<u>Wheat response to soil residues of grass herbicides</u>. (Kirk Howatt, Ronald Roach, Janet Harrington). 'Alsen' hard red spring wheat was seeded June 4. Treatments (14 days before seeding) were applied to bare soil on May 21 with 61 F air temperature, 37% RH, 50% cloud cover, 11 to 13 mph east wind, and soil temperature of 52 F. Treatments (7 days before seeding) were applied to bare soil on May 27 with 56 F air temperature, 46% RH, 25% cloud cover, 12 mph north wind, and soil temperature of 54 F. Treatments (0 days before seeding) were applied to 1 leaf kochia, 1 to 2-leaf foxtail, 2- to 4-leaf ragweed, 2-leaf common lambsquarters, and 1-leaf wild mustard on June 4 with 64 F air temperature, 63% RH, 50% cloud cover, 6 to 8 mph east wind, and soil temperature of 58 F. All treatments were applied with a backpack sprayer delivering 8.5 gpa at 35 or 40 psi through TT 11001 flat-fan nozzles to a 7 ft wide area the length of 10 by 30 ft plots. The experiment had a randomized complete-block design with four replicates. The experiment was treated when the wheat had 4 leaves with fenoxaprop, bromoxynil, MCPA, and thifensulfuron to control weeds. Wheat was harvested with a small-plot combine on September 28.

Table. Wheat response to soil residues of grass herbicides.

			June 18	July 01	July 29		Sept. 28
Treatment	Rate	Application	Wheat	Wheat	Stand	Height	Yield
	oz ai/A	Days before seeding	%	%	no./m	inches	bu/A
Quizalofop	0.54	14	0	0	61	28	40
Quizalofop	0.77	14	0	0	66	30	39
Quizalofop	1.54	14	1	0	53	31	35
Fluazifop-P	3	14	0	0	65	33	41
Sethoxydim	9	14	0	0	74	34	43
Clethodim	8	14	6	15	68	34	45
Quizalofop	0.54	7	0	0	63	35	41
Quizalofop	0.77	7	0	0	73	35	40
Quizalofop	1.54	7	1	1	63	33	46
Fluazifop-P	3	7	0	0	60	36	43
Sethoxydim	9	7	0	0	84	36	42
Clethodim	8	7	6	10	73	35	43
Quizalofop	0.54	0	0	0	60	33	32
Quizalofop	0.77	0	0	0	58	32	47
Quizalofop	1.54	0	1	4	70	35	36
Fluazifop-P	3	0	0	3	62	33	45
Sethoxydim	9	0	16	33	71	34	43
Clethodim	8	0	71	86	48	29	25
Untreated	0		0	0	77	34	41
CV			38	41	32	11	19
LSD (P=0.05)			3	5	30	5	11

Clethodim caused 6% to 15% wheat injury when applied 14 or 7 days before seeding but caused 86% injury on July 1 when applied the day of seeding. This injury resulted in reduced plant population, shorter plants, and less yield than the untreated wheat. Sethoxydim also caused injury when applied the day of seeding, but the injury did not affect plant population, plant height, or seed yield.

Wild oat control in wheat, Fargo. (Kirk Howatt, Ronald Roach, Janet Harrington). The experiment was established in a wild oat infested field without a crop because weather conditions prevented wild oat emergence in the area that was seeded to wheat. Treatments were applied to 1- to 2-leaf wild oat on May 18 with 75 F air temperature, 9% RH, 40% cloud cover, 2 mph south wind, and soil temperature of 55 F. Treatments were applied to 2- to 4-leaf wild oat on June 14 with 60 F air temperature, 69% RH, 100 cloud cover, 3 to 5 mph north wind, and soil temperature of 62 F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 40 psi through TT 11001 flat-fan nozzles to a 7 ft wide area the length of 10 by 30 ft plots. The experiment had a randomized complete-block design with four replicates. Wild oat population was estimated to be 100 to 300 plants per ft^2.

Table. Wild oat control in wheat, Fargo.

Treatment[1]	Rate	Timing	June 29 Wioa	July 19 Wioa
	oz ai/A	no. leaves	%	%
Imazamethabenz+ bromoxynil&MCPA+MSO	5 + 8 + 0.19	2 to 4	28	0
Flucarbazone+brox&MCPA+ Basic Blend	0.32 + 8 + 1%	2 to 4	75	90
Mesosulfuron+brox&MCPA+ MSO	0.036 + 8 + 1%	2 to 4	71	70
Clodinafop+brox&MCPA	0.8 + 8	2 to 4	75	83
Fenoxaprop+brox&MCPA	1.32 + 8	2 to 4	78	84
Tralkoxydim+brox&MCPA+ Supercharge+AMS	2.9 + 18 + 0.5% + 9.5	2 to 4	76	85
Flcz+Basic Blend / clfp+brox&MCPA	0.11 + 1% / 0.25 + 8	1 to 2 / 2 to 4	83	75
Mesosulfuron+MSO / clfp+brox&MCPA	0.012 + 1% / 0.25 + 8	1 to 2 / 2 to 4	83	73
Untreated	0		0	0
CV			4	5
LSD (P=0.05)			4	4

[1]MSO was Scoil methylated seed oil; "/" indicates treatment components were separated in time.

Split application treatments with flucarbazone or mesosulfuron followed by clodinafop provided 83% control of wild oat on June 29. The earlier application of these treatments enabled better control than other treatments because they were applied 4 weeks before the other treatments, giving them more time to work and leaving smaller plants for the second herbicide component to control. However, these treatments were among the herbicide treatments giving the least weed control on July 19, 75% and 73% respectively. With the poor growing conditions this spring, clodinafop at 0.25 oz ai/A (one-third the labeled rate) was not enough to kill the weeds present. Flucarbazone at 0.32 oz ai/A provided 90% wild oat control. Flucarbazone gave some residual activity to control very small and germinated but not emerged wild oat, resulting in better weed control than other herbicides. Clodinafop, fenoxaprop, and tralkoxydim provided 83% to 85% control of wild oat on July 19. Mesosulfuron at 0.036 oz ai/A gave less weed control than expected compared to other studies, giving 70% control on July 19. Imazamethabenz gave very poor weed control that could not be distinguished from the untreated on July 19.

Wild oat control in wheat, Langdon 2004. (Lukach)
Two wild oat experiments were established in Alsen HRSW seeded May 8. The experiments were adjoining blocks with Trial 1 having 30 wild oat/yd2 and Trial 2 having 9 wild oat/yd2 and 0 -20 green foxtail/ft2. The split applied treatments were intended to be applied more than 3 days apart. Weather interfered with timings so the order of split applications are reversed in the two trials. Treatments on June 11 were finished at 3pm and applied to predominantly 3 leaf wheat and wild oat. The treatments June 14 were finished at 4pm and were applied to 4 leaf wheat and wild oat. Conditions on June 11 were 67F, 76RH,15mph wind from the SE, clear sky and wet soil. A tree belt protected the site from the wind and a drift shield was used. Conditions on June 14 were 59F, 71RH, 4mph wind from the east, clear sky and wet soil. A drift shield was used. Applications were made using a CO2 pressurized sprayer, mounted on tractor 3-point. Five nozzles in 20 inch spacing were used with DG8001.5 tips at 35psi and 4.2mph applying 10 gal/a solution. Harvested plot size was 4.3ft x 20ft. Both trials were a RCBD design with four replications.

Wild oat control in wheat, Langdon				Crop	Control		Crop		Test
Treatment	Rate	Appli.	Timing	Inj.	Wioa	Grft	Height	Yield	Weight
	oz ai/A	Date	leaf	------------%------------			cm	bu/a	lb/bu
Trial 1									
Imazamethabenz + bromoxynil&MCPA+MSO	5 + 8 + 0.19	11-Jun	3	0	3	--	80	8	--
Flucarbazone+brox&MCPA + Basic Blend	0.32 + 8 + 0.01	11-Jun	3	6	85	--	72	37	--
Mesosulfuron+brox&MCPA +MSO	0.036 + 8 + 0.01	11-Jun	3	0	10	--	76	6	--
Clodinafop+brox&MCPA	0.8 + 8	11-Jun	3	0	86	--	76	30	--
Fenoxaprop+brox&MCPA	1.32 + 8	11-Jun	3	0	91	--	75	46	--
Tralkoxydim+brox&MCPA +Supercharge+AMS	2.9 + 18 + 0.5% + 9.5	11-Jun	3	2	79	--	77	33	--
Flcz+Basic Blend / clfp+brox&MCPA	0.11 + 1% / 0.25 + 8	June 11 / 14	3 / 4	3	73	--	81	30	--
Mesosulfuron+MSO / clfp+brox&MCPA	0.012 + 1% / 0.25 + 8	June 11 / 14	3 / 4	0	15	--	75	17	--
Untreated	--	--	--	0	0	--	82	9	--
CV				209	19	--	9	31	--
LSD (P=0.05)				4	13	--	NS	11	--
Trial 2									
Imazamethabenz + bromoxynil&MCPA+MSO	5 + 8 + 0.19	14-Jun	4	0	13	0	80	36	56
Flucarbazone+brox&MCPA + Basic Blend	0.32 + 8 + 0.01	14-Jun	4	0	81	63	78	40	56
Mesosulfuron+brox&MCPA +MSO	0.036 + 8 + 0.01	14-Jun	4	1	68	80	83	46	56
Clodinafop+brox&MCPA	0.8 + 8	14-Jun	4	0	88	99	81	47	56
Fenoxaprop+brox&MCPA	1.32 + 8	14-Jun	4	0	85	99	81	47	56
Tralkoxydim+brox&MCPA +Supercharge+AMS	2.9 + 18 + 0.5% + 9.5	14-Jun	4	15	88	43	75	43	56
clfp+brox&MCPA / Flcz+Basic Blend	0.25 + 8 / 0.11 + 1%	June 11 / 14	3 / 4	0	81	70	80	49	57
clfp+brox&MCPA / Mesosulfuron+MSO	0.25 + 8 / 0.012 + 1%	June 11 / 14	3 / 4	0	28	99	80	31	54
Untreated	--	--	--	0	0	0	83	36	55
CV		--	--	110	21	25	3	12	3
LSD (P=0.05)		--	--	3	18	23	4	9	NS

WILD OAT CONTROL IN DURUM

Wild oat control in durum, Williston 2004. (Riveland and Bradbury). 'Pierce' durum wheat was planted on re-crop (land cropped to durum wheat in 2003) in 7 inch rows at 90 lbs/a on April 23. The early 1 to 2-leaf treatments were applied on May 27 to 1 to 2-leaf wheat, 1-2 leaf wild oats (80% 1 leaf, 20% 2-leaf)and green foxtail emerging to 1.5 leaf with 59 F, 77% RH, 50% clear sky and 3-6 mph SE wind and moist topsoil at 52 F. The 3-4 leaf treatments were applied on June 9 with 59 F.62% RH, 15% clear sky and ESE wind at 5-9mph to 4-leaf wheat, 3-4 leaf wild oats and 2-4 leaf green foxtail. We used a small plot sprayer with wind cones, mounted on a G-Allis Chalmers tractor to apply the treatments, delivering 8.6 gals/a at 30 psi through 8001vs flat fan nozzles to a 6.67 ft wide area the length of 10 by 25 ft plots. First rain received after application was 0.08 inches on June 8 and 1.10 inches on June 10. The experimental design was a randomized complete block design with four replications. Wild oat density averaged 5-8 plants/ft2 and green foxtail density was about 40 plants/ft2. Plots were evaluated for crop injury on June 27 and July 31. Wild oat control was rated on June 27, July 8 and on July 31. Durum was machine harvested for yield on September 9.

Treatment [a]	Rate	Crop inj.	Test Weight	Yield	--Wioa Control-- 6/27	7/8	7/31	Cntl Grft
	oz/a ai	%	lbs/bus	bus/a	-------	%	------	%
Immb+Brox&MCPA5+MSO	5+8+0.19G	5	60.6	28.4	70	73	69	0
Flcz+Brox&MCPA5+Basic Blend	0.32+8+1%	13	60.4	27.8	68	90	91	93
Mess+Brox&MCPA5+MSO	0.036+8+1%	3	60.5	32.4	70	85	85	48
Clodinafop-np+Brox&MCPA5	0.8+8	2	60.6	37.5	88	94	97	97
Fenoxaprop+Brox&MCPA5	1.32+8	0	60.7	36.2	75	93	89	92
Tral+Brox&MCPA5+Suprchrge+AMS	2.9+8+0.5%+9.5	3	60.4	32.8	83	93	95	96
Flcz+BscBlnd/Clfp-ng+Brx&MCPA	0.11+1%/0.25+8	1	60.4	38.6	90	93	84	85
Mess+MSO/Clfp-ng+Brox&MCPA5	0.012+1%/0.25+8	0	59.8	29.1	74	61	55	64
Untreated	0.0	0	59.6	17.8	0	0	0	0
EXP MEAN		3	60.3	31.2	68	76	74	64
C.V. %		144	.6	15.3	20	5	16	31
LSD 5%		6	NS	6.9	20	5	17	29

Summary: Flucarbazone (Everest) caused some crop injury. Generally the treatments that give fast control and a high degree of wild oat control gave the best yield increase compared to the untreated check.

Resistant Wild Oat Control in Wheat – Langdon 2004 (Lukach)

The experiment was established in Alsen HRSW seeded May 8. Poor control of wild oat with Assert and AssureII had occurred in that area in previous years. The experiment was over sprayed with Bronate Advanced 19.2 oz/a on June 11. Treatments were applied on June 17 to 5 leaf wheat and wild oat. The area had 12 wild oat per yard square. The treatments were finished at 10am with conditions of 67F, 60RH, 9mph wind from the southwest, cloudy sky. A drift shield was used. Applications were made using a CO2 pressurized sprayer, mounted on tractor 3-point. Five nozzles in 20 inch spacing were used with DG8001.5 tips at 35psi and 4.2mph applying 10 gal/a solution. Harvested plot size was 4.3ft x 20ft. The trial had a RCBD design with four replications.

Wild Oat Control in Wheat, Langdon, 2004		Crop	Control			Test	Crop
Treatment	Rate	Inj.	Wheat	Wioa	Yield	Weight	Height
	oz/a product	--------- % ---------			bu/a	lb/bu	cm
Puma	10.7	0	--	95	45	56	89
Discover+DSV	3.2 + 10.2	0	--	94	47	56	88
Everest + NIS + Bronate Advanced	0.6 + 3 + 10.2	3	--	91	45	55	91
Puma + Bronate Advanced	10.7 + 10.2	0	--	91	45	56	91
Everest+Puma+NIS	0.2+5.3+3.2	0	--	91	47	57	93
Silverado+MSO+UAN	2.25 + 24 + 32	1	--	90	46	57	87
Silverado +MSO+UAN + Bronate Advanced	2.25 + 24 + 32 + 10.2	0	--	89	50	57	88
Everest+NIS	0.6 + 3.2	5	--	86	37	54	84
Silverado+MSO+UAN	1.75 + 24 + 32	0	--	86	46	56	93
Silverado+Discover+MSO+DSV	1.0+2.0+3.2+10.2	1	--	86	37	56	84
Everest+Discover+NIS+DSV	0.2+2.0+3.2+10.2	0	--	85	39	54	87
Puma	5.3	0	--	84	42	57	89
Silverado+Puma+MSO	1.0+5.3+3.2	1	--	83	43	57	87
Everest+NIS	0.3 + 3.2	1	--	79	39	56	86
Discover + DSV + Bronate Advanced	3.2 + 10.2 + 10.2	0	--	76	43	54	92
Achieve+Supercharge+AMS	7 + 6.4 + 11.2	0	--	74	44	56	90
Avenge	64	0	--	73	42	55	90
Assert+MSO	24 + 24	0	--	30	33	56	88
Select + COC	4 +32	--	85	96	--	--	--
AssureII + COC	7+ 12.8	--	100	64	--	--	--
Select + COC + Bronate Advanced	4 +32 +10.2	--	88	87	--	--	--
AssureII + COC + Bronate Advanced	7+ 12.8 +10.2	--	100	15	--	--	--
C.V. %		229	18.2	11	16	3	5
LSD 5%		2	5	13	NS	NS	NS

MSO = Destiny NIS = AdWet90 COC = Prime Oil

The Bronate Advanced antagonized wild oat control with AssureII and reduced control with Discover. Several herbicides offer good control of five leaf Assert resistant wild oat in this area.

Broadleaf tank-mixes with reduced clodinafop rate. (Kirk Howatt, Ronald Roach, Janet Harrington). The experiment was established in a wild oat infested field without a crop because weather conditions prevented wild oat emergence in the area that was seeded to wheat. Treatments were applied to 3.5-leaf wild oat on June 14 with 56 F air temperature, 57% RH, 100% cloud cover, 3 to 5 mph north wind, and soil temperature 62 F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 35 psi through TT 11001 flat-fan nozzles to a 7 ft wide area the length 10 by 30 ft plots. The experiment had a randomized complete-block design with a four replicates. Wild oat population was estimated to be 100 to 300 plants per ft^2.

Table. Broadleaf tank-mixes with reduced clodinafop rate.

Treatment	Rate	June 29 Wioa	July 19 Wioa
	oz ai/A	%	%
Clodinafop+DSV	0.8 + 1%	70	91
Clfp+DSV+PO	0.54 + 0.6%+0.4%	70	90
Clfp+DSV+PO	0.4 + 0.5% + 0.5%	70	88
Clfp+bromoxynil&MCPA+DSV	0.8 + 8 + 1%	61	81
Clfp+brox&MCPA+DSV+PO	0.54 + 8 + 0.6% + 0.4%	58	74
Clfp+brox&MCPA+DSV+PO	0.4 + 8 + 0.5% + 0.5%	55	63
Clfp+thifensulfuron&tribenuron+ fluroxypyr&MCPA+DSV	0.8 + 0.22 + 8+1%	66	89
Clfp+thif&trib+flox&MCPA+ DSV+PO	0.54 + 0.22 + 8 + 0.6%+0.4%	68	78
Clfp+thif&trib+flox&MCPA+ DSV+PO	0.4 + 0.22 + 8 + 0.5%+0.5%	60	79
Clfp+dicamba+carfentrazone+ DSV	0.8 + 1.5 + 0.128 + 1%	65	84
Clfp+dica+carf+ DSV+PO	0.54 + 1.5 + 0.128 + 0.6% + 0.4%	68	81
Clfp+dica+carf+ DSV+PO	0.4 + 1.5 + 0.128 + 0.5% + 0.5%	64	83
Untreated	0	0	0
CV		6	5
LSD (P=0.05)		5	5

Without broadleaf herbicide clodinafop provided similar control at all three application rates, 70% on June 29 and 90% on July 19. Bromoxynil and MCPA caused more antagonism than tank-mix partners for broadleaf weed control. The difference between Bromoxynil and MCPA and other treatments containing broadleaf herbicides on July 19 was as much as 8% with 0.8 oz clodinafop, 7% with 0.54 oz clodinafop, and 20% with 0.4 oz clodinafop.

<u>Clodinafop-NG Tank Mixes in Spring Wheat at Hettinger</u>. (Eriksmoen) Reeder hard red spring wheat was seeded on April 15. Treatments were applied to 3 ½ leaf wheat and to 2 ½ leaf wild oats on May 20 with 43°F, 94 % RH, clear sky and 2 mph NW wind. Treatments were applied with a tractor mounted CO^2 propelled plot sprayer delivering 10 gpa at 40 psi through 8001.5 flat fan nozzles to a 5 foot wide area the length of 10 by 28 foot plots. The experiment was a randomized complete block design with four replications. 10 oz/A 2,4-D (LV6) + 0.5 oz/A Aim was applied on May 28 to control broadleaf weeds. Wild oat populations were 3 plants per sq. foot. A strip of quackgrass was observed in one rep and data was collected from those plots. The trial sustained frost on May 13 (16°F) and on June 18 (25°F), and received a total of 5.4 inches of growing season rainfall (April 1 - July 31). Evaluations for crop injury were on June 3, and for weed control on July 13. The trial was harvested on August 6.

Treatment		Rate	June 6	July 13		8/6
			HRSW	Wiot	Qugr	Yield
	Product	oz/A ai	--------- % Control -------			bu/A
1	Clodinafop-NG	0.8	2.5	98	95	13.9
2	Clodinafop-NG + Brox&MCPA5	0.8 + 8	3.8	99	0	16.9
3	Clodinafop-NG + Brox&MCPA5 + Quilt	0.8 + 8 + 7	1.2	99	90	19.4
4	Clodinafop-EC+DSV+Brox&MCPA5+Quilt	0.8 + 1% + 8 + 7	0	99	95	12.7
5	Clodinafop-NG + Clopyralid&Fluroxypyr	0.8 + 2.8	0	99	95	12.8
6	Clodinafop-NG +Thifensulfuron + MCPA	0.8 + 0.22 + 6	0	99	50	14.0
7	Clodinafop-NG+Thifensulfuron+Fluroxypyr	0.8 + 0.22 + 1	1.2	99	90	13.1
8	Clodinafop-NG + Fluroxypyr + Thif&Trib	0.8 + 1 + 0.45	1.2	99	80	12.4
9	Clodinafop-NG + Dicamba-dga + MCPA	0.8 + 1 + 6	2.5	99	85	13.3
10	Fenoxaprop + Brox&MCPA5	1.28 + 8	0	99	0	15.5
11	Untreated	0	0	0	0	12.6
C.V. %			164	0.7	--	11.7
LSD 5%			NS	1	--	2.4

Summary

Crop injury was minor for all herbicide treatments. All herbicide treatments and tank mix combinations provided excellent season long wild oat control. Very good quackgrass control was observed although the Discover Herbicide label does not list any activity on this weed. Additional studies are needed to verify this control. Although significant differences in grain yield were observed, these differences did not correspond with crop injury or weed control. Grain yields were poor and probably reflected weather conditions rather than effects of the herbicide treatments.

Lower rates of clodinafop or flucarbazone in split system. (Kirk Howatt, Ronald Roach, Janet Harrington). The experiment was established in a wild oat infested field without a crop because weather conditions prevented wild oat emergence in the area that was seeded to wheat. All treatments were applied with a backpack sprayer delivering 8.5 gpa at 35 or 40 psi through TT 11001 flat-fan nozzles to a 7 ft wide area the length of 10 by 30 ft plots Table 1. The experiment had a randomized complete-block design with four replicates. Wild oat population was estimated to be 100 to 300 plants per ft^2.

Table 1. Application conditions.

Treatment	2L	10DAT	3-4L
Date	May 18	May 28	June 14
Air temperature, F	73	53	62
RH, %	14	56	86
Sky, % cloud cover	40	95	100
Wind, mph and direction	1.5, south	3, east	3 to 4, north
Soil Temperature, F	73	53	62
Wioa, leaf stage	1.5 to 2	1 to 2	3 to 5

Table 2. Lower rates of clodinafop or flucarbazone in a split system.

Treatment	Rate	Timing	June 22 Wioa	June 29 Wioa	July 19 Wioa
	oz ai/A		%	%	%
Clodinafop+DSV	0.8 + 1%	3-4L	30	74	93
Clfp+DSV / clfp+DSV	0.25 + 1% / 0.25 + 1%	2L / 10DAT	87	83	74
Clfp+DSV / clfp+DSV	0.2 + 1% / 0.2 + 1%	2L / 10DAT	76	68	58
Clfp+DSV / clfp+DSV	0.15 + 1% / 0.15 + 1%	2L / 10DAT	89	86	76
Clfp+DSV / clfp+DSV	0.1 + 1% / 0.1 + 1%	2L / 10DAT	86	83	66
Flucarbazone+Basic Blend	0.42 + 1%	3-4L	35	69	91
Flcz+Basic Blend / flcz+Basic Blend	0.13 + 1% / 0.13 + 1%	2L / 10DAT	93	91	86
Flcz+Basic Blend / flcz+Basic Blend	0.1 + 1% / 0.1 + 1%	2L / 10DAT	88	89	81
Flcz+Basic Blend / flcz+Basic Blend	0.075 + 1% / 0.075 + 1%	2L / 10DAT	92	90	82
Flcz+Basic Blend / flcz+Basic Blend	0.05 + 1% / 0.05 + 1%	2L / 10DAT	83	80	79
Untreated	0		0	0	0
CV			7	7	9
LSD (P=0.05)			7	8	9

Split-application treatments provided better control than single application treatments on June 22 and 29 because they had a longer window for activity before evaluation. However, control with single applications increased as the season progressed while control with split applications declined, resulting in a trend for better control with single applications at labeled rates on July 19. None of the clodinafop split-treatments, 58% to 76%, controlled wild oat as well as the single application, 93%. Flucarbazone at 0.13 oz ai/A twice provided 86% wild oat control compared with 91% control with 0.42 oz, but other flucarbazone treatments gave about 10% less wild oat control than 0.42 oz.

Fenoxaprop tank-mixes for wild oat control. Kirk A. Howatt, Ronald F. Roach, and Janet D. Harrington. (Plant Sciences Department, North Dakota State University, Fargo, ND 58105) An experiment was established to determine whether broadleaf herbicides affect the control of wild oat with fenoxaprop. The experiment was established in a wild oat infested field without a crop because weather conditions prevented wild oat emergence in the area that was seeded to wheat. Treatments were applied to 3- to 5-leaf wild oat on June 14 with 56 F air temperature, 80% relative humidity, 100% cloud cover, 2 to 4 mph north wind, and 62 F soil temperature at 4 inches. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 35 psi through TT 11001 flat-fan nozzles to an area 7 ft wide and the length of 10- by 30-ft plots. The experiment had a randomized complete-block design with four replicates. Wild oat population was estimated to be 100 to 300 plants per ft^2.

Table. Wild oat control with fenoxaprop tank-mixes near Fargo, ND, in 2004.

Treatment	Rate[1]	June 24 Wild oat	July 19 Wild oat
	oz ai/A	%	%
Fenoxaprop	1.32	73	97
Fenoxaprop + bromoxynil/MCPA	1.32 + 8	68	77
Fenoxaprop + bromoxynil/MCPA + fluroxypyr	1.32 + 6 + 1	63	84
Fenoxaprop + bromoxynil/MCPA + thifensulfuron	1.32 + 6 + 0.1	64	81
Fenoxaprop + thifensulfuron + fluroxypyr	1.32 + 0.3 + 1	73	95
Fenoxaprop + clopyralid/MCPA + fluroxypyr	1.32 + 9.6 + 1.5	69	91
Fenoxaprop + clopyralid + fluroxypyr + thifensulfuron	1.32 + 1.5 + 1.5 + 0.22	75	93
Clodinafop + thifensulfuron + fluroxypyr	0.8 + 0.3 + 1	75	92
Untreated	0	0	0
CV		5	3
LSD (P=0.05)		5	4

[1] Fluroxypyr, clopyralid, and MCPA rates expressed in ae.

The experiment provided a unique perspective on antagonism of fenoxaprop activity because results were not confounded by the effect of crop competition. Fenoxaprop gave 73% control of wild oat on June 24. The fenoxaprop tank-mixes that gave less control than fenoxaprop alone on June 24 each included bromoxynil and MCPA. Fenoxaprop plus thifensulfuron plus fluroxypyr provided 73% control on June 24, the same as with fenoxaprop alone. However, thifensulfuron or fluroxypyr each tended to reduce wild oat control when included with fenoxaprop plus bromoxynil and MCPA, giving 63% and 64% control respectively, as compared with 68% with fenoxaprop plus bromoxynil and MCPA. Only fenoxaprop plus thifensulfuron plus fluroxypyr, 95%, provided control similar to fenoxaprop alone, 97%, on July 19. The herbicide treatment giving the least wild oat control on July 19 was fenoxaprop plus bromoxynil and MCPA at 77%. Better control of wild oat with fenoxaprop plus bromoxynil and MCPA occurred when less bromoxynil and MCPA was included in the tank-mix and fluroxypyr or thifensulfuron was added to supplement broadleaf weed control, but control with these combinations did not exceed 84%. The result of adding thifensulfuron or fluroxypyr with fenoxaprop plus bromoxynil and MCPA was different at each evaluation. On June 24, thifensulfuron or fluroxypyr decreased wild oat control with the bromoxynil treatments, while on July 19, thifensulfuron or fluroxypyr gave increased control. Thifensulfuron and fluroxypyr may have slowed initial injury expression of wild oat, but the same effect was not observed with other treatments containing these herbicides. The control ratings on July 19 seem to be caused solely by antagonism from bromoxynil and MCPA, since the greater rate of bromoxynil and MCPA corresponded to greater antagonism and less control of wild oat. Clodinafop plus thifensulfuron plus fluroxypyr gave wild oat control similar to fenoxaprop plus thifensulfuron plus fluroxypyr at both evaluations.

Broadleaf tank-mixes with reduced fenoxaprop rate. (Kirk Howatt, Ronald Roach, and Janet Harrington). The experiment was established in a wild oat infested field without a crop because weather conditions prevented wild oat emergence in the area that was seeded to wheat. Treatments were applied to 2- to 5-leaf wild oat on June 14 with 69 F air temperature, 39% RH, 90% cloud cover, 1 to 3 mph north wind, and soil temperature of 62 F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 35 psi through TT 11001 flat-fan nozzles to a 7 ft wide area the length of 10 by 30 ft plots. The experiment had a randomized complete-block design with four replicates. Wild oat population was estimated to be 100 to 300 plants per ft^2.

Table. Broadleaf tank-mixes with reduced fenoxaprop rate.

Treatment[1]	Rate	June 29 Wioa	July 19 Wioa
	oz ai/A	%	%
Fenoxaprop	1.32	79	95
Fenoxaprop	1	73	88
Fenoxaprop+bromoxynil&MCPA	1.32 + 8	65	74
Fenoxaprop+bromoxynil&MCPA	1 + 8	58	74
Fenx+thifensulfuron&tribenuron+ fluroxypyr&MCPA	1.32 + 0.22 + 8	76	88
Fenx+thifensulfuron&tribenuron+ fluroxypyr&MCPA	1 + 0.22 + 8	75	87
Fenoxaprop+dicamba+ carfentrazone+NIS	1.32 + 1.5 + 0.128+0.25%	73	86
Fenoxaprop+dicamba+ carfentrazone+NIS	1 + 1.5 + 0.128+0.25%	71	83
Untreated	0	0	0
CV		4	4
LSD (P=0.05)		4	4

[1]NIS was Activator 90 nonionic surfactant.

Without broadleaf herbicide, fenoxaprop at 1 oz ai/A gave less control of wild oat than 1.32 oz/A, 73% and 79% respectively on June 29. On July 19, fenoxaprop at 1.32 oz/A provided 95% control while 1 oz/A gave 88% control. Bromoxynil and MCPA was the most antagonistic to fenoxaprop efficacy, resulting in less control by 15 percentage points within each herbicide rate on June 29. At this evaluation, dicamba also antagonized wild oat control with 1.32 oz/A fenoxaprop, resulting in 73% control, but other treatments provided similar control to fenoxaprop alone. Control increased for each herbicide treatment from June 29 to July 19, but the relative ranks were similar.

Adjuvants for flucarbazone. (Kirk Howatt, Ronald Roach, Janet Harrington). The experiment was established in a wild oat infested field without a crop because weather conditions prevented wild oat emergence in the area that was seeded to wheat. Treatments were applied to 2- to 5-leaf wild oat on June 14 with 57 F air temperature, 73% RH, 100% cloud cover, 2 to 4 mph north wind, and soil temperature of 62 F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 35 psi through TT 11001 flat-fan nozzles to a 7 ft wide area the length of 10 by 30 ft plots. The experiment had a randomized complete-block design with four replications. Wild oat population was estimated to be 100 to 300 plants per ft^2.

Table. Adjuvants for flucarbazone.

Treatment[1]	Rate	June 29 Wioa	July 19 Wioa
	oz ai/A	%	%
Flucarbazone	0.21	60	69
Flucarbazone	0.42	59	78
Flucarbazone+NIS	0.14 + 0.25%	60	79
Flucarbazone+NIS	0.21 + 0.25%	60	83
Flucarbazone+NIS	0.28 + 0.25%	63	85
Flucarbazone+NIS	0.35 + 0.25%	63	86
Flucarbazone+NIS	0.42 + 0.25%	60	86
Flucarbazone+MSO	0.21 + 0.19G	59	86
Flucarbazone+MSO+AMS	0.21 + 0.19G+0.5G	61	92
Flucarbazone+Basic Blend	0.21 + 1%	64	91
Fenoxaprop	1.32	71	96
Clodinafop	0.8	71	96
Mesosulfuron+MSO+AMS	0.036 + 0.19G + 0.5G	65	87
Flucarbazone+Mesosulfuron+ MSO+AMS	0.21 + 0.018 + 0.19G + 0.5G	64	92
CV		5	2
LSD (P=0.05)		5	3

[1]NIS was Activator 90 nonionic surfactant; MSO was Scoil methylated seed oil; AMS was ammonium sulfate solution.

Flucarbazone gave 59% to 64% control of wild oat on June 29, regardless of herbicide rate or adjuvants included. With nonionic surfactant (NIS), mesosulfuron at 0.28 oz ai/A provided similar wild oat control to 0.42 oz/A on July 19. Methylated seed oil (MSO) was a better adjuvant than NIS for flucarbazone at 0.21 oz/A, enabling 86% control rather than 83%. MSO plus ammonium sulfate (AMS) and basic pH blend adjuvant systems enabled flucarbazone at 0.21 oz/A to provide greater than 90% control of wild oat, but fenoxaprop and clodinafop gave the greatest control at 96%. Mesosulfuron control of wild oat was improved when AMS was included with MSO relative to results of other studies this year in Fargo.

Broadleaf tank-mixes with reduced flucarbazone rate. (Kirk Howatt, Ronald Roach, Janet Harrington). The experiment was established in a wild oat infested field without a crop because weather conditions prevented wild oat emergence in the area that was seeded to wheat. Treatments were applied to 2- to 5-leaf wild oat on June 14 with 57 F air temperature, 73% RH, 100% cloud cover, 2 to 5 mph north wind, and soil temperature of 62 F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 35 psi through TT 11001 flat-fan nozzles to a 7 ft wide area the length of 10 by 30 ft plots. The experiment had a randomized complete-block design with four replicates. Wild oat population was estimated to be 100 to 300 plants per ft^2.

Table. Broadleaf tank-mixes with reduced flucarbazone rate.

Treatment[1]	Rate	June 29 Wioa	July 19 Wioa
	oz ai/A	%	%
Flucarbazone+NIS	0.42 + 0.25%	65	86
Flucarbazone+NIS	0.28 + 0.25%	63	84
Flucarbazone+bromoxynil&MCPA+NIS	0.42 + 8 + 0.25%	65	86
Flucarbazone+bromoxynil&MCPA+NIS	0.28 + 8 + 0.25%	61	82
Flucarbazone+thifensulfuron&tribenuron+ fluroxypyr&MCPA+NIS	0.42 + 0.22 + 8 + 0.25%	70	91
Flucarbazone+thif&trib+flox&MCPA+NIS	0.28 + 0.22 + 8 + 0.25%	66	86
Flucarbazone+dicamba+carfentrazone+NIS	0.42 + 1.5 + 0.128 + 0.25%	63	80
Flucarbazone+dicamba+carfentrazone+NIS	0.28 + 1.5 + 0.128 + 0.25%	56	69
Flucarbazone+2,4-D(Salvo)+NIS	0.42 + 8 + 0.25%	61	85
Flucarbazone+2,4-D(Salvo)+NIS	0.28 + 8 + 0.25%	65	86
CV		7	5
LSD (P=0.05)		7	6

[1]NIS was Activator 90 nonionic surfactant.

Flucarbazone at 0.42 oz ai/A provided 86% control of wild oat on July 19. The only herbicide combination that gave less weed control than 86% was flucarbazone plus dicamba and carfentrazone. Dicamba and carfentrazone antagonized flucarbazone control of wild oat resulting in 80% control with 0.42 oz/A flucarbazone and 69% control with 0.28 oz/A flucarbazone.

Wild oat control with mesosulfuron, Fargo. (Kirk Howatt, Ronald Roach, and Janet Harrington). The experiment was established in a wild oat infested field without a crop because weather conditions prevented wild oat emergence in the area that was seeded to wheat. Treatments were applied to 2- to 4-leaf wild oat on June 14 with 57 F air temperature, 73% RH, 100% cloud cover, 2 to 5 mph north wind, and soil temperature of 62 F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 35 psi through TT 11001 flat-fan nozzles to a 7 ft wide area the length of 10 by 30 ft plots. The experiment had a randomized complete-block design with four replicates. Wild oat population was estimated to be 100 to 300 plants per ft^2.

Table. Wild oat control with mesosulfuron, Fargo.

Treatment[1]	Rate	Timing	June 24 Wioa	July 19 Wioa
	oz ai or ae/A	no. leaves	%	%
Mesosulfuron+MSO	0.036 + 0.19G	2 to 4	50	61
Mesosulfuron+Basic Blend	0.036 + 1%	2 to 4	50	74
Mesosulfuron+bromoxynil&MCPA+ MSO	0.036 + 8 + 0.19G	2 to 4	53	66
Mesosulfuron+bromoxynil&MCPA+ Basic Blend	0.036 + 8 + 1%	2 to 4	55	72
Mesosulfuron+MCPA+fluroxypyr+ MSO	0.036 + 6 + 2 + 0.19G	2 to 4	50	72
Mesosulfuron+MCPA+fluroxypyr+ Basic Blend	0.036 + 6 + 2 + 1%	2 to 4	53	81
Mesosulfuron+thifensulfuron+ fluroxypyr+MSO	0.036 + 0.4 + 2 + 0.19G	2 to 4	48	57
Mesosulfuron+thifensulfuron+ fluroxypyr+Basic Blend	0.036 + 0.4 + 2 + 1%	2 to 4	50	61
Clodinafop+bromoxynil&MCPA	0.8 + 8	2 to 4	55	86
Untreated			0	0
CV			10	10
LSD (P=0.05)			7	9

[1]MSO was Scoil methylated seed oil.

Weather contitions this spring were not conducive to wild oat control with mesosulfuron. Limited experience has indicated that mesosulfuron, like flucarbazone, provides better wild oat control in warmer, drier environments. All herbicide treatments gave similar weed control of 48% to 55% control of wild oat on June 24. On July 19, mesosulfuron tended to provide better wild oat control when methylated seed oil (MSO) was included as the adjuvant rather than a basic pH blend (BB) adjuvant, 4 to 13 percentage point increase. Fluroxypyr and MCPA increased wild oat control with mesosulfuron and MSO to 72%, but bromoxynil and MCPA or thifensulfuron and fluroxypyr did not affect the rating. Within MSO treatments, MCPA and fluroxypyr tended to increase control, 81%, but thifensulfuron and fluroxypyr antagonized mesosulfuron activity, resulting in 61% wild oat control. Clodinafop plus bromoxynil and MCPA provided 86% control, which was similar to mesosulfuron plus MCPA plus fluroxypyr with BB, but greater than comparable mesosulfuron treatments with bromoxynil and MCPA.

<u>Silverado for Wild Oat Control in Spring Wheat</u> (Terry D. Gregoire, 2004) HRS wheat was planted in April. Wheat was sprayed June 4th between 11:00 am and 11:40 am near Minnewaukan, North Dakota. The temperature during application was 70°F, relative humidity near 65%, with partly cloudy sky. The leaf stages of the wheat and weeds were: wheat 4 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 4 times. Treatment evaluation dates were June 19th and July 19th 2004. No wheat injury was observed.

Trt	Treatment	Rate	June 19 Wild Oat	July 19 Wild Oat
			% control	% control
1	untreated		0.0	0.0
2	Silverado	1.78 OZ/A	74	95
	Destiny	1.5 PT/A		
3	Silverado	1.78 OZ WT/A	64	96
	Quad 7	1% V/V		
4	Silverado	1.78 OZ WT/A	64	93
	Bronate Advanced	0.8 PT/A		
	Destiny	1.5 PT/A		
5	Silverado	1.78 OZ WT/A	65	95
	Bronate Advanced	0.8 PT/A		
	Quad 7	1% V/V		
6	Silverado	1.78 OZ WT/A	61	94
	Mcpa Ester	0.75 PT/A		
	Starane 180	0.665 PT/A		
	Destiny	1.5 Pt/A		
7	Silverado	1.78 OZ WT/A	71	96
	Mcpa Ester	0.75 PT/A		
	Starane 180	0.665 PT/A		
	Quad 7	1% V/V		
8	Silverado	1.78 OZ WT/A	69	96
	Harmony GT	0.4 OZ WT/A		
	Starane 180	0.665 PT/A		
	Destiny	1.5 PT/A		
9	Silverado	1.78 OZ WT/A	76	88
	Harmony GT	0.4 OZ WT/A		
	Starane 180	0.665 PT/A		
	Quad 7	1% V/V	85	100
10	Discover	3.2 OZ/A		
	Score	0.8% V/V		
11	Puma	0.654 PT/A	95	100
12	Puma	0.654 PT/A		
	Bronate Advanced	0.8 PT/A	94	99
13	Puma	0.54 PT/A	95	100
	Harmony GT	0.4 OZ WT/A		
	Starane 180	0.665 PT/A		

Wild oat control was excellent with no significant differences among treatments in this trial. Silverado wild oat injury was slower to develop than Puma or Discover and had lower wild oat control in the June evaluations.

SILVERADO ON DURUM WHEAT

Wild oat control in durum with Silverado, Williston 2004. (Neil Riveland). 'Pierce' durum wheat was planted on re-crop (land cropped to durum wheat in 2003) in 7 inch rows at 90 lbs/a on April 23. The treatments were applied on May 27 to 3-leaf wheat, 1-4 leaf wild oats (70% 2-3 leaf, 20% 1 leaf and 10% 4-leaf) with 70 F, 50% RH, 30% clear sky and 0-3 mph SSE wind and moist topsoil at 66 F. 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 25 ft plots. First rain received after application was 0.46 inches on June 21. The experiment was a randomized complete block design with four replications. Wild oat density averaged 10 plants/ft2. Green foxtail density was very low and was not rated. Plots were evaluated for crop injury and wild oat control on June 27, July 31 and September 3. Durum was machine harvested for yield on September 9.

Treatment [a]	Product Rate	Crop inj.	--Wioa Control-- 6/27	7/31	9/03	Test Wght	Yield
		%	-------%-------			lb/bu	bus/a
Untreated	0	0	0	0	0	60.6	16.6
Silverado+Destiny	1.75oz+1.5 pt	9	53	56	59	62.0	29.9
Silverado+Quad 7	1.75oz+1%	1	69	68	71	61.6	33.6
Silvrdo+Bronate Adv+Destiny	1.75oz+0.8pt+1.5pt	1	64	71	71	61.6	34.9
Silvrdo+Bronate Adv+Quad 7	1.75oz+0.8pt+1%	1	75	82	85	61.7	38.2
Silvrdo+MCPA E+Star+Quad 7	1.75oz+0.75pt+0.665pt+1%	4	70	69	65	62.5	32.9
Silvrdo+MCPA E+Star+Destiny	1.75oz+.75pt+.665pt+1.5pt	0	51	56	60	61.5	30.6
Silvrdo+HarmonyGT+Star+Quad	1.75oz+0.4oz+0.665pt+1%	0	41	36	45	60.7	26.1
Silvrdo+HarmonyGT+Star+Dest	1.75oz+0.4oz+.665pt+1.5pt	1	25	29	24	62.5	26.3
Discover+Score	3.2 oz+0.8%	3	91	95	96	60.4	45.6
Puma 1 EC	0.654pt	0	86	90	90	61.7	41.1
Puma 1 EC+Bronate Advanced	0.654pt+0.8pt	0	86	93	96	62.3	48.5
Puma 1 EC+Harmony GT+Starane	0.654pt+0.4oz+0.665pt	0	85	93	94	61.0	39.5
EXP MEAN		2	61	65	66	61.5	34.1
C.V. %		125	22	20	23	1.2	18.5
LSD 5%		3	19	19	22	NS	9.1

[a] - Silvrdo = Silverado. Destiny - a methylated seed oil adjuvant from Agriliance. Quad 7 - a basic pH blend adjuvant from AGSCO. Score - DSV adjuvant from Monsanto.

Summary: All treatments resulted in significant yield increases. Silverado treatments did not control wild oats as quickly as Discover or Puma; therefore the yield increases for the Silverado treatments tended to be less than those for the Discover or Puma treatments. Wild oat control with Silverado was less when Destiny was used as an adjuvant compared to when Quad 7 was used as an adjuvant.

Adjuvants for mesosulfuron. (Kirk Howatt, Ronald Roach, Janet Harrington). The experiment was established in a wild oat infested field without a crop because weather conditions prevented wild oat emergence in the area that was seeded to wheat. Treatments were applied to 2- to 5-leaf wild oat on June 14 with 58 F air temperature, 70% RH, 100% cloud cover, 3 to 4 mph north wind, and soil temperature of 62 F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 35 psi through 8001 flat-fan nozzles to a 7 ft wide area the length of 10 by 30 ft plots. The experiment had a randomized complete-block design with four replicates. Wild oat population was estimated to be 100 to 300 plants per ft^2.

Table. Adjuvants for mesosulfuron.

Treatment[1]	Rate	June 29 Wioa	July 19 Wioa
	oz ai/A	%	%
Mesosulfuron+bromoxynil&MCPA+ Scoil	0.036 + 8 + 1%	58	78
Mesosulfuron+bromoxynil&MCPA+ Scoil	0.027 + 8 + 1%	50	75
Mesosulfuron+bromoxynil&MCPA+ Scoil	0.018 + 8 + 1%	53	69
Mesosulfuron+bromoxynil&MCPA+ Scoil	0.009 + 8 + 1%	50	58
Mesosulfuron+Thifensulfuron+ Fluroxypry+Destiny	0.027 + 0.3 + 2 + 1%	48	66
Mesosulfuron+Thifensulfuron+ Fluroxypyr+Prime Oil	0.027 + 0.3 + 2 + 1%	50	66
Mesosulfuron+Thifensulfuron+ Fluroxypyr+HiPerOil	0.027 + 0.3 + 2 + 0.5%	50	66
Mesosulfuron+Thifensulfuron+ Fluroxypyr+AG04031	0.027 + 0.3 + 2 + 0.25%	50	64
Mesosulfuron+Thifensulfuron+ Fluroxypyr+Rivet	0.027 + 0.3 + 2 + 0.5%	48	61
Mesosulfuron+Thifensulfuron+ Fluroxypyr+AG01034	0.027 + 0.3 + 2 + 0.25%	48	70
Mesosulfuron+Thifensulfuron+ Fluroxypyr+AG04029	0.027 + 0.3 + 2 + 1%	53	72
Mesosulfuron+Thifensulfuron+ Fluroxypyr+AG03002	0.027 + 0.3 + 2 + 1%	53	61
Mesosulfuron+Thifensulfuron+ Fluroxypyr+AG03002	0.027 + 0.3 + 2 + 2%	53	74
Mesosulfuron+Thifensulfuron+ Fluroxypyr+Basic Blend	0.027 + 0.3 + 2 + 1%	50	71
Mesosulfuron+Thifensulfuron+ Fluroxypyr	0.027 + 0.3 + 2	45	53
CV		7	10
LSD (P=0.05)		5	9

[1]AG numbered entries were proprietary adjuvants from Agriliance.

Mesosulfuron at 0.036 oz ai/A gave better control of wild oat than all reduced rate treatments on June 29, but control did not exceed 58%. On July 19, a strong trend existed of less control with each lower increment of mesosulfuron rate. AG01034, AG04029, AG03002 at 2%, and basic pH blend adjuvant with mesosulfuron provided similar control to mesosulfuron at 0.027 oz/A plus Scoil, while mesosulfuron with all other adjuvants gave less control than with Scoil on July 19. Rivet and AG03002 at 1% did not increase wild oat control with mesosulfuron compared with mesosulfuron without additional adjuvant on July 19.

Foxtail control in HRS wheat, Carrington, 2004. (Greg Endres and Kirk Howatt) The experiment was conducted on a Heimdahl loam soil with 6.1 pH and 3.5% organic matter at the NDSU Carrington Research Extension Center. The experimental design was a randomized complete block with three replicates. 'Reeder' HRS wheat was planted on May 1. Herbicide treatments were applied with a CO_2-hand-boom plot sprayer delivering 10 gal/A at 30 psi through 8001 flat fan nozzles to the center 6.7 ft of 10 by 25 ft plots. Treatments were applied on June 9 with 54 F, 63% RH, 75% clear sky, and 12 mph wind to 4-leaf wheat and 2- to 4-leaf yellow and green foxtail. Average wheat density in untreated plots was 24 plants/ft^2 and foxtail density was 13 plants/ft^2. The trial was harvested with a plot combine on September 27.

Herbicide		Weed control		HRS wheat	
		6/23	7/13	Injury	Seed
Treatment	Rate	Fota[a]		6/23	yield
	lb ai/A	--------% --------		%	bu/A
Imb+Brox&MCPA5+MSO	5+8+0.19G	69	25	0	57.9
Flcz+Brox&MCPA5+Basic Blend	0.32+8+1%	83	82	8	53.3
Mess+Brox&MCPA5+MSO	0.036+8+1%	72	37	2	55.4
Clfp-ng+Brox&MCPA5	0.8+8	76	86	0	58.2
Fenx+Brox&MCPA5	1.32+8	96	96	0	57.4
Tral+Brox&MCPA5+Supercharge+AMS	2.9+8+0.5%+9.5	86	95	0	56.9
Flcz+Clfp-ng+Brox&MCPA5	0.11+0.25+8	79	92	0	59.9
Mess+Clfp-ng+Brox&MCPA5	0.012+0.25+8	83	92	0	57.2
Untreated	0	0	0	0	54.6
LSD (0.05)		5	7	2	NS

[a]Fota=yellow and green foxtail.

Foxtail population was primarily yellow foxtail. Fenoxyprop-P, tralkoxydim, flucarbazone+clodinofop, and mesosulfuron+clodinofop with tank mixture of bromoxynil&MCPA provided excellent foxtail control when visually evaluated on July 13 (about 5 weeks after herbicide application). Slight wheat injury occurred with flucarbazone or mesosulfuron tankmixed with bromoxynil&MCPA. Wheat yield did not differ among treatments, likely due to adequate crop density with good vigor and light foxtail density.

<u>Yellow foxtail control with Puma and broadleaf tank mixes</u>. Jenks, Markle, and Willoughby. Lebsock durum was seeded May 26 at 110 lb/A into 7.5-inch rows. Individual plots were 10 x 30 ft and replicated 3 times. Herbicide treatments were applied June 25 to 3-4 leaf durum with a bicycle sprayer delivering 10 gpa at 40 psi through XR 8001 nozzles. Air and soil temperatures were 66 and 63 F, respectively, relative humidity was 43%. Plant sizes at time of application were yellow foxtail (Foxt) at 2- to 4-inch, wild buckwheat (Wibw) at 3- to 4-inch, common lambsquarters (Colq) at 2- to 5-inch, and kochia 1- to 4-inch. The yellow foxtail density was high while broadleaf densities were generally lower.

Two treatments provided excellent yellow foxtail control: Puma followed 6 days later by Bronate Advanced and Puma tank mixed with Curtail M + Starane. The remaining herbicide combinations resulted in 10-30% less yellow foxtail control. No treatments caused any visible crop injury. Despite the lower yellow foxtail control, only the untreated yield was significantly different from the other treatments.

Table. Yellow foxtail control with Puma and broadleaf tank mixes (2004).

			Yeft		Wibw		Colq		Kocz		
Treatment[a]	Rate	Timing	Jul 9	Aug 4	Jul 9	Aug 4	Jul 9	Aug 4	Jul 9	Aug 4	Yield
			% control								bu/A
Untreated			0	0	0	0	0	0	0	0	28
Puma/ Bronate	0.66 pt/ 0.8 pt	3-4 lf/ + 6 day	94	93	94	98	99	100	98	100	57
Puma + Bronate	0.66 pt + 0.8 pt	3-4 lf	81	73	93	98	99	98	96	100	53
Puma + Bronate + Starane	0.66 pt + 0.6 pt + 0.33 pt	3-4 lf	84	77	95	100	99	100	99	100	53
Puma + Bronate + Harmony GT	0.66 pt + 0.6 pt + 0.1 oz	3-4 lf	64	65	96	100	100	100	97	100	60
Puma + Harmony GT + Starane	0.66 pt + 0.3 oz + 0.33 pt	3-4 lf	80	78	92	100	92	99	97	99	53
Puma + Curtail M + Starane	0.66 pt + 1.75 pt + 0.5 pt	3-4 lf	92	92	94	100	97	98	98	100	56
Puma + Stinger + Starane + Harmony GT	0.66 pt + 0.25 pt + 0.5 pt + 0.3 oz	3-4 lf	78	81	94	100	97	99	98	100	53
LSD (0.05)			9	7	4	2	3	2	4	1	9
CV			7	5	3	1	2	2	2	0	10

[a]*Bronate applied was Bronate Advanced*

Residual grass control from POST applications in wheat. (Kirk Howatt, Ronald Roach, Janet Harrington). Imidazolinone-resistant wheat was seeded April 20. Treatments were applied to 3- to 4-leaf wheat and 2-leaf foxtail on June 10 with 57 F air temperature, 54% RH, 100% cloud cover, 3 to 5 mph east wind, and soil temperature of 60 F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 40 psi through TT 11001 flat-fan nozzles to a 7 ft wide area the length of 10 by 30 ft plots. The experiment had a randomized complete-block design with four replicates.

Table. Residual grass control with POST applications in wheat.

		June 24		July 21	August 18
Treatment[1]	Rate	Wht	Yeft	Yeft	Yeft
		%	%	%	%
BAS 777+NIS+UAN	4.5 + 0.25% + 1%	0	86	89	85
BAS 777+pend-h+NIS+ UAN	4.5 + 12 + 0.25% + 1%	0	88	90	94
BAS 777+pend-h+NIS+ UAN	4.5 + 20 + 0.25% + 1%	0	83	91	95
Fenx+2,4-D(Salvo)	1.32 + 4	0	93	87	85
Fenx+2,4-D(Salvo)+pend-h	1.32 + 4 + 12	0	93	97	98
Fenx+2,4-D(Salvo)+pend-h	1.32 + 4 + 20	0	96	98	97
Fenx+brox&MCPA+pend-h	1.32 + 8 + 20	0	78	96	98
Fenx+brox&MCPA+pend	1.32 + 8 + 20	0	88	94	95
Fenx+brox&MCPA+dime-p	1.32 + 8 + 16	0	94	96	93
Fenx+brox&MCPA+trifluralin	1.32 + 8 + 16	0	83	88	82
Clfp+brox&MCPA+pend-h	0.8 + 8 + 12	0	91	91	94
Flcz+brox&MCPA+pend-h+ Basic Blend	0.32 + 8 + 12 + 1%	0	70	80	60
Mess+brox&MCPA+pend-h+ MSO	0.036 + 8 + 12 + 1%	0	23	33	28
Untreated	0	0	0	0	5
CV		0	7	4	7
LSD (P=0.05)		0	8	5	8

[1]BAS 777 was a proprietary premix of imazamox and phenoxy herbicide from BASF; Pend-h was the water formulation of pendimethalin; NIS was Activator 90 nonionic surfactant; and MSO was Scoil methylated seed oil.

Herbicide treatments did not cause visible injury. Fenoxaprop provided better control of yellow foxtail on June 24 than BAS 777, flucarbazone, or mesosulfuron, except when mixed with pendimethalin formulations or trifluralin. Foxtail control was similar among BAS 777 treatments on June 24 and July 21. On August 18, control of yellow foxtail was better with BAS 777 plus pendimethalin-h, 95%, than with BAS 777 alone, 85%, indicating that pendimethalin-h gave some residual control of late-emerging foxtail. Likewise, residual grass control products improved control of foxtail with fenoxaprop on July 21 and August 18 except for trifluralin, which may have been degraded by photolysis before incorporation by rain. Control of yellow foxtail with flucarbazone and mesosulfuron in the study was consistent with previous experiments.

Yellow foxtail control with flucarbazone. Kirk A. Howatt, Ronald F. Roach, Janet D. Harrington. (Plant Sciences Department, North Dakota State University, Fargo, ND 58105-5051) An experiment was established to determine the best adjuvant system to maximize control of yellow foxtail with flucarbazone. 'Alsen' hard red spring wheat was seeded May 4. Treatments were applied to 1- to 2-leaf yellow foxtail on June 10 with 60 F air temperature, 72% relative humidity, 100% cloud cover, 7 mph east wind, and 58 F soil temperature at 4 inches. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 40 psi through TT 11001 flat-fan nozzles to an area 7 ft wide and the length of 10- by 30-ft plots. The experiment had a randomized complete-block design with four replicates. Yellow foxtail population was estimated to be 75 plants per ft^2.

Table. Yellow foxtail control with flucarbazone near Fargo, ND, in 2004.

		June 24		July 02	July 27
Treatment[1]	Rate[2]	Wheat	Yellow foxtail	Yellow foxtail	Yellow foxtail
	oz ai/A	%	%	%	%
Flucarbazone	0.28	0	40	45	30
Flucarbazone	0.42	0	50	55	50
Flucarbazone + NIS	0.28 + 0.25%	0	58	50	40
Flucarbazone + NIS	0.42 + 0.25%	0	58	64	48
Flucarbazone + MSO	0.28 + 0.19G	0	58	63	38
Flucarbazone + MSO	0.42 + 0.19G	0	50	63	48
Flucarbazone + NIS + AMS	0.28 + 0.25% + 1G	0	45	38	35
Flucarbazone + NIS + AMS	0.42 + 0.25% + 1G	0	75	80	74
Flucarbazone + MSO + AMS	0.28 + 0.19G + 1G	0	69	75	68
Flucarbazone + MSO + AMS	0.42 + 0.19G + 1G	0	70	80	85
Flucarbazone + bromoxynil&MCPA + NIS	0.42 + 8 + 0.25%	0	80	83	75
Flucarbazone + thifensulfuron + 2,4-D	0.42 + 0.225 + 6	0	68	81	65
Fenoxaprop	0.8	0	91	98	97
Fenoxaprop + bromoxynil&MCPA	0.8 + 8	0	76	83	90
Fenoxaprop + thifensulfuron + MCPA	0.8 + 0.225 + 8	0	79	88	86
Untreated	0	0	0	0	0
CV		0	11	10	13
LSD (P=0.05)		0	10	9	10

[1]NIS was nonionic surfactant, Activator 90 from Loveland Industries, Greeley, CO 80632; MSO was methylated seed oil, Scoil from AGSCO, Grand Forks, ND 58208; and AMS was diammonium sulfate solution from Agriliance LLC, St. Paul, MN 55164.
[2]MCPA and 2,4-D rates expressed in ae; "%" was % vol/vol; and "G" was gallons per acre.

Flucarbazone or fenoxaprop tank-mixes did not cause observable injury to wheat. Flucarbazone at 0.42 oz/A generally provided greater yellow foxtail control than flucarbazone at 0.28 oz/A during July evaluations. The addition of non-ionic surfactant (NIS) or methylated seed oil (MSO) alone initially increased foxtail control with flucarbazone at 0.28 oz to 58%, which was similar to flucarbazone at 0.42 oz with either of these adjuvants. By July 27, improved foxtail control from the addition of NIS or MSO alone with flucarbazone was not visible. Diammonium sulfate solution (AMS) increased foxtail control with flucarbazone and MSO an average of 33 percentage points on July 27, resulting in 85% foxtail control with 0.42 oz flucarbazone. Bromoxynil and MCPA or 2,4-D formulations likely provided adjuvant properties that resulted in better foxtail control with flucarbazone than flucarbazone alone or with NIS, but control was 75% and 65%, respectively on July 27, which was less than the 85% control with 0.42 oz flucarbazone plus MSO and AMS. Fenoxaprop alone provided greater than 90% yellow foxtail control. Bromoxynil and MCPA or thifensulfuron plus MCPA antagonized control of foxtail with fenoxaprop, resulting in control with fenoxaprop tank-mixes on June 24 of 76% to 79% compared to 91% with fenoxaprop alone. By July 2, fenoxaprop provided 98% control of wild oat, while fenoxaprop tank-mixes gave 83% to 88% control. Only thifensulfuron plus MCPA resulted in antagonism of fenoxaprop on July 27.

2004 Control of Japanese Brome in Spring Wheat at Hettinger. (Eriksmoen) Reeder hard red spring wheat was seeded on April 15. Treatments 1 - 8 were applied to 3 ½ leaf wheat and to Japanese brome that was tillering on May 20 with 43° F, 94% RH, clear sky and 2 mph NW wind. Sequential treatments 7 and 8 were applied to 4 leaf wheat and to tillering Japanese brome on May 28 with 54° F, 91% RH, clear sky and calm wind. All treatments were applied with a tractor mounted CO^2 propelled plot sprayer delivering 10 gpa at 40psi through 8001.5 flat fan nozzles to a 5 foot wide area the length of 10 by 28 foot plots. The experiment was a randomized complete block design with four replications. Japanese brome population was 4 plants per sq. foot. The trial sustained frost on May 13 (16° F) and on June 18 (25°F), and received a total of 5.4 inches of growing season rainfall (April 1 - July 31). Evaluations for crop injury were on June 6 and for Japanese brome control on June 17 and July 13. The trial was not harvested.

	Treatment	Rate	6/6	6/17	7/13
			HRSW	Jabr	Jabr
		oz/A ai	-------- % Control -------		
1	Immb + Brox&MCPA5 + MSO	5 + 8 + 0.19G	2.5	83	65
2	Flcz + Brox&MCPA5 + Basic Blend	0.32 + 8 + 1%	1.2	98	99
3	Mesosulfuron + Brox&MCPA5 + MSO	0.036 + 8 + 1%	0	92	75
4	Clodinafop-ng + Brox&MCPA5	0.8 + 8	1.2	20	25
5	Fenoxaprop + Brox&MCPA5	1.32 + 8	0	23	7
6	Tral + Brox&MCPA5 + S'Chrg + AMS	3 + 8 + 0.5% + 9.5	1.2	33	43
7	Flcz+Basic Blend / Clfp-ng+Brox&MCPA5	0.11 + 1% / 0.25 + 8	5	98	98
8	Mess + MSO / Clfp-ng + Brox&MCPA5	0.012 + 1% / 0.25 + 8	0	25	26
9	Untreated	0	0	0	0
C.V. %			215	60.5	60.3
LSD 5%			NS	47	44

Summary

Crop injury was minor for all herbicide treatments. Treatments containing flucarbazone (trts 2 and 7) had excellent season long control of Japanese brome. Treatments 1 and 3 also provided significant Japanese brome control over the untreated check. All other treatments showed relatively minor activity on Japanese brome.

Flucarbazone Herbicide + Tank Mix Additives in Spring Wheat at Hettinger. (Eriksmoen) Reeder hard red spring wheat was seeded on April 15. Treatments were applied to 3 ½ leaf wheat and to tillering Japanese brome, downy brome that was heading and to 2 ½ leaf wild oats on May 20 with 43°F, 94 % RH, clear sky and 2 mph NW wind. Treatments were applied with a tractor mounted CO^2 propelled plot sprayer delivering 10 gpa at 40 psi through 8001.5 flat fan nozzles to a 5 foot wide area the length of 10 by 28 foot plots. The experiment was a randomized complete block design with four replications. 10 oz/A 2,4-D + 0.5 oz/A Aim was applied on May 28 to control broadleaf weeds. The trial sustained frost on May 13 (16°F) and on June 18 (25°F), and received a total of 5.4 inches of growing season rainfall (April 1 - July 31). Populations of downy brome and wild oats were not uniform across the trial. Evaluations for crop injury were on June 3, and for weed control on June, 17 and July 13. The trial was not harvested.

Treatment		Rate	June 6	June 17		July 13		
			HRSW	Jabr	dobr	Jabr	dobr	wiot
	Product + Additive*	oz/A ai		--------- % Control -------				
1	Flucarbazone	0.21	2.5	99	74	96	75	98
2	Flucarbazone	0.1	0.5	99	99	93	65	96
3	Flucarbazone + NIS	0.1 + 0.25%	3.8	99	70	95	90	96
4	Flucarbazone + MVO	0.1 + 1%	0.5	99	20	96	25	96
5	Flucarbazone + AMS	0.1 + 1%	2.5	98	70	93	50	90
6	Flucarbazone + UAN	0.1 + 1%	1.2	99	80	99	85	99
7	Flucarbazone + NIS + AMS	0.1 + 0.25% + 1%	5.0	94	85	99	80	99
8	Flucarbazone + MSO + AMS	0.1 + 1% + 1%	2.5	99	50	99	25	99
9	Flucarbazone + Fenoxaprop	0.1 + 0.015	3.8	99	90	95	90	99
10	Flucarbazone + Clodinafop-ng	0.1 + 0.011	2.5	98	58	98	65	99
11	Flucarbazone + Mesosulfuron	0.1 + 0.012	1.2	99	80	98	90	99
12	Untreated	0	0	0	0	0	0	0
C.V. %			104	3.1	58.0	4.9	36.0	4.2
LSD 5%			NS	4	NS	7	NS	6

*Tank mix additive: NIS = non-ionic surfactant, MVO = methylated vegetable oil, AMS = ammonium sulfate, UAN = urea ammonium nitrate.

Summary

Crop injury was relatively minor for all herbicide treatments. All flucarbazone treatments provided excellent season long Japanese brome and wild oat control regardless of tank mix additive. The addition of fenoxaprop or mesosulfuron to flucarbazone may enhance the control of downy brome.

Late Fall and Early Spring Pre-plant Applications of Flucarbazone in Spring Wheat at Hettinger, North Dakota. (Eriksmoen) Fall treatments (trts 2,3 and 4) were applied on October 15, 2003. Early pre-plant treatments (trts 9 and 10) were applied on March 24, 2004 and a pre-plant treatment (trt 8) was applied on April 14. Pre-emergence treatments (trts 5,6 and 7) were applied on April 20. Sequential (trts 4 and 7) and post-emergence treatments (trts 10,11 and 12) were applied to 3 ½ leaf wheat, to 2 ½ leaf wild oats and to tillering Japanese brome on May 20 with 43°F, 94 % RH, clear sky and 2 mph NW wind. Reeder hard red spring wheat was seeded into no-till HRSW stubble on April 15. All treatments were applied with a tractor mounted CO^2 propelled plot sprayer delivering 10 gpa at 40 psi through 8001.5 flat fan nozzles to a 5 foot wide area the length of 10 by 28 foot plots. The experiment was a randomized complete block design with four replications. 10 oz/A 2,4-D (LV6) + 0.5 oz/A Aim was applied on May 28 to control broadleaf weeds. Wild oat and Japanese brome populations were 1 and 4 plants per sq. ft, respectively. The trial sustained frost on May 13 (16°F) and on June 18 (25°F), and received a total of 5.4 inches of growing season rainfall (April 1 - July 31). Evaluations for crop injury were on June 6, and for weed control on June 17 and July 13. The trial was harvested on August 6.

	Treatment	Rate	Timing	June 6	6/17	July 13		8/6
				HRSW	Jabr	Jabr	Wiot	Yield
		oz/A ai		------------	% Control	------------		bu/A
1	Untreated	0		0	0	0	0	14.6
2	Flucarbazone	0.42	Fall	0	98	99	91	19.7
3	Flucarbazone	0.21	Fall	0	98	99	82	16.5
4	Flcz / Flcz	0.21 / 0.21	Fall / POST	0	99	99	97	14.3
5	Flucarbazone	0.42	PE	0	99	99	94	15.3
6	Flucarbazone	0.21	PE	1	99	97	76	16.6
7	Flcz / Flcz	0.21 / 0.21	PE / POST	1	99	99	98	15.1
8	Flucarbazone	0.42	PP	0	96	97	82	15.0
9	Flucarbazone	0.21	Early PP	2	99	99	82	14.2
10	Flcz / Flcz	0.21 / 0.21	Early PP / POST	4	99	99	94	15.1
11	Flucarbazone	0.21	POST	2	99	99	96	16.1
12	Flucarbazone	0.42	POST	2	99	99	99	13.6
C.V. %				178	2.5	1.6	5.4	14.6
LSD 5%				NS	3	2	6	NS

Summary

Crop injury was relatively minor on all herbicide treatments. All flucarbazone treatments provided excellent Japanese brome control regardless of application rate or the timing of the application. The higher application rate (0.42 oz/A ai) provided excellent season long wild oat control with the exception of the pre-plant treatment (trt 8). The lower application rate (0.21 oz/A ai) did not provide adequate season long wild oat control except when applied post-emergence. Sequential applications (trts 4, 7 and 10) did not significantly enhance weed control compared to the post-applied treatments (trts 11 and 12). Grain yields were poor and probably reflected weather conditions rather than herbicide treatments.

Volunteer barley control in winter wheat. Kent Mckay, Kristie Michels (North Central Research Extension Center, Minot, ND), and Mike Hutter (Northern Ag Management, Westhope, ND). An experiment was conducted to evaluate volunteer barley control in winter wheat. 'CDC Falcon' winter wheat was planted no-till on previous barley residue on September 20, 2003 near Newburg, North Dakota. In the spring of 2004, volunteer barley emerged and a competitive stand of 8 to 10 plants per square foot was present. Treatments were applied May 26 to 5-leaf winter wheat (start of jointing) and 3 to 4-leaf (fully tillered) volunteer barley with 61°F air, 54°F soil surface, 54% relative humidity, 50% clouds, 5 to 8 mph NNE wind, damp soil surface, moist subsoil, and excellent crop vigor. Treatments were applied with a backpack sprayer delivering 10 gpa at 40 psi through 8001 flat fan nozzles to 10 by 30 ft plots. The experiment was a randomized complete block design with three relicates per treatment. Treatments were evaluated June 8 for volunteer barley control and ten volunteer barley plants per plot were measured for plant height.

Treatment	Rate/A	Volunteer Barley	Plant Height to 6 leaf collar
		----------% control----------	------------cm------------
Untreated		0	16.4
Discover NG	16 fl oz	85	5.8
Discover NG+Starane	16 fl oz + 6 fl oz	85	6.4
Discover NG+Starane	12.8 fl oz + 6 fl oz	55	8.7
Everest+Quad 7	0.6 oz + 1% v/v	80	6.8
Everest+Starane	0.6 oz + 6 fl oz	74	7.4
Everest+Starane	0.4 oz + 6 fl oz	20	12.2
Silverado	2.25 oz	8	15.6
LSD (P=0.05)		10	2
CV		11	11

The high rates of Discover provided good control of volunteer barley. The high rates of Everest provided fair to good control of volunteer barley. The low rates of Discover and Everest did not provide adequate control of volunteer barley in this experiment. Silverado caused minor injury to volunteer barley. No winter wheat injury was observed with any treatment.

Imidazolinone-resistant wheat response to BAS 777. (Kirk Howatt, Ronald Roach, and Janet Harrington). Imidazolinone-resistant wheat was seeded April 20. Treatments were applied to 1.5- to 2-leaf wheat on May 18 with 72 F air temperature, 9% RH, 40% cloud cover, 1.5 mph southwest wind, and soil temperature of 55 F. Treatments were applied to 3- to 4-leaf wheat on June 10 with 58 F air temperature, 62% RH, 100% cloud cover, 4 mph east wind, and soil temperature of 60 F. All treatments were applied with a backpack sprayer delivering 8.5 gpa at 35 psi through TT 11001 flat-fan nozzles to a 7 ft wide area the length of 10 by 30 ft plots. The experiment had a randomized complete-block design with four replicates. Plots were harvested August 17.

Table. Imidazolinone-resistant wheat response to BAS 777.

Treatment[1]	Rate	Timing	June 10 Wht	June 24 Wht	July 16 Wht	Aug. 04 Wht	Aug. 17 Yield
	oz ai/A	no. leaves	%	%	%	%	bu/A
BAS 777 + NIS	9 + 0.25%	2	28	26	5	1	45
BAS 777 + MSO	9 + 1%	2	25	24	3	1	42
BAS 777 + NIS	13.4 + 0.25%	2	71	76	25	12	37
BAS 777 + MSO	13.4 + 1%	2	63	70	16	7	40
Imazamox + NIS	1.5 + 0.25%	2	60	53	10	5	42
Imazamox + MSO	1.5 + 1%	2	80	78	28	15	38
BAS 777 + NIS	9 + 0.25%	4	0	5	4	1	45
BAS 777 + MSO	9 + 1%	4	0	6	5	1	44
BAS 777 + NIS	13.4 + 0.25%	4	0	25	18	11	39
BAS 777 + MSO	13.4 + 1%	4	0	33	38	28	33
Imazamox + NIS	1.5 + 0.25%	4	0	7	4	1	46
Imazamox + MSO	1.5 + 1%	4	0	60	46	31	33
Untreated	0		0	0	0	0	48
CV			29	26	65	82	12
LSD (P=0.05)			10	13	14	10	7

[1]BAS 777 was a proprietary premix of imazamox and phenoxy herbicide from BASF; all herbicide treatments included urea and ammonium nitrate solution at 2.5% vol./vol.; NIS was Activator 90 nonionic surfactant; and MSO was Scoil methylated seed oil.

BAS 777 at 9 oz ai/A represents two times the application rate proposed for the label, while imazamox at 1.5 oz ai/A was three times the use rate. Compared to nonionic surfactant (NIS) treatments, methylated seed oil (MSO) did not increase visible injury of BAS 777 to wheat applied at the 2-leaf stage, but imazamox injury to wheat did increase with MSO. The cause of this increase with imazamox cannot be determined from this study. The effect could be influenced by formulation differences, imazamox rate differences, or phenoxy herbicide antagonism between BAS 777 and imazamox. Wheat injury when treatments were applied to 2-leaf wheat ranged from 25% to 80% on June 10. BAS 777 at 13.4 oz ai/A caused 16% to 25% injury on July 16 and resulted in less yield than the untreated while BAS 777 at 9 oz ai/A gave less than 5% injury and resulted in yield similar to the untreated. Treatments caused less injury when applied to 4-leaf when than 2-leaf wheat. Injury with BAS 777 at 9 oz with NIS or MSO or imazamox with NIS did not exceed 7% and yields obtained were similar to the untreated.

<u>Evalutation of BAS 777 for weed control in wheat</u>. (Kirk Howatt, Ronald Roach, Janet Harrington). Imidazolinone-resistant wheat was seeded April 20. Treatments were applied to 3- to 4-leaf wheat, 1- to 2-leaf yellow foxtail, 1-leaf redroot pigweed, and 1- to 2-leaf common mallow on June 10 with 59 F air temperature, 70% RH, 100% cloud cover, 5 mph east wind, and soil temperature of 58 F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 40 psi through TT 11001 flat-fan nozzles to a 7 ft wide area the length of 10 by 30 ft plots. The experiment had a randomized complete-block design with four replicates.

Table. Evaluation of BAS 777 for weed control in wheat.

		June 24				July 21				August 18
Treatment	Rate	Wht	Yeft	Rrpw	Coma	Wht	Yeft	Rrpw	Coma	Yeft
	oz ai/A	%	%	%	%	%	%	%	%	%
Immx+brox&MCPA+ NIS+UAN	0.5 + 8 + 0.25% + 2.5%	0	84	92	88	0	90	99	94	90
BAS 777+brox+ NIS+UAN	4.5 + 4 + 0.25% + 2.5%	0	89	86	78	0	86	99	97	89
Fenx+brox&MCPA	1.32 + 8	0	93	84	73	0	93	98	96	93
Mesosulfuron+ brox&MCPA+MSO	0.036 + 8 + 1%	0	33	63	57	7	23	99	97	10
Untreated	0	0	0	0	0	0	0	0	0	0
CV		0	6	9	10	46	6	1	4	11
LSD (P=0.05)		0	5	9	12	1	5	1	5	10

NIS was Activator 90 nonionic surfactant; UAN was urea and ammonium nitrate solution; BAS 777 was a proprietary premix of imazamox and phenoxy herbicide from BASF; and MSO was Scoil methylated seed oil.

Weed control with imazamox plus bromoxynil and MCPA was essentially similar to BAS 777 plus bromoxynil for all evaluation dates. Fenoxaprop provided 93% control of yellow foxtail on July 21, which was greater than BAS 777 at 86% but similar to imazamox at 90%. Mesosulfuron gave 23% foxtail control on July 21 and caused 7% wheat injury xpressed as stunting. Broadleaf weed control on July 21 was similar with all herbicide treatments, but mesosulfuron antagonized bromoxynil and MCPA activity on June 24.

Broadleaf weed control with BAS 777. (Kirk Howatt, Ronald Roach, Janet Harrington). Imidazolinone-resistant wheat was seeded April 20. Treatments were applied to 3- to 4-leaf wheat, 1- to 2-leaf yellow foxtail, 1- to 2-leaf redroot pigweed, and 1-leaf common mallow on June 10 with 62 F air temperature, 63% RH, 100% cloud cover, 9 mph southeast wind, and soil temperature of 60 F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 40 psi through TT 11001 flat-fan nozzles to a 7 ft wide area the length of 10 by 30 ft plots. The experiment had a randomized complete-block design with four replicates. Wheat was harvested with a small-plot combine on August 17.

Table. Broadleaf weed control with BAS 777.

		June 24				July 21		Aug. 18	Aug. 17
Treatment[1]	Rate	Wht	Yeft	Rrpw	Coma	Wht	Yeft	Yeft	Yield
	oz ai or ae/A	%	%	%	%	%	%	%	bu/A
BAS 777	4.5	0	86	87	92	0	90	91	55
BAS 777	9	14	93	94	93	1	95	95	51
Imazamox	0.5	1	91	89	89	0	92	95	50
BAS 777+dica	4.5 + 1	8	89	90	92	9	90	91	53
BAS 777+dica	4.5 + 2	18	86	89	88	20	88	88	47
BAS 777+flox	4.5 + 0.75	1	89	88	94	0	91	90	56
BAS 777+flox	4.5 + 1.5	1	88	88	90	0	92	92	55
BAS 777+brox&MCPA	4.5 + 12	5	89	91	95	0	87	92	52
BAS 777+brox	4.5 + 4	5	86	90	94	0	88	88	58
BAS 777+2,4-D(Amine)	4.5 + 4	6	87	88	91	1	92	91	55
BAS 777+2,4-D(Salvo)	4.5 + 4	2	86	89	94	0	88	88	51
BAS 777+clpy&2,4-D	4.5 + 4.7	8	88	89	93	0	89	88	51
BAS 777+clpy&2,4-D	4.5 + 9	7	82	85	89	0	85	93	50
BAS 777+carf	4.5 + 0.125	34	90	93	95	7	89	88	45
BAS 777+thif&trib	4.5 + 0.4	13	96	94	96	7	92	91	49
Untreated	0	0	0	0	0	0	0	0	52
CV		45	4	4	5	43	4	5	9
LSD (P=0.05)		5	6	5	6	2	5	7	6

[1]BAS 777 was a proprietary premix of imazamox and phenoxy herbicide from BASF; all herbicide treatments included Activator 90 nonionic surfactant at 0.25% vol./vol. and urea and ammonium nitrate solution at 2.5% vol./vol.

BAS 777 at 4.5 oz ai/A did not cause injury to wheat but at 9 oz caused 14% injury observed as stunting and slight chlorosis. Addition of several different herbicides for broadleaf weed control increased injury caused by BAS 777 to as much as 8%. Wheat injury from BAS 777 and dicamba, 8% to 18%, was more typical of dicamba injury than BAS 777 injury because the plants seemed to lose turgor and become limp. BAS 777 plus carfentrazone caused 34% injury as necrosis similar to carfentrazone alone with a slight height reduction. BAS 777 plus thifensulfuron and tribenuron injury, 13%, also manifested as necrosis with slight stunting. On July 21, wheat injury from BAS 777 tank-mixes with dicamba, carfentrazone, and thifensulfuron and tribenuron remained. These treatments resulted in lower wheat yield than wheat treated with BAS 777 at 4.5 oz ai/A. Thifensulfuron and tribenuron improved the control of yellow foxtail and redroot pigweed on June 24. Yellow foxtail and redroot pigweed control with BAS 777 was not antagonized by broadleaf herbicides, and only dicamba at 2 oz ae/A and clopyralid and 2,4-D at 9 oz ae/A antagonized control of common mallow.

Broadleaf weed control in wheat, Fargo. (Kirk Howatt, Ronald Roach, Janet Harrington). 'Alsen' hard red spring wheat was seeded May 4. Treatments were applied to 3- to 4-leaf wheat, bolting wild mustard, 2- to 5-leaf redroot pigweed, 3- to 5-leaf wild buckwheat, and 2- to 6-leaf common mallow on June 14 with 67 F air temperature, 41% RH, 60% cloud cover, 2 to 4 mph north wind, and soil temperature of 67 F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 35 psi through TT11001 flat-fan nozzles to a 7 ft wide area the length of 10 by 30 ft plots. The experiment had a randomized complete-block design with four replicates. Plots were harvested September 1.

Table. Broadleaf weed control in wheat, Fargo.

		June 29					Sept. 01
Treatment	Rate	Wheat	Rrpw	Wibw	Wimu	Coma	Yield
	oz ai or ae/A	%	%	%	%	%	bu/A
Fluroxypyr&2,4-D	7.5	0	73	35	78	43	60
Fluroxypyr&MCPA	8	0	53	30	78	33	63
Bromoxynil&MCPA	8	0	78	30	84	33	63
Carfentrazone+2,4-D(Salvo)	0.125 + 6	8	93	90	80	88	59
Carfentrazone+dicamba	0.125 + 1.5	5	91	88	80	85	59
Carfentrazone+thifensulfuron	0.125 + 0.22	0	86	80	80	84	62
Clopyralid+fluroxypyr	1.5+ 1.5	0	33	65	70	63	62
Clopyralid+fluroxypyr	1+1	0	35	45	70	40	61
Clopyralid+fluroxypyr+ carfentrazone	1+1+ 0.125	5	88	86	84	80	62
Clopyralid+fluroxypyr+ thifensulfuron	1+1+ 0.22	0	80	68	76	38	63
Clopyralid+fluroxypyr+ tribenuron	1+1+ 0.18	0	73	40	76	33	61
Clopyralid+fluroxypyr+ bromoxynil&MCPA	1+1+ 6	0	70	65	83	38	63
Untreated	0	0	0	0	0	0	52
CV		0	8	12	7	11	5
LSD (P=0.05)		0	8	10	8	8	4

Carfentrazone caused 5% to 8% wheat injury unless thifensulfuron was included in the tank-mix. Wheat injury was not visible on July 21 (data not shown). Treatments that included carfentrazone caused quicker weed desiccation and better control on June 29 than other treatments. Carfentrazone tank-mixes provided 80% to 90% control of wild buckwheat compared with 30% to 68% control with other treatments and 80% to 88% control of common mallow compared with 33% to 63% control with other treatments. Bromoxynil, another "burning-type" herbicide, did not improve the speed of control like carfentrazone did. Clopyralid plus fluroxypyr at 1 and 1 oz ae/A gave 75% pigweed control and 50% buckwheat control on July 21, while all other treatments provided 95% control or better of all weeds (data not shown). There was no difference in wheat yield among herbicide treatments, but all herbicide treatments resulted in greater wheat yield than the untreated.

Broadleaf weed control in wheat, Langdon 2004 (Lukach)
The experiment was established in Alsen HRSW seeded May 8. The experiment was over sprayed with Puma 0.67pt/a on June 11. Treatments were applied on June 14 to 4 leaf wheat. The area had about 20 wild mustard, 2 kochia, 2 false chamomile, 0-10 common mallow and 0-10 prickly lettuce per yard square. All weeds were small with no re-rooted winter annuals. Treatments June 14 were finished at 4:30pm with conditions of 59F, 71RH, 4mph wind from the east, clear sky and wet soil. A drift shield was used. Applications were made using a CO2 pressurized sprayer, mounted on a tractor 3-point. Five nozzles in 20 inch spacing were used with DG8001.5 tips at 35psi and 4.2mph applying 10 gal/a solution. Harvested plot size was 4.3ft x 20ft. The trial had a RCBD design with four replications.

Broadleaf control in wheat, Langdon 2004

		Crop	Control						Test	Crop
Treatment	Rate	Inj	Wimu	Fach	Kocz	Lath	Prle	Yield	Weight	Height
	oz ai/A	----------------------	%	----------------------				bu/a	lb/bu	cm
Fluroxypyr&2,4-D	7.5	0	97	62	94	80	57	41	56	77
Fluroxypyr&MCPA	8	0	97	45	91	45	37	39	57	74
Bromoxynil&MCPA5	8	0	96	59	93	63	52	35	57	75
Carfentrazone+Salvo	0.125+6	0	96	87	88	55	33	36	56	73
Carfentrazone+Dicamba	0.125+1.5	1	92	57	93	82	83	37	57	72
Carfentrazone+	0.125									
Thifensulfuron-sg	+0.22	0	93	96	35	97	38	34	56	73
Clopyralid+Fluroxypyr	1.5+1.5	0	94	93	100	90	99	42	58	75
Clopyralid+Fluroxypyr	1+1	0	88	87	98	72	53	41	57	75
Clopyralid+Fluroxypyr	1+1									
+Carfentrazone	+0.125	0	84	70	93	75	80	41	58	78
Clopyralid+Flox	1+1									
+Thifensulfuron-sg	+0.22	0	97	97	96	88	97	40	57	73
Clopyralid+Fluroxypyr	1+1									
+Tribenuron-sg	+0.18	0	98	98	93	82	100	45	57	76
Clopyralid+Fluroxypyr										
+Brox&MCPA5	1+1+6	0	96	95	100	94	98	38	56	73
Untreated	0	0	0	0	0	0	0	31	55	79
C.V. %		416	6	31	14	25	39	18	2	5
LSD 5%		1	7	38	17	30	42	NS	NS	NS

Test weight was reduced by the Aug 20 frost. The kochia in that area is ALS resistant.

Broadleaf Weed Control in Spring Wheat at Hettinger. (Eriksmoen) Reeder hard red spring wheat was seeded on April 15. Treatments were applied to 3 ½ leaf wheat, to 2 leaf wild buckwheat and to ½ inch tall kochia on May 20 with 43°F, 94% RH, clear sky and 2 mph NW wind. Treatments were applied with a tractor mounted CO^2 propelled plot sprayer delivering 10 gpa at 40 psi through 8001.5 flat fan nozzles to a 5 foot wide area the length of 10 by 28 foot plots. The experiment was a randomized complete block design with four replications. Wild buckwheat and kochia populations were 0.3 and 1 plants per sq. foot, respectively. The trial sustained frost on May 13 (16°F) and on June 18 (25°F), and received a total of 5.4 inches of growing season rainfall (April 1 - July 31). Evaluations for crop injury were on June 3 and for weed control on July 13. The trial was not harvested.

Treatment		Rate	June 6	July 13	
			HRSW	Wibw	kocz
	Product	oz/A ai	--------- % Control -------		
1	Fluroxypyr&2,4-D	7.5	0	80	45
2	Fluroxypyr&MCPA	8	0	33	60
3	Bromoxynil&MCPA5	8	0	99	99
4	Carfentrazone + Salvo	0.125 + 6	3.8	50	92
5	Carfentrazone + Dicamba	0.125 + 1.5	0.5	96	83
6	Carfentrazone + Thifensulfuron-sg	0.125 + 0.22	0	65	28
7	Clopyralid + Fluroxypyr	1.5 + 1.5	0	98	83
8	Clopyralid + Fluroxypyr	1 + 1	1.2	99	99
9	Clopyralid + Fluroxypyr + Carfentrazone	1 + 1 + 0.125	0	99	99
10	Clopyralid + Fluroxypyr + Thifensulfuron-sg	1 + 1 + 0.22	0	99	99
11	Clopyralid + Fluroxypyr + Tribenuron-sg	1 + 1 + 0.18	0	94	98
12	Clopyralid + Fluroxypyr + Brox&MCPA5	1 + 1 + 6	0	99	99
13	Untreated	0	0	0	0
C.V. %			242	35.7	35.1
LSD 5%			1.5	47	45

Summary

Crop injury was relatively minor for all herbicide treatments. Bromoxynil&MCPA5 (trt 3), carfentrazone + dicamba (trt 5) and clopyralid + fluroxypyr treatments (trts 7 - 12) provided excellent wild buckwheat control. Bromoxynil&MCPA5 (trt 3), carfentrazone + salvo (trt 4) and clopyralid + fluroxypyr treatments (trts 8 - 12) provided excellent kochia control. Fluroxypyr&2,4-D and Fluroxypyr&MCPA treatments (trts 1 and 2) were deficient in providing both wild buckwheat and kochia control.

Broadleaf weed control in durum wheat, Williston 2004. (Riveland). The experiment was conducted to evaluate several herbicides for broadleaf weed control in wheat. 'Pierce' durum wheat was planted on re-crop in 7 inch rows at 90 lbs/a on April 23. Treatments were applied on June 16 to 7-leaf wheat, 2-4 leaf volunteer safflower, 3-4 inch wild buckwheat, 1-2 inch Russian thistle and 3-4 inch common lambsquarters with 72 F, 38% RH, 65% cloudy sky, and less than 2mph W wind with dry topsoil at 70 F. Treatments were applied with a small plot sprayer with wind cones, mounted on a G-Allis Chalmers tractor and delivering 8.6 gals/a at 30 psi through 8001 flat fan nozzles to a 6.67 ft wide area the length of 10 by 25 ft plots. First rainfall event recorded after application was 0.06 inches on June 26. The experiment was a randomized complete block design with four replications. Weed densities were moderate to light and averaged 4-5 plants/ft2 for Russian thistle and 1 plant/yd2 for volunteer safflower. Densities for wild buckwheat ranged from 1/yd2 in rep 1 & 2 to an average of 1/ft2 in the other reps. Plots were evaluated on June 27 and July 31 for injury and on July 8 and July 31 for weed control. Wheat was machine harvested on September 9.

Treatment[a]	Rate	Crop Inj	Ruth Control 7-8	Ruth Control 7-31	Wibw Control 7-8	Wibw Control 7-31	Test Weight	Yield
	oz/a ai	%	---- % ----		---- % ----		lbs/bu	bus/a
Fluroxpyr&2,4-D	7.5	0	88	99	84	97	59.8	31.1
Fluroxpyr&MCPA	8	0	74	65	79	87	59.8	32.8
Bromoxynil&MCPA5	8	1	96	98	95	99	59.6	30.3
Carfentrazone+Salvo	0.125+6	7	91	96	86	97	59.6	28.5
Carfentrazone+Dicamba	0.125+1.5	9	74	77	85	97	59.1	28.4
Carfentrazone+Thifen	0.125+0.22	3	81	85	84	95	59.3	28.5
Clopyralid+Fluroxpyr	1.5+1.5	0	69	81	76	73	59.8	32.0
Clopyralid+Fluroxpyr	1+1	0	15	34	15	49	59.8	30.9
Clopyralid+Flox+Carf	1+1+0.125	1	84	77	93	95	59.8	31.1
Clopyralid+Flox+Thif	1+1+0.22	0	83	97	81	98	59.8	32.9
Clopyralid+Flox+Trib	1+1+0.18	6	85	99	78	99	59.6	32.1
Clopyr+Flox+Brox&MCPA5	1+1+6	1	89	99	91	99	59.5	31.6
Untreated	0.0	0	0	0	0	0	59.0	31.2
EXP MEAN		2	71	77	73	83	59.6	30.9
C.V. %		108	5	21	5	25	.5	8.9
LSD 5%		3	6	23	5	30	NS	NS

[a] - Thif = Thifensulfuron. Trib = Tribenuron. Clopy - Clopyralid
Carf = Carfentrazone Flox = Fluroxypry

Summary: Weed control did not affect yield or test weight of the durum. All carfentrazone treatments caused slight crop injury but most injury occurred when in combination with dicamba. Volunteer safflower (not shown), wild buckwheat and Russian thistle were controlled adequately by all treatments except the low rate of Clopyralid+Fluroxpyr.

Bromoxynil&MCPA combinations for broadleaf weed control. (Kirk Howatt, Ronald Roach, and Janet Harrington). 'Alsen' hard red spring wheat was seeded May 4. Treatments were applied to 3- to 4-leaf wheat, 4- to 6-leaf redroot pigweed and wild buckwheat, 4- to 8-inch Canada thistle, and bolting wild mustard on June 14 with 73 F air temperature, 34% RH, 40% cloud cover, 1 to 4 mph north wind, and soil temperature of 70 F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 35 psi through TT 11001 flat-fan nozzles to a 7 ft wide area the length of 10 by 30 ft plots. The experiment had a randomized complete-block design with four replicates. Plots were harvest September 1.

Table. Bromoxynil&MCPA combinations for broadleaf weed control.

		June 29					July 21					September 01
Treatment[1]	Rate	Wht	Rrpw	Wibw	Cath	Wimu	Wht	Rrpw	Wibw	Cath	Wimu	Yield
	oz ai/A	%	%	%	%	%	%	%	%	%	%	bu/A
Bromoxynil&MCPA	8	0	85	92	88	89	0	99	99	94	99	61
Brox&MCPA	10	0	81	90	95	91	0	99	99	93	99	57
Brox&MCPA	12	0	79	91	95	91	0	99	99	94	99	54
Brox&MCPA+fluroxypyr	6 +1	0	86	96	83	94	0	99	99	87	99	45
Brox&MCPA+fluroxypyr	8 +1	0	81	91	90	93	0	99	99	90	99	58
Brox&MCPA+thifensulfuron+ NIS	8 + 0.1 + 0.25%	0	73	76	57	80	0	99	66	53	96	57
Brox&MCPA+tribenuron+ NIS	8 + 0.167 + 0.25%	0	66	55	73	84	0	99	81	95	99	55
Clopyralid+fluroxypyr	1.5 + 1.5	0	53	69	80	76	0	93	91	91	94	54
Clpy+flox+thif+NIS	1+1+ 0.1 + 0.25%	0	82	77	58	79	0	99	99	91	99	57
Carfentrazone+thif+MCPA+ NIS	0.125 + 0.22 + 4 + 0.25%	9	95	95	65	87	4	99	85	77	99	49
Untreated	0	0	0	0	0	0	0	0	0	0	0	47
CV		42	6	8	7	7	233	1	4	8	3	11
LSD (P=0.05)		1	7	9	9	8	1	1	5	10	4	9

[1]NIS was Activator 90 nonionic surfactant.

Carfentrazone caused 9% injury to wheat on June 29. This injury was still visible but had diminished to 4% by July 21 mainly because most of the effected leaves had naturally senesced. Carfentrazone plus thifensulfuron and MCPA provided 95% control of redroot pigweed on June 29 while other treatments gave 53% to 86% control. Herbicides provided at least 93% control of pigweed by July 21. The carfentrazone treatment, bromoxynil and MCPA at all three rates, and bromoxynil and MCPA tank-mixed with fluroxypyr provided 90% control or better of wild buckwheat on June 29. Thifensulfuron at 0.1 oz ai/A was not enough to control wild buckwheat and antagonized buckwheat control with bromoxynil and MCPA giving 66% control on July 21. Several treatments provided at least 90% control of Canada thistle because the population was low. Bromoxynil and MCPA at 6 oz ai/A resulted in 61 bu/A, but only wheat treated with bromoxynil and MCPA at 6 oz/A plus fluroxypyr, carfentrazone plus thifensulfuron and MCPA, and the untreated produced less grain than the high yield.

Evaluation of thifensulfuron:tribenuron rate ratios. (Kirk Howatt, Ronald Roach, Janet Harrington). 'Alsen' hard red spring wheat was seeded on May 6. Treatments were applied to 3-leaf wheat, 2 to 9 inch tall thistle, 1 leaf Venice mallow, 1 leaf wild buckwheat, and 1- to 4-leaf wild mustard on June 9 with 55 F air temperature, 66% RH, 80% cloud cover, 6 mph northeast wind, and soil temperature of 58 F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 40 psi through TT 11001 flat-fan nozzles to a 7 ft wide area the length of 10 by 30 ft plots. The experiment had a randomized complete block design with four replicates.

Table. Evaluation of thifensulfuron:tribenuron rate ratios.

		June 18	June 22				July 01				July 19	August 04
Treatment[1]	Rate	Wht	Cath	Vema	Wibw	Wimu	Cath	Vema	Wibw	Wimu	Cath	Cath
	oz ai/A	%	%	%	%	%	%	%	%	%	%	%
Fenx+thif+trib+ 2,4-D+NIS	1.32 + 0.25 + 0.25+ 6 + 0.25%	0	80	86	82	97	84	91	94	98	85	81
Fenx+thif+trib+ 2,4-D+NIS	1.32 + 0.33 + 0.33+ 6 + 0.25%	0	76	90	90	98	87	93	97	98	94	89
Fenx+thif+trib+ 2,4-D+NIS	1.32 + 0.25 + 0.083+ 6 + 0.25%	0	79	89	86	99	86	91	94	98	93	88
Fenx+thif+trib+ 2,4-D+NIS	1.32 + 0.25 + 0.0625+ 6 + 0.25%	0	81	89	86	99	88	90	94	98	88	79
Fenx+thif+ 2,4-D+NIS	1.32 + 0.25+ 6 + 0.25%	0	66	84	65	96	88	89	93	98	90	85
Fenx+trib+ 2,4-D+NIS	1.32 + 0.25+ 6 + 0.25%	0	81	89	79	99	90	95	93	98	95	93
Fenx+thif+trib+ 2,4-D+NIS	1.32 + 0.25 + 0.125+ 6 + 0.25%	0	80	88	84	99	85	93	89	98	93	83
Fenx+clopyralid+ flox	1.32 + 1.5+ 1.5	0	93	85	88	85	89	91	91	96	93	86
Fenoxaprop+clpy+ flox	1.32 + 1+ 1	0	81	79	71	60	80	82	81	78	87	82
Fenoxaprop	1.32	0	0	0	0	0	0	0	0	0	0	0
CV		0	8	5	19	8	5	3	3	2	3	4
LSD (P=0.05)		0	8	5	20	9	6	4	3	2	4	4

[1]2,4-D was Salvo formulation; NIS was Activator 90 nonionic surfactant.

None of the treatments caused visible wheat injury. Treatments containing tribenuron and 2,4-D gave 76% to 81% control of Canada thistle on June 22, while clopyralid and fluroxypyr at 1.5 oz ai/A each provided 93% control. Thifensulfuron plus 2,4-D gave 66% thistle control on June 22 but 88% control on July 1. Clopyralid and fluroxypyr at 1 oz/A each gave from 10% to 20% less control of each weed through July 1 than at 1.5 oz/A each. Various thifensulfuron and tribenuron rates and ratios provided similar weed control in this study until the end of the season, but a consistent trend in herbicide rate or ratio was not evident.

Evaluation of 4:1 thifensulfuron&tribenuron. (Kirk Howatt, Ronald Roach, Janet Harrington). 'Alsen' hard red spring wheat was seeded May 4. Treatments were applied to 4-leaf wheat and 1- to 5-leaf wild buckwheat on June 9 with 71 F air temperature, 44% RH, clear sky, 4 mph north wind, and soil temperature of 66 F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 35 psi through TT 11001 flat-fan nozzles to a 7 ft wide area the length of 10 by 30 ft plots. The experiment had a randomized complete-block design with four replicates.

Table. Evaluation of 4:1 thifensulfuron&tribenuron.

Treatment[1]	Rate	June 18 Wht	June 24 Wibw	June 30 Wibw	July 19 Wibw
	oz ai or ae/A	%	%	%	%
Fenx + thif + trib + flox&2,4-D + NIS	1.32 + 0.12 + 0.03 + 7.5 + 0.25%	0	85	93	92
Fenx + thif + trib + flox&2,4-D + NIS	1.32 + 0.24 + 0.06 + 7.5 + 0.25%	0	89	93	92
Fenx + thif + trib + flox&2,4-D + NIS	1.32 + 0.48 + 0.12 + 7.5 + 0.25%	0	92	95	95
Fenx + thif + trib + flox&2,4-D + NIS	1.32 + 0.72 + 0.18 + 7.5 + 0.25%	0	93	95	95
Fenx + thif + trib + brox&MCPA + NIS	1.32 + 0.12 + 0.03 + 7.4 + 0.25%	0	96	96	95
Fenx + thif + trib + brox&MCPA + NIS	1.32 + 0.24 + 0.06 + 7.4 + 0.25%	0	96	96	94
Fenx + thif + trib + brox&MCPA + NIS	1.32 + 0.48 + 0.12 + 7.4 + 0.25%	0	97	99	96
Fenx + thif + trib + brox&MCPA + NIS	1.32 + 0.72 + 0.18 + 7.4 + 0.25%	0	96	96	95
Fenx + flox&2,4-D	1.32 + 7.5	0	93	93	95
Fenx + brox&MCPA	1.32 + 9.8	0	85	90	90
Fenx	1.32	0	0	0	0
CV		0	3	3	4
LSD (P=.05)		0	4	5	7

[1]NIS was Activator 90 nonionic surfactant.

Herbicide treatments did not cause visible wheat injury. Bromoxynil and MCPA was a better tank-mix partner for the control of wild buckwheat with thifensulfuron and tribenuron than fluroxypyr and MCPA on June 24, but the difference between bromoxynil and MCPA tank-mixes was not significant on June 30. The lowest rates of thifensulfuron and tribenuron, 0.12 and 0.03 oz ai/A, provided similar control to the highest rates, 0.72 and 0.18 oz ai/A, when mixed with bromoxynil and MCPA, 0.24 oz ai/A thifensulfuron and 0.06 oz ai/A tribenuron was required to give similar control to the highest rates when mixed with fluroxypyr and MCPA on June 24. All herbicide treatments provided similar control on July 19.

Broadleaf weed control with 2,4-D. (Kirk Howatt, Ronald Roach, Janet Harrington). 'Alsen' hard red spring wheat was seeded May 4. Treatments were applied to 3- to 4-leaf wheat, bolting wild mustard, 2- to 5-leaf redroot pigweed, and 3- to 5-leaf wild buckwheat on June 14 with 73 F air temperature, 34% RH, 40% cloud cover, 3 to 5 mph north wind, and soil temperature of 70 F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 35 psi through TT 11001 flat-fan nozzles to a 7 ft wide area the length of 10 by 30 ft plots. The experiment had a randomized complete-block design with four replicates.

Table. Broadleaf weed control with 2,4-D.

		June 29				July 21			
Treatment[1]	Rate	Wht	Rrpw	Wibw	Wimu	Wht	Rrpw	Wibw	Wimu
	oz ai or ae/A	%	%	%	%	%	%	%	%
AGH 02007	4	0	55	58	75	0	85	84	98
2,4-D(LV6)	4	0	60	70	71	0	99	86	99
AGH 02001	4.128	7	89	75	88	0	96	93	99
AGH 03007	4	0	66	69	70	0	99	76	99
2,4-D(LV4)	4	0	65	71	76	0	99	93	99
Carfentrazone+thif+ 2,4-D(LV4)+NIS	0.25 + 0.25 + 4 + 0.125%	7	94	86	90	5	98	95	99
Carf+thifensulfuron+ 2,4-D(LV4)+NIS	0.25 + 0.25 + 4 + 0.125%	7	95	85	95	5	99	97	99
Untreated	0	0	0	0	0	0	0	0	0
CV		43	10	10	5	0	4	9	0
LSD (P=0.05)		2	10	10	6	0	5	11	1

[1]AGH 02007 and AGH 03007 were proprietary 2,4-D formulations from Agriliance; AGH 02001 was a proprietary formulation of 2,4-D and carfentrazone from Agriliance; and NIS was Activator 90 nonionic surfactant.

Carfentrazone caused 7% injury to wheat on June 29. Carfentrazone injury was still visible on July 21 if the rate was 0.25 oz ai/A but not when the rate was 0.128 oz ai/A. Carfentrazone increased control of redroot pigweed compared to treatments with 2,4-D alone on June 29, average of 93% and 61% respectively. All herbicide treatments provided more than 95% pigweed control on July 21 except AGH 02007. AGH 02007 also gave slower control of wild buckwheat and, overall, less weed control. Carfentrazone tank-mixes provided better control of wild mustard on June 29, but all herbicides provided near complete control of wild mustard on July 21.

Broadleaf Weed Control with Pyraflufen in Spring Wheat at Hettinger. (Eriksmoen) Reeder hard red spring wheat was seeded on April 15. Treatments were applied to 4 leaf wheat, to ½" tall kochia, 5 leaf dandelion, 2" tall wild buckwheat, 1" tall Russian thistle, 4" long field bindweed and to 6" tall alfalfa on May 28 with 54° F, 91% RH, clear sky and calm wind. Treatments were applied with a tractor mounted CO^2 propelled plot sprayer delivering 10 gpa at 40 psi through 8001.5 flat fan nozzles to a 5 foot wide area the length of 10 by 28 foot plots. The experiment was a randomized complete block design with four replications. Kochia, dandelion, wild buckwheat, Russian thistle, field bindweed and alfalfa populations were 50+, 0.75, 1, 3, 0.25 and 0.1 plants per sq. foot, respectively. The trial sustained frost on May 13 (16°F) and on June 18 (25°F), and received a total of 5.4 inches of growing season rainfall (April 1 - July 31). Evaluations for crop injury were on June 3 and July 13, and for weed control on June 17 and July 13. The trial was not harvested.

	Treatment	Rate	June 3	June 17						July 13	
			HRSW	kocz	fibw	dand	ruth	alfa	wibw	HRSW	kocz
		oz/A ai	% Control								
1	Untreated	0	0	0	0	0	0	0	0	0	0
2	Pyraflufen	0.012	1.2	62	63	59	60	65	82	0	22
3	Pyraflufen	0.038	7.5	74	40	65	84	--	81	5.0	65
4	Pyra + MVO	0.012 + 1%	7.5	72	47	58	88	33	90	5.0	30
5	Pyra + MVO	0.038 + 1%	13.8	92	40	75	96	68	81	5.0	80
6	Pyra + NIS	0.012 + 0.25%	1.2	65	69	78	93	65	87	5.0	50
7	Pyra + NIS	0.038 + 0.25%	5.5	89	37	38	96	--	63	7.5	54
8	Pyra + 2,4-D ester + NIS	0.012 + 4 + 0.25%	14.2	89	94	94	96	90	95	10.0	68
9	Pyra + Dicamba + NIS	0.012 + 1 + 0.25%	3.0	94	90	91	96	90	93	5.0	94
10	Pyra+Brox&MCPA5+NIS	0.012 + 8 + 0.25%	11.2	96	90	89	99	90	99	0.0	82
11	Pyra+Thifensulfuron+NIS	0.012+0.22+0.25%	5.0	76	40	68	97	50	97	10.0	40
12	Pyra + 2,4-D ester	0.038 + 4	7.5	81	85	91	96	92	92	1.2	70
13	Pyra + Dicamba	0.038 + 1	6.8	93	78	89	94	95	95	0.0	92
14	Pyra + Brox&MCPA5	0.038 + 8	15.0	96	70	81	97	87	99	16.2	92
15	Pyra+Thifensulfuron+NIS	0.038+0.22+0.25%	10.0	92	20	87	99	65	98	2.5	79
16	2,4-D ester	4	6.2	58	83	79	94	92	86	8.8	55
17	Dicamba	1	6.8	90	40	35	70	--	90	21.2	66
18	Bromoxynil&MCPA5	8	4.2	84.8	87	80	97	--	97	0.0	86
19	Thifensulfuron + NIS	0.22 + 0.25%	3.8	28	15	45	90	60	92	15.0	48
C.V. %			89.8	17.8	30.3	29.5	15.5	21.3	14.7	166	35.9
LSD 5%			8.8	19	24	29	19	23	18	NS	31

Summary

Crop injury was observed on all herbicide treatments on June 3. This injury tended to diminish over time except for thifensulfuron treatments 15 and 19 and dicamba treatment 17 which tended to increase. Kochia control was significantly higher for the higher rate of pyraflufen alone (trt 3) and pyraflufen + adjuvant (trts 5 and 7) than for the lower rate of pyraflufen alone (trt 2) or pyraflufen + adjuvant (trts 4 and 6). Weed control tended to not be as rate dependant for pyraflufen when applied in a tank mix. The addition of either a non-ionic surfactant (NIS) or methylated vegetable oil (MVO) to pyraflufen tended to enhance weed control. All tank mix combinations (trts 8 - 15) tended to have enhanced weed control over individual components applied alone.

Canada thistle control in glyphosate-resistant wheat. (Kirk Howatt, Ronald Roach, Janet Harrington). Glyphosate-resistant wheat was seeded May 6. Treatments were applied to 2-leaf wheat and 6 to 16 inch tall Canada thistle on June 9 with 66 F air temperature, 50% RH, 15% cloud cover, 4 mph northeast wind, and soil temperature of 60 F. Treatments were applied to 5-leaf wheat and 8 to 16 inch Canada thistle on June 22 with 63 F air temperature, 43% RH, clear sky, 4 to 8 mph west wind, and soil temperature of 53 F. All treatments were applied with a backpack sprayer delivering 8.5 gpa at 40 psi through TT 11001 flat-fan nozzles to a 10 ft wide area the length of 12 by 30 ft plots. The experiment had a randomized complete-block design with four replicates. Project was terminated prior to seed production. The Canada thistle population was counted twice in each plot and reached as many as 60 stems/m^2.

Table. Canada thistle control in glyphosate-resistant wheat.

Treatment[1]	Rate	Timing	June 18 Cath	August 18 Cath
	oz ai/A	no. wheat leaves	%	%
Glyphosate/glyphosate	6/6	2/5	40	95
Glyphosate	12	5	60	97
Glyphosate+ clopyralid&2,4-D	12+ 9.6	5	83	89
Glyphosate+tribenuron	12+0.24	5	61	96
Glyphosate+ bromoxynil&MCPA	12+ 8	5	63	85
Clopyralid&2,4-D	12.8	5	83	90
Tribenuron+2,4-D(Salvo)+ NIS	0.24+4+ 0.25%	5	53	36
Bromoxynil&MCPA	15	5	71	84
Brox&MCPA+tribenuron+ NIS	15+0.24+ 0.25%	5	74	86
Untreated	0		0	0
CV			26	16
LSD (P=0.05)			22	18

[1]Glyphosate was the Ultramax II formulation of the potassium salt of glyphosate; "/" indicates treatment components were separated in time; NIS was Activator 90 nonionic surfactant.

Treatments containing clopyralid and 2,4-D provided 83% control of Canada thistle on June 18 while other treatments gave 74% control or less. Glyphosate applied twice at 6 oz ae/A each only gave 40% thistle control on June 18. By August 18, the split-treatment of glyphosate provided 95% control of Canada thistle. Herbicide treatments other than tribenuron plus 2,4-D provided 84% to 97% control. Glyphosate plus tribenuron provided 96% thistle control on August 18, but tribenuron plus 2,4-D only gave 36% control. Why the tribenuron plus 2,4-D treatment gave such poor thistle control is not known. In other studies, this treatment has provided near 90% control.

Canada Thistle Control Simulated for Roundup Ready Wheat, Langdon 2004 (Lukach)

The treatments were intended to be in Roundup Ready wheat which was not planted. The trial was lined out along a grass drain in a field which was flax the previous year. The first application of the split roundup application was on June 5 at 7pm. The second application and all other in crop treatments were applied June 14 at 7pm. Canada thistle was bolting with stems up to 12 inches tall. The ground cover was 5 to 8 inches tall and consisted of volunteer flax, wild oat, red root pigweed and kochia. Conditions on June 5 were 71F, 38RH, 11mph northwest wind and clear sky. June 14 was 61F, 68RH, 7mph southeast wind with heavy clouds. A drift shield was used. Applications were made using a CO2 pressurized sprayer, mounted on tractor 3-point. DG8001.5 tips were used in 20 inch spacing at 35psi and 4.2mph applying 10 gal/a solution. Plot size was 25 x 22 feet with the uniform thistle close to the edge of the grass drain. The trial had a RCBD design with three replications. On August 13 the plot area was mowed about four inches high to simulate harvest. On Sept 29 each plot was split between no fall herbicide or 21.3 fl oz/a of Roundup Ultramax II + AMS at 7 lb/100gal. The same sprayer was used to apply 10 gal/a solution. Conditions on Sept 29 at 4:30pm were 69F, 47RH, 10mph south wind with partly cloudy sky. The thistle rosettes at application time were from greater than 9 inches in diameter to just emerging. All were green and healthy. Frosts on Oct 1, 2, 3 and 4 (28, 25, 26 and 20 degrees) desiccated the small plants and about 50 percent of the leaf area on the large rosettes. Other frosts prior to spray application were Aug 20 and 34 degrees on Sept 28. Fall tillage of the trial was two operations of a chisel plow on Nov 13.

Canada Thistle Control Langdon 2004		Jun 5	Aug 13				Sept 29			
		----------Canada Thistle ------------				Plant	---Canada Thistle ---			
Treatment	Rate	Plants	Plants	Height	Stage	Biomass	Plants	<9"	3"-9"	>3"
	oz/a product	------- per m2 -------		cm	1-3	1-10	------- per m2 -------			
Roundup Ultramax II + AMS / Roundup Ultramax II + AMS	10.7+ 1 lb/a / 10.7+ 1 lb/a	6.0	2.5	50.8	1.7	3.0	6.2	0.3	3.3	2.5
Roundup Ultramax II + AMS	21.3 + 1 lb/a	8.7	4.2	47.2	1.7	2.8	7.2	0.3	4.3	2.5
Glyp + Curtail + AMS	21.3 + 32.3 + 1 lb/a	7.2	3.5	58.7	1.7	2.3	9.7	2.2	5.3	2.2
Glyp + Express + AMS	21.3 + 0.2 + 1 lb/a	4.8	3.3	48.0	1.0	2.3	10.8	0.7	7.0	3.2
Glyp + Bronate Advanced + AMS	21.3 +12.8 + 1 lb/a	4.8	2.7	54.7	1.3	2.0	6.2	0.0	3.3	2.8
Curtail	42.5	5.8	1.5	51.8	1.3	6.8	3.7	0.0	1.8	1.8
Express + 2,4-Dester + NIS	0.2 +8 +0.25%	9.7	5.7	51.3	1.0	8.3	8.3	0.0	3.0	5.3
Bronate Advanced	24	8.3	5.7	66.3	2.0	3.5	11.2	0.2	8.2	2.8
Bronate Advanced + Express + NIS	24 +0.2 +0.25%	9.0	3.5	52.3	1.3	5.0	4.0	0.0	1.7	2.3
Untreated	---	10.7	11.5	128.8	3.0	6.3	14.0	0.2	10.3	3.5
Lsd 5%		NA	4.0	15.8	0.7	2.8	5.5	NA	3.6	NA

Canada Thistle Stage 1= vegetative, 2=bud, 3=flowering

Plant biomass 1=no plant growth, 10 = thick kochia 120 cm tall

All notes were taken on the plots as split for the fall application. This data is averaged over the split for fall application since those effects won't be seen until the spring of 2005.

Long-term milkweed control 2002-04. Jenks, Markle, and Willoughby. Spring wheat was seeded May 13, 2002 near Wolf Creek, ND. POST and POST II treatments were applied June 7, and 14 2002, respectively, with a bicycle sprayer delivering 10 gpa at 40 psi through XR 8001 nozzles to 4-leaf wheat, and up to 10-inch milkweed. Air and soil temperatures were 79 and 72 F, respectively, and relative humidity was 23% on June 7. Air and soil temperatures were 73 and 72 F, respectively, and relative humidity was 45% on June 14. Pre-harvest treatments were applied Aug 5, 2002 with a handboom delivering 10 gpa at 40 psi through XR 8001 nozzles. Air and soil temperatures were 72 and 71 F, respectively, and relative humidity was 46% on Aug 5. Individual plots were 10 x 30 ft and replicated four times. All common milkweed plants present in each plot were counted prior to the in-crop herbicide application on June 7, 2002. Canola was planted over the study area April 26, 2003. All milkweed plants present in each plot were counted June 4, 2003 prior to a single glyphosate application to canola. Spring wheat was seeded again in 2004. Milkweed plants were counted in the same fashion as previous years on June 7, 2004.

A visual evaluation of common milkweed control in August 2002 did not provide much useful information. Milkweed control ranged from 50-81%, but was not consistent across the four replications. Milkweed is difficult to control because it emerges at different times throughout the growing season. At the August 2002 evaluation, we observed some dead plants, some injured plants, and many healthy plants. It was not possible to determine whether these live plants were emerged or not at the June 2002 application time. The most encouraging observations came from the density counts in June 2003. All treatments reduced milkweed densities compared to the initial densities in 2002; however, treatments that received the pre-harvest glyphosate application had significantly lower milkweed densities in 2003.

Common milkweed densities generally increased slightly in most treatments in 2004 compared to 2003. The only herbicide applied in 2003 was a single glyphosate application in-crop to canola. Although milkweed density tended to increase slightly, the plants were very small when wheat was about 5-leaf. Fewer plants grew above the wheat canopy compared to previous years. Glyphosate was applied pre-harvest at 0.75 lb ae to the entire plot on July 27, 2004. The study will continue in 2005 to determine the impact of the 2004 pre-harvest glyphosate application.

Table. Long-term milkweed control 2002-2004 (Wolf Creek).

Herbicide treatment in wheat in 2002[ab]	Herbicide treatment in canola in 2003	Timing	Common milkweed Jun 7 2002	Jun 4 2003	Jun 7 2004
			plants / plot[d]		
Express + 2,4-D	Glyphosate[e]	POST	56	16	16
Same as above fb glyphosate[c]		PRE-H	154	12	23
Express + 2,4-D + Banvel	Glyphosate	POST	60	28	36
Same as above fb glyphosate		PRE-H	60	4	9
Express + 2,4-D + Starane	Glyphosate	POST	98	34	49
Same as above fb glyphosate		PRE-H	36	5	7
Express + 2,4-D/ Express	Glyphosate	POST / II	107	54	41
Same as above fb glyphosate		PRE-H	59	13	18
Express + Curtail	Glyphosate	POST	153	66	44
Same as above fb glyphosate		PRE-H	75	5	13
Paramount + Curtail + MSO	Glyphosate	POST	84	49	22
Same as above fb glyphosate		PRE-H	61	8	14

[a]*Express treatments were applied with Quad 7 at 1% v/v.*
[b]*Glyphosate applied in 2002 was Roundup Ultra Max at 0.75 lb ae with AMS at 2.5 gal/100 gal.*
[c]*Treatment listed above was applied in-crop followed by glyphosate applied pre-harvest.*
[d]*Represents the average number of milkweed plants over the four replications.*
[e]*Glyphosate applied in 2003 to canola was Roundup Ultra Max at 0.58 lb ae.*

Common milkweed control in barley. Jenks, Markle, and Willoughby. A study was initiated in 2003 to determine the short- and long-term impact of herbicides on common milkweed control. Barley was seeded May 20, 2003 north of Minot, ND. The 2-leaf, 5-leaf, and pre-harvest (PRE-H) treatments listed below were applied June 11, June 17, and August 14, 2003, respectively. Air and soil temperatures were 62 and 60 F, respectively, on June 11, relative humidity was 77%. Air and soil temperatures were 80 and 70 F, respectively, on June 17, relative humidity was 47%. Air and soil temperatures were 94 and 87 F, respectively, on August 14, relative humidity was 31%. All milkweed plants in each plot were counted on June 17, 2003 and again on June 21, 2004.

Glyphosate applied pre-harvest in 2003 significantly reduced milkweed densities more than in-crop treatments alone. Pre-harvest glyphosate reduced milkweed densities 91-98% compared to 54-74% and 45-50% for in-crop treatments containing Express and Aim, respectively. Wheat was planted into the study area in 2004. A blanket treatment of Express (0.33 oz) + MCPE (0.75 pt) + Starane (0.5 pt) + Puma (0.66 pt) was applied June 24, 2004. Glyphosate was applied pre-harvest over the entire plot area September 7, 2004.

Table. Common milkweed control in barley (Minot 2004).

			Common milkweed	
Treatment[ab]	Rate	Timing	Jun 17 2003	Jun 21 2004
			—— plants / plot ——	
Express + NIS/ Express + MCPA + Starane + Puma	0.167 oz + 0.25% v/v/ 0.167 oz + 0.75 pt + 0.5 pt + 0.67 pt	2-leaf/ 5-leaf	112	45
Express + MCPA + Starane + Puma	0.33 oz + 0.75 pt + 0.5 pt + 0.67 pt	5-leaf	111	42
Express + NIS/ Express + MCPA + Starane + Puma/ Glyphosate	0.167 oz + 0.25% v/v/ 0.167 oz + 0.75 pt + 0.5 pt + 0.67 pt/ 26 fl oz	2-leaf/ 5-leaf/ PRE-H	123	6
Express + MCPA + Starane + Puma/ Glyphosate	0.33 oz + 0.75 pt + 0.5 pt + 0.67 pt/ 26 fl oz	5-leaf/ PRE-H	132	11
Express + MCPA + Starane + Puma[c]	0.33 oz + 0.75 pt + 0.5 pt + 0.67 pt	5-leaf	130	32
Aim + MCPA + Puma	0.5 oz + 0.75 pt + 0.67 pt	5-leaf	121	60
Aim + MCPA + Puma	1 oz + 0.75 pt + 0.67 pt	5-leaf	74	35
Aim + MCPA + Puma/ Glyphosate	0.5 oz + 0.75 pt + 0.67 pt/ 26 fl oz	5-leaf/ PRE-H	97	2
Aim + MCPA + Puma/ Glyphosate	1 oz + 0.75 pt + 0.67 pt/ 26 fl oz	5-leaf/ PRE-H	128	3
Aim + MCPA + Puma[c]	0.5 oz + 0.75 pt + 0.67 pt	5-leaf	89	45
Aim + MCPA + Express + Puma	0.5 oz + 0.75 pt + 0.167 oz + 0.67 pt	5-leaf	107	32
Aim + MCPA + Express + Puma/ Glyphosate	0.5 oz + 0.75 pt + 0.167 oz + 0.67 pt/ 26 fl oz	5-leaf/ PRE-H	92	4
LSD (0.05)			NS	24
CV			49	64

[a]*Glyphosate applied was Roundup Ultra Max with AMS at 2.5 gal/100 gal.*
[b]*Express (0.33 oz) + MCPE (0.75 pt) + Starane (0.5 pt) + Puma (0.66 pt) was applied as a blanket treatment in 2004.*
[c]*A post-harvest glyphosate application was planned, but not applied in 2003 due to no weed regrowth.*

Control of volunteer wheat. (Kirk Howatt, Ronald Roach, Janet Harrington). The experiment was established in a field which previously was cropped with glyphosate-resistant wheat. Treatments were applied to 5- to 6-leaf volunteer wheat on June 22 with 52 F air temperature, 63% RH, 100% cloud cover, 4 mph west wind, and soil temperature of 53 F. Treatments were applied using a backpack sprayer delivering 8.5 gpa at 35 psi through TT 11001 flat-fan nozzles to a 7 ft wide area the length of 10 by 30 ft plots. The experiment had a randomized complete-block design with four replicates.

Table. Control of volunteer wheat.

Treatment[1]	Rate	June 27 Wht	July 02 Wht
	oz ai or ae/A	%	%
Glyphosate+clethodim	6+0.5	6	35
Glyt+clet+NPak	6+0.5+2.5%	16	63
Glyt+clet+Alliance	6+0.5+1.25%	19	74
Glyt+clet+Destiny+NPak	6+0.5+1%+2.5%	23	73
Glyt+clet+Preference+NPak	6+0.5+0.25%+2.5%	16	70
Glyt+clet+SuperbHC+NPak	6+0.5+0.5%+2.5%	21	73
Glyt+clet+SuperbHC+Alliance	6+0.5+0.5%+1.25%	21	71
Glyt+clet+AG03002	6+0.5+1%	20	74
CV		23	5
LSD (P=0.05)		6	5

[1]Glyphosate was a potassium salt formulated in Ultramax II; AG03002 was a proprietary adjuvant from Agriliance.

Addition of each adjuvant in this study increased control of wheat with glyphosate plus clethodim. Glyphosate plus clethodim with Destiny and NPak provided 23% control of wheat on June 27. Only the herbicides with NPak alone or Preference and NPak, each at 16%, gave less control than with Destiny and NPak. NPak as an adjuvant system gave 63% wheat control compared with 35% for clethodim alone, but other adjuvant systems provided 70% to 74% control on July 2.

Varietal Tolerance to Treflan Herbicide at Hettinger. (Eriksmoen)

HRSW	2004	2003	2002	2000
Keene	0	0	0	0
Russ	+	0	0	+
Oxen	0	0	0	0
Gunner	0	0	0	0
Reeder	+	0	0	0
Parshall	0	0	0	0
Ingot	+	0	0	0
Norpro	0	0	0	+
Mercury	0	0	?	0
Alsen	0	0	0	0
Knudson	+	0	+	
AC Superb	0	0	0	
Briggs	0	0	0	
Hanna	0	0	0	
Dapps	0	0	0	
Granite	+	0	0	
Outlook	0	0	0	
Steele ND	0	0	0	
AC Amizon	0	0		
Laser	0	0		
Freyer	0			
Banton	0			
Trooper	+			
Dandy		0	+	+
McKenzie		0	0	0
Keystone		0	0	
Zeke		0	+	
Hank		0	0	
AC Corinne		0		
AC Glenavon		0		
Walworth			0	
Ernest				0
Butte 86				+
Ivan				+
Grandin				+
Aurora				+
Conan				+
Scholar				+

Durum	2004	2003	2002	2000
Rugby	+	0	0	0
Monroe	+	0	0	0
Renville	0	0	0	0
Munich	0	0	0	0
Ben	0	0	0	+
Belzer	0	0	0	0
Maier	0	0	0	0
Mountrail	0	0	0	0
Pierce	+	0	0	0
Dilse	+	0	0	0
Lebsock	0	0	0	0
Plaza	+	0	0	0
AC Avonlea	0	0		
Primo D'Oro	0			
1AS/1D2				0
AC Melita				0
Plenty				0
Kari				0
Dressler				0

Application Date: 4/3/04, 4/1/03, 4/11/02, 4/4/00
Seeding Date: 4/5/04, 4/8/03, 4/11/02, 4/4/00
Application Rate: 0.75 lb/a ai (1.5 pt/A product)
Stand reduction: + = susceptible, 0 = tolerant

2004 Varietal Tolerance to Treflan Herbicide at Hettinger. (Eriksmoen)

HRSW	May 26
Oxen	0
Mercury	0
Parshall	0
Reeder	+
Alsen	0
Briggs	0
Granite	+
Dapps	0
Keene	0
Gunner	0
Russ	+
Ingot	+
Norpro	0
AC Amizon	0
AC Superb	0
Knudson	+
Hanna	0
Steele ND	0
Freyer	0
Banton	0
Laser	0
Outlook	0
Trooper	+
ND751	0
NDSW0246	0
ND804	+
ND805	0
ND806	0
ND807	0

Durum	May 26
Rugby	+
Monroe	+
Renville	0
Munich	0
Ben	0
Belzer	0
Maier	0
Mountrail	0
Lebsock	0
Plaza	+
Pierce	+
Dilse	+
AC Avonlea	0
Primo D'Oro	0
D96694	+
D97780	+
D971511	0
D00095	0
D00534	0
D00535	0
D00622	0
D00624	0
D00704	+
D00752	0
D00767	+
D00879	0
D00969	0
D001097	0
DH1039	0
DH01060	0
DH01066	0
DG014152	0
CA-801-706	0

Application Date: April 3 Seeding Date: April 5
Application Rate: 0.75 lb/a ai, (1.5 pt/A product)

Stand reduction: + = susceptible, 0 = tolerant

2004 HRSW Varietal Tolerance to Far-Go Herbicide at Hettinger. (Eriksmoen)

Variety	5/26/04
Oxen	0
Mercury	0
Parshall	0
Reeder	0
Alsen	0
Briggs	0
Granite	+
Dapps	0
Keene	0
Gunner	0
Russ	0
Ingot	0
Norpro	0
AC Amizon	0
AC Superb	0
Knudson	0
Hanna	0
Steele ND	0
Freyer	0
Banton	0
Laser	+
Outlook	+
Trooper	0
ND751	0
NDSW0246	0
ND804	+
ND805	+
ND806	0
ND807	0
Application Date	April 3
Seeding Date	April 5
Rate (product)	3 pt

Stand reduction: + = susceptible, 0 = tolerant

HRSW Varietal Tolerance to Far-Go Herbicide at Hettinger. (Eriksmoen)

Variety	5/26/04	6/10/03	5/24/02	5/22/01	5/22/00	6/9/99	5/26/98	6/18/97	6/20/96	6/9/95
Keene	0	0	+	+	0	0	+	0	+	0
Russ	0	0	0	0	0	0	?	0	0	0
Oxen	0	0	0	0	0	0	0	0	0	0
Gunner	0	0	0	+	0	0	0	0	+	
Reeder	0	0	0	0	0	0	0	0	0	
Parshall	0	0	0	0	0	0	0	0	0	
Ingot	0	0	0	0	0	0	0			
Norpro	0	0	0	0	0	0				
Mercury	0	0	0	0	0	0				
Alsen	0	0	0	0	0	0				
Dapps	0	0	+	+	?	0				
Knudson	0	+	0	+						
AC Superb	0	?	0	+						
Briggs	0	0	0	0						
Hanna	0	0	0	0						
Granite	+	0	?							
Outlook	+	0	+							
Steele ND	0	0	0							
Laser	+	0								
AC Amazon	0	0								
Freyer	0									
Banton	0									
Trooper	0									
Dandy		0	0	0	0	0				
McKenzie		0	0	+	+	0				
Keystone		+	0	0						
Zeke		0	0	0						
Hank		0	0							
AC Corinne		0								
AC Glenavon		0								
Walworth			0	0						
Grandin				0	0	0	0	0	0	0
Ivan				+	+	0	+			
Butte 86					0	0	0	0	0	0
2375					0	0	0	0	0	0
Ernest					+	0	?	0	+	0
AC Barrie						0	?	0	+	+
Argent						0	0	0	0	0
Amidon						0	+	+	+	+
Trenton						0	0	0	0	0
Hammer						0	+	0	+	+
Application Date	4/3	4/1	4/11	4/16	3/27	4/12	4/3	4/3	4/18	3/24
Seeding Date	4/5	4/8	4/11	4/17	4/4	4/13	4/8	4/29	4/19	4/7
Rate (product)	3 pt	3 pt	3 pt	3 pt	3 pt	3 pt	3 pt	3 pt	2 pt	2 pt

Stand reduction: + = susceptible, ? = questionable, 0 = tolerant

2004 Small Grain Variety Tolerance to Pyraflufen at Hettinger. (Eriksmoen) Varieties of HRSW, durum, barley and oat were seeded on April 5. Pyraflufen was applied at rates of 1 ounce and 2 ounces of product pre acre to 4 leaf small grain varieties on May 27 with 59° F, 68% RH, clear sky and 3 mph W wind. Treatments were applied with a pickup mounted sprayer delivering 20 gpa at 40 psi through 8004 flat fan nozzles to a 6 foot wide area the width of 11 by 120 foot plots. The experiment was not replicated. Varieties were evaluated for crop injury on May 29, June 4 and on June 22.

HRSW	Durum	Barley	Oat
Oxen	Rugby	Morex	AC Assiniboia
Mercury	Monroe	Robust	Beach
Parshall	Renville	Excel	Buff
Reeder	Munich	Stander	CDC Dancer
Alsen	Ben	Foster	Ebeltoft
Briggs	Belzer	Drummond	AC Gwen
Granite	Maier	Lacey	Hytest
Dapps	Mountrail	Legacy	HiFi
Keene	Lebsock	Tradition	Jerry
Gunner	Plaza	Bowman	AC Kaufman
Russ	Pierce	Conlon	Killdeer
Ingot	Dilse	Eslick	AC Medallion
Norpro	AC Avonlea	Harrington	Monida
AC Amizon	Primo D'Oro	Logan	Morton
AC Superb	D96694	AC Metcalfe	Otana
Knudson	D97780	Stark	CDC Pacer
Hanna	D971511	Valier	AC Pinnacle
Steele ND	D00095	Haxby	Paul
Freyr	D00534	ND17711	Reeves
Banton	D00535	2ND19119	AC Ronald
Laser	D00622	2ND19854	Sesqui
Outlook	D00624		Stark
Trooper	D00704		Youngs
ND751	D00752		ND000244
NDSW0246	D00767		ND000305
ND804	D00879		ND000824
ND805	D00969		ND010264
ND806	D001097		ND9508252-75-5
ND807	DH01039		
	DH01060		
	DH01066		
	DG014152		
	CA-801-706		

Summary: All varieties exhibited severe leaf chlorosis an necrosis on May 29. New plant growth was evident on all varieties on June 4. There was no noticeable injury (plant stunting, head deformity, leaf chlorosis or necrosis) to any variety on June 22.