	0	97
EXP MEAN		56.7	17.2	10	5	4	4	67	78	79	59	79
C.V. %		1.0	11.1	33	99	97	79	7	8	5	11	4
LSD 5%		NS	NS	5	8	6	5	11	11	6	16	4

Quad 7 - a basic pH blend adjuvant from Agsco

Summary: Though weed pressure was light and yield levels were low due to drought stress in July and August, durum yields tended to increase with adequate control of the wild oats and green foxtail. Crop injury on June 5,12 and 20 was rated on crop color and stunting. On July 8 delay in crop heading was the rated. Everest applied at the higher rate and in combination with Bronate gave the most crop injury lasting the entire season but durum yields were not reduced significantly.

Wild oat control with Everest applied early vs. late POST. Jenks, Willoughby, and Mazurek. 'Steele' spring wheat was seeded May 9 at 90 lb/A into 7.5 inch rows. Herbicide treatments were applied postemergence on May 23 at the wheat 2-leaf stage and on June 12 at the 4-5 leaf stage. On May 23, wild oat was at the 2-leaf stage with approximately 6-10 plants/ft². On June 12, wild oat was at the 3-4 leaf stage with 1-8 plants/ft². Individual plots were 10 x 30 ft and replicated three times.

We observed minor injury, generally less than 10%, mostly visible as stunting. The July 3 height measurement showed wheat in the Everest 0.6 oz rate treatment being slightly shorter (~ 3 inches less) compared to the untreated and Puma treatments. Wheat in the 0.4 oz rate treatments were only about 1-2 inches shorter than the untreated and Puma.

Through most of June, the 0.6 oz rate visibly showed more wild oat activity than 0.4 oz. However, by July there was not much difference between rates. The early Puma treatment was rated lower mostly due to the later flush that was missed. The later Puma treatment took a while to control the larger wild oat and never really reached the level of control provided by Everest. There was no significant difference in wheat yield or test weight between treatments.

Table. Wild oat control with Everest applied early vs. late POST.

			Wheat			Wild Oat			Wheat		
Treatment[b]	Rate	Timing	Jun 10	Jul 12	Aug 2	Jun 10	Jul 12	Aug 2	Height Jul 3	Yield	Test Wt.
			---% injury---			--% control--			in.	bu/A	lb/bu
Untreated			0	0	0	0	0	0	26.7	35.9	59.7
Everest / Bronate[a]	0.4 oz / 0.8 pt	2-lf / 4-5 lf	3	3	0	89	94	93	24.4	43.1	59.9
Everest / Bronate	0.6 oz / 0.8 pt	2-lf / 4-5 lf	6	4	0	95	95	96	23.8	42.3	59.6
Everest + Bronate	0.4 oz + 0.8 pt	2-lf	3	1	0	86	91	91	25.3	45.6	59.6
Everest + Bronate	0.6 oz + 0.8 pt	2-lf	7	4	0	96	94	94	23.2	46.4	59.5
Puma + Bronate	0.67 pt + 0.8 pt	2-lf	0	0	0	78	78	77	26.6	44.1	59.6
Puma + Bronate	0.67 pt + 0.8 pt	4-5 lf	0	1	0	0	75	85	26.2	44.4	59.5
LSD (0.05)			2	2	NS	5	7	6	2.3	NS	NS
CV			40	58	0	4	6	4	5.2	11.5	1.2

[a] The Bronate formulation used was Bronate Advanced.
[b] All Everest treatments were applied with Quad 7 (1%).

Antagonism of wild oat control with flucarbazone or propoxycarbazone and mesosulfuron. Kirk Howatt, Ronald Roach, and Janet Harrington. 'Alsen' hard red spring wheat was seeded April 26 near Fargo, North Dakota. Treatments were applied to 3-leaf wheat and 3- to 4-leaf wild oat on May 30 with 76°F, 28% RH, 20% cloud cover, wind velocity of 3 to 7 mph at 270°, and dry soil with 64°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 35 psi through 11001 TT nozzles to a 7-ft wide area the length of 10 by 30 ft plots. The experiment was a randomized, complete block design with three replicates. The plots were harvested on August 1.

		6/14	Wild oat		8/1
Treatment[a]	Rate	Wht	6/14	6/27	Yield
	oz ai/A	% injury	% control		bu/A
Flucarbazone	0.35	0	85	96	29
Flucarbazone	0.28	0	85	94	34
Flucarbazone+Brox&2,4-D	0.35+9	0	82	93	33
Flucarbazone+Brox&2,4-D	0.28+9	0	85	94	28
Flucarbazone+Clpy&Flox+Thif-sg+Trib-sg	0.35+3+0.24+0.06	0	85	96	28
Flcz+Clpy&Flox+Thif-sg+Trib-sg	0.28+3+0.24+0.06	0	82	94	28
Propoxycarbazone&Mesosulfuron	0.178	0	83	92	28
Ppcz&Mess	0.14	0	90	95	37
Ppcz&Mess+Brox&2,4-D	0.178+9	0	78	88	30
Ppcz&Mess+Brox&2,4-D	0.14+9	0	78	88	31
Ppcz&Mess+Clpy&Flox+Thif-sg+Trib-sg	0.178+3+0.24+0.06	0	87	91	31
Ppcz&Mess+Clpyd&Flox+Thif-sg+Trib-sg	0.14+3+0.24+0.06	0	85	86	33
LSD (P=.05)		0	6	4	7
CV		0	4	2	13

[a] A basic blend adjuvant at 1% vol/vol was included with all treatments.

Treatments did not cause visible injury to wheat. Wild oat control with flucarbazone was not reduced by the addition of other herbicides. In addition, the two rates of flucarbazone provided similar wild oat control, 93 to 96%. Propoxycarbazone and mesosulfuron alone provided 92 to 95% wild oat control. Bromoxynil and 2,4-D reduced the control of wild oat with propoxycarbazone and mesosulfuron, resulting in 88% control regardless of grass herbicide rate. Clopyralid and fluroxypyr plus thifensulfuron and tribenuron reduced control of wild oat with propoxycarbazone and mesosulfuron at 0.14 oz/A, 86% control, but not at 0.178 oz/A, 91% control.

Wild oat control with propoxycarbazone and mesosulfuron tank-mixes. Kirk Howatt, Ronald Roach, and Janet Harrington. 'Alsen' hard red spring wheat was seeded April 26 near Fargo, North Dakota. Treatments were applied to 3-leaf wheat and 3- to 4-leaf wild oat on May 30 with 76°F, 28% RH, 20% cloud cover, wind velocity of 3 to 7 mph at 270°, and dry soil at 64°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 35 psi through 11001 TT nozzles to a 7-ft wide area the length of 10 by 30 ft plots. The experiment was a randomized, complete block design with three replicates. Plots were harvested August 1.

Treatment[a]	Rate	6/14 Wht	Wild oat 6/14	Wild oat 6/27	8/1 Yield
	oz ai/a	% injury	% control		bu/A
Propoxycarbazone&Mesosulfuron	0.178	0	87	89	29
Prcz&Mess+Brox&2,4-D	0.178+9	0	87	89	28
Prcz&Mess+Flox&MCPA+Thif-sg+Trib-sg	0.178+8+0.24+0.06	0	82	88	31
Prcz&Mess+Clpy&Flox+Thif-sg+Trib-sg	0.178+3+0.24+0.06	0	82	89	29
Prcz&Mess+Clpy&Flox+MCPA	0.178+3+4	0	85	87	32
Prcz&Mess+Brox&MCPA5+Flox	0.178+8+1.5	0	82	92	33
Prcz&Mess+Thif-sg+Trib-sg+MCPA	0.178+0.24+0.06+6	0	87	96	37
Prcz&Mess+Dicamba+Carfentrazone	0.178+1.5+0.125	0	80	83	31
Prcz&Mess+MCPA+Carfentrazone	0.178+6+0.125	0	83	92	33
Untreated	0	0	0	0	22
LSD (P=.05)		0	5	7	10
CV		0	4	5	18

[a] A basic blend adjuvant at 1% vol/vol was included with all propoxycarbazone and mesosulfuron treatments.

Treatments did not cause wheat injury. Control of wild oat with propoxycarbazone and mesosulfuron was 87% on June 14, which was 14 days after application. Control was reduced by thifensulfuron and tribenuron when two other active ingredients were included but not when only one additional broadleaf active ingredient was added. Control also was reduced when bromoxynil and MCPA plus fluroxypyr was included, but the most antagonism was caused by dicamba. This antagonism resulted in a delay in control rather than reduced season-long control because none of the herbicide combinations resulted in less control than propoxyarbazone and mesosulfuron alone.

Efficacy of mesosulfuron and propoxycarbazone tank-mixes. Kirk Howatt, Ronald Roach, and Janet Harrington. 'Alsen' hard red spring wheat was seeded April 26, near Fargo, North Dakota. Treatments were applied to 3- to 4-leaf wheat and wild oat on May 30 with 74°F, 20% RH, 28% cloud cover, wind velocity and direction of 3.5 mph at 270°, and dry soil at 64°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 35 psi through 11001 TT nozzles to a 7-ft wide area the length of 10 by 30 ft plots. The experiment was a randomized, complete block design with three replicates.

Treatment	Rate	6/14 Wht	Wild oat 6/14	Wild oat 6/27	Yield bu/A
	oz ai/A	% injury	— % control —		
Mess&Prcz+MSO	0.178+0.19G	0	83	93	25
Mess&Prcz+Basic Blend	0.178+1%	0	82	89	23
Mess&Prcz+Brox&MCPA5 +MSO	0.178+8 +0.19G	0	83	90	30
Mess&Prcz+Brox&MCPA5 +Basic Blend	0.178+8 +1%	0	78	91	25
Mess&Prcz+Thif-sg+Trib-sg +MSO	0.178+0.24+0.06 +0.19G	0	83	92	26
Mess&Prcz+Thif-sg+Trib-sg +Basic Blend	0.178+0.24+0.06 +1%	0	82	93	26
Flucarbazone+Brox&MCPA5 +Basic Blend	0.35+8 +1%	0	77	92	22
Clodinafop-ng+Brox&MCPA5	0.8+8	0	82	94	27
Untreated	0	0	0	0	17
LSD (P=.05)		0	6	3	5
CV		0	5	2	12

Treatments did not cause wheat injury. The evaluation on June 27 indicated that methylated seed oil was a slightly better adjuvant than basic blend for control of wild oat with mesosulfuron and propoxycarbazone. But this difference was not observed when broadleaf herbicides were included. Addition of broadleaf herbicides did not antagonize the activity of mesosulfuron and propoxycarbazone. Control of wild oat with flucarbazone and clodinafop was essentially similar to control with mesosulfuron and propoxycarbazone.

Rimfire for wild oat control in HRS wheat, Williston 2006. Neil Riveland. 'Reeder' spring wheat was planted on recrop (land cropped to wheat in 2005) in 7 inch rows at 80 lbs/a on May 9. All treatments were applied on June 1 with 84 F., 21% RH, soil temp 79 F, 75% clear sky and wind at 2-4mph from SW to 3-3.5 leaf wheat, 1-4 leaf wild oats (most in the 2 to 3-leaf), 1-4 leaf green foxtail and 0.5-1.5 inch Russian thistle. We used a small plot sprayer with wind cones, mounted on a G-Allis Chalmers tractor to apply the treatments, delivering 10 gals/a at 40 psi through 8001vs flat fan nozzles to a 6.67 ft wide area the length of 10 by 24 ft plots. First rain received after application was 0.13 inches on June 4. Experimental design was a randomized complete block design with four replications. Wild oat density averaged 3-5 plants/ft2, green foxtail density was 10 plants/ft2 and Russian thistle density was 3-4 plants/yd2. On June 15 Bronate Advanced was applied at 0.8 pt/a to Rimfire plots having no broadleaf companion to control Russian thistle. Plots were evaluated for crop injury on June 12 and 17. Weed control ratings were taken on June 17 (green foxtail), July 9 (wild oats) and August 20 (wild oats). Wheat was machine harvested for yield on August 21.

Treatment[a]	Product Rate	Test Weight	Yield	Wioa Control 7/8	Wioa Control 8/20	Grft Control
	oz/a	lbs/b	bus/a		%	
Untreated Check	0	52.8	16.2	0	0	0
Rimfire+MSO	1.75+24	53.5	17.9	98	98	75
Rimfire+Basic Blend	1.75+1%	52.8	18.4	98	99	85
Rimfire+Bronate Advanced+MSO	1.75+12.8+24	53.0	17.9	98	99	90
Rimfire+Bronate Advanced+Basic Blend	1.75+12.8+1%	53.2	19.3	98	99	81
Rimfire+Affinity TM+MCPAe+MSO	1.75+0.6+8+2	53.3	18.2	98	99	83
Rimfire+Affinity TM+MCPAe+Basic Blend	1.75+0.6+8+1	53.0	19.0	95	97	88
Puma+Bronate Advanced	10.46+12.8	52.9	20.2	87	87	95
Silverado+Affinity BS+WideMatch+MSO	1.75+0.4+8+2	53.3	20.0	94	93	83
Discover-ng+Bronate Advanced	12.8+12.8	53.8	20.7	91	91	92
HIGH MEAN		53.8	20.7	98	99	95
LOW MEAN		52.8	16.2	0	0	0
EXP MEAN		53.1	18.8	86	86	77
C.V. %		1.1	9.5	6	5	9
LSD 5%		NS	2.6	7	6	10
LSD 1%		NS	NS	9	8	13
# OF REPS		2	4	4	4	4
F-TRT		.5	2.3	159	224	71

Summary: No crop injury was recorded for any treatment. Rimfire alone did not control green foxtail as well when MSO was used as the surfactant compared to using Basic Blend, though wild oat control was very good with either surfactant. However in combination with Bronate Advanced, MSO as the surfactant seemed better than Basic Blend for green foxtail control, but again had no affect on wild oat control. Yields from Basic Blend vs MSO tended to be slightly greater.

Silverado for Wild Oat Control in Spring Wheat (Terry D. Gregoire, 2006) Alsen HRS wheat was planted May 6. Wheat was sprayed May 31st between 1:00 pm and 1:40 pm near Devils Lake, North Dakota. The temperature during application was 68°F, relative humidity near 65%, with partly cloudy sky. The leaf stages of the wheat and weeds were: wheat 3 ½ leaf, wild oat 2-4 leaf. Treatments were applied with a CO_2 pressurized back pack sprayer using 8.5 gpa at 40 psi and 8001 nozzles. Treatments were arranged in RCBD and replicated 3 times. Treatment evaluation dates were June 5th, 16th, and July 11th 2006. Wheat injury was measured on a scale of 1-4. 1= light yellow, 3=leaf blotches evident, 4= some stunting.

Trt No.	Treatment Name	Rate	Rate Unit	Wheat Injury June 5	Wheat Injury June 16	July 11 Wild Oat % control
1	untreated			0	0	0
2	Silverado	1.75	OZ WT/A	1	0	99
	Destiny	1.5	PT.A			
3	Silverado	1.75	OZ WT/A	3.3	0	97
	Bronate Advanced	0.8	PT/A			
	Destiny	1.5	PT.A			
4	Silverado	1.75	OZ WT/A	3.3	0	93
	MCPA Ester	0.5	PT/A			
	Widematch	0.75	PT/A			
	Destiny	1.5	PT.A			
5	Silverado	1.75	OZ WT/A	3.3	0	96
	Affinity Tankmix	0.6	OZ WT/A			
	MCPA Ester	0.5	PT/A			
	Destiny	1.5	PT.A			
6	Rimfire	1.75	OZ/A	3	0	100
	Destiny	1.5	PT.A			
7	Rimfire	1.75	OZ/A	3.3	0	100
	Bronate Advanced	0.8	PT/A			
	Destiny	1.5	PT.A			
8	Axial	0.52	OZ/A	0.7	0	100
	Bronate Advanced	0.8	PT/A			
	Adigor	0.6	PT/A			
9	Puma	0.66	PT/A	0.3	0	83
	Bronate Advanced	0.8	PT/A			
10	Everest	0.4	OZ WT/A	0.7	0	100
	Bronate Advanced	0.8	PT/A			
	LSD			0.8		5
	CV			25.0		3

Wild oat control was not different for any treatment except Puma. When evaluated one week after treatment, Silverado tank-mix combinations and Rimfire treatments were more injurious to wheat than Silverado applied alone. However, no injury was evident 11 days later or at maturity. Axial, Puma, and Everest treatments were also less injurious than Silverado tank mixes or Rimfire treatments one week after treatment.

Efficacy of Mesosulfuron tank-mixes. Kirk Howatt, Ronald Roach, and Janet Harrington. 'Alsen' hard red spring wheat was seeded April 26 near Fargo, North Dakota. Treatments were applied to 3- to 4-leaf wheat and wild oat on May 30 with 66°F, 45% RH, 20% cloud cover, wind velocity of 3.5 mph at 270°, and dry soil at 64°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 35 psi through 11001 TT nozzles to a 7-ft wide area the length of 10 by 30 ft plots. The experiment was a randomized, complete block design with three replicates.

		6/14	Wild oat		
Treatment	Rate	Wht	6/14	6/27	8/3
	oz ai/A	% injury	% control		
Mesosulfuron+MSO	0.036+0.19G	0	77	94	90
Mess+Brox&MCPA5+MSO	0.036+8+0.19G	0	82	90	89
Mess+MCPA+Clpy&MCPA+MSO	0.036+6+2.3+0.19G	0	80	95	93
Mess+Thif-sg+Trib-sg+MCPA+MSO	0.036+0.24+0.06+6+0.19G	0	73	92	88
Flcz+Brox&MCPA5+Basic Blend	0.35+8+1%	0	78	95	89
Clodinafop-ng+Bromoxynil&MCPA5	0.8+8	0	82	98	99
Untreated	0	0	0	0	0
LSD (P=.05)		0	8	2	5
CV		0	7	1	4

Treatments did not cause injury to wheat. Antagonism did not occur with any tank-mix on June 14. However, bromoxynil and MCPA or thifensulfuron and tribenuron plus MCPA caused slight reduction of mesosulfuron activity on June 27. Control was still maintained at 90% or greater even with the antagonism. By August, control of wild oat with mesosulfuron was not antagonized by broadleaf herbicides. Flucarbazone provided similar control to mesosulfuron alone, and clodinafop gave better control at mid- and late-season evaluations.

Adjuvants with Mesosulfuron. Kirk Howatt, Ronald Roach, and Janet Harrington. 'Alsen' hard red spring wheat was seeded April 26 near Fargo, North Dakota. Treatments were applied to 3-leaf wheat and 3- to 4-leaf wild oat on May 30 with 66°F, 45% RH, 20% cloud cover, wind velocity of 3.5 mph of 270°, and dry soil at 64°F. A backpack sprayer delivering 8.5 gpa at 35 psi through 11001 TT nozzles was used for treatment application to a 7-ft wide area the length of 10 by 30 ft plots. The experiment was a randomized, complete block design with three replicates.

Treatment	Rate	6/14 Wht	6/14 Wioa	6/27 Wioa
	oz ai/A	% injury	—% control	—
Mesosulfuron+UAN	0.027+2.5%	0	57	65
Mesosulfuron+Destiny+UAN	0.027+1%+2.5%	0	77	87
Mesosulfuron+Prime Oil+UAN	0.027+1%+2.5%	0	72	73
Mesosulfuron+SuperbHC+UAN	0.027+0.5%+2.5%	0	72	75
Mesosulfuron+Newtone	0.027+1%	0	72	78
Mesosulfuron+AG05006+UAN	0.027+1%+2.5%	0	53	67
Mesosulfuron+AG05055	0.027+2.5%	0	72	82
Mesosulfuron+Exp1	0.027+1%	0	70	73
Mesosulfuron+Exp1+AG05006	0.027+0.5%+0.5%	0	72	77
Mesosulfuron+Destiny+AG02013+UAN	0.027+1%+0.368%+2.5%	0	75	87
Mesosulfuron+AG06022+UAN	0.027+0.5%+2.5%	0	72	80
Mesosulfuron+AG06023+UAN	0.027+0.5%+2.5%	0	73.	82
LSD (P=.05)		0	7	7
CV		0	6	5

Treatments did not cause visible wheat injury. A reduced rate of mesosulfuron was used to accentuate the effect of adjuvant treatment. Mesosulfuron with UAN gave 65% control of wild oat June 27. AG05006 was the only adjuvant that did not improve wild oat control. Desitiny increased control of wild oat to 87%, but the addition of AG02013 did not improve control beyond that with Destiny. AG05055, AG06022, and AG06023 each enhanced control with mesosulfuron to at least 80%.

Wild oat control with Affinity. Kirk Howatt, Ronald Roach, and Janet Harrington. 'Alsen' hard red spring wheat was seeded April 26 near Fargo, North Dakota. Treatments were applied to 3-leaf wheat and 3- to 5-leaf wild oat on May 30 with 82° F, 21% RH, 10% cloud cover, wind velocity of 2 mph at 270°, and dry soil with 60°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 35 psi through 11001 TT nozzles to a 7-ft wide area the length of 10 by 30 ft plots. The experiment was a randomized, complete block design with three replicates.

Treatment[a]	Rate	6/7 Wht	Wioa 6/7	Wioa 6/14	Wioa 6/20	Wioa 7/10
		% injury	% control			
Ppcz+Mess+Brox&MCPA5	0.143+0.035+8+1%	0	40	73	82	85
Ppcz+Mess+Brox&MCPA5	0.184+0.045+8+1%	0	40	73	85	90
Ppcz+Mess+Thif-sg+Trib-+Brox&MCPA5	0.143+0.035+0.32+0.08+8+1%	0	40	73	87	85
Ppcz+Mess+Thif-sg+Trib-sg+Broxy&MCPA5	0.143+0.035+0.2+0.2+8+1%	0	43	72	83	85
Ppcz+Mess+Thif-sg+Trib-sg+Brox&MCPA5	0.184+0.045+0.32+0.08+8+1%	0	40	73	82	88
Ppcz+Mess+Thif-sg+Trib-sg+Brox&MCPA5	0.184+0.045+0.2+0.2+8+1%	0	40	75	85	90
Flcz+Clpy&Flox	0.28+2+1%	0	33	72	83	91
Flcz+Clpy&Flox	0.42+2+1%	0	33	68	82	94
Flcz+Clpy&Flox+Thif-sg+Trib-sg+2,4-D	0.28+2+0.32+0.08+4	0	30	72	83	87
Flcz+Clpy&Flox+Thif-sg+Trib-sg+2,4-D	0.28+2+0.2+0.2+4	0	30	72	85	93
Flcz+Clpy&Flox+Thif-sg+Trib-sg+2,4-D	0.42+2+0.32+0.08+4	0	33	75	85	94
Flcz+Clpy&Flox+Thif-sg+Trib-sg+2,4-D	0.42+2+0.2+0.2+4	0	37	70	83	88
Clodinafop-ng+Clpy&Fluroxypyr	0.8+2	0	37	80	91	97
Clodinafop-ng+Clpy&Fluroxypyr	1+2	0	33	82	93	99
Clodinafop-ng+Clpy&Flox+Thif-sg+Trib-sg	0.8+2+0.32+0.08	0	37	77	91	98
Clodinafop-ng+Clpy&Flox+Thif-sg+Trib-sg	0.8+2+0.2+0.2	0	33	80	94	98
Clodinafop-ng+Clpy&Flox+Thif-sg+Trib-sg	1+2+0.32+0.08	0	37	80	92	98
Clodinafop-ng+Clpy&Flox+Thif-sg+Trib-sg	1+2+0.2+0.2	0	33	82	93	99
Pinoxaden+Clpy&Fluroxypyr+Adigor	0.86+2+0.075G	0	37	82	92	99
Pinoxaden+Clpy&Flox+Thif-sg+Trib-sg+Adigor	0.86+2+0.32+0.08+0.075G	0	40	82	93	98
Pinoxaden+Clpy&Flox+Thif-sg+Trib-sg+Adigor	0.86+2+0.2+0.2+0.075G	0	43	80	90	99
Untreated	0	0	0	0	0	0
LSD (P=.05)		0	8	6	4	6
CV		0	14	5	3	4

[a] Propoxycarbazone plus mesosulfuron and flucarbazone treatments included a basic blend adjuvant at 1% vol/vol.

Treatments did not cause visible injury to wheat. Thifensulfuron and tribenuron in the Affinity Tank-mix ratio of 4:1 or the Affinity Broad-spec ratio of 1:1 did not result in less wild oat control within a particular grass herbicide rate. Often there was not even a separation between rates of a given grass herbicide. The ACCase-inhibitors, clodinafop and pinoxaden, provided near complete control of wild oat, while the ALS-inhibitors, propoxycarbazone plus mesosulfuron and flucarbazone provided 85 to 95% control.

Wild oat control with tank-mixes that include thifensulfuron and tribenuron. Kirk Howatt, Ronald Roach, and Janet Harrington. ' Alsen' hard red spring wheat was seeded on April 26. Treatments were applied to 3-leaf wheat and 3- to 5-leaf wild oat on May 30 with 80°F, 40% RH, 20% cloud cover, wind velocity of 2 mph at 270°, and dry soil with 60°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 35 psi through 11001 TT nozzles to a 7-ft wide area the length of 10 by 30 ft plots. The study design was randomized, complete block with four replicates.

Treatment	Rate	6/19 Wht	Wioa 6/19	Wioa 7/10
	oz ai/A	% injury	– % control –	
Ppcz+Mess+Thif-sg+Trib-sg +Clpy&Flox+Basic Blend	0.143+0.035+0.24+0.06 +2+1%	0	83	85
Ppcz+Mess+Carfentrazone +MCPA+Basic Blend	0.143+0.035+0.125 +4+1%	0	85	85
Flcz+Thif-sg+Trib-sg+Flox +2,4-D+Basic Blend	0.35+0.24+0.06+1 +5+1%	0	89	96
Flcz+Carfentrazone+2,4-D +Basic Blend	0.35+0.125+5 +1%	0	85	93
Clodinafop-ng+Thif-sg+Trib-sg +Clpy&Flox	0.8+0.24+0.06 +2	0	94	97
Clodinafop-ng+Carfentrazone +MCPA	0.8+0.125 +4	0	93	98
Pinoxaden+Thif-sg+Trib-sg +Clpy&Fluroxypyr+Adigor	0.86+0.24+0.06 +2+0.075G	0	94	99
Pinoxaden+Carfentrazone +MCPA+Adigor	0.86+0.125 +4+0.075G	0	93	99
Untreated	0	0	0	0
LSD (P=.05)		0	3	2
CV		0	2	1

Treatments did not cause visible wheat injury. Thifensulfuron and tribenuron, in the ratio available in Affinity Tank-mix, did not reduce control of wild oat herbicides compared with carfentrazone and MCPA. Carfentrazone and MCPA was used as the standard in this case because the combination very seldom will reduce wild oat control. As documented in other studies, flucarbazone, clodinafop, and pinoxaden provided greater than 92% control of wild oat on July 10. Average pinoxaden control of wild oat was 99%, which was not different than clodinafop and slightly greater than flucarbazone at 95%.

Grass weed control in HRS wheat, Carrington, 2006. (Greg Endres and Kirk Howatt)
The experiment was conducted on a Heimdahl loam soil with 6.9 pH and 3.3% organic matter at the NDSU Carrington Research Extension Center. The experimental design was a randomized complete block with three replicates. 'Alsen' HRS wheat was direct-seeded into oat stubble on April 27. Herbicide treatments were applied with a CO_2-hand-boom plot sprayer delivering 10 gal/A at 35 psi through 8001 flat fan nozzles to the center 6.7 ft of 10 by 25 ft plots. Treatments were applied on June 1 with 81 F, 21% RH, 80% clear sky, and 12 mph wind to 5-leaf wheat and 2- to 5-leaf yellow and green foxtail, and 5-leaf barnyardgrass. Average wheat density in untreated plots on June 1 was 17 plants/ft^2 and grass weed density was 21 plants/ft^2. The trial was harvested with a plot combine on August 1.

Table. Grass weed control in HRS wheat, Carrington, 2006.

Herbicide		Grass control				Wheat			
		6/16	7/8			Injury		Seed	Test
Treatment	oz ai/A	Fxtl[1]	Fxtl	Bygr	Foba	6/16	7/18	yield	weight
		%						bu/A	lb/bu
Mesosulfuron+Brox&MCPA5+Basic Blend	0.036+8+1%	96	20	0	27	3	0	47.1	57.4
Flucarbazone+Brox&MCPA5+Basic Blend	0.32+8+1%	85	98	80	70	8	0	45.7	57.7
Prcz&Mess+Brox&MCPA5+Basic Blend	0.178+8+1%	80	23	97	82	3	0	41.1	57.1
Immb+Brox&MCPA5+MSO	5+8+0.19G	40	0	7	0	13	0	41.2	57.8
Tral+Brox&MCPA5+Supercharge+AMS	2.9+8+0.5%+9.5	75	75	27	0	0	0	44.5	58.3
Fenoxaprop+Brox&MCPA5	0.8+8	78	96	83	0	0	0	46.1	58.1
Fenoxaprop+Brox&MCPA5	1.32+8	95	96	94	0	0	0	49.2	58.0
Clodinafop-ng+Brox&MCPA5	0.8+8	93.7	90	96	0	0	0	48.1	58.0
Pinoxaden+Brox&MCPA5+Adigor	0.86+8+0.075G	92.7	83	92	0	0	0	40.7	57.8
Difenzoquat+Brox&MCPA5	16+8	40	0	0	0	60	23	26.9	53.8
Untreated check	0	0	0	0	0	0	0	34.2	55.9
C.V. (%)		7	13	10	23	42	41	10	2
LSD (0.05)		9	11	9	6	6	1	7.4	1.7

[1]Fxtl= Yellow and green foxtail.

Foxtail and barnyardgrass control was 90-96% and wheat yield was over 48 bu/A with Fenoxaprop at 1.32 oz ai/A and clodinafop. Propoxycarbazone+mesosulfuron provided 82% foxtail barley control. Difenzoquat did not control weeds and severely injured 'Alsen' wheat, resulting in similar wheat yield and reduced test weight compared to the untreated check.

Foxtail control in barley, Carrington, 2006. (Greg Endres) The dryland study was conducted at the NDSU Carrington Research Extension Center on a loam soil with 6.9 pH and 3.3 % organic matter. The experimental design was a randomized complete block with three replicates. 'Drummond' was direct seeded into oat stubble on April 26. Herbicide treatments were applied with a CO_2-hand-boom plot sprayer delivering 10 gal/A at 35 psi through 8001 flat-fan nozzles to the center 6.7 ft of 10 by 25 ft plots. Treatments were applied on June 1 with 57 F, 83% RH, 80% clear sky, and 9 mph wind to 5-leaf barley and 3- to 4-leaf yellow and green foxtail. Average wheat density in untreated plots was 23 plants/ft^2 and grass weed density was 24 plants/ft^2. The trial was harvested with a plot combine on July 24.

Herbicide		Foxtail control		Seed	Test
Treatment	Product rate	6/16	6/29	yield	weight
	fl oz/A	----------%	---------	bu/A	lb/bu
Axial+Adigor	8.2+9.6	96	94	82.9	39.5
Axial+Adigor+Bronate Advanced	8.2+9.6+12.8	90	93	71.8	39.6
Axial+Adigor+AffinityTM+MCPAe	8.2+9.6+0.6oz/A+8.7	73	75	63.0	41.1
Axial+Adigor+AffinityTM+MCPAe	8.2+9.6+0.6oz/A+8.7	76	79	71.4	39.5
Axial+Adigor+AffinityTM+Starane	8.2+9.6+0.6oz/A+5.3	74	77	62.8	39.0
Axial+Adigor+Curtail M	8.2+9.6+28	74	80	57.3	39.9
Puma+Bronate Advanced	8+12.8	77	75	64.2	39.6
Untreated	0	0	0	67.7	39.9
CV		7.2	9.2	16.3	3.7
LSD (0.05)		9	12	NS	NS

Foxtail control was 90 to 96% with Axial or tank mixture of Axial plus Bronate Advanced. Foxtail control was antagonized when Axial was tank mixed with other broadleaf herbicides. No crop injury was observed with treatments. Barley yield and test weight did not differ among treatments, likely due to a competitive crop and light grass weed density.

Yellow foxtail control with Pinoxaden. Kirk Howatt, Ronald Roach, and Janet Harrington. ' Alsen' hard red spring wheat was seeded May 18, near Fargo, North Dakota. Treatments were applied to 3- to 4-leaf wheat and 3-leaf yellow foxtail on June 8 with 60°F, 44% RH, 0% cloud cover, wind velocity of 8 mph at 45°, and dry soil at 60°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 35 psi through 11001 TT nozzles to a 7-ft wide area the length of 10 by 30 ft plots. The experiment was a randomized, complete block design with four replicates.

Treatment	Rate	6/21 Wht	6/21 Yeft	8/8 Yield
	oz ai/A	% injury	% control	bu/A
Pinoxaden+Adigor	0.86+075G	0	99	40
Pinoxaden+Brox&MCPA5+Adigor	0.86+8+075G	0	96	40
Pinoxaden+Thif-sg+Trib-sg+MCPA+Adigor	0.86+0.24+06+4+075G	0	97	41
Pinoxaden+Clpy&Fluroxypyr+MCPA+Adigor	0.86+3+4+075G	0	98	37
Pinoxaden+Thif-sg+MCPA+Adigor	0.86+0.23+4+075G	0	93	46
Pinoxaden+Thif-sg+Fluroxypyr+Adigor	0.86+0.23+1+075G	0	95	47
Pinoxaden+Clopyralid&MCPA+Adigor	0.86+9.5+075G	0	96	43
Pinoxaden+Tribenuron-sg+MCPA+Adigor	0.86+0.19+4+075G	0	91	44
Pinoxaden+2,4-D+Thifensulfuron-sg+Adigor	0.86+4+0.15+075G	0	86	48
Pinoxaden+Brox&MCPA-V+Adigor	0.86+8+075G	0	94	46
Pinoxaden+Brox&2,4-D+Adigor	0.86+9+075G	0	91	43
Pinoxaden+Carfentrazone+MCPA+Adigor	0.86+0.125+4+075G	0	97	42
Flucarbazone+Brox&MCPA5+Basic Blend	0.42+8+1%	0	81	45
Prcz&Mesosulfuron+Brox&MCPA5+MSO	0.178+8+0.19G	0	55	41
Mesosulfuron+Brox&MCPA5+MSO	035+8+0.19G	0	30	43
Fenoxaprop+Brox&MCPA5	0.8+8	0	97	39
Untreated	0	0	0	40
LSD (P=.05)		0	5	8
CV		0	4	13

Treatments did not cause visible injury to wheat. Pinoxaden provided 99% control of foxtail on June 21, 13 days after treatment. 2,4-D and thifensulfuron was the most antagonistic, resulting in 86% control. Four other tank-mix treatments were antagonistic to pinoxaden activity on foxtail, but control was 91 to 94%. Flucarbazone, propoxycarbazone, and mesosulfuron are ALS-inhibiting products and gave less control than pinoxaden or fenoxaprop, which are ACCase-inhibitors. The population of foxtail was not high enough to reduce yield in this experiment.

Adjuvants with Flucarbazone. Kirk Howatt, Ronald Roach, and Janet Harrington. 'Alsen' hard red spring wheat was seeded May 18, near Fargo, North Dakota. Treatments were applied to 2- to 3-leaf wheat and 2 leaf foxtail on June 2 with 84°F, 33% RH, clear sky, wind velocity 3.5 mph at 135°, and dry soil with 65°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 35 psi through 11001 TT nozzles to a 7-ft wide area the length of 10 by 30 ft plots. The experiment was a randomized, complete block design with four replicates.

		6/16		6/30
Treatment	Rate	Wht	Yeft	Yeft
	oz ai/A	% inj	% control	
Flucarbazone+UAN	0.35+2.5%	0	87	99
Flucarbazone+Destiny+UAN	0.35+1%+2.5%	0	95	99
Flucarbazone+Prime Oil+UAN	0.35+1%+2.5%	0	95	99
Flucarbazone+SuperbHC+UAN	0.35+0.5%+2.5%	0	87	99
Flucarbazone+Newtone	0.35+1%	0	87	99
Flucarbazone+AG05006+UAN	0.35+1%+2.5%	0	91	99
Flucarbazone+AG05055	0.35+2.5%	0	95	99
Flucarbazone+AG06051	0.35+1%	0	96	99
Flucarbazone+ AG06051+AG05006	0.35+0.5%+0.5%	0	93	99
Flucarbazone+Destiny+AG02013+UAN	0.35+1%+4+2.5%	0	96	99
Flucarbazone+AG06022+UAN	0.35+0.5%+2.5%	0	96	99
Flucarbazone+AG06023+UAN	0.35+0.5%+2.5%	0	97	99
LSD (P=.05)		0	3	0
CV		0	2	0

A reduced rate of flucarbazone was used to accentuate adjuvant differences. The small size of foxtail at application resulted in exceptional control relative to what would typically be expected. Flucarbazone did not injure wheat in this study. Control of foxtail with flucarbazone and UAN on June 16, 14 days after treatment, was 87%. Including SuperbHC or Newtone did not enhance flucarbazone activity. Other adjuvants increased the control with flucarbzone to greater than 90%, with several adjuvants enabling 95 to 97% control of foxtail with flucarbazone. All treatments provided 99% control of foxtail on June 30.

Yellow foxtail control with propoxycarbazone&mesosulfuron and adjuvants. Kirk Howatt, Ronald Roach, and Janet Harrington. 'Alsen' hard red spring wheat was seeded May 18 near Fargo, North Dakota. Treatments were applied to 2- to 3-leaf wheat and 2-leaf yellow foxtail on June 2 with 81°F, 20% RH, 0% cloud cover, wind velocity of 3 mph at 270°, and dry soil with 64°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 35 psi through 11001 TT nozzles to a 7-ft wide area the length of 10 by 30 ft plots. The experiment was a randomized, complete block design with four replicates.

		6/16		6/30
Treatment	Rate	Wht	Yeft	Yeft
	oz ai/A	% injury	—% control—	
Propoxycarbazone&Mesosulfuron+Quad 7	0.178+1%	0	52	60
Propoxycarbazone&Mesosulfuron+Renegade	0.178+0.19G	0	40	45
Propoxycarbazone&Mesosulfuron+MSO	0.178+0.19G	0	62	57
Propoxycarbazone&Mesosulfuron+NIS	0.178+0.25%	0	50	45
Propoxycarbazone&Mesosulfuron+PhaseII	0.178+1%	0	50	50
Propoxycarbazone&Mesosulfuron+SuperbHC	0.178+0.19G	0	52	50
Propoxycarbazone&Mesosulfuron+Dyne-Amic	0.178+0.5%	0	42	52
Propoxycarbazone&Mesosulfuron+Flame	0.178+0.5%	0	42	52
Flucarbazone+Quad 7	0.42+1%	0	89	92
Flucarbazone+PhaseII	0.42+1%	0	89	92
Flucarbazone+Flame	0.42+0.5%	0	90	89
Untreated	0	0	0	0
LSD (P=.05)		0	9	7
CV		0	11	8

Treatments did not cause visible wheat injury in this study. Methylated seed oil (MSO) was the best adjuvant for yellow foxtail control with propoxycarbazone and mesosulfuron on June 16 but gave only 62% control. Quad 7 also enabled 60% control on June 30. The adjuvants with flucarbazone provided similar control of 89 to 92% control, demonstrating that flucarbazone was a much better yellow foxtail herbicide than propoxycarbazone and mesosulfuron.

2006 Evaluation of Pre-emergence Applied Everest Herbicide on HRSW at Hettinger

Eric Eriksmoen

Reeder hard red spring wheat was seeded on April 17. Pre-emergence (PRE) treatments were applied on April 21 to 2 leaf downy brome (dobr) with 63° F, 40% RH, clear sky and SE wind at 4 mph. Post-applied (POST) treatments were applied on May 11 to 2 leaf wheat and to downy brome in the boot stage with 56° F, 35% RH, clear sky and W wind at 7 mph. Treatments were applied with a tractor mounted CO_2 propelled plot sprayer delivering 10 gpa at 30 psi to 5 foot wide by 20 foot long plots. Downy brome populations were 1.5 plants per ft^2. The experiment was a randomized complete block design with four replications. Glyphosate treatments 9 and 10 were applied on May 11 (2 leaf HRSW) and on May 31 (6 leaf HRSW), respectively, to help differentiate weed flushes. The trial was oversprayed with 16 oz/A WideMatch herbicide for broadleaf weed control on June 6. Plots were evaluated for crop injury and downy brome control on May 27, June 16 and on July 3. The trial was harvested on July 18.

	Treatment	Application Timing	Product Rate	inj	5/27 dobr	6/16 dobr	7/3 dobr	Grain Yield
			oz/Ac	--------	% control	---------		bu/A
1	Untreated	--	0	0	0	0	0	7.4
2	Glyphosate + NIS + AMS	PRE	17 + 0.5% + 1%	0	98	97	95	11.2
3	Everest + Glyph. + NIS + AMS	PRE	0.4 + 17 + 0.5% + 1%	0	98	97	96	9.6
4	Everest + Glyph. + NIS + AMS	PRE	0.6 + 17 + 0.5% + 1%	0	98	96	95	11.4
5	Everest + Glyph. + NIS + AMS /	PRE	0.3 + 17 + 0.5% + 1% /					
	Everest + Bronate	POST	0.3 + 16	0	96	95	95	13.7
6	Everest + Glyph. + NIS + AMS /	PRE	0.2 + 17 + 0.5% + 1% /					
	Everest + Bronate	POST	0.4 + 16	0	98	97	97	10.0
7	Glyphosate + NIS + AMS /	PRE	17 + 0.5% + 1% /					
	Everest + Bronate	POST	0.4 + 16	0	97	88	81	13.7
8	Glyphosate + NIS + AMS /	PRE	17 + 0.5% + 1% /					
	Puma + Bronate	POST	10.6 + 16	0	97	96	95	10.3
9	Glyphosate	5/11	24	100	100	100	100	0.0
10	Glyphosate	5/31	24	100	--	100	100	0.0
C.V. %				0	1.9	5.5	8.2	15.2
LSD .05				1	2	7	10	2.3

Summary

Crop injury was not observed. Multiple weed flushes were not observed. Unfortunately wild oats and foxtails were not present in this trial. The trial sustained severe heat and moisture stress resulting in very poor yields. Downy brome was effectively controlled by the pre-emergence application of glyphosate. The addition of Everest to the pre-emergence application of glyphosate and the split applications did not enhance downy brome control. Evaluation of Everest's residual weed control was not possible due to a lack of multiple weed flushes following the pre-emergence treatments. This trial re-emphasizes the importance of early control of downy brome.

2006 Evaluation of Early POST Applied Everest vs. Standard Group 1 on HRSW

Eric Eriksmoen

Reeder hard red spring wheat was seeded on April 17. Treatments 2 – 6 were applied on May 11 to 2 ½ leaf wheat and to downy brome in the boot stage with 56° F, 35% RH, clear sky and W wind at 7 mph. Treatment 7 was applied on May 31 to 6 leaf wheat and to fully headed downy brome with 64° F, 53% RH, clear sky and W wind at 4 mph. Treatments were applied with a tractor mounted CO_2 propelled plot sprayer delivering 10 gpa at 30 psi to 5 foot wide by 20 foot long plots. Downy brome populations were 17 plants per ft^2. The experiment was a randomized complete block design with four replications. The trial was oversprayed with 16 oz/A WideMatch herbicide for broadleaf weed control on June 6. Plots were evaluated for crop injury on May 26 and June 7 and for downy brome control on May 26, June 7 and June 29. The trial was not harvested.

	Treatment	Product Rate	5/27 inj	5/27 dobr	6/7 inj	6/7 dobr	6/29 dobr
		oz/Ac	-------------	-------------	% control	-------------	-------------
1	Untreated	0	0	0	0	0	0
2	Everest + Quad 7	0.4 + 1%	1	66	0	75	45
3	Everest + Quad 7	0.6 + 1%	1	66	0	72	50
4	Everest + Bronate + Quad 7	0.4 + 16 + 1%	1	71	0	78	45
5	Everest + Bronate + Quad 7	0.6 + 16 + 1%	1	66	0	75	50
6	Puma + Bronate	10.5 + 16	0	15	0	0	15
7	Puma + Bronate	10.5 + 16	--	--	0	0	0
C.V. %			219	26.3	0	14.3	36.9
LSD .05			NS	19	NS	9	16

Summary

Crop injury was very minor when observed. Multiple weed flushes were not observed. Unfortunately wild oats and foxtails were not present in this trial. Downy brome essentially chocked out the crop and other weed species. The trial also sustained severe heat and moisture stress resulting in very poor seed production. Early application of Everest controlled about half of the downy brome and was not rate sensitive. Puma did not provide significant control of downy brome.

Adjuvants with propoxycarbazone&mesosulfuron. Kirk Howatt, Ronald Roach, and Janet Harrington. 'Alsen' hard red spring wheat was seeded near Valley City, North Dakota. Treatments were applied to downy brome that was in various stages of tiller development on May 5 with 56°F, 26% RH, 15% cloud cover, wind velocity of 3 mph at 270°, and dry soil at 48°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 35 psi through 11001 TT nozzles to a 7-ft wide area the length of 10 by 30 ft plots. The experiment was a randomized, complete block design with three replicates.

		Downy Brome		
Treatment	Rate	5/26	6/9	6/26
	oz ai/A	% control		
Propoxycarbazone&Mess+UAN	0.178+2.5%	45	85	60
Prcz&Mesosulfuron+Destiny+UAN	0.178+1%+2.5%	53	85	80
Prcz&Mess+SuperbHC+UAN	0.178+0.5%+2.5%	53	85	75
Prcz&Mess+Newtone	0.178+1%	52	85	80
Prcz&Mess+AG05006+UAN	0.178+1%+2.5%	52	85	85
Prcz&Mess+AG05055	0.178+2.5%	47	85	80
Prcz&Mess+Destiny+AG02013+UAN	0.178+1%+4+2.5%	53	85	85
Prcz&Mess+AG06022+UAN	0.178+0.5%+2.5%	45	85	85
Prcz&Mess+AG06023+UAN	0.178+0.5%+2.5%	50	85	80
LSD (P=.05)		7	0	
CV		8	0	

Slight differences were observed in speed of activity on May 26, but none of the treatments provided greater than 85% control on June 9. Downy brome treated with Propoxycarbazone and mesosulfuron without an oil or surfactant adjuvant was noticeably recovering on June 26 and starting to produce a seed head. Brome in the treatment that included SuperbHC had more typical brome color than other treated brome. The remaining adjuvant systems provided very similar control of downy brome. The plants were not dying, but seed development was substantially inhibited.

Downy brome control in spring wheat. Kirk Howatt, Ronald Roach, and Janet Harrington. 'Alsen' hard red spring wheat was seeded near Valley City, North Dakota. Early post emergence treatments (1 through 5) were applied to tillering downy brome on May 5 with 48°F, 26% RH, 15% cloud cover, wind velocity at 3 mph at 270°, and dry soil at 48°F. Late post emergence treatments (6 through 9) were applied to fully tillered downy brome on May 19 with 74°F, 21% RH, 5% cloud cover, wind velocity 3 mph at 0°, dry soil with 65°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 35 psi through 11001 TT nozzles to a 7-ft wide area the length of 10 by 30 ft plots. The experiment was a randomized, complete block design with three replicates.

			Downy Brome		
Treatment	Rate	Timing	5/26	6/9	6/26
	oz ai/A			% control	
Glyphosate+AMS	9+22	EPOST	93	98	98
Prcz&Mesosulfuron+Basic Blend	0.178+1%	EPOST	48	86	90
Propoxycarbazone+Basic Blend	0.42+1%	EPOST	57	92	99
Imazamox+NIS+UAN	0.5+0.25%+2.5%	EPOST	72	86	75
Flucarbazone+Basic Blend	0.42+1%	EPOST	42	87	95
Glyphosate+AMS	9+22	LPOST	-	99	99
Prcz&Mesosulfuron+Basic Blend	0.178+1%	LPOST	-	75	90
Propoxycarbazone+Basic Blend	0.42+1%	LPOST	-	68	90
Flucarbazone+Basic Blend	0.42+1%	LPOST	-	67	85
Untreated	0		0	0	0
LSD (P=.05)			6	5	
CV			7	4	

Glyphosate provided exceptional control of downy brome at both timings. This has not always been the case and the reason for lack of control in some instances is not understood. Propoxycarbazone and mesosulfuron gave better control at the later application timing than expected. The plants were not killed, but growth and development were severely inhibited. Flucarbazone and imazamox generally provided 80 to 90% control as arrested plant development.

Evaluation of Tank mixes with Axial Herbicide for Downy Brome Control at Hettinger, ND

Eric Eriksmoen

'Reeder' HRSW was seeded on April 17. Treatments were applied on May 11 to 3 leaf wheat and to 6 leaf downy brome with 58° F, 33% RH, clear sky and north wind at 7 mph. Treatments were applied with a tractor mounted CO^2 propelled plot sprayer delivering 10 gpa at 40 psi through PK-01E80 nozzles to a 5 foot wide area the length of 10 by 28 foot plots. The trial was sprayed with 16 oz/acre Widematch to control broadleaf weeds on May 25. The trial was a randomized complete block design with four replications. Downy brome population was 50+ plants per square foot in rep. 1 and 1.5 plants per square foot in the remaining reps. Plots were evaluated for crop injury on May 27, June 7 and on June 23, and were evaluated for downy brome control on June 7 and June 23. The trial was not harvested due to severe drought.

	Treatment	Application Rate	--- Crop injury --- 5/27	6/7	6/23	--- Dobr --- 6/7	6/23
		oz/Ac	----------------- %				-----------------
1	Untreated	0	0	0	0	0	0
2	Axial + Adigor*	8.2 + 9.6	0	0	0	0	2
3	Olympus + NIS	0.6 + 0.5% v/v	0	0	0	90	71
4	Maverick + NIS	0.66 + 0.5% v/v	0	1	0	88	71
5	Rimfire + MSO	2.25 + 24	0	0	0	89	59
6	Everest + NIS	0.6 + 0.25% v/v	0	1	0	85	55
7	Axial + Olympus	8.2 + 0.6	0	0	0	75	58
8	Axial + Maverick	8.2 + 0.66	0	0	0	62	48
9	Axial + Rimfire	8.2 + 2.25	0	1	0	62	52
10	Axial + Everest	8.2 + 0.6	0	0	0	50	48
11	Axial + MCPA ester	8.2 + 12	0	1	0	9	4
12	Axial + Olympus + MCPA	8.2+0.6+12	0	0	0	76	58
13	Axial + Maverick + MCPA	8.2+0.66+12	0	0	0	55	42
14	Axial + Rimfire + MCPA	8.2+2.25+12	0	0	0	55	35
15	Axial + Everest + MCPA	8.2+0.6+12	0	0	0	28	42
Trial Mean			0	0	0	55	43
C.V. %			0	343	0	33.4	31.8
LSD .05			NS	NS	NS	37	20

*Adigor adjuvant was applied at 0.6 pt/A to all Axial treatments.

Summary

Crop injury was very minor. Treatments were applied to relatively large downy brome plants. Axial + Olympus (trt 7) and Axial + Maverick (trt 8) treatments had considerably lower levels of downy brome control than Olympus or Maverick treatments alone. The addition of Axial to Rimfire (trt 9) and Everest (trt 10) did not change the efficacy of downy brome control. The addition of MCPA did not enhance or reduce downy brome control of any treatment.

2006 Evaluation of Everest and Axial Herbicide Combinations on HRSW at Hettinger

	Treatment	Application Timing	Product Rate	inj	June 19 wioa	June 19 dobr	June 19 jabr	June 19 peda	July 15 wioa	July 15 dobr	July 15 jabr	July 15 peda
			oz/Ac	% Control								
1	Untreated	--	0	0	0	0	0	0	0	0	0	0
2	Everest + NIS	PRE	0.3 + 0.25%	0	20	38	94	--	0	39	96	--
3	Everest + NIS	PRE	0.4 + 0.25%	0	99	45	94	0	87	42	96	--
4	Everest + NIS /	PRE	0.3 + 0.25%									
	Axial + Adigor	POST	4.1 + 4.8	0	94	42	95	--	91	19	97	--
5	Everest + NIS /	PRE	0.4 + 0.25%									
	Axial + Adigor	POST	4.1 + 4.8	0	98	62	92	99	96	50	96	99
6	Everest + NIS /	PRE	0.3 + 0.25%									
	Axial + Adigor	POST	2.05 + 2.4	0	30	30	92	--	1	1	96	0
7	Everest + NIS /	PRE	0.4 + 0.25%									
	Axial + Adigor	POST	2.05 + 2.4	0	77	50	91	--	65	38	94	--
8	Everest + NIS /	PRE	0.3 + 0.25%									
	Axial + Adigor	POST	1.0 + 1.2	0	20	38	94	--	0	54	92	--
9	Everest + NIS /	PRE	0.4 + 0.25%									
	Axial + Adigor	POST	1.0 + 1.2	0	70	10	90	0	2	25	89	0
10	Everest + NIS /	PRE	0.3 + 0.25%									
	Everest + NIS	POST	0.3 + 0.25%	0	99	38	95	0	96	58	96	0
11	Everest + NIS +	POST	0.4 + 0.25% +									
	Axial + Adigor	POST	2.05 + 2.4	0	90	42	94	0	98	50	92	0
12	Axial + Adigor	POST	1.0 + 1.2	0	21	0	0	--	18	0	0	--
13	Axial + Adigor	POST	2.05 + 2.4	0	42	0	0	50	30	0	0	80
14	Axial + Adigor	POST	4.1 + 4.8	0	91	0	0	99	97	0	0	99
15	Axial + Adigor	POST	8.2 + 9.6	0	99	0	0	99	99	0	0	99
16	Glyphosate	PRE	24	0	0	92	90	0	0	99	97	8
17	Glyphosate	2 leaf HRSW	24	100	100	100	100	90	98	99	99	87
18	Glyphosate	4 leaf HRSW	24	100	100	100	99	100	99	99	98	99
	C.V. %			0	17	30	5	--	21	32	4	--
	LSD .05			1	15	16	4	--	17	17	4	--

2006 Grass Control in Wheat at Hettinger

Eric Eriksmoen

Reeder hard red spring wheat was seeded on April 17. Treatments were applied on May 25 to 4 leaf wheat and downy brome (dobr) that was about 50% emerged from the boot with 50° F, 87% RH, sunny sky and W wind at 2 mph. Treatments were applied with a tractor mounted CO_2 propelled plot sprayer delivering 10 gpa at 30 psi to 5 foot wide by 20 foot long plots. Downy brome population was 15 per ft^2. The experiment was a randomized complete block design with four replications. Plots were evaluated for crop injury on June 5 and on June 14 and for downy brome control on June 14. The trial was not harvested.

	Treatment	Product Rate	June 5 hrsw	June 14 hrsw	June 14 dobr
		oz/A	------ % Control ------		
1	Silverado + Bronate Adv. + Basic Blend	1.8 + 12.8 + 1%	2	0	8
2	Everest + Bronate Adv. + Basic Blend	0.45 + 12.8 + 1%	2	0	8
3	Rimfire + Bronate Adv. + Basic Blend	1.76 + 12.8 + 1%	2	0	10
4	Assert + Bronate Adv. + MSO	16 + 12.8 + 24	0	0	4
5	Achieve + Bro. Adv. + Sup.Crg. + AMS	7 + 12.8 + 0.5% + 1%	0	0	0
6	Puma + Bronate Adv.	6.4 + 12.8	0	0	0
7	Puma + Bronate Adv.	10.6 + 12.8	0	0	4
8	Discover NG + Bronate Adv.	12.8 + 12.8	0	0	0
9	Axial + Bronate Adv. + Adigor	8.3 + 12.8 + 9.6	0	1	0
10	Avenge + Bronate Adv.	64 + 12.8	25	27	0
11	Untreated	--	0	0	0
C.V. %			87.4	63.6	79.9
LSD .05			4	2	3

Summary

Data from this trial is very limited due to downy brome being the only grassy weed present. Herbicide treatments were applied to downy brome which was in an advanced growth stage. Although significant differences in downy brome control were noted, none of the treatments provided very effective control.

Wheat tolerance to imazamox application timing. Kirk Howatt, Ronald Roach, and Janet Harrington. 'AP603CL' hard red spring wheat was seeded April 27 near Fargo, North Dakota. Treatments 1 and 2 were applied to 1.5-leaf wheat on May 5 with 67°F, 25% RH, 60% cloud cover, wind velocity of 6 mph at 135°, and damp soil at 54°F. Treatments 3 through 7 were applied to 3- to 4-leaf wheat on May 30 with 84°F, 28% RH, 5% cloud cover, wind velocity of 4 mph at 270°, and dry soil at 63°F. Treatments 8 through 12 were applied to 5-leaf wheat on June 5 with 74°F, 59% RH, 95% cloud cover, wind velocity of 7 mph at 135°, and dry soil at 62°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 35 psi through 11001 TT nozzles to a 7-ft wide area the length of 10 by 30 ft plots. The experiment was a randomized, complete block design with four replicates.

			6/14		6/19		6/27			7/6			Grain	
Treatment[a]	Rate	Timing	chlor	stunt	chlor	stunt	chlor	stunt	head	chlor	stunt	head	mois	Yield
	oz ai/A	wht leaf	% injury										%	bu/A
Immx+Rhonox+NIS	1+7.4+0.25%	1.5	0	6	0	7	0	10	3	0	4	2	7.7	59
Immx+Rhonox+MSO	1+7.4+1%	1.5	0	6	0	9	0	27	7	0	5	2	9.1	56
Immx+NIS	1+0.25%	3	6	3	0	0	0	1	0	0	4	0	6.0	56
Immx+NIS	2+0.25%	3	5	5	0	0	0	0	0	0	4	0	6.9	53
Immx+Rhonox+NIS	0.75+5.6+0.25%	3	2	3	0	0	0	2	0	0	1	0	6.5	63
Immx+Rhonox+NIS	1+7.4+0.25%	3	3	4	0	0	0	1	0	0	2	0	7.6	54
Immx+Rhonox+MSO	1+7.4+1%	3	3	3	0	0	0	3	0	0	5	0	6.1	53
Immx+NIS	1+0.25%	5	1	0	0	0	0	0	0	0	0	0	6.3	45
Immx+NIS	2+0.25%	5	1	1	0	0	0	1	2	0	0	0	5.1	50
Immx+Rhonox+NIS	0.75+5.6+0.25%	5	3	1	0	0	0	1	2	0	1	0	6.1	54
Immx+Rhonox+NIS	1+7.4+0.25%	5	4	4	0	0	0	1	0	0	1	0	5.7	45
Immx+Rhonox+MSO	1+7.4+1%	5	1	1	0	0	0	1	0	0	2	0	7.2	46
Untreated	0		0	0	0	0	0	0	0	0	0	0	6.7	47
LSD (P=.05)			2	3	0	2	0	4	2	0	4	1	2.2	12
CV			67	82	0	105	0	74	109	0	99	300	22	177

[a] Rhonox is an MCPA ester; all imazamox treatments included UAN at 2.5% vol/vol.

The majority of treatments did not cause more than 5% injury as chlorosis, stunting, or head deformity even with imazamox at 2 oz/A, which is four times the labeled use rate. Injury that exceeded 5% was restricted to applications to wheat in the 1.5-leaf growth stage. Wheat that is 2-leaf and younger has exhibited elevated injury to imazamox compared with more developed wheat in several previous studies. In this instance, injury did not elicit prolonged chlorosis and did not limit grain yield, although slight head deformity expressed as kinked heads and twisted awns was observed.

Clearfield wheat response to imazamox tank-mixes. Kirk Howatt, Ronald Roach, and Janet Harrington. 'AP603CL' wheat was seeded April 27 near Fargo, North Dakota. Treatments were applied to 4-leaf wheat on June 2 with 75°F, 36% RH, clear sky, wind velocity of 3 mph at 270°, and damp soil a 64°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 35 psi through 11001 TT nozzles to a 7-ft wide area the length of 10 by 30 ft plots. The experiment was a randomized, complete block design with four replicates.

		6/16		6/28			Grain	
Treatment[a]	Rate	chlor	stunt	chlor	stunt	head	moisture	Yield
	oz ai/A	% injury					%	bu/A
Immx+NIS	1+0.25%	2	0	0	0	0	4.7	57
Immx+Rhonox+NIS	1+7.4+0.25%	3	0	0	0	0	6.5	59
Immx+Rhonox+Flox+NIS	1+7.4+1.5+0.25%	3	2	0	1	1	5.5	55
Immx+Rhonox+Flox+NIS	1+7.4+3+0.25%	4	0	0	1	0	5.5	56
Immx+Rhonox+Brox4+NIS	1+7.4+4+0.25%	3	0	0	1	0	6.0	60
Immx+Rhonox+Brox4+NIS	1+7.4+8+0.25%	3	0	0	1	1	5.6	58
Imazamox+Rhonox+Dicamba+NIS	1+7.4+1+0.25%	6	6	0	9	1	5.0	48
Imazamox+Rhonox+Dicamba+NIS	1+7.4+2+0.25%	6	8	0	6	1	5.2	52
Imazamox+Rhonox+2,4-D+NIS	1+7.4+2+0.25%	4	1	0	0	0	5.3	59
Immx+Rhonox+2,4-D Amine+NIS	1+7.4+4+0.25%	6	6	0	3	1	5.5	52
Immx+Rhonox+Thif-sg+Trib-sg+NIS	1+7.4+0.1+0.1+0.25%	6	1	0	0	0	5.2	48
Untreated	0	0	0	0	0	1	4.9	42
LSD (P=.05)		3	2	0	3	2	1.8	9
CV		50	67	0	103	249	23	12

[a] Rhonox is an MCPA ester; all imazamox treatments included UAN at 2.5% vol/vol.

Imazamox rate was included in this study at twice the labeled use rate to enhance the occurrence of injury. All imazamox treatments initially caused slight chlorosis that was not apparent on June 28. Teatments that included dicamba increased the amount of stunting observed throughout the season. Degree of stunting was less than 10% but yields of wheat treated with imazamox and dicamba tended to be less than yields of other treatments. Wheat yield when treated with imazamox and thifensulfuron plus tribenuron also reduced yield compared with several other tank-mixes even though visible injury was not pronounced.

Weed control in Clearfield wheat. Kirk Howatt, Ronald Roach, and Janet Harrington. 'AP603CL' hard red spring wheat was seeded April 27 near Fargo, North Dakota. Treatments was applied to 4-leaf wheat, 4-leaf pigweed and common lambsquarters, 2- to 3-leaf wild buckwheat, and 6-leaf wild mustard on June 2 with 77°F, 28% RH, 0% cloud cover, wind velocity of 3 mph at 270°, and damp soil at 64°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 35 psi through 11001 TT nozzles to a 7-ft wide area the length of 10 by 30 ft plots. The experiment was a randomized, complete block design with four replicates.

		Wheat		6/16				6/28				8/4
Treatment	Rate	6/16	6/28	Wibw	Colq	Wimu	Rrpw	Wibw	Colq	Wimu	Rrpw	Yield
	oz ai/A	% injury		% control								bu/A
Immx+NIS+UAN	0.375+0.25%+2.5%	0	0	79	76	89	84	86	87	94	94	55
Immx+NIS+UAN	0.5+0.25%+2.5%	0	0	79	80	87	88	79	86	95	93	54
Immx+Rhonox+NIS+UAN	0.375+2.8+0.25%+2.5%	0	0	87	91	95	93	90	96	98	98	55
Immx+Rhonox+NIS+UAN	0.5+3.7+0.25%+2.5%	0	0	88	90	92	93	94	97	99	98	54
Immx+Rhonox+Flox+NIS+UAN	0.5+3.7+1.5+0.25%+2.5%	0	1	87	91	96	96	94	97	98	97	52
Immx+Rhonox+Brox4+NIS+UAN	0.5+3.7+4+0.25%+2.5%	0	1	96	95	98	97	98	99	99	98	55
Immx+Rhonox+Dica+NIS+UAN	0.5+3.7+1+0.25%+2.5%	0	2	82	87	92	95	95	99	99	99	55
Immx+Rhonox+2,4-D+NIS+UAN	0.5+3.7+2+0.25%+2.5%	0	1	86	94	94	96	91	98	99	97	50
Flcz+Brox&2,4-D+Basic Blend	0.42+9+1%	0	5	96	97	98	97	98	99	99	99	56
Pinoxaden+Brox&MCPA+Adigor	0.86+8+0.075G	0	0	93	92	96	80	87	99	99	97	51
Untreated	0	0	0	0	0	0	0	0	0	0	0	47
LSD (P=.05)		0	2	5	5	5	4	5	3	2	2	5
CV		0	159	4	5	4	3	4	3	2	2	6

Injury to wheat with imazamox did not exceed 5% and was not correlated with grain yield. Imazamox at the standard rate of 0.5 oz/A gave less than 80% control of wild buckwheat. Buckwheat control on June 28 was 90% or better with imazamox tank-mixes, with 98% control provided by imazamox plus Rhonox and bromoxynil or flucarbazone plus bromoxynil and MCPA. Imazamox alone also was weak on lambsquarters giving 86% control compared with 96% or better with other treatments. A similar divergence occurred for wild mustard and pigweed, but the separation was less. Control of mustard and pigweed was at least 93%. Grain yield was not influenced by the differences in weed control.

Weed control systems in Clearfield spring wheat. Jenks, Willoughby, and Mazurek. Clearfield wheat was seeded on May 8 at 90 lb/A into 7.5 inch rows. Herbicide treatments were applied June 1 with green foxtail at 2 inches tall with 0-2 plants/ft² and wild buckwheat at 3 inches tall with 0-2 plants/ft². Wheat was at the 3.5- to 4-leaf stage and 7 inches tall. Individual plots were 10 x 30 ft and replicated three times.

There was no visible crop injury in the form of chlorosis or stunting. All treatments effectively control green foxtail and flixweed. Tank mixes including Buctril and WideMatch provided better early-season wild buckwheat control compared to other treatments. However, by July all treatments provided good to excellent wild buckwheat control. Dry conditions and canopy shading likely inhibited wild buckwheat recovery. There was no significant difference in wheat yield or test weight between herbicide treatments.

Table. Weed control systems in Clearfield spring wheat.

		Wheat		Wibw			Grft			Flix		Wheat	
Treatment	Rate	Jun 13	Aug 9	Jun 13	Jul 8	Aug 9	Jun 13	Jul 8	Aug 9	Jun 13	Aug 9	Yield	Test wt.
		% injury		--------------% control--------------								bu/A	lb/bu
Beyond + NIS + 28% N	4 fl oz + 0.25% + 2.5%	0	0	62	87	93	89	99	97	83	100	41.6	57.5
Beyond + MCPA ester + NIS + 28% N	4 fl oz + 8 fl oz + 0.25% + 2.5%	0	0	69	92	95	90	99	96	85	100	39.3	57.0
Beyond + MCPA ester + Bromoxynil (Buctril)	4 fl oz + 8 fl oz + 8 fl oz	0	0	88	100	98	90	99	95	80	100	39.1	57.3
Beyond + MCPA ester + Starane	4 fl oz + 8 fl oz + 6 fl oz	0	0	74	91	98	89	99	97	82	100	41.8	57.2
Beyond + MCPA ester + Widematch	4 fl oz + 8 fl oz + 8 fl oz	0	0	83	100	100	89	99	96	80	100	39.3	57.0
Untreated check		0	0	0	0	0	0	0	0	0	0	38.5	56.8
LSD (0.05)		NS	NS	5	5	8	2	1	3	6	NS	NS	NS
CV		0	0	4	4	5	2	0	2	5	0	5.3	0.6

2006 Weed Control Systems in Clearfield Spring Wheat at Hettinger, ND

Eric Eriksmoen

'AP630CL' HRSW was seeded on April 13. Treatments were applied on May 10 to 4 leaf wheat, to downy brome (dobr) in the boot stage, to 6" tall tansy mustard (tamu), to 2" tall wild buckwheat (wibw), to 3 leaf wild oats (wioa), to 3 leaf Japanese brome (jabr) and to 2 leaf Persian darnel (peda) with 39° F, 93% RH, partly cloudy sky and W wind at 10 mph. Treatments were applied with a tractor mounted CO_2 propelled plot sprayer delivering 10 gpa at 30 psi through PK-01E80 nozzles to a 5 foot wide area the length of 10 by 28 foot plots. The trial was a randomized complete block design with four replications. Downy brome, tansy mustard, wild buckwheat, wild oats, Japanese brome and Persian darnel populations were 15, 0.3, 0.25, 10, 5 and 3 plants per square foot respectively. Plots were evaluated for crop injury and weed control on May 31, June 15 and June 29. The trial was harvested on July 18.

Summary

Crop injury was not observed on any treatment. Beyond alone (trt 1) tended to be weaker on broadleaf weeds (tansy mustard and wild buckwheat) than the other herbicide treatments. Grassy weed control was excellent for all herbicide treatments. Grain yields were very low due to extremely hot and dry growing conditions but tended to be significantly higher than that of the untreated check

2006 Weed Control Systems in Clearfield Spring Wheat at Hettinger, ND

	Treatment	Application Rate	May 31 hrs	May 31 tamu	May 31 dobr	May 31 wibw	June 15 wioa	June 15 dobr	June 15 peda	June 15 jabr	June 29 wioa	June 29 dobr	June 29 peda	June 29 jabr	Grain Yield
		oz/Ac	% Control												bu/A
1	Beyond + NIS + UAN	4 + 0.25% + 2.5%	0	73	63	60	99	57	99	96	98	93	96	93	8.0
2	ClearMax + NIS + UAN	12 + 0.25% + 2.5%	0	88	68	85	99	90	98	92	96	96	93	93	9.5
3	ClearMax + Bromoxynil	12 + 8	0	92	43	60	99	92	98	95	93	95	98	95	6.1
4	ClearMax + Starane	12 + 6	0	82	82	78	99	62	98	94	96	90	92	95	6.6
5	ClearMax + Widematch	12 + 8	0	82	82	81	99	91	99	95	97	98	96	96	9.7
6	Untreated		0	0	0	0	0	0	0	0	0	0	0	0	5.2
C.V. %			0	9.2	15.5	14.9	0	12.1	1.8	2.5	3.6	5.1	2.8	4.2	16.8
LSD .05			NS	10	14	15	1	13	2	3	5	6	4	5	2.0

ClearMax = 4 oz/A Beyond + 8 oz/A MCPA ester

Broadleaf weed control in small grains. Kirk Howatt, Ronald Roach, and Janet Harrington. 'Alsen' hard red spring wheat was seeded May 18 near Fargo, North Dakota. Treatments were applied to 3- to 4-leaf wheat, 4- to 5-leaf redroot pigweed, and 4- to 6-leaf wild mustard on June 13 with 74°F, 47% RH, 45% cloud cover, wind velocity of 1.5 mph at 315°, and dry soil at 64°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 35 psi through 11001 TT nozzles to a 7-ft wide area the length of 10 by 30 ft plots. The experiment was a randomized, complete block design with four replicates.

		6/28			7/10	8/8
Treatment	Rate	Wht	Rrpw	Wimu	Rrpw	Yield
	oz ai/A	% inj		% control		bu/A
Fluroxypyr&2,4-D	7.5	0	95	97	99	43
Fluroxypyr&MCPA	8	0	90	.	99	49
Bromoxynil&MCPA5	8	0	87	.	98	46
Bromoxynil+Fluroxypyr	4+1	0	87	.	98	46
Bromoxynil&2,4-D	9	0	97	.	98	52
Clopyralid&Fluroxypyr	3	0	82	.	99	49
Clopyralid&Fluroxypyr+Carfentrazone	2+0.125	6	99	.	99	51
Clopyralid&Fluroxypyr+Thifensulfuron-sg	2+0.1	0	90	.	97	51
Clopyralid&Fluroxypyr+Salvo	2+4	1	93	.	99	47
Carfentrazone+Sword+NIS	0.125+4+0.25%	5	98	.	99	48
Carfentrazone+Thifensulfuron-sg+NIS	0.125+0.1+0.25%	4	98	.	99	49
Pyraflufen+Sword+NIS	0.013+4+0.25%	0	89	.	98	47
Pyraflufen+Thifensulfuron-sg+NIS	0.013+0.1+0.25%	0	94	.	99	47
Thifensulfuron-sg+Tribenuron-sg +Sword+NIS	0.24+0.06 +4+0.125%	0	91	.	99	46
Thifensulfuron-sg+Tribenuron-sg +Salvo+NIS	0.1+0.1 +4+0.125%	0	99	.	99	52
Untreated	0	0	0	.	0	50
LSD (P=.05)		1	4	.	2	7
CV		92	3	.	1	10

Treatments containing carfentrazone caused injury to wheat of 4 to 6%. This injury was expressed as the typical necrotic speckling of older leaf tissue. Plant growth was not slowed by this injury, and the injury was not present on July 10. Clopyralid and fluroxypyr gave the least control of pigweed on June 28 at 82%. Fluroxypyr or MCPA do not provide as much control of pigweed as 2,4-D; therefore, when these three are combined with bromoxynil, the premix with 2,4-D provided 97% control compared with 87% control with treatments containing fluroxypyr or MCPA. Equivalent labeled rates of carfentrazone and pyraflufen were compared with two tank-mix partners. In each case, carfentrazone provided slightly greater control of pigweed than pyraflufen. By July 10, all herbicide combinations provided excellent control of pigweed. Wild mustard population was low and spotty which prevented analysis of observations. On June 28, any treatment where mustard occurred provided at least 97% wild mustard control. No wild mustard plants were observed on July 10.

2006 Broadleaf Weed Control in Wheat at Hettinger

Eric Eriksmoen

Reeder hard red spring wheat was seeded on April 17. Treatments were applied on May 25 to 4 leaf wheat, 2" tall kochia (kocz), 3" tall Russian thistle (ruth), 9" tall tansy mustard (tamu) and to 6" long field bindweed (fibw) with 50^o F, 87% RH, sunny sky and W wind at 2 mph. Treatments were applied with a tractor mounted CO_2 propelled plot sprayer delivering 10 gpa at 30 psi to 5 foot wide by 20 foot long plots. Weed populations for kochia, Russian thistle, tansy mustard and field bindweed were 3.3, 0.3, 0.7 and 3 plants per ft^2, respectively. The experiment was a randomized complete block design with four replications. Plots were evaluated for crop injury on June 8 and June 16 and for weed control on June 16 and July 17. The trial was not harvested.

	Treatment	Product Rate	6/8	June 16					--July 17--	
			hrsw	hrsw	kocz	ruth	tamu	fibw	kocz	fibw
		oz/A	% Control							
1	Starane + Salvo	16	2	0	94	88	40	90	97	92
2	Starane + Sword	18	0	0	94	3	40	86	96	86
3	Bronate Advance	12.8	1	0	79	90	19	95	95	91
4	Buctril + Starane	16 + 5.3	0	0	95	92	16	9	96	75
5	B-4	16	2	0	91	95	25	90	92	94
6	WideMatch	16	0	0	90	85	20	79	98	92
7	WideMatch + Aim	10.7 + 0.5	0	0	91	75	25	24	92	50
8	WideMatch + Harmony GT	10.7 + 0.2	0	0	92	90	72	22	95	68
9	WideMatch + Salvo	10.7 + 6.4	0	0	92	68	38	85	97	88
10	Aim + Sword + NIS	0.5 + 6.2 + 0.25%	0	0	65	42	32	60	90	74
11	Aim + Harmony GT + NIS	0.5 + 0.2 + 0.25%	1	1	70	86	55	12	92	0
12	ET + Sword + NIS	0.52 + 6.2 + 0.25%	0	2	14	2	15	90	92	52
13	ET + Harmony GT + NIS	0.52 + 0.2 + 0.25%	0	1	21	89	57	4	79	1
14	Harm.GT+Express+Sword+NIS	0.48+0.12+4+0.12%	1	0	52	8	81	89	68	86
15	Harm.Gt+Express+Salvo+NIS	0.2+0.2+6.4+0.12%	0	0	84	89	88	92	91	94
16	Untreated	--	0	0	0	0	0	0	0	0
C.V. %			279	206	15	11	27	17	7	15
LSD .05			NS	1	15	11	15	14	9	13

Summary

Crop injury was very minor when observed. All herbicide treatments provided excellent season long control of kochia except for ET + Harmony GT + NIS and Harmony GT + Express + Sword + NIS (trts 13 and 14). Treatments containing Sword (trts 2, 10, 12 and 14) tended to provide poor control of Russian thistle. Herbicide treatments were applied to tansy mustard that was in an advanced growth stage resulting in relatively poor control with the exception of Harmony GT + Express + Sword + NIS and Harmony GT + Express + Salvo + NIS (trts 14 and 15) which provided relatively good control. Treatments containing 2,4-D (trts 1, 5, 9 and 15) provided the highest level of season long control of field bindweed.

Broadleaf weed control with pryasulfotol. Kirk Howatt, Ronald Roach, and Janet Harrington. 'Alsen' hard red spring wheat was seeded May 17 near Prosper, North Dakota. Treatments 1 and 2 were applied to 2-leaf wheat, 1- to 2-inch common lambsquarters and pigweed, 3-leaf wild oat, and 2- to 3-inch kochia and common cocklebur on June 5 with 79°F, 49% RH, 97% cloud cover, wind velocity of 9 mph at 225°, and dry soil at 65°F. Treatments 3 through 5 were applied to 4-leaf wheat and wild oat and 3- to 6-inch common lambsquarters, redroot pigweed, common cocklebur, and kochia on June 13 with 79°F, 49% RH, 90% cloud cover, wind velocity of 8 mph at 225°, and dry soil at 65°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 35 psi through 11001 TT nozzles to a 7-ft wide area the length of 10 by 30 ft plots. The experiment was a randomized, complete block design with four replicates. Treatment 1 was sprayed with fenoxaprop to control grass weeds while test compound (TC) 2 included a component for grass control.

		Wht		6/20					6/28					7/10				
Treatment	Rate	6/20	6/28	Kocz	Cocb	Colq	Rrpw	Wioa	Kocz	Cocb	Colq	Rrpw	Wioa	Kocz	Cocb	Colq	Rrpw	Wioa
	fl oz/A	% injury		% control														
Pyrasulfotol&brox	13.6	0	0	97	97	97	97	96	99	98	99	99	99	99	99	99	99	99
TC2	20.5	0	0	97	96	97	97	96	97	99	98	99	99	98	99	99	99	99
TC2	20.5	0	0	40	30	30	45	85	81	88	90	89	93	80	92	96	91	99
TC2+Brox&MCPA5	20.5+4.8	6	0	91	89	94	89	90	88	92	92	91	93	94	97	98	96	94
Fenx+Carf+MCPA	10.7+0.5+9.6	10	0	92	86	89	91	87	95	95	95	94	92	95	95	98	95	93
Untreated	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LSD (P=.05)		1	0	3	3	2	5	2	3	2	2	3	4	3	2	1	3	6
CV		23	0	3	3	2	4	2	3	2	2	2	3	3	2	1	3	4

Injury to wheat of 6 to 10% was observed on June 20 but was not evident 8 days later. Pyrasulfotol with bromoxynil or included with TC2 applied to small weeds less than 3 inches tall was very effective, providing 96 to 97% control of all broadleaf weeds by June 20. Later application of pyrasulfotol was very slow to control broadleaf weeds only gave 80% control of kochia on July 10. Smaller kochia was killed and the larger kochia maintained mottled bleaching throughout the plant for the duration of the season. Kochia plants that survived topped the crop canopy. Addition of bromoxynil and MCPA at the later application improved the speed and completeness of control of the entire weed spectrum.

Comparison of bromoxynil premixes. Kirk Howatt, Ronald Roach, and Janet Harrington. 'Alsen' hard red spring wheat was seeded April 27. Treatments were applied to 5-leaf wheat, flowering wild mustard, 4- to 6-leaf wild buckwheat, and 8-leaf common lambsquarters on June 7 with 67°F, 52% RH, clear sky, wind velocity of 8.5 mph at 315°, and dry soil at 60°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 35 psi through 11001 TT nozzles to a 7-ft wide area the length of 10 by 30 ft plots. The experiment was a randomized, complete block design with four replicates. Wild mustard was naturally senescing by July 6 so evaluation of this weed was suspended.

		6/21				7/6		8/3	
Treatment	Rate	Wht	Wibw	Colq	Wimu	Wibw	Colq	Wibw	Colq
	oz ai/A	% inj	% control						
Bromoxynil&MCPA5	8	0	84	86	85	86	96	82	98
Bromoxynil&MCPA	8	0	86	92	87	92	98	84	99
Bromoxynil&2,4-D	9	0	85	89	85	92	96	91	99
Bromoxynil&MCPA-V	8	0	87	92	90	89	99	89	99
Bromoxynil&2,4-D +InPlace[a]	7.2 +38.4	0	80	87	84	95	98	89	99
Bromoxynil&MCPA-V +InPlace	6.4 +38.4	0	75	86	84	86	99	82	99
Thifensulfuron-sg +2,4-D+NIS	0.3 +4+0.25%	0	86	89	86	92	99	93	98
Carfentrazone+2,4-D +NIS	0.125+4 +0.25%	6	84	89	84	92	99	86	98
Pyraflufen+2,4-D+NIS	0.013+4+0.25%	4	47	65	59	54	74	47	99
Untreated	0	0	0	0	0	0	0	0	0
LSD (P=.05)		1	16	21	19	18	23	16	1
CV		94	15	19	18	16	19	15	1

[a] In-Place was mixed with herbicides before adding water.

Wheat demonstrated temporary injury of 4 to 6% with carfentrazone and pyraflufen. Large LSDs resulted because of variation within treatment, especially the pyraflufen treatment. Bromoxynil premixes with MCPA or 2,4-D provided consistent control of wild buckwheat, common lambsquarters, and wild mustard. Reduced rates of bromoxynil and 2,4-D or MCPA with In-Place provided control that was numerically less than full rates of these herbicides but not different. Thifensulfuron or carfentrazone treatments provided control that was similar to bromoxynil treatments, but control with pyraflufen lagged significantly behind the other treatments. Common lambsquarters control was consistent across all herbicides at 98 to 99% on Aug 3, but control of wild buckwheat with pyraflufen was 47% compared with greater than 80% for all other herbicides.

Pyraflufen equivalency to carfentrazone. Kirk Howatt, Ronald Roach, and Janet Harrington. 'Alsen' hard red spring wheat was seeded May 18, near Fargo, North Dakota. Treatments were applied to 3- to 4-leaf wheat, 3- to 5-leaf redroot pigweed, and flowering wild mustard on June 13 with 71°F, 44% RH, 65% cloud cover, wind velocity of 1 mph at 315°, and dry soil at 64°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 35 psi through 11001 TT nozzles to a 7-ft wide area the length of 10 by 30 ft plots. The experiment was a randomized, complete block design with four replicates. Wild mustard was naturally senescing by July 10 so evaluation was suspended.

Rating Date		6/27			7/10	8/3
Treatment	Rate	Wht	Wimu	Rrpw	Rrpw	Rrpw
	oz ai/A	% injury	% control			
Carfentrazone+NIS	0.125+0.25%	6	91	95	99	95
Carfentrazone+NIS	0.25+0.25%	7	92	98	99	98
Pyraflufen+NIS	0.013+0.25%	5	62	55	62	55
Pyraflufen+NIS	0.018+0.25%	8	69	72	70	80
Pyraflufen+NIS	0.025+0.25%	6	82	81	84	82
Pyraflufen+NIS	0.032+0.25%	9	90	89	87	90
Pyraflufen+NIS	0.038+0.25%	10	95	94	96	97
Carfentrazone+MCPA+NIS	0.125+6+0.25%	11	98	97	98	96
Pyraflufen+MCPA+NIS	0.013+6+0.25%	7	96	92	85	80
Pyraflufen+MCPA+NIS	0.026+6+0.25%	9	94	92	92	90
MCPA+NIS	6+0.25%	0	72	62	72	69
LSD (P=.05)		2	7	6	6	7
CV		19	6	5	5	6

Necrotic speckling of wheat occurred with all treatments containing carfentrazone or pyraflufen. Injury was less than 12% and dissipated. The field use rate of carfentrazone at 0.125 oz/A provided similar control of wild mustard to 0.032 oz/A pyraflufen on June 27. The equivalent rate of pyraflufen for pigweed control was 0.038 oz/A. The prescribed use rate of pyraflufen was suggested at 0.013 oz/A. This meant that a 3X field rate of pyraflufen was needed to provide control of wild mustard and pigweed similar to carfentrazone at the 1X rate.

Broadleaf weed control with florasulam. Kirk Howatt, Ronald Roach, and Janet Harrington. 'Alsen' hard red spring wheat was seeded April 27 near Fargo, North Dakota. Treatments were applied to 5-leaf wheat, flowering wild mustard, 4- to 6-leaf wild buckwheat, and 8-leaf common lambsquarters on June 7 with 67°F, 52% RH, clear sky, wind velocity of 8.5 mph at 315°, and dry soil at 60°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 35 psi through 11001 TT nozzles to a 7-ft wide area the length of 10 by 30 ft plots. The experiment was a randomized, complete block design with four replicates.

			Wht		6/14			6/21			6/28			8/4
Treatment	Rate	6/14	6/28	7/11	Wibw	Colq	Wimu	Wibw	Colq	Wimu	Wibw	Colq	Wimu	Yield
	oz ai/A		% injury						% control					bu/A
Untreated	0	0	0	0	0	0	0	0	0	0	0	0	0	53
Florasulam+NIS	0.036+0.2%	0	0	0	12	10	20	45	42	75	79	20	72	58
Fslm+NIS	0.071+0.2%	0	0	0	17	15	22	52	55	80	77	27	76	54
Fslm+NIS	0.14+0.4%	0	1	0	20	15	27	60	62	80	77	50	85	55
Fslm+MCPA	0.036+5	0	2	0	15	22	40	70	85	86	89	95	96	54
Fslm+MCPA	0.071+5	0	1	1	20	35	42	80	87	90	95	98	95	53
Fslm+MCPA	0.14+10	0	2	1	22	37	42	81	90	89	94	96	96	56
Fslm+2,4-D Ester	0.036+8	0	7	3	37	42	40	85	90	92	94	97	96	52
Fslm+2,4-D Ester	0.071+8	0	4	4	45	47	45	82	90	94	92	96	97	51
Fslm+2,4-D Ester	0.14+16	0	15	8	50	47	40	82	90	94	98	98	97	45
Fslm+Fluroxypyr	0.036+1.5	0	0	0	17	22	22	67	67	84	94	91	96	57
Fslm+Fluroxypyr	0.071+1.5	0	0	0	17	22	25	65	65	84	96	90	92	51
Fslm+Fluroxypyr	0.14+3	0	0	0	22	25	22	76	80	86	96	95	96	56
MCPA	5	0	2	0	25	55	40	62	84	84	80	88	96	53
2,4-D Ester	8	0	6	2	42	60	52	67	86	84	89	97	95	45
Fluroxypyr	1.5	0	0	0	32	37	57	69	72	81	84	70	77	53
Bromoxynil&MCPA	10	0	4	2	65	77	88	79	90	94	95	97	97	52
Clpyr&Flox+MCPA	3+5.5	0	1	2	62	72	85	80	87	90	96	98	99	47
LSD (P=.05)		0	3	2	6	6	6	8	8	4	4	6	4	6
CV		0	82	92	16	12	10	8	7	4	4	5	3	9

Wheat injury with fluasulam was enhanced with the addition of 2,4-D ester. This injury was primarily stunting and remained prevalent throughout the season. Expression of symptoms and activity of fluasulam was slow. In addition, control of wild buckwheat, common lambsquarters, and wild mustard with fluasulam was less than control with MCPA, 2,4-D, or fluroxypyr alone. Addition of MCPA, 2,4-D, or fluroxypyr to florasulam increased the control of weeds relative to either tank-mix partner applied alone. 2,4-D ester provided the greatest supplement of florasulam activity, but, as stated earlier, 2,4-D also enhanced wheat injury. Substantial weed pressure was present, so the reason why yield is not correlated with weed control in not known.

Adjuvants with Thifensulfuron&Tribenuron. Kirk Howatt, Ronald Roach, and Janet Harrington. 'Alsen' hard red spring wheat was seeded May 23 near Colfax, North Dakota . Treatments were applied to 3.5- to 4-leaf wheat and 3-leaf to 7-inch vining wild buckwheat on June 12 with 67°F, 26% RH, 75% cloud cover, wind velocity of 8 mph at 180°, and dry soil at 68°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 35 psi through 11001 TT nozzles to a 7-ft wide area the length of 10 by 30 ft plots. The experiment was a randomized, complete block design with four replicates.

Rating Date		6/26	Wibw	
Treatment	Rate	Wht	6/26	7/7
	oz ai/a	% inj	% control	
Thif-sg+Trib-sg+Preference	0.16+0.04+0.25%	0	84	92
Thif-sg+Trib-sg+AG03019	0.16+0.04+0.25%	0	76	89
Thif-sg+Trib-sg+AG03037	0.16+0.04+0.25%	0	81	92
Thif-sg+Trib-sg+AG04021	0.16+0.04+5	0	85	93
Thif-sg+Trib-sg+AG06001	0.16+0.04+0.25%	0	87	95
Thif-sg+Trib-sg+AG06011	0.16+0.04+5	0	92	93
Thif-sg+Trib-sg+AG06013	0.16+0.04+0.25%	0	80	86
Thif-sg+Trib-sg+AG06015	0.16+0.04+5	0	81	88
Thif-sg+Trib-sg+Activator 90	0.16+0.04+0.25%	0	77	87
Thif-sg+Trib-sg+Quad 7	0.16+0.04+1%	0	82	86
LSD (P=.05)		0	5	6
CV		0	4	5

Treatments did not cause wheat injury. AG06011 enabled quicker activity by thifensulfuron and tribenuron than other adjuvants resulting in 92% wild buckwheat control on June 26. AG03019 and Activator 90 resulted in 76 and 77% control, respectively. On July 7, AG06001, AG06011, AG04021, AG03037, and Preference resulted in control of buckwheat with thifensulfuron and tribenuron of 92% or greater.

Weed control with Affinity tank mixes in spring wheat. Jenks, Willoughby, and Mazurek. 'Steele' spring wheat was seeded on May 9 at 90 lb/A into 7.5 inch rows. Herbicide treatments were applied postemergece (POST) on May 31. At time of application, wheat was at the 3.5-leaf stage and 6 inches tall, wild oat was at the 3-leaf stage with 3-6 plants/ft², and lambsquarters was 4 inches tall with 3-5 plants/ft². Individual plots were 10 x 30 ft and replicated three times.

Only Everest caused visible crop injury in the form of stunting. All herbicide treatments provided excellent lambsquarters control. Everest and Axial provided excellent wild oat control, while Rimfire and Discover provided poor to fair wild oat control. There was no significant difference in yield or test weight between herbicide treatments.

Table. Weed control with Affinity tank mixes in spring wheat.

			Wheat			Wioa		Colq		Wheat	
Treatment	Rate	Timing	Jun 10	Jun 22	Jul 13	Jun 22	Jul 13	Jun 22	Jul 13	Yield	Test wt.
			--% injury--			-----% control-----				bu/A	lb/bu
Affinity TM + Widematch + Rimfire	0.3 oz ai + 0.66 pt + 1.75 oz	POST	0	0	0	53	68	100	100	46.5	59.2
Affinity TM + Starane + 2,4-D ester + Everest	0.3 oz ai + 0.33 pt + 10 fl oz + 0.5 oz	POST	7	3	7	86	91	98	100	48.3	58.7
Affinity TM + Widematch + Discover NG	0.3 oz ai + 0.66 pt + 12.8 fl oz	POST	0	0	0	60	50	100	100	50.1	59.0
Affinity TM + Widematch + Axial + Adigor	0.3 oz ai + 0.66 pt + 8.2 fl oz + 9.6 fl oz	POST	0	0	0	92	95	99	100	53.2	59.3
Untreated			0	0	0	0	0	0	0	14.9	56.7
LSD (0.05)			1	2	3	11	11	1	NS	9.3	1.2
CV			39	129	123	10	10	1	0	11.6	1.1

Wild Buckwheat Control with Fluroxypyr Premixes. Kirk Howatt, Ronald Roach, and Janet Harrington. 'AP603CL' hard red spring wheat was seeded April 27 near Fargo, North Dakota. Treatments were applied to 5-leaf wheat, flowering wild mustard, 4- to 6-leaf wild buckwheat, and 8-leaf common lambsquarters on June 7 with 67°F, 52% RH, clear sky, wind velocity of 8.5 mph at 315°, and dry soil at 60°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 35 psi through 11001 TT nozzles to a 7-ft wide area the length of 10 by 30 ft plots. The experiment was a randomized, complete block design with four replicates.

		6/21				7/6		8/3	
Treatment	Rate	Wht	Wibw	Colq	Wimu	Wibw	Colq	Wibw	Colq
	oz ai/A	% inj	———	———	———	% control	———	———	———
Clopyralid&Fluroxypyr	3	0	74	82	80	87	87	95	94
Clpy&Flox+MCPA	3+6	0	81	86	86	95	98	98	99
Clpy&Flox+Thif-sg+NIS	3+0.063+0.25%	0	80	80	86	92	92	95	90
Clpy&Flox+Thif-sg +Trib-sg+NIS	3+0.063 +0.016+0.25%	0	80	85	84	94	91	96	95
Bromoxynil&Fluroxypyr	5	0	87	89	94	98	98	98	97
Brox&Flox+MCPA	5+4	0	92	94	95	98	99	98	99
Brox&Flox+Thif-sg +Trib-sg+NIS	5+0.05 +0.05+0.25%	0	91	91	90	98	98	98	97
Brox&Flox+Thif-sg+NIS	5+0.063+0.25%	0	91	91	94	95	95	97	92
Fluroxypyr +Bromoxynil&MCPA5	1 +8	0	81	89	90	93	98	76	99
Fluroxypyr+2,4-D	1.5+6	0	70	87	80	64	97	70	99
Fluroxypyr&MCPA	8	0	75	85	85	94	99	94	99
Fluroxypyr&2,4-D	7.5	0	76	84	85	91	96	97	99
Bromoxynil&2,4-D	9	0	91	92	92	91	98	93	99
Untreated	0	0	0	0	0	0	0	0	0
LSD (P=.05)		0	5	5	3	4	4	6	4
CV		0	5	4	2	3	3	5	3

Treatments that contained bromoxynil generally provided greater than 90% control of the weeds in this study. Control of weeds with clopyralid and fluroxypyr or bromoxynil and fluroxypyr was improved by the addition of another broadleaf product. For this weed spectrum, MCPA was more consistently a better partner than sulfonylurea products. However, the "three-way" tank-mix of clopyralid and fluroxypyr plus bromoxynil relies solely on growth regulator herbicides and extensive use is cautioned. The premix of bromoxynil and fluroxypyr with MCPA added gave better control of all three weeds on June 21 than the premix of bromoxynil and MCPA with fluroxypyr added even though the same amounts of active ingredient were included. This difference was consistent for wild buckwheat during the other two evaluations but common lambsquarters was controlled equally well. Wild mustard plants were naturally senescing by July 6 so evaluation of this weed was suspended.

Wild buckwheat control with phenoxy herbicides. Kirk Howatt, Ronald Roach, and Janet Harrington. 'Alsen' hard red spring wheat was seeded May 23 near Colfax, North Dakota . Treatments were applied to 3.5- to 4-leaf wheat and 3-leaf to 7-inch vining wild buckwheat on June 12 with 67°F, 26% RH, 75% cloud cover, wind velocity of 8 mph at 180°, and dry soil at 68°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 35 psi through 11001 TT nozzles to a 7-ft wide area the length of 10 by 30 ft plots. The experiment was a randomized, complete block design with four replicates.

Treatment	Rate	6/26 Wht	6/26 Wibw	7/7 Wibw
	oz ai/A	% inj	— % control	—
AGH 02007	3.8	0	72	77
LV6	3.8	0	64	67
AGH 06012	3.8	0	60	65
AGH 06014	3.8	0	72	79
AGH 06016	3.8	0	71	66
AGH 02007	7.2	0	85	90
LV6	7.2	0	81	85
AGH 06014	7.2	0	75	86
AGH 06014+AG06011	3.8+5	0	67	80
AGH 02007+AG06038	3.8+5	0	77	84
NUP12KO4	3.8	0	70	72
Bromoxynil&2,4-D	9	0	93	96
Untreated	0	0	0	0
LSD (P=.05)		0	6	8
CV		0	6	8

Treatments did not cause injury to wheat. The most effective treatment bromoxynil and 2,4-D which provided 93% control of wild buckwheat on June 26. The bromoxynil component was unique to this treatment and provided rapid desiccation of tissue compared with the slow degeneration of tissue caused by phenoxy herbicides. AGH02007 provided better control than LV6 when applied at 3.8 oz/A, but the numerical difference was not large enough to be statisticall different at 7.2 oz/A. AGH06014 was similar to AGH02007 at 3.8 oz/A but tended to provide less control than AGH02007 at 7.2 oz/A.