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Triallate winter incorporation. Howatt, Roach, and Harrington. Fall treatments were applied near Fargo on November 2 with 35°F, 89% relative humidity, partly cloudy sky, 0 mph wind velocity, and dry topsoil at 40°F. Spring treatments were applied to 1 leaf wild oat prior to the main spring emergence flush on April 22 with 41°F, 63% relative humidity, 3.3 mph wind at 45°, and damp topsoil at 40°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 40 psi through 11001 TT nozzles to a 7 foot wide area the length of 10 by 30 feet. The experiment was a randomized complete block design with four replicates.

Treatment	Rate	Growth Stage	5/20 wioa	6/8 wioa
Triallate	16	Fall	3	0
Triallate	20	Fall	9	5
Triallate	24	Fall	12	14
Triallate	32	Fall	13	15
Triallate/Triallate	12/12	Fall/Spring	11	10
Triallate/Triallate	16/16	Fall/Spring	13	10
Triallate	20	Spring	20	15
Triallate	32	Spring	23	15
Untreated Check	0		0	0
CV			24	9
LSD P=.05			4	1

Triallate has been very effective when mechanically incorporated. Desire for direct seed and minimum tillage systems does not allow adequate mechanical incorporation. Timely precipitation could promote incorporation of herbicide but amount and intensity dictates benefit. Some indicate sufficient incorporation with precipitation on sandy soil to achieve 75% control without full mechanical incorporation. This soil has high clay content, which reduces infiltration compared with sandier soils. In this study, minimal activity was obtained without mechanical incorporation and relying on only precipitation to incorporate the herbicide.

Weed control with IB6002. Howatt, Roach, and Harrington. Treatments, 14 days before planting, were applied to crop area pre-plant, to less than 4 inch tall field pennycress and less than 3 inch downy brome grass on May 5 with 62°F, 46% relative humidity, 10% hazy sky, 6 to 12 mph wind velocity at 135°, and dry topsoil at 52°F. Treatments 7 days before planting were applied to crop pre-plant, pre-flowering field pennycress, and greater than 4 leaf downy brome grass on May 12 with 50°F, 73% relative humidity, 100% cloudy sky, 9 to 15 mph wind velocity at 270°and dry topsoil at 51°F. Treatments 0 days before planting were applied to crop pre-plant, bolting field pennycress, and 1 to 5 leaf downy brome clumps, and 4 leaf wild buckwheat on May 19 with 64°F, 43% relative humidity, clear sky, 8 to 12 mph wind velocity at 180°, and dry topsoil at 60°F. Prosper hard red spring wheat was seeded near Fargo, May 19. All treatments were applied with a backpack sprayer delivering 17 gpa at 40 psi through 11002 TT nozzles to a 7 foot wide area the length of 10 by 30 foot plots. The experiment was a randomized complete block design with four replicates.

		Before	May 12		May 19		May 26		June 9			
Treatment	Rate	planting	fipc	dobr	dobr	fipc	dobr	fipc	wht	dobr	fipc	wibw
	oz/A	days	%	%	%	%	%	%	%	%	%	%
IB6002+MSO+AMS-L	0.71+1%+90	14	79	60	85	95	78	93	0	45	94	88
IB6002+MSO+AMS-L	1.07+1%+90	14	83	73	88	96	85	93	0	73	91	85
IB6002+MSO+AMS-L	1.43+1%+90	14	83	78	90	97	90	97	0	85	93	88
IB6002+MSO+AMS-L	2.14+1%+90	14	88	75	93	97	94	97	0	90	97	97
Saff+MSO+AMS-L	0.71+1%+90	14	79	0	0	93	0	96	0	0	97	97
IB6002+MSO+AMS-L	0.71+1%+90	7	0	0	40	53	55	93	0	55	91	59
IB6002+MSO+AMS-L	1.07+1%+90	7	0	0	73	74	80	96	0	83	95	84
IB6002+MSO+AMS-L	1.43+1%+90	7	0	0	85	78	88	97	0	83	93	89
IB6002+MSO+AMS-L	2.14+1%+90	7	0	0	90	86	93	97	0	93	97	97
Saff+MSO+AMS-L	0.71+1%+90	7	0	0	0	78	0	97	0	0	97	97
IB6002+MSO+AMS-L	0.71+1%+90	0	0	0	0	0	70	55	0	65	60	63
IB6002+MSO+AMS-L	1.07+1%+90	0	0	0	0	0	70	56	0	78	63	76
IB6002+MSO+AMS-L	1.43+1%+90	0	0	0	0	0	83	63	0	75	69	92
IB6002+MSO+AMS-L	2.14+1%+90	0	0	0	0	0	90	80	0	85	85	94
Saff+MSO+AMS-L	0.71+1%+90	0	0	0	0	0	0	66	0	0	85	96
Untreated Check	0		0	0	0	0	0	0	0	0	0	0
CV			7	5	5	4	5	4	0	8	6	8
LSD P=.05			2	1	3	3	6	5	.	10	7	9

Increased rate of IB6002 provided increased control of weeds present. The high rate of IB6002 gave similar control of broadleaf weeds to saflufenacil. However, saflufenacil did not affect downy brome at all while control with IB6002 exceeded 90% at the high rate. Wheat did not express injury to any herbicide treatment. Application at least 7 days before planting allowed better control of field pennycress likely based on plant development, but control of other weeds was consistent across timing at 1 oz/A or more.

Residual activity of Halauxifen. Howatt, Roach, and Harrington. Treatments were applied to crop area preemergence to 2 inch diameter field pennycress, 2 leaf common mallow, and 2 to 3 leaf wild buckwheat on May 12 with 68°F, 80% relative humidity, 100% cloud cover, 6 to 12 mph wind velocity at 270°, and dry topsoil at 52°F. 'Prosper' hard red spring wheat was seeded near Fargo on May 19. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 40 psi through 11001 TT nozzles to a 7 foot wide area the length of 10 by 30 foot plots. The experiment was a randomized complete block design with four replicates.

		May 19					May 26	June 2	June 9	June 22	
Treatment	Rate	fipc	colq	rrpw	wibw	coma	wht	wht	wht	rrpw	vema
Glyt-dma+AMS	9+22	99	99	99	99	99	0	0	0	0	0
Glyt-dma +Halauxifen&Flas+AMS	9 +0.15+22	99	99	99	99	99	0	0	0	80	75
Glyt-dma+Saflufenacil +AMS	9+0.36 +22	99	99	99	99	99	0	0	0	74	69
Glyt-dma+Dicamba +AMS	9+2 +22	99	99	99	99	99	0	0	0	63	50
Glyt-dma+Carfentrazone +AMS	9+0.26 +22	99	99	99	99	99	0	0	0	30	28
Untreated Check	0	0	0	0	0	0	0	0	0	0	0
CV		0	0	0	0	0	0	0	0	12	15
LSD P=.05		.	.	.	.	.	.	.	.	7	8

Glyphosate was able to control small weeds without the addition of other herbicides. Wheat was not injured by soil residues of any of the herbicides applied. Control of weeds with herbicide residue in the soil could not be evaluated until new emergence of weeds in mid-June. Halauxifen and florasulam provided 80 and 75% control of pigweed and Venice mallow, respectively. This was similar to control with saflufenacil and better than dicamba or carfentrazone.

Evaluation of Quelex for preplant weed control in HRSW. (Minot). Quelex was recently registered for postemergence use in small grains. This study evaluated Quelex for preplant weed control compared to other standard herbicides. Treatments were applied May 7 and wheat was planted May 12. No wheat injury was observed.

Durango (glyphosate) plus Sharpen or Aim (Group 14 herbicides) provided about 25% less dandelion control compared to Durango applied alone or Durango tank mixed with Quelex or Clarity (based on June 15 evaluation). All treatments provided good control of emerged wild buckwheat and lambsquarters.

Table. Evaluation of Quelex for preplant weed control in HRSW. (1614)

		Weed Control[b]							
		Dand			Wibw			Colq	
Treatment[ac]	Rate	May-12	May-24	Jun-15	May-12	May-24	Jun-15	May-24	Jun-15
		----------%----------							
Untreated		0	0	0	0	0	0	0	0
Durango	18 oz	20	93	86	17	97	82	100	83
Quelex + Durango	0.75 oz + 18 oz	17	93	88	23	100	86	100	87
Sharpen + Durango	1 oz + 18 oz	70	77	62	70	100	86	100	88
Clarity + Durango	4 oz + 18 oz	23	91	86	40	100	81	100	88
Aim + Durango	2 oz + 18 oz	52	74	63	57	100	81	100	77
LSD (0.05)		12.8	5.7	10.4	7.2	3.4	3.8	0	10.3

[a] *All treatments applied with AMS (2.5 gal/100 gal)*

[b] *Dand=Dandelion; Wibw=Wild buckwheat; Colq=Common lambsquarters*

[c] *Treatments applied May 7 and wheat planted May 12*

Anthem Flex Applied as Preemergence Burndown for Weed Control in Spring Wheat

Caleb Dalley, HREC, Hettinger, ND, 2016

A field trial was conducted to evaluate weed control and spring wheat tolerance to Anthem Flex applied as part of a PRE burndown combined with POST application of WideMatch compared to other PRE/POST and total POST herbicide options. Anthem Flex combines the contact herbicide carfentrazone with the soil active preemergence herbicide pyroxasulfone. Spring wheat 'Elgin' was planted at a rate of 100 lb/A on May 6, 2016 using a John Deere 1590 no-till drill. At planting, 40 lb/A of starter fertilizer (18-46-0) was drilled into the planting drill. Prior to planting, urea fertilizer (46-0-0) was broadcast applied at a rate of 120 LB/A. PRE burndown treatments were applied on May 9 using a tractor mounted research sprayer at a spray volume of 10 gal/A using flat fan nozzles spaced at 20 inches and using CO2 as a propellant. Wheat emerged on May 15. Little rainfall occurred between planting and crop emergence (0.36 inches) and daily rainfall never exceed 0.2 inches. POST treatments were applied on June 15 using the same equipment and procedures as previously described. Weeds present in the trial included field pennycress, shepherd's purse, flixweed, horseweed, common mallow, Japanese brome and common lambsquarters, and green foxtail. Wheat was evaluated for injury at 8 and 17 days after crop emergence and at 7, 16, 21, and 28 days after POST treatment application (DAT). No injury was observed as a result of PRE treatments at any of the evaluation dates. Mild injury in the form of stunting or slight yellowing was observed following POST application of Goldsky and WideMatch plus Axial. Injury would not have been noticed if not for side by side comparisons with untreated wheat. A general rating of annual mustard control was taken at 18 days after the PRE application. All Anthem Flex plus glyphosate treatments control annual mustards97-99%. Horseweed was controlled 100% with all PRE treatments of AnthemFlex plus glyphosate, regardless of rate. POST treatments controlled horseweed in a range of 74% with Goldsky to 88% with Olympus followed by WideMatch. Common lambsquarters was controlled 96 to 100% with PRE treatments of Anthem Flex plus glyphosate. At 28 DAT, common lambsquarters control was 71% or less with POST treatments. Prickly lettuce was controlled 100% with PRE application of Anthem Flex plus glyphosate. At 28 DAT, common lambsquarters control ranged from 65% with Goldsky to 80% with WideMatch plus Axial. Green foxtail control at 28 days after POST application ranged from 75 to 83% with PRE application of Anthem Flex plus glyphosate, with no significant increase in control as rate increased, however, there was a trend for increased green foxtail control as Anthem Flex rate increased from 2.5 oz/A (75%) to 4.5 oz/A (83%). Anthem Flex plus glyphosate followed by Everest 2.0 and WideMatch controlled green foxtail at 89%. POST applications provided poor control of green foxtail (30-54%). Spring wheat was harvested on August 4 using a Kincaid plot combine with a 5 foot header. All PRE Anthem Flex plus glyphosate treatments yielded similar to the weed free control. The highest yield was recorded in plots where the highest rate of Anthem Flex was used (4.5 oz/A). Yield was less than the weed free control with POST treatments of WideMatch plus Axial and Goldsky. Olympus PRE followed by WideMatch POST yielded similar to the weed free control. This year's trial alone would conclude that Anthem Flex is safe when applied PRE to spring wheat. However, conditions at Hettinger were very dry during 2016 with less than 4 inches of rain occurring between planting and harvest compared with average rainfall of around 8 inches during this time period. Further evaluation of Anthem Flex during average or above average rainfall is needed to come to firm conclusions regarding the safety of Anthem Flex applied PRE to spring wheat in western North Dakota.

Treatment	Rate	Wheat injury 7 DAT	Wheat injury 16 DAT	Wheat injury 28 DAT	Common lambsquarters	Green foxtail	Prickly Lettuce	Horseweed	Test wt	Yield
		——%——			——control at 28 DAT (%)——				lbs/bu	bu/A
1 Anthem Flex	2.5 oz/a	0 c	0 a	0 b	100 a	75 c	100 a	100 a	54 a	22.7 ab
Glyphosate	32 oz/a									
AMS	17 lb/100 gal									
WideMatch	1.33 pt/a									
2 Anthem Flex	3 oz/a	0 c	0 a	0 b	96 a	76 c	100 a	100 a	53 abc	25.6 a
Glyphosate	32 oz/a									
AMS	17 lb/100 gal									
WideMatch	1.33 pt/a									
3 Anthem Flex	3.5 oz/a	0 c	0 a	0 b	100 a	81 bc	100 a	100 a	53 ab	25.8 a
Glyphosate	32 oz/a									
AMS	17 lb/100 gal									
WideMatch	1.33 pt/a									
4 Anthem Flex	4.5 oz/a	0 c	0 a	0 b	100 a	83 bc	100 a	100 a	53 abc	27.0 a
Glyphosate	32 oz/a									
AMS	17 lb/100 gal									
WideMatch	1.33 pt/a									
5 Anthem Flex	3.5 oz/a	0 c	0 a	0 b	100 a	89 b	100 a	100 a	53 ab	23.3 ab
Glyphosate	32 oz/a									
AMS	17 lb/100 gal									
Everest 2.0	1 oz/a									
WideMatch	1.33 pt/a									
6 WideMatch	1.33 pt/a	3 b	0 a	3 a	68 bc	54 d	80 b	85 b	52 c	14.3 d
Axial XL	16.4 oz/a									
7 Olympus	0.9 oz/a	0 c	0 a	0 b	71 b	30 f	74 c	88 b	53 abc	25.1 a
WideMatch	1.33 pt/a									
8 GoldSky	1 pt/a	6 a	0 a	1 b	59 c	40 e	65 d	74 c	53 bc	17.1 cd
9 Weed Free		0 c	0 a	0 b	100 a	100 a	100 a	100 a	53 bc	25.7 a
Glyphosate	32 oz/a									
AMS	17 lb/100 gal									
Olympus	0.9 oz/a									
10 Untreated		0 c	0 a	0 b	0 d	0 g	0 e	0 d	50 d	19.0 bc
LSD P=.10		1.1	NS	1.3	10.6	9.0	4.6	4.6	1.5	4.46
Standard Deviation		0.9	0.0	1.1	8.8	7.4	3.8	3.8	1.3	3.70
CV		118.34	0.0	252.43	11.05	11.87	4.64	4.54	2.43	16.4
Treatment F		14.9	0.00	3.38	53.8	70.07	277.9	262.1	3.71	5.43
Treatment Prob(F)		0.0001	1.0000	0.0067	0.0001	0.0001	0.0001	0.0001	0.0039	0.0003

Wheat tolerance to Flumioxazin&Pyroxasulfone POST. Howatt, Roach, and Harrington. 'Prosper' hard red spring wheat was seeded near Fargo on May 5. Treatments were applied to 2 leaf wheat on June 2 with 71°F, 33% relative humidity, 5% cloud cover, 3 to 7 mph wind at 270°, and dry topsoil at 63°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 40 psi through 11001 TT nozzles to a 7 foot wide area the length of 10 by 30 foot plots. The experiment was a randomized complete block design with four replicates.

Treatment	Rate	June 8 wht	June 16 wht	June 30 wht	July 29 wht	August 22 Yield
Pxlm&Flas&Flox +NIS+AMS	1.67 +0.25%+24	3	2	0	0	39
Flumioxazin	0.77	9	4	0	0	44
Flum&Pxsf	1.14	9	5	0	0	44
V10425	1.14	13	6	0	0	41
Flum&Pxsf	2.28	13	5	0	0	44
V10425	2.28	23	7	0	0	39
Untreated Check	0	3	2	0	0	45
CV		24	31	0	0	8
LSD P=.05		4	2	.	.	5

Wheat was seeded shallow to accentuate injury. Weeds did not emerge in this specially planted area so weed control could not be evaluated. Pyroxsulam resulted in slight chlorosis that was not different than untreated wheat. Flumioxazin and the equivalent rate of flumioxazin and pyroxasulfone resulted in 9% injury that was observed as chlorosis and leaf tip burn. V10425 caused 4 to 10% more injury than flumioxazin and pyroxasulfone. The injury did not develop on new tissue so, as leaves senesced, no injury was observed. However, the high rate of V10425 resulted in less wheat yield as well as treatment with Pyroxsulam, and there was a trend for less yield with the low rate of V10425. Yield of wheat treated with flumioxazin or flumioxazin and pyroxasulfone was very similar to untreated wheat.

Wheat Response to glyphosate at 4 leaf stage, Location 1. Howatt, Roach, and Harrington. Wheat was seeded near Cooperstown, ND on May 10. Treatments were applied to 4 leaf wheat on June 16 with 72°F, 85% relative humidity, 25% cloud cover, 6 to 12 mph wind velocity at 90°, and damp topsoil at 67°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 40 psi through 11001 TT nozzles to a 7 foot wide area the length of 10 by 30 foot plots. The experiment was a randomized complete block design with four replicates.

Treatment	Rate	June 30 wht	July 15 wht	August 23 Yield
	oz/A	%	%	bu/A
Glyphosate4.5+NIS+AMS	0.025+0.25%+12	0	0	43
Glyphosate4.5+NIS+AMS	0.05+0.25%+12	7	4	38
Glyphosate4.5+NIS+AMS	0.1+0.25%+12	18	13	26
Glyphosate4.5+NIS+AMS	0.15+0.25%+12	23	29	24
Glyphosate4.5+NIS+AMS	0.2+0.25%+12	33	43	17
Glyphosate4.5+NIS+AMS	0.25+0.25%+12	48	60	16
Glyphosate4.5+NIS+AMS	0.3+0.25%+12	64	75	11
Glyphosate4.5+NIS+AMS	0.35+0.25%+12	76	83	7
Untreated Check	0	0	0	46
CV		13	9	12
LSD P=.05		5	4	4

Mild to moderate visible injury caused wheat damage that resulted in less wheat yield. At visible injury ratings less than 25%, yield loss percentage was about three times the injury rating. Leaf tissue samples were sent for lab analysis of glyphosate residue, which was not correlated well with injury or yield loss. Shikimate content also was requested and results have not yet been received. Shikimate accumulation is a direct result of glyphosate action and could provide a better early diagnostic tool to estimate loss.

Wheat Response to glyphosate at 4 leaf stage, Location 2. Howatt, Roach, and Harrington. 'Prosper' hard red spring wheat was seeded near Fargo on May 9. Treatments were applied to 5 leaf, tillering wheat on June 16 with 69°F, 85% relative humidity, clear sky, 2 to 6 mph wind velocity at 90°, and dry topsoil at 63°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 40 psi through 11001 TT nozzles to a 7 foot wide area the length of 10 by 30 foot plots. The study area was treated with herbicides to control weeds. The experiment was a randomized complete block design with four replicates.

Treatment	Rate	June 30 wht	July 15 wht	August 15 Yield
	oz/A	%	%	bu/A
Glyphosate 4.5+NIS+AMS	0.025+0.25%+12	0	0	50
Glyphosate 4.5+NIS+AMS	0.05+0.25%+12	1	2	46
Glyphosate 4.5+NIS+AMS	0.1+0.25%+12	9	7	32
Glyphosate 4.5+NIS+AMS	0.15+0.25%+12	23	23	20
Glyphosate 4.5+NIS+AMS	0.2+0.25%+12	40	44	16
Glyphosate 4.5+NIS+AMS	0.25+0.25%+12	65	66	9
Glyphosate 4.5+NIS+AMS	0.3+0.25%+12	78	80	7
Glyphosate 4.5+NIS+AMS	0.35+0.25%+12	89	94	3
Untreated Check	0	0	0	50
CV		12	10	12
LSD P=.05		6	5	4

Mild to moderate visible injury caused wheat damage that resulted in less wheat yield. At visible injury ratings less than 25%, yield loss percentage was about three times the injury rating. Leaf tissue samples were sent for lab analysis of glyphosate residue, which was not correlated well with injury or yield loss. Shikimate content also was requested and results have not yet been received. Shikimate accumulation is a direct result of glyphosate action and could provide a better early diagnostic tool to estimate loss.

Wheat Response to glyphosate 4.5 at 4 leaf stage, Location 3. Howatt, Roach, and Harrington. 'Prosper' hard red spring wheat was seeded near Prosper, ND on May 16. Treatments were applied to 4.5 to 5 leaf wheat on June 16 with 69°F, 86% relative humidity, 5% cloud-cover, 4 to 7 mph wind at 90°, and damp topsoil at 64°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 40 psi through 11001 TT nozzles to a 7 foot wide area the length of 10 by 30 foot plots. The experiment was a randomized complete block design with four replicates. The whole study area was treated with herbicides to remove weed competition. Harvest for yield was August 17.

Treatment	Rate	6/30 wht	7/15 wht	8/17 Yield
	oz/A	%	%	bu/A
Glyphosate 4.5+NIS+AMS	0.025+0.25%+12	0	0	36
Glyphosate 4.5+NIS+AMS	0.05+0.25%+12	0	1	34
Glyphosate 4.5+NIS+AMS	0.1+0.25%+12	14	7	29
Glyphosate 4.5+NIS+AMS	0.15+0.25%+12	38	21	17
Glyphosate 4.5+NIS+AMS	0.2+0.25%+12	59	48	18
Glyphosate 4.5+NIS+AMS	0.25+0.25%+12	73	65	17
Glyphosate 4.5+NIS+AMS	0.3+0.25%+12	85	84	7
Glyphosate 4.5+NIS+AMS	0.35+0.25%+12	89	91	4
Untreated Check	0	0	0	38
CV		8	10	17
LSD P=.05		4	5	5

Mild to moderate visible injury caused wheat damage that resulted in less wheat yield. At visible injury ratings less than 25%, yield loss percentage was about three times the injury rating. Leaf tissue samples were sent for lab analysis of glyphosate residue, which was not correlated well with injury or yield loss. Shikimate content also was requested and results have not yet been received. Shikimate accumulation is a direct result of glyphosate action and could provide a better early diagnostic tool to estimate loss.

Wheat Response to New OD Formulations of SU. Howatt, Roach, and Harrington. 'Carpio' durum and 'Barlow' spring wheat were seeded in bioassay strips near Fargo on May 5. Treatments were applied to 3 leaf durum and wheat on June 2 with 78°F, 21% relative humidity, 5% cloud cover, 2 to 7 mph wind velocity at 270°, and dry topsoil at 68°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 40 psi through 11001 TT nozzles to a 7 foot wide area the length of 10 by 30 foot plots. The experiment was a randomized complete block design with four replicates. The entire experiment was treated with herbicides to remove weed competition.

		June 8		June 16		June 30		July 12		July 29		August 16	
Treatment	Rate	wht	dur	wht	dur	wht stunt	dur stunt	wht	dur	wht	dur	wht	dur
	oz/A	%	%	%	%	%	%	%	%	%	%	%	%
Mets&Thif&Flox+NIS	1.38+0.25%	0	0	0	0	5	5	0	0	0	0	0	0
Thif&Flox+NIS	1.55+0.25%	0	0	0	0	0	0	0	0	0	0	0	0
Thif&Flox+NIS	1.94+0.25%	0	0	0	0	0	0	0	0	0	0	0	0
Mets&Thif&Flox+Thcz+NIS	1.38+072+0.25%	0	0	0	0	5	5	0	0	0	0	0	0
Thif&Flox+Thcz+NIS	1.94+072+0.25%	0	0	0	0	0	0	0	0	0	0	0	0
Thcz+NIS	072+0.25%	0	0	0	0	0	0	0	0	0	0	0	0
Thcz+Florasulam&Flox+NIS	072+1.48+0.25%	0	0	0	0	0	0	0	0	0	0	0	0
Untreated Check	0	0	0	0	0	0	0	0	0	0	0	0	0
CV		0	0	0	0	45	45	0	0	0	0	0	0
LSD P=.05		.	.	.	.	1	1	.	.	.	.	.	.

Last year stunting and prominent lodging occurred from these oil dispersion sulfonylurea formulations on hard red spring wheat. This year the herbicide treatments were very safe to durum and hard red spring wheat in this study. Slight stunting could be discerned only at one evaluation in mid-season, and lodging did not occur in any of the plots.

Re-crop after STD71, location 1. Howatt, Roach, and Harrington. Plots were established and treatments were applied near Fargo on June 29, 2015 with 68°F, 98% relative humidity, and 100% cloud cover, 1 to 4 mph wind velocity at 270° and dry topsoil at 70°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 40 psi through 11001 TT nozzles to a 7 foot wide area the length of 20 by 30 foot plots. 'DKC 38-04 Rib' corn, 'Asgrow 0835' soybean, and 'Royal Hybrid RH 1121' sunflower were seeded perpendicular to treatment in 30 inch rows, 'Richlea' lentil and 'DKL 70-50 CR' canola were seeded perpendicular to treatment in side-by-side arrangement in 7.5 inch rows May 17, 2016. The experiment was a randomized complete block design with four replicates. Evaluations during 2016 included some weeds that emerged with the crops.

		June 8							June 22		
Treatment	Rate	vema	fipc	len	can	soya	corn	sufl	vema	rrpw	fxtl
	oz/A	%	%	%	%	%	%	%	%	%	%
STD71+NIS	1.4+0.25%	69	40	5	0	1	4	5	75	84	81
STD71+NIS	2.7+0.25%	90	78	10	5	7	7	11	79	95	92
CV		7	15	28	31	41	18	42	6	7	9
LSD P=.05		13	20	4	2	4	2	7	10	14	17

		June 22					July 6				
Treatment	Rate	lentil	cano	soya	corn	sunfl	lentil	cano	soya	corn	sunfl
	oz/A	%	%	%	%	%	%	%	%	%	%
STD71+NIS	1.4+0.25%	0	0	0	0	0	2	0	0	0	0
STD71+NIS	2.7+0.25%	0	0	0	0	0	5	0	0	0	0
CV		0	0	0	0	0	10	0	0	0	0
LSD P=.05		.	.	.	.	.	1	.	.	.	.

STD71 is an oil dispersion sulfonylurea herbicide proposed for use in wheat. The season following application control of Venice mallow, redroot pigweed, and yellow foxtail was evident compared to untreated check strips between plots and on the study perimeter. Weed control with the higher rate exceeded 90% early in the season, but weed emergence was noted through the entire study after June. Shortly after emergence of crops, slight injury most noted as chlorosis was recorded for all crops with lentil and sunflower given rating of about 10% injury. This injury was not observed later in June but slight chlorosis was detected on lentil in July. Plant height and development seemed unhindered by treatments at all evaluations.

Re-crop after STD71, location 2. Howatt, Roach, and Harrington. The plots were established in a sunflower field and treatments applied near Valley City on June 29, 2015 with 75°F, 84% relative humidity, 100% cloud cover, 1 to 3 mph wind velocity at 315°, and dry topsoil at 70°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 40 psi through 11001 TT nozzles to a 7 foot wide area the length of 20 by 30 foot plots. Corn (DKC 38-04 RIB), sunflower (Royal Hybid RH 1121), and soybean (Asgrow 0835) were seeded perpendicular to treatment in 30 inch rows, and canola (DKL 70-50 CR) and lentil (Richlea) were seeded perpendicular to treatment in 7.5 inch rows on May 17, 2016. The experiment was a randomized complete block design with four replicates.

		June 7					June 22					
Treatment	Rate	vsun	len	can	soya	corn	vsun	len	can	soya	corn	sunf
STD71+NIS	1.4+0.25%	30	6	1	1	5	0	20	0	10	0	0
STD71+NIS	2.7+0.25%	85	9	8	10	10	76	20	0	10	0	0
CV		16	21	108	37	23	25	0	0	0	0	0
LSD P=.05		20	4	11	5	4	22	.	.	.	.	.

STD71 is an oil dispersion sulfonylurea herbicide proposed for use in wheat. The simulated crop of sunflower emerged later than the rest of the species, but volunteer sunflower were present throughout the study for evaluation. Shortly after emergence of crops, slight injury most noted as chlorosis was recorded for all crops with the higher dose causing about 10% injury. Volunteer sunflower was more injured and symptoms included stunting, especially at the higher rate. Injury was not detected on canola, corn, or sunflower on June 22, but soybean and lentil still expressed concerning levels of injury and volunteer sunflower in plots with the higher rate of STD71 displayed necrotic tissue and stand loss. This site had light textured soil with very low organic matter and had been relatively dry since treatments were applied the previous season.

Wheat Response to PGR timing. Howatt, Roach, and Harrington. 'Prosper' hard red spring wheat was seeded near Fargo on May 9. Treatments (3L) were applied to 2 leaf wheat on June 2 with 54°F, 59% relative humidity, clear sky, 2 to 5 mph wind velocity at 270°, and dry topsoil at 54°F. Treatments (tillered) were applied to tillering/5 leaf wheat on June 13 with 66°F, 81% relative humidity, clear sky, 1 to 4 mph wind velocity at 45°, and dry topsoil at 68°F. Treatments (flag) were applied to flag leaf wheat on June 23 with 78°F, 48% relative humidity, clear sky, 1 to 2 mph wind velocity at 360°, and dry topsoil at 70°F. All treatments were applied with a backpack sprayer delivering 8.5 gpa at 40 psi through 11001 TT nozzles to a 7 foot wide area the length of 10 by 30 foot plots. The experiment was a randomized complete block design with four replicates.

Treatment	Rate	Growth Stage	6/9 wht	6/16 wht	6/22 wht	7/7 wht	7/22 wht	7/19 wht	8/22 Yield
	oz/A		%	%	%	%	%	%	bu/A
2,4-D&Dica&Flox+NIS	4.75+0.5%	3L	2	0	1	1	0	1	42
2,4-D&Dica&Flox+NIS	9.5+0.5%	3L	5	3	5	3	1	2	40
Dica&2,4-D-BM+NIS	8.2+0.5%	3L	0	5	6	7	4	5	41
2,4-D&Dica&Flox+NIS	4.75+0.5%	Tillered	0	0	5	8	5	4	40
2,4-D&Dica&Flox+NIS	9.5+0.5%	Tillered	0	0	11	16	8	8	38
Dica&2,4-D-BM+NIS	8.2+0.5%	Tillered	0	0	14	17	12	11	34
2,4-D&Dica&Flox+NIS	4.75+0.5%	Flag	0	0	0	16	12	14	27
2,4-D&Dica&Flox+NIS	9.5+0.5%	Flag	0	0	0	25	19	19	18
Dica&2,4-D-BM+NIS	8.2+0.5	Flag	0	0	0	29	24	25	18
Untreated Check	0		0	0	0	0	0	0	43
CV			48	0	50	18	18	22	34
LSD P=.05			1	.	3	3	2	3	4

The premix of 2,4-D and dicamba and fluroxypyr consistently resulted in more injury to barley at the high rate than the low rate used in this study. This difference at 3-leaf application was more than twice the lower rate value, while the difference at flag leaf application was less than twice the value. This illustrated the increased susceptibility of wheat to PGR damage later in plant development.

Injury tended to be less when fluroxypyr was included with the premix compared with dicamba and 2,4-D alone. This was easily discernible in the field even though yield estimates did not support the observation except at the tillered application timing. Yield was greatly reduced with herbicide application at flag leaf.

Barley Response to PGR timing. Howatt, Roach, and Harrington. 'Tradition' barley was seeded near Fargo on May 5. Treatments on June 2 were applied to 3 leaf barley with 71°F, 33% RH, wind velocity 3 to 7 mph at 220°, and damp soil at 63°F. Treatments, Tiller, were applied to tillering, 6 leaf barley on June 13 with 70°F, 68% RH, 2 to 5 mph wind speed at 45°, 100% cloud cover, and dry soil at 68°F. Treatments, flag, were applied to flag leaf barley on June 21 with 83°F, 68% RH, clear sky with 1 to 2 mph wind at 225°, and dry soil at 71°F. All treatments were applied using a backpack sprayer delivering 8.5 gpa at 40 psi through 11001 TT nozzles to a 7 foot wide area the length of 10 by 30 foot plots. The experiment was a randomized complete block design with four replicates, and the entire study was treated to remove weed pressure.

Treatment	Rate	Growth Stage	6/9/16 Barley	6/16/16 Barley	6/22/16 Barley	7/7/16 Barley	7/22/16 Barley
	oz/A		%	%	%	%	%
2,4-D&Dica&Flox+NIS	4.75+0.5%	3L	9	1	2	0	0
2,4-D&Dica&Flox+NIS	9.5+0.5%	3L	18	11	11	5	2
Dica&2,4-D-BM+NIS	8.2+0.5%	3L	19	13	13	7	5
2,4-D&Dica&Flox+NIS	4.75+0.5%	Tiller	0	2	7	12	8
2,4-D&Dica&Flox+NIS	9.5+0.5%	Tiller	0	6	18	19	15
Dica&2,4-D-BM+NIS	8.2+0.5%	Tiller	0	7	21	18	14
2,4-D&Dica&Flox+NIS	4.75+0.5%	Flag	0	0	3	12	11
2,4-D&Dica&Flox+NIS	9.5+0.5%	Flag	0	0	5	17	16
Dica&2,4-D-BM+NIS	8.2+0.5	Flag	0	0	13	26	23
Untreated Check	0		0	0	0	0	0
CV			5	4	9	11	9
LSD P=.05			2	2	4	4	3

The experiment was terminated July 26 because of extreme damage from hail. The premix of 2,4-D and dicamba and fluroxypyr consistently resulted in more injury to barley at the high rate than the low rate used in this study. This difference at 3-leaf application was much more than twice the lower rate value, while the difference at flag leaf application was much less than twice the value. This illustrated the increased susceptibility of barley to PGR damage later in plant development.

Injury tended to be less when fluroxypyr was included with the premix compared with dicamba and 2,4-D alone for 3-leaf and flag leaf application timings. Difference was occasionally identified with small margin for 3-leaf treatments but was present at each evaluation for flag leaf treatments. And the margin was 7 to 9 percentage points, very easily discernible in the field.

Common Ragweed Control with PGR premix. Howatt, Roach, and Harrington. 'Prosper' hard red spring wheat was seeded near Prosper, ND on May 16. Treatments were applied to 5 leaf wheat, less than 12 inch tall common cocklebur, less than 8 inch tall common ragweed, and pre-flowering wild mustard on June 21 with 85°F, 63% relative humidity, clear sky, 2 to 5 mph wind at 270°, and dry topsoil at 71°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 40 psi through 11001 TT nozzles to a 7 foot wide area the length of 10 by 30 foot plots. The experiment was a randomized complete block design with four replicates. Harvest for yield was August 17.

		July 6				July 18				August 1		August 17
Treatment	Rate	wht	cocb	corw	wimu	wht	cocb	corw	wimu	stunt	maturity	Yield
	oz/A	%	%	%	%	%	%	%	%	%	%	bu/A
2,4-D&Dica&Flox+NIS	4.75+0.5%	9	88	83	87	11	99	92	99	10	19	39
2,4-D&Dica&Flox+NIS	9.5+0.5%	14	88	83	85	20	99	96	99	20	11	31
2,4-D&Dica&Flox +Pxlm-TM+NIS	4.75 +0.21+0.5%	4	85	80	86	6	99	92	99	7	31	40
2,4-D&Dica&Flox +Thif-sg+Trib-sg+NIS	4.75+0.15 +075+0.5%	3	85	78	85	9	99	94	99	6	26	36
Untreated Check	0	0	0	0	0	0	0	0	0	0	45	36
CV		17	3	5	3	24	1	7	1	37	19	10
LSD P=.05		2	3	5	3	3	1	8	1	5	8	6

The premix of 2,4-D and dicamba and fluroxypyr caused injury to wheat expressed mainly as stunting. Inclusion of pyroxsulam or thifensulfuron and tribenuron resulted in less stunting than the premix alone. Stunting was evident with the same relationship throughout the entire season. Stunting on August 1 with the 2X rate was still 20% of untreated height. Color loss due to crop maturity also was reduced at this evaluation. Untreated wheat had 45% color loss on August 1 while color loss with the premix was less than 20%. Yield was less when wheat was treated with the premix at 2X rate compared with all other treatments.

Weed control was similar across all treatments. Common ragweed control was 92 to 96% across treatments.

Weed control with new herbicide formulation. Howat, Roach, and Harrington. 'Prosper' hard red spring wheat was seeded near campus, May 6. Treatments were applied to flag leaf wheat, 4 to 6 leaf redroot pigweed, 6 leaf wild mustard, and 2 to 4 leaf Venice mallow on June 21 with 71°F, 87% relative humidity, 5% cloud cover, 2 to 3 mph wind velocity at 225°, and dry topsoil at 64°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 40 psi through 11001 TT nozzles to a 7 foot wide area the length of 10 by 30 foot plots. The experiment was a randomized complete block design with four replicates.

		July 5				July 18		
Treatment	Rate	wht	rrpw	wimu	vema	rrpw	wimu	vema
	oz/A	%	%	%	%	%	%	%
Pxdn+AGH15004	0.86+16	0	76	86	76	90	97	93
Pxdn+AGH15004+Preference +Interlock	0.86+16+0.25% +4	0	85	95	94	98	99	98
Pxdn+AGH15004+AG8050	0.86+16+0.5%	0	84	96	91	81	95	93
Pxdn+AGH15004+AG14039	0.86+16+0.5%	0	88	95	92	96	99	97
Pxdn+AGH15004	0.86+24	0	92	97	96	96	99	95
Pxdn+AGH15004+Preference +Interlock	0.86+24+0.25% +4	0	97	99	98	97	99	98
Pxdn+AGH15004+AG8050	0.86+24+0.5%	0	95	98	99	95	99	97
Pxdn+AGH15004+AG14039	0.86+24+0.5%	0	93	98	98	98	99	99
Pxdn+Brox&MCPA&Flox	0.86+8	0	83	98	97	84	99	92
Pxdn+Brox&Flox	0.86+7.5	0	91	97	91	90	99	95
Untreated Check	0	0	0	0	0	0	0	0
CV		0	4	2	3	4	1	2
LSD P=.05		.	4	2	3	4	1	3

Herbicides did not cause visible injury to wheat. AGH15004 alone at 16 oz/A provided at least 90% control of weeds present. Increasing the rate to 24 oz/A slightly improved weed control. Addition of Preference and Interlock to the 16 oz/A rate resulted in 98 to 99% weed control. AG14039 also improved weed control with AGH15004.

2,4-D Formulations for tame buckwheat control. Howatt, Roach, and Harrington. 'Prosper' hard red spring wheat was seeded near Fargo on May 3. Treatments were applied to 3 leaf wheat and cotyledon or 4 to 5 leaf tame buckwheat (two flushes) on June 2 with 58°F, 57% relative humidity, clear sky, 2 to 5 mph wind velocity at 270°, and dry topsoil at 55°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 40 psi through TT11001 nozzles to a 7 foot wide area the length of 10 by 30 foot plots. The experiment was a randomized complete block design with four replicates.

		June 16		June 30
Treatment	Rate	wht	tabw	tabw
Fenoxaprop+AGH09008	1+16	0	73	70
Fenoxaprop+AGH16006	1+16	0	71	69
Fenoxaprop+2,4-D amine 4	1+7.6	0	75	80
Fenx+AGH09008+Preference+Interlock	1+16+0.25%+4	0	78	80
Fenx+AGH16006+Preference+Interlock	1+16+0.25%+4	0	74	75
Fenx+2,4-D amine 4+Preference +Interlock	1+7.6+0.25% +4	0	84	85
Fenoxaprop+Clopyralid&2,4-D	1+9	0	79	84
Untreated Check	0	0	0	0
CV		0	5	5
LSD P=.05		.	5	5

Herbicides did not cause visible injury to wheat. Traditional 2,4-D amine formulation provided better control than formulations under investigation in this study. Addition of Preference and Interlock increased control of tame buckwheat with each 2,4-D formulation.

Broadleaf Control in Wheat Exp 1. Howatt, Roach, and Harrington. 'Prosper' hard red spring wheat was planted near Fargo on May 3. Treatments were applied to 3 leaf wheat and cotyledon and 3 to 5 leaf tame buckwheat (two distinct flushes) on June 2 with 56°F, 78% relative humidity, clear sky, 4 mph wind velocity at 270°, and damp topsoil at 54°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 40 psi through 11001 TT nozzles to a 7 foot wide area the length of 10 by 30 foot plots. The experiment was a randomized complete block design with four replicates.

		June 16		June 30	August 15
Treatment	Rate	wht	tabw	tabw	contamin.
	oz/A	%	%	%	%
Pxdn+Flox+MCPA	0.86+2+6	0	70	81	0.042
Pxdn+Flox&Dicamba	0.86+2.6	0	71	96	0.004
Pxdn+Clpy&Flox+Thif-sg	0.86+3+0.15	0	83	91	0.009
Pxdn+Carf+Flox+NIS	0.86+0.128+1.5+0.25%	0	91	95	0.009
Pxdn+Carf+2,4-D+NIS	0.86+0.128+6+0.25%	0	84	90	0.012
Pxdn+Brox&MCPA5	0.86+8	0	94	97	0.015
Pxdn+Brox&Flox	0.86+7.5	0	92	94	0.007
Pxdn+Brox&Pyst+AMS	0.86+3.4+8	0	90	95	0.004
Pxdn+Coact+Brox&Bicp+PO	0.86+0.91+3+1%	0	90	97	0.014
Pxdn+Florasulam&Flox	0.86+1.5	0	91	98	0.000
Pxdn+Florasulam&MCPA	0.86+6	0	93	98	0.004
Pxdn+Flox&Thif&Trib+NIS	0.86+1.8+0.25%	0	91	97	0.000
Pxdn+Flox&Thif+NIS	0.86+1.94+0.25%	0	86	91	0.009
Pxdn+Flox&Mets&Thif+NIS	0.86+1.37+0.25%	0	89	95	0.011
Untreated Check		0	0	0	0.652
CV		0	4	4	318
LSD P=.05		.	4	4	0.24

Herbicides did not cause visible injury to wheat. Control of tame buckwheat at various sizes was at least 90% with all herbicides except fluroxypyr and MCPA, which gave 81% control. Several herbicides provided 97 to 98% control but only florasulam and fluroxypyr or fluroxypyr and thifensulfuron and tribenuron did not have tame buckwheat contamination in the wheat grain sample. Efficiency of pollination seemed low. This species requires insect pollinators that did not seem to be present in the study. Even the untreated check had very low seed set.

Broadleaf Control in Wheat Exp 2. Howatt, Roach, and Harrington. 'Prosper' hard red spring wheat was seeded near campus, May 6. Treatments were applied to flag leaf wheat and 4 to 6 leaf redroot pigweed on June 21 with 61°F, 100% relative humidity, 5% cloud cover, 2 to 4 mph wind velocity at 225°, and dry topsoil at 64°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 40 psi through 11001 TT nozzles to a 7 foot wide area the length of 10 by 30 foot plots. The experiment was a randomized complete block design with four replicates.

Treatment	Rate	June 5 wht	June 5 rrpw	July 18 rrpw
	oz/A	%	%	%
Pxdn+Flox+MCPA	0.86+2+6	0	61	70
Pxdn+Flox&Dicamba	0.86+2.6	0	56	89
Pxdn+Clpy&Flox+Thif-sg	0.86+3+0.15	0	66	84
Pxdn+Carf+Flox+NIS	0.86+0.128+1.5+0.25%	0	69	85
Pxdn+Carf+2,4-D+NIS	0.86+0.128+6+0.25%	0	75	95
Pxdn+Brox&MCPA5	0.86+8	0	43	56
Pxdn+Brox&Flox	0.86+7.5	0	54	71
Pxdn+Brox&Pyst+AMS	0.86+3.4+8	0	78	91
Pxdn+Coact+Brox&Bicp+PO	0.86+0.91+3+1%	0	55	59
Pxdn+Florasulam&Flox	0.86+1.5	0	45	58
Pxdn+Florasulam&MCPA	0.86+6	0	64	90
Pxdn+Flox&Thif&Trib+NIS	0.86+1.8+0.25%	0	64	86
Pxdn+Flox&Thif+NIS	0.86+1.94+0.25%	0	69	84
Pxdn+Flox&Mets&Thif+NIS	0.86+1.37+0.25%	0	66	85
Untreated Check	0	0	0	0
CV		0	9	8
LSD P=.05		.	8	8

Coverage of weeds beneath the wheat canopy may have been inhibited because of the large wheat size at application. However, under this stress on the system some herbicides still performed very well. Carfentrazone and 2,4-D provided 95% control. Bromoxynil and pyrasulfotole or florasulam and MCPA also gave at least 90% control. Bromoxynil and MCPA, bromoxynil and biceclopyrone, or florasulam and fluroxypyr gave less than 60% control.

Broadleaf weed control with halauxifen. Howatt, Roach, and Harrington. 'Prosper' hard red spring wheat was seeded near Prosper, ND on May 16. Treatments were applied to 4 leaf wheat and 4 to 6 leaf wild mustard, common ragweed and common cocklebur on June 13 with 86°F, 44% relative humidity, 10% cloud cover, 1 to 3 mph wind velocity at 45°, and dry topsoil at 70°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 40 psi through 11001 TT nozzles to a 7 foot wide area the length of 10 by 30 foot plots. The experiment was a randomized complete block design with four replicates.

		June 20	June 27			July 12		
Treatment	Rate	wht	cocb	corw	wimu	cocb	corw	wimu
	oz/A	%	%	%	%	%	%	%
Clpy&Flox+Haux&Flas +NIS+AMS	3+0.15 +0.25%+22	0	87	83	88	99	99	99
Clpy&Flox+Thif-sg+Trib-sg +NIS+AMS	3+08+02 +0.25%+22	0	91	87	90	99	99	99
Clpy&Flox+Thif-sg+Trib-sg +NIS+AMS	3+05+02 +0.25%+22	0	89	84	89	99	99	99
Clpy&Flox	3	0	91	84	92	99	99	91
Fluroxypyr&Flas	1.5	0	91	73	86	99	96	99
Brox&Pyst+AMS	3.5+22	0	96	94	97	99	99	99
Clpy&Flox&MCPA	8.5	0	93	92	95	99	98	99
Untreated Check	0	0	0	0	0	0	0	0
CV		0	2	4	3	1	1	1
LSD P=.05		.	3	4	3	1	2	1

Herbicides did not cause visible injury to wheat. All herbicides generally provided exceptional control of weeds present. Clopyralid and fluroxypyr gave 91% control of wild mustard. Fluroxypyr and florasulam gave 96% control of common ragweed.

Evaluation of Quelex for POST broadleaf weed control in HRSW. (Minot). The objective of the study was to evaluate Quelex for postemergence (POST) broadleaf weed control in wheat compared to other standard herbicides. Treatments were applied June 15 at the 4-leaf wheat stage. Weed density was low (<1 plant per sq ft) in the study.

None of the treatments caused visible crop injury. All treatments provided excellent control of kochia, redroot pigweed, and volunteer soybean.

Table. Evaluation of Quelex + WideMatch for POST broadleaf weed control in HRSW. (1638)

			Wheat	Weed Control					
			Injury	Kochia		Volunteer soybean		Redroot pigweed	
Treatment	Rate	Timing	Jun-24	Jul-5	Jul-21	Jul-5	Jul-21	Jul-5	Jul-21
			----%----	----------%----------					
Untreated			0	0	0	0	0	0	0
WideMatch + Quelex[ab]	1 pt + 0.75 oz	4-leaf	0	95	98	88	99	96	96
WideMatch + Affinity TM[ab]	1 pt + 0.6 oz	4-leaf	0	95	97	96	99	92	95
WideMatch + Affinity BS[ab]	1 pt + 0.6 oz	4-leaf	0	97	94	96	99	96	96
WideMatch	1 pt	4-leaf	0	94	97	95	99	76	96
Starane Flex	13.5 oz	4-leaf	0	93	93	90	96	79	94
Huskie[a]	13.5 oz	4-leaf	0	99	100	99	99	99	100
Hat Trick	1 pt	4-leaf	0	98	97	98	99	96	94
LSD (0.05)			NS	2.4	2.5	8.4	1.6	15.8	1.3

[a] *Applied with AMS (2.5 gal/100 gal)*

[b] *Applied with Activator 90 (0.25%)*

Broadleaf Control with New pyroxsulam formulation. Howatt, Roach, and Harrington. Prosper hard red spring wheat was seeded near Prosper, ND on May 16. Treatments were applied to 4 leaf wheat, 2 to 6 leaf common ragweed, and 4 to 6 leaf wild mustard and common cocklebur on June 13 with 86°F, 44% relative humidity, 1 to 3 mph wind velocity at 45°, and dry topsoil at 70°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 40 psi through 11001 TT nozzles to a 7 foot wide area the length of 10 by 30 foot plots. The experiment was a randomized complete block design with four replicates. Harvest for yield was August 17.

		June 20	June 27				July 12			July 25			Aug 17
Treatment	Rate	wht	wht	cocb	corw	wimu	cocb	corw	wimu	cocb	corw	wimu	Yield
	oz/A	%	%	%	%	%	%	%	%	%	%	%	bu/A
Pxlm&Flas&Flox +NIS+AMS	1.68 +0.5%+22	9	0	89	81	92	96	91	99	99	97	99	43
Pxlm&Flas&Flox +2,4-D+AMS	1.68 +5+22	9	0	90	81	90	98	93	99	99	99	99	45
Pxlm&Clpy&Flox +NIS+AMS	3.2 +0.5%+22	12	0	95	90	95	99	98	99	99	99	99	42
Pxlm&Clpy&Flox +2,4-D+AMS	3.2 +5+22	9	0	93	87	94	99	99	99	99	99	99	43
Pxlm-TM +Clpy&Flox&MCPA+AMS	0.21 +8.5+22	4	0	92	88	91	99	96	99	99	99	99	42
Brox&Pyst&Thcz	3	0	0	94	89	95	99	98	99	99	99	99	43
Pinoxaden+Clpy&Flox +AMS	0.86+3 +22	0	0	90	88	84	98	99	98	98	99	99	42
Flcz2.0+Clpy&Flox +NIS+AMS	0.32+3 +0.25%+22	0	0	89	83	88	97	94	99	99	99	99	41
Untreated Check	0	0	0	0	0	0	0	0	0	0	0	0	40
CV		24	0	2	3	3	2	3	1	1	1	0	9
LSD P=.05		2	.	2	4	4	3	2	1	1	1	0	6

Treatments that contained pyroxsulam caused general chlorosis of wheat 7 days after application. Chlorosis was most intense when the premix with clopyralid was applied without addition of 2,4-D. 2,4-D did not alter the injury caused by the pyroxsulam premix that contained florasulam. The stand alone pyroxsulam formulation, which is a WDG, only caused 4% chlorosis. All herbicide treatments provided exceptional control of weeds present.

Kochia Control with Bicyclopyrone. Howatt and Harrington. 'Tradition' barley was seeded near Rogers, ND on April 22. Field was a silty clay loam with 4.2% organic matter and 7.9 pH. Treatments were applied to 4 leaf barley and less than 5 inch tall kochia on May 27 with 61°F, 95% relative humidity, 10% cloud cover, 5 to 9 mph wind velocity at 45°, and tacky topsoil. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 40 psi through 11001 TT nozzles to a 7 foot wide area the length of 10 by 30 foot plots. The experiment was a randomized complete block design with four replicates.

		June 2	
Treatment	Rate	kochia	barley
	oz/A	%	%
CoAct+Brox&Bicyclopyrone+COC+Pxdn	0.9+3+1%+0.86	89	0
CoAct+Brox&Bicyclopyrone+COC+Pxdn	1.1+3.5+1%+0.86	92	0
CoAct+Brox&Bicyclopyrone+COC+Pxdn	1.2+4+1%+0.86	96	0
Brox&Pyst+NIS+Pxdn	3+0.25%+0.86	92	0
Clpy&Flox+Pxdn	3+0.86	82	0
Thif-sg+Trib-sg+MCPA+Pxdn	0.24+0.06+5.6+0.86	67	0
Brox&MCPA&Flox+Pxdn	8+0.86	91	0
CV		5	0
LSD P=.05		6	.

Herbicides did not cause visible injury to barley. The comparable commercial standard of bromoxynil and pyrasulfotole gave 92% control of kochia 7 days after application. This was equal to the middle rate of bromoxynil and bicyclopyrone and similar to all rates of this treatment. The stems of larger kochia at application retained some green color but the leaves of these larger plants and entire smaller plants were completely desiccated at this evaluation. Study was terminated before the next evaluation because of spray drift contamination.

Common Ragweed Control with Bicyclopyrone. Howatt, Roach, and Harrington. 'Prosper' hard red spring wheat was seeded near Prosper, ND on August 17. Treatments were applied to 4 to 4.5 leaf wheat and 4 to 6 leaf wild mustard, common ragweed and common cocklebur on June 13 with 86°F, 44% relative humidity, 10% cloud cover, 1 to 3 mph wind velocity at 45°, and dry topsoil at 70°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 40 psi through 11001 TT nozzles to a 7 foot wide area the length of 10 by 30 foot plots. The experiment was a randomized complete block design with four replicates. Harvest for yield was August 17.

		June 20				June 27			July 12			July 25	Aug 17
Treatment	Rate	wht	cocb	corw	wimu	cocb	corw	wimu	cocb	corw	wimu	corw	Yield
	oz/A	%	%	%	%	%	%	%	%	%	%	%	bu/A
CoAct+Brox&Bicyclopyrone +COC+Pxdn	0.9+3 +1%+0.86	0	81	71	80	97	93	95	99	97	99	97	38
CoAct+Brox&Bicyclopyrone +COC+Pxdn	1.1+3.5 +1%+0.86	0	83	71	79	97	95	96	99	97	99	99	38
CoAct+Brox&Bicyclopyrone +COC+Pxdn	1.2+4 +1%+0.86	0	85	80	86	99	98	98	99	99	99	99	39
Brox&Pyst+NIS+Pxdn	3+0.25%+0.86	0	83	74	85	97	97	98	99	98	99	98	39
Clpy&Flox+Pxdn	3+0.86	0	70	59	59	89	88	85	99	98	99	99	38
Thif-sg+Trib-sg+MCPA+Pxdn	0.24+06+5.6+0.86	0	71	55	79	96	70	97	99	78	99	55	36
Brox&MCPA&Flox+Pxdn	8+0.86	0	94	86	94	99	95	99	99	90	99	85	40
Pxdn	0.86	0	0	0	0	0	0	0	0	0	0	0	36
CV		0	3	5	5	2	3	2	1	2	0	3	8
LSD P=.05		.	3	5	5	2	3	3	1	3	.	4	4

Herbicides did not cause visible injury to wheat. Thifensulfuron and tribenuron and MCPA was not a good option for ragweed control and resulted in 55% control July 25. Bromoxynil and MCPA and fluroxypyr control of ragweed also waned in July, 85%. All other herbicides provided at least 90% control of weeds present by July. Treatments that included bromoxynil gave more rapid activity than other treatments. The commercial standard of bromoxynil and pyrasulfotole provided very good control of weeds. The new herbicide premix bromoxynil and bicyclopyrone at the mid or high rate provided similar control to bromoxynil and pyrasulfotole.

Buckwheat Control with Bicyclopyrone. Howatt, Roach, and Harrington. 'Prosper' hard red spring wheat was seeded near Fargo on May 3. Treatments were applied to 3 leaf wheat, and cotyledon or 3 to 5 leaf tame buckwheat (two distinct flushes) on June 2 with 57°F, 78% relative humidity, clear sky, 2 to 7 mph wind velocity at 270°, and damp topsoil at 59°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 40 psi through 11001 TT nozzles to a 7 foot wide area the length of 10 by 30 foot plots. The experiment was a randomized complete block design with four replicates. Harvest for yield was on August 15.

		June 9	June 16		June 30	July 12	Aug 15
Treatment	Rate	wht	wht	tabw	tabw	tabw	Yield
	oz/A	%	%	%	%	%	bu/A
CoAct+Brox&Bicyclopyrone +COC+Pxdn	0.9+3 +1%+0.86	0	0	91	93	92	52
CoAct+Brox&Bicyclopyrone +COC+Pxdn	1.1+3.5 +1%+0.86	5	0	95	97	96	52
CoAct+Brox&Bicyclopyrone +COC+Pxdn	1.2+4 +1%+0.86	5	0	96	94	97	51
Brox&Pyst+NIS+Pxdn	3+0.25%+0.86	0	0	96	97	96	54
Clpy&Flox+Pxdn	3+0.86	0	0	79	86	89	51
Thif-sg+Trib-sg+MCPA+Pxdn	0.24+06+5.6+0.86	0	0	92	98	97	50
Brox&MCPA&Flox+Pxdn	8+0.86	0	0	95	99	98	54
Pxdn	0.86	0	0	0	0	0	45
CV		0	0	3	3	2	6
LSD P=.05		.	.	4	3	3	4

Bromoxynil and bicyclopyrone at the mid and high rates caused bronze streaking on leaf surfaces that were horizontal during application. This injury was not observed on June 16. Bromoxynil and bicyclopyrone at the mid rate gave very similar control of tame buckwheat to bromoxynil and pyrasulfotole. Clopyralid and fluroxypyr gave 89% control while other herbicides gave 96 to 98% control.

Broadleaf weed control with Talinor in HRSW. (Minot). The objective of the study was to evaluate Talinor for weed control and crop safety. Talinor is a new Syngenta herbicide containing bicyclopyrone (Group 27) and bromoxynil (Group 6). Talinor controls many annual broadleaf weeds. Treatments were applied June 7 to 4-leaf wheat.

All treatments caused only slight crop injury. There was no significant difference in wheat yield between treatments. All three Talinor rates provided excellent control of redroot pigweed, lambsquarters, and volunteer canola. WideMatch applied alone provided only fair control of pigweed and lambsquarters and poor control of volunteer canola.

Table. Broadleaf weed control with Talinor in HRSW. (1620)

			Weed Control						Wheat					
			Rrpw		Colq		Vol canola		Injury			Moisture	Yield	Test wt.
Treatment	Rate	Timing	Jun-24	Jul-11	Jun-24	Jul-11	Jun-24	Jul-11	Jun-12	Jun-24	Jul-11	Aug-22	Sep-16	Sep-16
			——————%——————						——%——			—%—	bu/A	lb/bu
Untreated			0	0	0	0	0	0	0	0	0	14.2	71	64.4
Talinor + Coact+[a]	13.7 oz + 2.74 oz	POST	96	99	99	99	99	99	8	1	0	13.4	78	64.4
Talinor + Coact+[a]	16 oz + 3.2 oz	POST	97	99	99	99	99	99	9	0	0	13.6	71	64.5
Talinor + Coact+[a]	18.2 oz + 3.6 oz	POST	98	98	99	99	99	99	11	2	0	13.8	78	64.2
Huskie + NIS	11 oz + 0.25%	POST	99	99	99	99	99	99	8	0	0	15.0	72	64.2
WideMatch	1 pt	POST	53	72	40	72	43	30	4	0	0	13.7	69	64.1
Affinity TM + MCPA ester	0.6 oz + 0.75 pt	POST	96	99	96	99	96	99	12	2	0	13.8	71	64.1
Bronate	1 pt	POST	74	82	99	99	83	99	4	0	0	13.6	74	63.9
LSD (0.05)			9	6.6	12.3	6.4	14.7	0.5	1.5	NS	NS	NS	NS	0.35
CV			6.7	4.7	8.9	4.4	10.9	0.3	11.9	177.6	0	6.7	6.6	0.3

[a] *Applied with COC (1%)*

[b] *Rrpw=Redroot pigweed; Colq=Common lambsquarters; Vol canola=Volunteer canola*

Comparison of Varro Tank-mix Combinations for Weed Control in Durum

Caleb Dalley, HREC, Hettinger, ND, 2016

A field trial was conducted to evaluate crop safety and weed control with tank-mixes of Varro (thiencarbazone-methyl) in durum wheat. Durum 'Carpio' was planted on May 11, 2016 with a John Deere 1590 no-till drill at a rate of 120 lbs/A. Starter fertilizer (18-46-0) was applied at planting at a rate of 40 lbs/A. Prior to planting, urea (46-0-0) was applied at a rate of 100 lbs/A. Durum emerged on May 23. Herbicide treatments were applied on June 2 when durum was at the 3 to 6 leaf stage with an average height to the longest extended leaf of 5 inches. Weeds present in the trial included kochia, wild buckwheat, and Russian thistle. The trial was evaluated at 11, 21, and 35 days after treatment (DAT). No injury was observed due to any of the treatments applied in this study at any of the dates treatments were rated. At 21 DAT, Russian thistle control ranged from 70% with Wolverine and from 73 to 83% with Varro tank-mixes and 83% with Huskie Complete. Also at 21 DAT, wild buckwheat control ranged from 81 to 95% control, with Varro plus Carnivore, Varro plus Bison, and Huskie Complete having the highest control ratings. At 21 DAT, kochia control ranged from 64 to 85%, with Wolverine Advanced at 64% and Varro plus WideMatch plus 2,4-D ester at 85%. Due to droughty conditions this season, durum wheat yield was very low and variable with yield ranging from 12.5 to 23.3 bu/A and test weights ranging from 43 to 45 lbs/bu with no yield difference due to treatment.

Treatment	Rate	Spring wheat injury			Kochia	Russian thistle	Wild buckwheat	Test wt	Yield
		11 DAT	21 DAT	35 DAT				Aug 10	Aug 10
		——%——			— Control at 21 DAT (%) —			lbs/bu	bu/A
1 Untreated		0 a	0 a	0 a	0 d	0 d	0 d	43.5 a	16.5 a
2 Varro	6.85 oz/a	0 a	0 a	0 a	70 bc	79 ab	91 ab	45.2 a	12.5 a
Bison	1 pt/a								
AMS	0.5 lb/a								
3 Varro	6.85 oz/a	0 a	0 a	0 a	75 abc	73 bc	83 c	43.7 a	22.9 a
Weld	18 oz/a								
AMS	0.5 lb/a								
4 Varro	6.85 oz/a	0 a	0 a	0 a	78 ab	80 ab	95 a	43.9 a	24.0 a
Carnivore	1 pt/a								
AMS	0.5 lb/a								
5 Varro	6.85 oz/a	0 a	0 a	0 a	85 a	83 a	88 abc	45.8 a	21.5 a
WideMatch	1 pt/a								
2,4-D ester	0.5 pt/a								
AMS	0.5 lb/a								
6 Varro	6.85 oz/a	0 a	0 a	0 a	68 bc	77 abc	81 c	43.9 a	17.5 a
WideMatch	1 pt/a								
MCPA Ester	0.5 pt/a								
AMS	0.5 lb/a								
7 Varro	6.85 oz/a	0 a	0 a	0 a	79 ab	79 ab	86 bc	45.6 a	18.6 a
WideMatch	1 pt/a								
Affinity TankMix	0.6 oz/a								
AMS	0.5 lb/a								
8 Varro	6.85 oz/a	0 a	0 a	0 a	74 bc	83 a	91 ab	45.3 a	23.3 a
Olympus	0.2 oz/a								
Carnivore	1 pt/a								
AMS	0.5 lb/a								
9 Huskie complete	13.7 oz/a	0 a	0 a	0 a	75 abc	83 a	87 bc	45.3 a	21.0 a
AMS	0.5 lb/a								
10 Wolverine Adv	27.4 oz/a	0 a	0 a	0 a	64 c	70 c	84 c	44.6 a	21.5 a
LSD P=.05		NS	NS	NS	11.1	8.6	7.4	NS	NS
Standard Deviation		0.0	0.0	0.0	9.1	7.1	6.2	1.9	6.1
CV		0.0	0.0	0.0	13.7	10.1	7.9	4.2	30.6
Treatment F		0.000	0.000	0.000	27.9	29.3	81.5	0.764	1.409
Treatment Prob(F)		1.000	1.000	1.000	0.0001	0.0001	0.0001	0.6499	0.2391

Nanotech for broadleaf control, Location 1. Howatt, Roach, and Harrington. 'Prosper' hard red spring wheat was seeded near Prosper North Dakota on May 16. Treatments were applied to 5 leaf wheat, less than 10 Inch tall common cocklebur, bolted wild mustard, and less than 8 inch tall common ragweed on June 21 with 85°F, 68% relative humidity, clear sky, 2 to 5 mph wind velocity at 270°, and dry topsoil at 71°F. The pH water treatment was achieved with Regulator. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 40 psi through 11001 TT nozzles to a 7 foot wide area the length of 10 by 30 foot plots. The experiment was a randomized complete block design with four replicates.

			July 6				July 18		
Treatment	Rate	H2O	wht	cocb	corw	wimu	cocb	corw	wimu
	oz/A		%	%	%	%	%	%	%
Fenx+Flox&Dica	0.86+1.75	tap	0	84	75	83	95	85	90
Rev+Fenx+Flox&Dica	4+0.86+1.75	pH	0	83	75	83	96	84	89
Fenx+MCPA+Thif-sg+Trib-sg	0.86+4+0.16+0.04	tap	0	75	58	81	89	64	95
Rev+Fenx+MCPA+Thif-sg+Trib-sg	4+0.86+4+0.16+0.04	pH	0	83	58	85	88	64	95
Fenx+Carf+2,4-D+NIS	0.86+0.128+4+0.25%	tap	0	90	84	90	98	83	99
Rev+Fenx+Carf+2,4-D+NIS	4+0.86+0.128+4+0.25%	pH	0	92	88	93	97	88	97
Fenx+Brox&MCPA5	0.86+8	tap	0	96	92	96	98	92	99
Rev+Fenx+Brox&MCPA5	4+0.86+8	pH	0	93	85	93	97	93	98
Fenx+Brox&Pyst+AMS	0.86+3+8	tap	0	95	89	95	99	98	99
RevFenxBrox&Pyst	4+0.86+3	pH	0	94	88	95	98	97	99
Fenx+Flox&Thif+NIS	0.86+1.94+0.25%	tap	0	85	68	81	93	74	94
Rev+Fenx+Flox&Thif+NIS	4+0.86+1.94+0.25%	pH	0	86	76	84	95	76	97
Fenx+Flox&Thif&Trib+NIS	0.86+1.24+0.25%	tap	0	83	71	81	88	70	92
Rev+Fenx+Flox&Thif&Trib+NIS	4+0.86+1.24+0.25%	pH	0	80	65	76	90	74	91
CV			0	4	6	4	4	7	3
LSD P=.05			.	5	6	5	5	8	3

Weed control was similar between a base herbicide treatment and the treatment plus Regulator and Revolution.

Nanotech for broadleaf control, Location 2. Howatt, Roach, and Harrington. 'Prosper' hard red spring wheat was seeded on the campus of North Dakota State University on May 6. Treatments were applied to flag leaf wheat and 4 to 8 leaf pigweed on June 21 with 67°F, 87% relative humidity, 5% cloud cover, 2 to 3 mph wind at 225°, and dry topsoil at 64°F. The pH water treatment was achieved with Regulator. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 40 psi through 11001 TT nozzles to a 7 foot wide area the length of 10 by 30 foot plots. The experiment was a randomized complete block design with four replicates.

			July 5		July 18
Treatment	Rate	H2O	wht	rrpw	rrpw
	oz/A		%	%	%
Fenx+Flox&Dica	0.86+1.75	tap	0	53	60
Rev+Fenx+Flox&Dica	4+0.86+1.75	pH	0	58	68
Fenx+MCPA+Thif-sg+Trib-sg	0.86+4+0.16+0.04	tap	0	63	81
Rev+Fenx+MCPA+Thif-sg+Trib-sg	4+0.86+4+0.16+0.04	pH	0	63	86
Fenx+Carf+2,4-D+NIS	0.86+0.128+4+0.25%	tap	0	56	84
Rev+Fenx+Carf+2,4-D+NIS	4+0.86+0.128+4+0.25%	pH	0	63	87
Fenx+Brox&MCPA5	0.86+8	tap	0	38	56
Rev+Fenx+Brox&MCPA5	4+0.86+8	pH	0	43	68
Fenx+Brox&Pyst+AMS	0.86+3+8	tap	0	58	85
RevFenxBrox&Pyst	4+0.86+3	pH	0	73	85
Fenx+Flox&Thif+NIS	0.86+1.94+0.25%	tap	0	70	86
Rev+Fenx+Flox&Thif+NIS	4+0.86+1.94+0.25%	pH	0	71	90
Fenx+Flox&Thif&Trib+NIS	0.86+1.24+0.25%	tap	0	68	84
Rev+Fenx+Flox&Thif&Trib+NIS	4+0.86+1.24+0.25%	pH	0	64	88
CV			0	11	7
LSD P=.05			.	9	7

Weed control often was similar between a base herbicide treatment and the treatment plus Regulator and Revolution. There was an improvement of pigweed control for fluroxypyr and dicamba and bromoxynil and MCPA on July 18, but control for each was 60% or less with the herbicides alone.

Nanotech for Foxtail control. Howatt, Roach, and Harrington. 'Prosper' hard red spring wheat was seeded near Fargo on May 3. Treatments were applied to 3 leaf wheat, 1 to 3 leaf yellow foxtail, and cotyledon Venice mallow on June 2 with 64°F, 56% relative humidity, 25% cloud cover, 6.5 mph average wind velocity at 225°, and damp topsoil at 54°F. The pH water treatment was achieved with Regulator. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 40 psi through 11001 TT nozzles to a 7 foot wide area the length of 10 by 30 foot plots. The experiment was a randomized complete block design with four replicates.

			June 16			July 6
Treatment	Rate	H2O	wht	yeft	vema	yeft
	oz/A		%	%	%	%
Flcz 2.0+Basic Blend	0.32+1%	tap	0	43	45	68
Rev+Flcz 2.0	4+0.32	pH	0	43	43	65
Pxlm&Flas&Flox+BB	1.68+1%	tap	0	78	94	63
Rev+Pxlm&Flas&Flox	4+1.68	pH	0	73	95	66
Brox&Pyst&Thcz+UAN	3+16	tap	0	84	96	80
Rev+Brox&Pyst&Thcz	4+3	pH	0	84	96	81
Fenx+Brox&MCPA5	0.8+8	tap	0	74	96	76
Rev+Fenx+Brox&MCPA5	4+0.8+8	pH	0	84	96	76
Clfp+Brox&MCPA5	0.8+8	tap	0	35	94	69
Rev+Clfp+Brox&MCPA5	4+0.8+8	pH	0	33	94	33
Pxdn+Brox&MCPA5	0.86+8	tap	0	93	97	85
Rev+Pxdn+Brox&MCPA5	4+0.86+8	pH	0	93	97	86
CV			0	6	8	10
LSD P=.05			.	6	9	10

Weed control was similar between a base herbicide treatment and the treatment plus Regulator and Revolution.

Nanotech for wild oat control. Howatt, Roach, and Harrington. 'Prosper' hard red spring wheat was seeded near Fargo on May 2. Treatments were applied to 4 leaf wheat and 3 leaf wild oat on June 2 with 73°F, 96% relative humidity, 10% cloud cover, 4.6 mph average wind velocity at 315°, mostly dry topsoil at 67°F. The pH water treatment was achieved with Regulator. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 40 psi through 11001 TT nozzles to a 7 foot wide area the length of 10 by 30 foot plots. The experiment was a randomized complete block design with four replicates.

Treatment	Rate	H2O	6/16 wht	6/16 wioa	6/30 wioa
	oz/A		%	%	%
Flcz+Basic Blend	0.32+1%	tap	0	75	79
Rev+Flcz	4+0.32	pH	0	76	79
Pxlm&Flas&Flox+BB	1.68+1%	tap	0	79	69
Rev+Pxlm&Flas&Flox	4+1.68	pH	0	71	68
Brox&Pyst&Thcz+UAN	3+16	tap	0	75	74
Rev+Brox&Pyst&Thcz	4+3	pH	0	76	79
Fenx+Brox&MCPA5	1.32+8	tap	0	81	84
Rev+Fenx+Brox&MCPA5	3+1.32+8	pH	0	80	84
Clfp+Brox&MCPA5	0.8+8	tap	0	88	93
Rev+Clfp+Brox&MCPA5	4+0.8+8	pH	0	88	84
Pxdn+Brox&MCPA5	0.86+8	tap	0	89	99
Rev+Pxdn+Brox&MCPA5	4+0.86+8	pH	0	90	98
CV			0	3	7
LSD P=.05			.	4	8

Weed control was similar between a base herbicide treatment and the treatment plus Regulator and Revolution.

Foxtail herbicide comparison trial. Howatt, Roach, and Harrington. 'Prosper' hard red spring wheat was seeded near Fargo on May 3. Treatments were applied to 4 leaf wheat and 1 to 3 leaf foxtail on June 7 with 65°F, 55% relative humidity, clear sky, 2 to 5 mph wind velocity at 360°, and dry topsoil at 60°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 40 psi through 11001 TT nozzles to a 7 foot wide area the length of 10 by 30 foot plots. The experiment was a randomized complete block design with four replicates. Harvest for yield was August 15.

		June 9	June 16	June 21		July 6		8/15
Treatment	Rate	wht	wht	wht	yeft	wht	yeft	Yield
	oz/A	%	%	%	%	%	%	bu/A
Flucarbazone+Brox&MCPA5+BB	0.32+8+1%	5	28	21	84	11	88	39
Prcz+Brox&MCPA5+BB	0.42+8+1%	5	18	13	60	6	43	41
Pxlm-TM+Brox&MCPA5+BB	0.21+8+1%	5	8	5	78	0	87	46
Pxlm&Flas&Flox+BB	1.68+1%	3	8	5	75	0	88	46
Pxlm&Clopyralid&Flox+BB	3.2+1%	4	11	7	71	0	83	48
Thiencarbazone+Brox&MCPA5+BB	0.07+8+1%	4	6	3	78	0	88	50
Brox&Pyst&Thiencarbazone+UAN	3+16	5	5	3	78	0	90	49
Fenoxaprop+Brox&MCPA5	1.32+8	0	0	0	71	0	81	50
Clodinafop+Brox&MCPA5	0.8+8	0	0	0	79	0	84	51
Pinoxaden+Brox&MCPA5	0.86+8	0	0	0	89	0	93	49
Brox&MCPA5	8	2	0	0	0	0	0	47
CV		51	27	44	4	37	4	11
LSD P=.05		2	3	3	4	1	5	7

All wheat treated with ALS grass herbicide developed chlorosis within 2 days of application. This chlorosis remained for two weeks. In addition, flucarbazone or propoxycarbazone caused stunting. The flucarbazone used in this experiment was the 70 WDG formulation which does not have a safener. Stunting remained through the rest of the season.

Initial yellow foxtail control was greatest with pinoxaden followed closely by flucarbazone. Other herbicides gave less than 80% control June 21. In July, pinoxaden or the thiencarbazone premix gave at least 90% control. The Goldsky formulation of pyroxsulam gave slightly better control than the Perfectmatch formulation. Propoxycarbazone is not considered a herbicide for control of foxtail.

Wild Oat Herbicide Comparison trial. Howatt, Roach, and Harrington. 'Prosper' hard red spring wheat was seeded near Fargo on May 2. Treatments were applied to 2.5 leaf wheat and 1 to 3 leaf wild oat on May 24 with 62°F, 71% relative humidity, 95% cloud cover, 6 to 8 mph wind velocity at 100°, and dry topsoil at 68°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 40 psi through 11001 TT nozzles to a 7 foot wide area the length of 10 by 30 foot plots. The experiment was a randomized complete block design with four replicates. Harvest for yield was August 9.

		June 8		June 21	July 25	Aug 9
Treatment	Rate	wht	wioa	wioa	wioa	Yield
	oz/A	%	%	%	%	bu/A
Flucarbazone+Brox&MCPA5+BB	0.32+8+1%	0	90	96	91	53
PRCZ+Brox&MCPA5+BB	0.42+8+1%	0	79	82	79	44
Pxlm-TM+Brox&MCPA5+BB	0.21+8+1%	0	81	93	88	54
Pxlm&Flas&Flox+BB	1.68+1%	0	82	94	95	58
Pxlm&Clopyralid&Flox+BB	3.2+1%	0	87	91	95	52
Thiencarbazone+Brox&MCPA5+BB	0.07+8+1%	0	86	91	87	52
Brox&Pyst&Thiencarbazone+UAN	3+16	0	89	91	88	58
Fenoxaprop+Brox&MCPA5	1.32+8	0	91	93	93	58
Clodinafop+Brox&MCPA5	0.8+8	0	93	94	90	58
Pinoxaden+Brox&MCPA5	0.86+8	0	93	98	95	56
Brox&MCPA5	8	0	0	0	0	18
CV		0	4	2	3	13
LSD P=.05		.	4	2	3	10

Herbicides did not cause visible injury to wheat, and all wild oat herbicides substantially protected wheat yield potential. Flucarbazone and all three ACCase herbicides, fenoxaprop, clodinafop, and pinoxaden, provided 90% control or better at all three evaluations. ALS inhibitors typically are slow to develop symptoms. Pyroxsulam premixes gave better final control than the stand alone formulation. These premixes or pinoxaden gave 95% control in July. Fenoxaprop gave similar control to these at 93%.

Wild oat control with SAO66. Howatt, Roach, and Harrington. Prosper hard red spring wheat was seeded near Fargo on May 2. Treatments were applied to 2.5 leaf wheat and 1 to 2 leaf wild oat (beginning of the first flush) on May 24 with 62°F, 71% relative humidity, 95% cloud cover, 6 to 8 mph wind velocity at 100°, and dry topsoil at 68°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 40 psi through 11001 TT nozzles to a 7 foot wide area the length of 10 by 30 foot plots. The experiment was a randomized complete block design with four replicates.

		May 20		June 8	
Treatment	Rate	wht	wioa	wht	wioa
	oz/A	%	%	%	%
Flucarbazone	0.21	0	81	0	73
Propoxycarbazone	0.14	0	43	0	28
Pyroxasulfone	1.7	0	55	0	33
Flumioxazin&Pyroxasulfone	2.25	0	50	0	48
Pendimethalin	16	0	38	0	25
SA066	11.5	0	50	0	45
SA066	23	0	55	0	48
Untreated Check	0	0	0	0	0
CV		0	17	0	20
LSD P=.05		.	12	.	11

Herbicides did not cause visible injury to wheat. SA066 at either rate gave about 50% control of wild oat. This was similar to flumioxazin and pyroxasulfone and better than propoxycarbazone or pendimethalin. Flucarbazone provided the best control, 73%, but at a value much lower than typically achieved at this site.

Foxtail Control with Flucarbazone Tank-mixes. Howatt, Roach, and Harrington. 'Prosper' hard red spring wheat was seeded near Fargo on May 3. Treatments were applied to 3 leaf wheat and 2 leaf yellow foxtail on June 2 with 77°F, 37% relative humidity, 10% cloud cover, 2 to 6 mph wind velocity at 225°, and dry topsoil at 60°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 40 psi through 11001 TT nozzles to a 7 foot wide area the length of 10 by 30 foot plots. The experiment was a randomized complete block design with four replicates.

		June 16		July 6
Treatment	Rate	wht	yeft	yeft
	oz/A	%	%	%
Flcz2.0+Clpy&Flox+NIS+AMS	0.32+3+0.25%+16	0	55	64
X1581+Clpy&Flox+NIS+AMS	0.32+3+0.25%+16	0	33	30
X1581+Thif&TribA+Clpy&Flox +NIS+AMS	0.32+0.2+3 +0.25%+16	0	83	84
X1581+Clpy&Flox+NIS+AMS	0.43+3+0.25%+16	0	83	79
X1581+Thif&TribA+Clpy&Flox +NIS+AMS	0.43+0.2+3 +0.25%+16	0	80	86
X1780+NIS+AMS	1.8+0.25%+16	0	85	81
X1780+NIS+AMS	2.14+0.25%+16	0	83	84
X1581+ARY546+Flox+NIS+AMS	0.43+0.22+1.5+0.25%+16	0	50	38
X1581+ARY547+Flox+NIS+AMS	0.43+0.11+1.5+0.25%+16	0	71	69
X1581+ARY546+Mets+Flox +NIS+AMS	0.43+0.22+0.02+1.5 +0.25%+16	0	69	65
X1795+NIS+AMS	7.1+0.25%+16	0	87	89
X1795+NIS+AMS	8.5+0.25%+16	0	85	83
Pxm&Clpy&Flox+NIS+AMS	3.2+0.25%+16	0	79	81
Brox&Pyrst&Thz+NIS+AMS	3+0.25%+16	0	86	86
X1581+Thif&TribA+2,4-D +NIS+AMS	0.32+0.2+4 +0.25%+16	0	85	85
X1581+Thif&TribA+Dica +NIS+AMS	0.32+0.2+1 +0.25%+16	0	79	81
X1581+Thif&TribA+MCPA +NIS+AMS	0.32+0.2+4 +0.25%+16	0	84	85
Untreated Check	0	0	0	0
CV		0	7	7
LSD P=.05		.	7	7

Herbicides did not cause visible injury to wheat.

Wild Oat Control with Flcz2.0 Tank-mixes. Howatt, Roach, and Harrington. 'Prosper' hard red spring wheat was seeded near Fargo on May 2. Treatments were applied to 2.5 leaf wheat and 1 to 3 leaf wild oat on May 24 with 68°F, 65% relative humidity, 25% cloud cover, 7 to 12 mph wind velocity at 135°, and dry topsoil at 66°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 40 psi through 11001 TT nozzles to a 7 foot wide area the length of 10 by 30 foot plots. The experiment was a randomized complete block design with four replicates.

		June 8		June 21
Treatment	Rate	wht	wioa	wioa
	oz/A	%	%	%
Flcz2.0+Clpy&Flox+NIS+AMS	0.32+3+0.25%+16	0	83	94
X1581+Clpy&Flox+NIS+AMS	0.32+3+0.25%+16	0	84	92
X1581+Thif&TribA+Clpy&Flox +NIS+AMS	0.32+0.2+3 +0.25%+16	0	86	93
X1581+Clpy&Flox+NIS+AMS	0.43+3+0.25%+16	0	83	94
X1581+Thif&TribA+Clpy&Flox +NIS+AMS	0.43+0.2+3 +0.25%+16	0	85	96
X1780+NIS+AMS	1.8+0.25%+16	0	86	94
X1780+NIS+AMS	2.14+0.25%+16	0	86	96
X1581+ARY546+Flox+NIS+AMS	0.43+0.22+1.5+0.25%+16	0	83	92
X1581+ARY547+Flox+NIS+AMS	0.43+0.11+1.5+0.25%+16	0	85	94
X1581+ARY546+Mets+Flox +NIS+AMS	0.43+0.22+0.02+1.5 +0.25%+16	0	85	93
X1795+NIS+AMS	7.1+0.25%+16	0	87	93
X1795+NIS+AMS	8.5+0.25%+16	0	85	94
Pxm&Clpy&Flox+NIS+AMS	3.2+0.25%+16	0	86	91
Brox&Pyrst&Thz+NIS+AMS	3+0.25%+16	0	86	94
X1581+Thif&TribA+2,4-D +NIS+AMS	0.32+0.2+4 +0.25%+16	0	86	93
X1581+Thif&TribA+Dica +NIS+AMS	0.32+0.2+1 +0.25%+16	0	80	89
X1581+Thif&TribA+MCPA +NIS+AMS	0.32+0.2+4 +0.25%+16	0	88	94
Untreated Check	0	0	0	0
CV		0	2	2
LSD P=.05		.	3	3

Herbicides did not cause visible injury to wheat. Wild oat control was generally similar across flucarbazone formulation, tankmix, and rate. However, dicamba antagonized activity of X1581.

Wild Oat Control with Flcz2.0 Formulations. Howatt, Roach, and Harrington. 'Prosper' hard red spring wheat was seeded near Fargo on May 2. Treatments were applied to 2.5 leaf wheat and 1 to 3 leaf wild oat on May 24 with 64°F, 72% relative humidity, 50% cloud cover, 9 to 13 mph wind velocity at 125°, and dry topsoil at 65°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 40 psi through 11001 TT nozzles to a 7 foot wide area the length of 10 by 30 foot plots. The experiment was a randomized complete block design with four replicates.

		June 8		June 21
Treatment	Rate	wht	wioa	wioa
	oz/A	%	%	%
Flcz2.0+NIS+AMS	0.32+0.25%+16	0	81	96
Flcz2.0+Thif&TribA+NIS+AMS	0.32+0.2+0.25%+16	0	84	96
X1581+NIS+AMS	0.32+0.25%+16	0	84	95
X1581+Thif&TribA+NIS+AMS	0.32+0.2+0.25%+16	0	85	95
X1581+NIS+AMS	0.44+0.25%+16	0	83	96
X1581+Thif&TribA+NIS+AMS	0.44+0.2+0.25%+16	0	87	97
Thcz+NIS+AMS	0.072+0.25%+16	0	87	95
Thcz+Thif&TribA+NIS+AMS	0.072+0.2+0.25%+16	0	85	94
Pxlm-TM+NIS+AMS	0.21+0.25%+16	0	82	92
Pxlm-TM+Thif&TribA+NIS+AMS	0.21+0.2+0.25%+16	0	86	92
Untreated Check	0	0	0	0
CV		0	3	2
LSD P=.05		.	4	2

Herbicides did not cause visible injury to wheat. Tribenuron slightly improved wild oat control with pyroxsulam or the high rate of X1581 on June 8 although benefit was not observed 2 weeks later. Wild oat control was not affected by flucarbazone formulation or rate.

Foxtail Control with Flucarbazone Formulations. Howatt, Roach, and Harrington. 'Prosper' hard red spring wheat was seeded near Fargo on May 3. Treatments were applied to 3 leaf wheat, less than 2.5 leaf yellow foxtail, and cotyledon Venice mallow on June 2 with 66°F, 48% relative humidity, 10% cloud cover, 2 to 9 mph wind velocity at 225°, and dry topsoil at 55°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 40 psi through 11001 TT nozzles to a 7 foot wide area the length of 10 by 30 foot plots. The experiment was a randomized complete block design with four replicates.

		June 16			July 6
Treatment	Rate	wht	yeft	vema	yeft
	oz/A	%	%	%	%
Flcz2.0+NIS+AMS	0.32+0.25%+16	0	80	89	81
Flcz2.0+Thif&TribA+NIS+AMS	0.32+0.2+0.25%+16	0	85	92	87
X1581+NIS+AMS	0.32+0.25%+16	0	83	90	86
X1581+Thif&TribA+NIS+AMS	0.32+0.2+0.25%+16	0	87	90	83
X1581+NIS+AMS	0.44+0.25%+16	0	85	90	89
X1581+Thif&TribA+NIS+AMS	0.44+0.2+0.25%+16	0	90	96	87
Thcz+NIS+AMS	0.072+0.25%+16	0	88	94	84
Thcz+Thif&TribA+NIS+AMS	0.072+0.2+0.25%+16	0	86	96	85
Pxlm-TM+NIS+AMS	0.21+0.25%+16	0	79	91	80
Pxlm-TM+Thif&TribA+NIS+AMS	0.21+0.2+0.25%+16	0	84	91	79
Untreated Check	0	0	0	0	0
CV		0	4	3	5
LSD P=.05		.	5	4	5

Herbicides did not cause visible wheat injury. X1581 gave similar control of yellow foxtail to flucarbazone 2.0 formulation. Addition of tribenuron slightly improved foxtail control by flucarbazone 2.0 formulation. Similar benefit occasionally was observed with other herbicides but not consistently across evaluations.

Adjuvant for ALS grass herbicides. Howatt, Roach, and Harrington. 'Prosper' hard red spring wheat was seeded near Fargo on May 2. Treatments were applied to 2.5 leaf wheat and 1 to 3 leaf wild oat on May 24 with 67°F, 47% relative humidity, 50% cloud cover, 5 to 12 mph wind velocity at 160°, and dry topsoil at 59°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 40 psi through 11001 TT nozzles to a 7 foot wide area the length of 10 by 30 foot plots. The experiment was a randomized complete block design with four replicates.

		June 8		June 21
Treatment	Rate	wht	wioa	wioa
	oz/A	%	%	%
Flcz2.0+Brox&MCPA5	0.32+8	0	76	84
Flcz2.0+Brox&MCPA5+Basic Blend	0.32+8+1%	0	86	95
Flcz2.0+Brox&MCPA5+AG14039	0.32+8+0.5%	0	81	90
Flcz2.0+Brox&MCPA5+AG14039+UAN	0.32+8+0.5%+32	0	81	91
Thcz+Brox&MCPA5	0.072+8	0	81	92
Thcz+Brox&MCPA5+Basic Blend	0.072+8+1%	0	85	91
Thcz+Brox&MCPA5+AG14039	0.072+8+0.5%	0	86	92
Thcz+Brox&MCPA5+AG14039+UAN	0.072+8+0.5%+32	0	85	95
Pxlm-TM+Brox&MCPA5	0.21+8	0	84	93
Pxlm-TM+Brox&MCPA5+Basic Blend	0.21+8+1%	0	87	91
Pxlm-TM+Brox&MCPA5+AG14039	0.21+8+0.5%	0	86	91
Pxlm-TM+Brox&MCPA5+AG14039+UAN	0.21+8+0.5%+32	0	88	96
CV		0	3	3
LSD P=.05		.	3	4

Herbicides did not cause visible injury to wheat. Flucarbazone control of wild oat was improved with addition of adjuvant. Basic blend adjuvant improved flucarbazone activity the most to 95% control. Thiencarbazone or pyroxsulam control of wild oat was not improved by addition of adjuvant in this trial.

Thiencarbazone Control of Wild Oat. Howatt, Roach, and Harrington. Prosper hard red spring wheat was seeded near Fargo on May 2. Treatments were applied to 2.5 leaf wheat, 1 to 3 leaf wild oat, and 1 leaf yellow foxtail on May 24 with 63°F, 72% relative humidity, 95% cloud cover, 6 to 11 mph wind velocity at 135°, and dry topsoil at 65°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 40 psi through 11001 TT nozzles to a 7 foot wide area the length of 10 by 30 foot plots. The experiment was a randomized complete block design with four replicates. Harvest for yield was August 9.

		June 1		June 8		June 14	July 25	Aug 9
Treatment	Rate	wht	wioa	wht	wioa	wioa	wioa	Yield
	oz/A	%	%	%	%	%	%	bu/A
Thcz+Brox&MCPA+AMS	0.072+8+8	0	60	0	80	81	80	45
Thcz+Clpy&Flox&MCPA+AMS	0.072+7.5+8	0	60	0	87	92	96	48
Thcz+Brox&MCPA&Flox+AMS	0.072+8+8	0	60	0	83	88	90	52
Thcz+Clpy&Flox+2,4-De+AMS	0.072+3+3.8+8	0	60	0	85	90	92	53
Thcz+Clpy&Flox+MCPA+AMS	0.072+3+4+8	0	60	0	81	90	88	52
Thcz+Clpy&Flox+Thif-sg +Trib-sg+AMS	0.072+3+0.15 +0.15+8	0	60	0	84	92	95	52
Thcz+Prcz+Brox&MCPA&Flox +AMS	0.072+0.14+8 +8	0	60	0	83	87	89	48
Brox&Pyst&Thcz+AMS	3+8	0	60	0	84	86	88	49
Fenoxaprop&Brox&Pyst	5.4	0	84	0	91	98	85	46
Untreated Check	0	0	0	0	0	0	0	26
CV		0	1	0	3	3	3	13
LSD P=.05		.	1	.	4	3	3	9

Herbicides did not cause visible injury to wheat. All herbicide treatments greatly preserved wheat yield potential. Thiencarbazone was slow to cause wild oat symptoms, but by June 8, the tankmix with clopyralid and fluroxypyr and MCPA gave 87% control of wild oat, which was similar to control provided by fenoxaprop. In July this tankmix provided better control than fenoxaprop, as did several treatments containing thiencarbazone. Thiencarbazone plus bromoxynil and MCPA gave less control, 80%, than fenoxaprop, 85%.

Thiencarbazone Control of Yellow Foxtail. Howatt, Roach, Harrington. 'Prosper' hard red spring wheat was seeded near Fargo on May 3. Treatments were applied to 3 leaf wheat and 1 to 2 leaf yellow foxtail on June 2 with 61°F, 62% relative humidity, clear sky, 2 to 7 mph wind velocity at 270°, and damp topsoil at 54°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 40 psi through 11001 TT nozzles to a 7 foot wide area the length of 10 by 30 foot plots. The experiment was a randomized complete block design with four replicates. Harvest for yield was August 15.

		June 9		June 22	Aug 12	Aug 15
Treatment	Rate	wht	yeft	yeft	yeft	Yield
	oz/A	%	%	%	%	bu/A
Thcz+Brox&MCPA+AMS	0.072+8+8	0	63	85	88	52
Thcz+Clpy&Flox&MCPA+AMS	0.072+7.5+8	0	69	90	89	48
Thcz+Brox&MCPA&Flox+AMS	0.072+8+8	0	61	93	90	46
Thcz+Clpy&Flox+2,4-De+AMS	0.072+3+3.8+8	0	68	88	87	51
Thcz+Clpy&Flox+MCPA+AMS	0.072+3+4+8	0	66	83	85	54
Thcz+Clpy&Flox+Thif-sg+Trib-sg+AMS	0.072+3+0.15+0.15+8	0	68	89	90	49
Thcz+Prcz+Brox&MCPA&Flox+AMS	0.072+0.14+8+8	0	63	86	85	50
Brox&Pyst&Thcz+AMS	3+8	0	73	85	83	48
Fenoxaprop&Brox&Pyst	5.4	0	76	95	79	50
Untreated Check	0	0	0	0	0	47
CV		0	6	5	4	6
LSD P=.05		.	5	5	4	4

Herbicides did not cause visible injury to wheat. Initial control of foxtail was greatest with fenoxaprop at 76%. Fenoxaprop continued as having the highest treatment value for foxtail control through June. However, thiencarbazone plus bromoxynil and MCPA and fluroxypyr gave similar control at 93%. This treatment along with thiencarbazone plus tribenuron were evaluated as providing 90% control in August.

Grass and broadleaf weed control in spring wheat, Carrington, 2016.
Greg Endres and Mike Ostlie.

The field experiment was conducted at the NDSU Carrington Research Extension Center in cooperation with Bayer CropScience and Dow AgroSciences to examine weed efficacy and crop tolerance with Varro, Goldsky, PerfectMatch, and TeamMate herbicides. Experimental design was a randomized complete block with three replicates. 'Elgin-ND' HRS wheat was seeded on May 3 in conventionally tilled soil. Herbicide treatments were applied with a CO_2-hand-boom plot sprayer delivering 10 gal/A at 35 psi through 8001 flat fan nozzles to the center 6.7 ft of 10- by 25-ft plots. Treatments were applied on May 27 with 72 F, 47% RH and 7 mph wind to 3-leaf wheat, 1- to 4-leaf (tillering) yellow and green foxtail, and 1- to 2-inch tall common lambsquarters. Hail occurred on July 9 causing slight crop damage.

Wheat chlorosis/necrosis with ratings of 3-4 were noted seven days after herbicide application (DAA) with treatments 6, and 12-15 (Table). However, five days later, ratings for all treatments ranged from 0-2. Wheat growth reduction ranged from 13-38% seven DAA with all treatments except numbers 16 and 17. Five days later, growth reduction ranged from 0-19% with all treatments. Chlorosis/necrosis and growth reduction were not observed 25 DAA.

Visual evaluation 26 DAA indicated foxtail control ranging from 81-86% with treatments 4-8, 10-14, 16-17. Common lambsquarters control was excellent (90-96%) with treatments 2-3, 5, 7, and 12-15. At wheat maturity (August 2), foxtail was suppressed (67-76%) with all treatments except number 15. Common lambsquarters control was good to excellent (80-91%) with treatments 2-3, 5-7, and 12-14.

Table.

Herbicide			Weed control[1]						Wheat			
			9-Jun		22-Jun		2-Aug		Chlorosis/ Necrosis[2]		Growth reduction	
Number	Treatment[3]	Rate	fota	colq	fota	colq	fota	colq	3-Jun	8-Jun	3-Jun	8-Jun
		fl oz product/A	%						0-9		%	
1	Untreated check	x	0	0	0	0	0	0	0	0	0	0
2	Varro + Brox-M	6.9 + 16	83	97	79	92	72	83	2	0	22	2
3	Varro + Weld	6.9 + 18	86	79	77	91	67	91	2	0	23	1
4	Varro + Carnivore	6.9 + 16	83	96	83	86	71	74	2	0	17	1
5	Varro + WideMatch + 2,4-D ester	6.9 + 16 + 8	81	79	81	96	69	89	2	0	13	1
6	Varro + WideMatch + MCPA ester	6.9 + 16 + 8	84	78	81	88	67	90	3	0	17	1
7	Varro + WideMatch + Affinity Tankmix	6.9 + 16 + 0.6 oz wt	88	97	85	95	71	91	2	0	18	2
8	Varro + Carnivore + Olympus	6.9 + 16 + 0.2 oz wt	84	97	82	81	76	79	2	1	17	12
9	Huskie Complete	13.7	80	96	76	77	67	73	2	0	13	1
10	GoldSky + NIS	16 + 0.5% v/v	79	83	81	76	69	68	2	1	25	7
11	GoldSky + 2,4-D ester	16 + 7.3	79	94	82	85	70	70	2	1	23	12
12	PerfectMatch + NIS	16 + 0.5% v/v	82	88	84	90	69	80	4	1	35	13
13	PerfectMatch + 2,4-D ester	16 + 7.3	86	92	85	94	71	91	3	1	27	11
14	TeamMate + Weld	1 oz wt + 18	87	93	86	95	70	91	4	1	33	13
15	TeamMate + Carnivore	1 oz wt + 16	79	98	74	93	48	76	4	2	38	19
16	Axial XL + WideMatch	16.4 + 16	91	71	82	70	71	70	2	0	8	0
17	Everest 2.0 + WideMatch + NIS	1 + 16 + 0.5% v/v	78	68	86	73	76	71	1	0	0	0
C.V. (%)			6.0	3.3	5.1	5.4	7.7	5.9	35.5	106.4	37.5	55.5
LSD (0.05)			8	5	7	7	8	7	1	1	12	5

[1]fota=primarily yellow foxtail, and green foxtail; colq=common lambsquarters.

[2]Chlorosis/Necrosis:0=none; 9=all tissue yellow to brown.

[3]All herbicide treatments included ammonium sulfate: Treatments 2-9=8 oz wt/A; treatments 10-17=24 oz wt/A. NIS=Preference (Winfield).

Varro tank-mixes for Weed Control in Spring Wheat

Caleb Dalley, HREC, Hettinger, ND, 2016

A field trial was conducted to evaluate weed control and spring wheat tolerance to postemergence applications of Varro tank-mixes. Spring wheat 'Elgin' was planted into no-till barley stubble on May 6, 2016 using a John Deere 1590 no-till drill. During planting, starter fertilizer (18-46-0) was drilled into the planting furrow at a rate of 40 lbs/A. Prior to planting, urea (46-0-0) was broadcast applied at a rate of 120 lbs/A using a broadcast spreader. Spring wheat emerged on May 15. Below average rainfall occurred at the research field where this trial was conducted with only 3.4 inches of rain falling between planting and harvest, compared to an average rainfall of 7.9 inches during this time period. Herbicide treatments were applied on June 2 using a tractor mounted research sprayer at a spray volume of 10 gal/A using flat fan nozzles spaced at 20 inches. Wheat was at the tillering stage and averaged 7 inches to the longest extended leaf. Wheat injury and weed control were evaluated at 12, 22, and 35 days after application. Only minor injury was observed with any treatment consisting of primarily slight stunting in growth and there were no significant differences in injury due to treatment. At 35 DAT, Japanese brome control ranged from 81% with Wolverine to 98% with Varro + WideMatch + 2,4-D ester; Wild oat control ranged from 84 to 91% with no significant differences due to treatment; green foxtail control with Varro tank-mixes ranged from 80 to 89%, compared to 78% with the Huskie Complete treatment, and 83% with Wolverine Advanced. Common lambsquarters control was 90 to 100% with all treatments except Varro + Bison (80%); prickly lettuce was control 95 to 100% with all treatments. Wheat was harvested on August 1 using a Kincaid plot harvester with a 5 foot header. There were no significant differences in yield due to herbicide treatment, although yield was lowest in the untreated plots. POST options for weed control are valuable, especially in years where deficiencies in rainfall limit the efficacy of soil-applied PRE herbicides.

Treatment	Rate	Wheat injury			J. brome	G. foxtail	Wild oat	Test wt	Yield
		12 DAT	22 DAT	35 DAT					
		——%——			——control at 35 DAT (%)——			-lbs/bu-	bu/A
1 Untreated		0	0	0	0	0	0	54 a	44.7 a
2 Varro	6.85 oz/a	1 a	4 a	0 a	93 ab	82 bcd	84 a	56 a	57.1 a
Bison	1 pt/a								
AMS	0.5 lb/a								
3 Varro	6.85 oz/a	1 a	1 a	0 a	92 ab	89 ab	90 a	55 a	57.0 a
Weld	18 oz/a								
AMS	0.5 lb/a								
4 Varro	6.85 oz/a	1 a	1 a	0 a	95 ab	86 abc	90 a	55 a	53.7 a
Carnivore	1 pt/a								
AMS	0.5 lb/a								
5 Varro	6.85 oz/a	0 a	2 a	0 a	98 a	84 a-d	91 a	53 a	65.3 a
WideMatch	1 pt/a								
2,4-D ester	0.5 pt/a								
AMS	0.5 lb/a								
6 Varro	6.85 oz/a	0 a	4 a	0 a	96 a	84 a-d	90 a	55 a	56.5 a
WideMatch	1 pt/a								
MCPA Ester	0.5 pt/a								
AMS	0.5 lb/a								
7 Varro	6.85 oz/a	1 a	3 a	0 a	92 ab	80 cd	91 a	54 a	54.3 a
WideMatch	1 pt/a								
Affinity TankMix	0.6 oz/a								
AMS	0.5 lb/a								
8 Varro	6.85 oz/a	4 a	3 a	0 a	87 bc	89 a	91 a	56 a	67.6 a
Olympus	0.2 oz/a								
Carnivore	1 pt/a								
AMS	0.5 lb/a								
9 Huskie complete	13.7 oz/a	3 a	3 a	0 a	90 abc	78 d	89 a	55 a	64.5 a
10 Wolverine Adv	0.5 lb/a	0 a	2 a	0 a	81 c	72 abc	84 a	54 a	61.6 a
LSD P=.10		NS	NS	NS	10	NS	8.2	NS	NS
Standard Deviation		2.0	2.7	0	9.7	5.0	6.3	1.5	13.8
CV		172.7	107.5	0	9.8	8.17	8.8	2.7	23.7
Treatment F		1.500	1.587	0.000	3.374	0.245	4.693	1.500	1.587
Treatment Prob(F)		0.2399	0.2295	1.0000	0.0349	0.8641	0.0102	0.2399	0.2295

PRE/POST Combinations of Varro, Olympus, and Huskie Complete for Weed Control in Spring Wheat

Caleb Dalley, HREC, Hettinger, ND, 2016

A field trial was conducted to evaluate weed control and spring wheat tolerance to pre and postemergence combinations of Varro, Olympus, and Huskie Complete. Spring wheat 'Elgin' was planted using a John Deere 1590 into barley stubble. At planting, starter fertilizer (18-46-0) was drilled into the planting furrow at a rate of 40 lbs/A. Prior to planting urea (46-0-0) was broadcast applied at a rate of 120 lbs/A using a drop spreader. PRE treatments were applied on May 9 using a tractor mounted research sprayer at a spray volume of 10 gal/A using flat fan nozzles spaced at 20 inches. Wheat emerged on May 15. The growing season at Hettinger was dryer than average with only 3.4 inches of rain falling in between planting and harvest; compared to an average of 7.9 inches during this time period. Low rainfall limited the efficacy of soil applied PRE herbicides. POST treatments were applied as previously described on June 2. At time of application, wheat was in the tillering stage and had an average height of 7 inches to the longest extended leaf. Crop injury and weed control were evaluated at 12, 22, and 35 days after treatment (DAT). Minor injury (,6%), in the form of stunted growth, was observed with some treatments at 12 DAT. No significant injury was observed at 22 or 35 DAT. Weed control increased in nearly all cases when going from 12 to 35 DAT. At 35 DAT, Japanese brome, prickly lettuce, and horseweed control were 89 to 100%; wild oat control ranged from 88 to 95%; and green foxtail control ranged from 77 to 87%. Wheat was harvested on August 4 using a Kincaid plot harvester with a 5 foot wide header. No significant differences in yield were observed due to herbicide treatment. All herbicide combinations provided good or excellent weed control with little to no injury to the spring wheat crop. POST options for weed control were valuable in a season where low rainfall limited the efficacy of soil-applied PRE herbicides.

Treatment	Rate	Wheat injury			J. brome	G. foxtail	Wild oat	Horseweed	Test wt	Yield
		12 DAT	22 DAT	35 DAT						
		——%——			——control at 35 DAT (%)——				-lbs/bu-	-bu/A-
1 Untreated		0	0	0	0	0	0	0 c	53 a	30.5 a
2 Varro	6.85 oz/a	1 cd	1 a	0 a	96 b	84 a	88 d	92 b	55 a	30.2 a
Carnivore	1 pt/a									
AMS	0.5 lb/a									
3 Varro	6.85 oz/a	2 bcd	1 a	0 a	100 a	85 a	92 a-d	93 b	55 a	31.8 a
Carnivore	1 pt/a									
Olympus	0.2 oz/a									
AMS	0.5 lb/a									
4 Olympus	0.2 oz/a	6 a	2 a	0 a	100 a	83 a	94 ab	94 ab	54 a	31.2 a
Varro	6.85 oz/a									
Carnivore	1 pt/a									
AMS	0.5 lb/a									
5 Olympus	0.2 oz/a	0 d	1 a	0 a	100 a	87 a	95 a	94 ab	55 a	33.9 a
Varro	6.85 oz/a									
Carnivore	1 pt/a									
Olympus	0.2 oz/a									
AMS	0.5 lb/a									
6 Huskie Complete	13.7 oz/a	4 ab	3 a	0 a	99 a	84 a	89 cd	100 a	54 a	31.5 a
AMS	0.5 lb/a									
7 Huskie Complete	13.7 oz/a	3 bc	4 a	0 a	100 a	87 a	89 bcd	96 ab	55 a	36.2 a
Olympus	0.2 oz/a									
AMS	0.5 lb/a									
8 Olympus	0.2 oz/a	4 ab	3 a	0 a	98 ab	77 b	90 bcd	89 b	53 a	32.3 a
Huskie Complete	13.7 oz/a									
AMS	0.5 lb/a									
9 Olympus	0.2 oz/a	4 abc	0 a	0 a	100 a	85 a	93 abc	95 ab	55 a	33.7 a
Huskie Complete	13.7 oz/a									
Olympus	0.2 oz/a									
AMS	6.85 lb/a									
LSD P=.10		2.8	2.5	NS	2.3	4.6	5.0	7.2	1.5	4.47
Standard Deviation		2.3	2.1	0.0	1.9	3.8	4.1	6.0	2.21	11.4
CV		85.73	119.04	0.0	2.2	5.07	5.07	7.15	1.247	1.065
Treatment F		3.158	1.947	0.000	1166	221	221	111	1.247	1.065
Treatment Prob(F)		0.0145	0.1010	1.0000	0.0001	0.0001	0.0001	0.0001	0.3178	0.4200

Foxtail barley control with Varro tank mixes. (Minot). The objective of the study was to evaluate fall and spring herbicides for foxtail barley control. Treatments included Glyphosate, Olympus, and Varro. Fall treatments were applied September 30, 2015. Glyphosate was applied to the entire study (except untreated) on May 17. Wheat was planted May 19. Postemergence treatments were applied June 13.

No crop injury was observed with any treatment. All treatments provided nearly 100% foxtail barley control.

Table. Foxtail barley control with Varro tank mixes. (1625)

			Wheat Injury		Weed Control Foxtail barley		
Treatment	Rate (oz)	Timing	Jun-13	Jul-9	May-16	Jun-13	Jul-9
			--------%--------		----------%----------		
Untreated			0	0	0	0	0
Gly[a] + Olympus[b]	24 + 0.2	Fall	0	0	100	100	100
Gly[a] + Olympus[b]	24 + 0.4	Fall	0	0	100	100	100
Gly[a] + Olympus[b] / Varro + Huskie + Olympus[b]	24 + 0.2 / 6.85 + 13.5 + 0.2	Fall / 4-leaf	0	0	100	100	100
Gly[a] + Olympus[b] / Varro + Huskie + Olympus[b]	24 + 0.4 / 6.85 + 13.5 + 0.2	Fall / 4-leaf	0	0	100	100	100
Gly[ab] / Varro + Huskie + Olympus[b]	24 / 6.85 + 13.5 + 0.2	Fall / 4-leaf	0	0	100	100	100
Gly[ab] / Gly[ab] / Varro + Huskie + Olympus[b]	24 / 24 / 6.85 + 13.5 + 0.2	Fall / PRE / 4-leaf	0	0	100	100	100
Gly[ab] / Varro + Huskie + Olympus[b]	24 / 6.85 + 13.5 + 0.2	PRE / 4-leaf	0	0	0	99	100
LSD (0.05)			NS	NS	0	0.4	0

[a] *Gly=Glyphosate*

[b] *Applied with AMS (1.47 gal/100 gal)*

Adjuvants with Thiencarbazone for wild oat control. Howatt, Roach, and Harrington. 'Prosper' hard red spring wheat was seeded near Fargo on May 3. Treatments were applied to 4 leaf wheat and 3 leaf wild oat on June 2 with 74°F, 34% relative humidity, 15% cloud cover, 3.2 mph average wind velocity at 220°, mostly dry topsoil at 63°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 40 psi through 11001 TT nozzles to a 7 foot wide area the length of 10 by 30 foot plots. The experiment was a randomized complete block design with four replicates.

		June 16		June 30
Treatment	Rate	wht	wioa	wioa
	oz/A	%	%	%
Thcz	0.06	0	63	84
Thcz+Preference	0.06+0.25%	0	78	85
Thcz+Preference+AG02013	0.06+0.25%+4	0	75	84
Thcz+AG13063	0.06+1%	0	75	85
Thcz+AG13063	0.06+1.25%	0	79	85
Thcz+AG14039	0.06+4	0	76	74
Thcz+AG8050	0.06+6.4	0	76	71
Thcz+AG14039	0.06+6.4	0	76	76
Thcz+AG14039	0.06+8	0	80	78
Thcz+AG05006	0.06+8	0	81	76
Thcz+AG14039	0.06+1%	0	78	83
Thcz+AG05006	0.06+1%	0	85	76
CV		0.0	4	8
LSD P=.05		.	5	9

Thiencarbazone did not cause visible injury to wheat. All adjuvants improved thiencarbazone control of wild oat on June 16. AG05006 at 1% improved thiencarbazone control the most to 85%, but this treatment control was only 76% on June 30. On this date, adjuvants did not aid in thiencarbazone control of wild oat.

Adjuvants with Thiencarbazone for yellow foxtail control. Howatt, Roach, and Harrington. 'Prosper' hard red spring wheat was seeded near Fargo on May 3. Treatments were applied to 3 leaf wheat and 1 to 3 leaf yellow foxtail on June 2 with 64°F, 59% relative humidity, 25% cloud cover, 4.8 mph average wind velocity at 225°, and damp topsoil at 54°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 40 psi through 11001 TT nozzles to a 7 foot wide area the length of 10 by 30 foot plots. The experiment was a randomized complete block design with four replicates.

		June 16		July 6
Treatment	Rate	wht	yeft	yeft
	oz/A	%	%	%
Thcz	0.06	0	60	66
Thcz+Preference	0.06+0.25%	0	88	84
Thcz+Preference+AG02013	0.06+0.25%+4	0	85	83
Thcz+AG13063	0.06+1%	0	83	84
Thcz+AG13063	0.06+1.25%	0	80	77
Thcz+AG14039	0.06+4	0	81	79
Thcz+AG8050	0.06+6.4	0	79	79
Thcz+AG14039	0.06+6.4	0	82	84
Thcz+AG14039	0.06+8	0	84	81
Thcz+AG05006	0.06+8	0	81	82
Thcz+AG14039	0.06+1%	0	76	75
Thcz+AG05006	0.06+1%	0	89	90
CV		0	4	4
LSD P=.05		.	5	4

All adjuvants improved thiencarbazone control of yellow foxtail. AG05006 at 1% improved control the most to 90%. Other adjuvants with thiencarbazone were rated as 77 to 84% foxtail control. Pyroxsulam plus Preference gave 84% control in July.

Wild Oat Control with New pyroxsulam formulation. Howatt, Roach, and Harrington. 'Prosper' hard red spring wheat was seeded near Fargo on May 2. Treatments were applied to 2.5 leaf wheat and 1 to 2 leaf wild oat on May 24 with 74°F, 37% relative humidity, 30% cloud cover, 9 to 12 mph wind velocity at 160°, and dry topsoil at 62°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 40 psi through 11001 TT nozzles to a 7 foot wide area the length of 10 by 30 foot plots. The experiment was a randomized complete block design with four replicates. Harvest for yield was August 9.

		May 27	June 1	June 8		June 21	July 25	Aug 9
Treatment	Rate	wht	wht	wht	wioa	wioa	wioa	Yield
	oz/A	%	%	%	%	%	%	bu/A
Pxlm&Flas&Flox +NIS+AMS	1.68 +0.5%+22	0	0	0	83	92	98	50
Pxlm&Flas&Flox+2,4-D +AMS	1.68+5 +22	0	0	0	86	95	95	50
Pxlm&Clpy&Flox +NIS+AMS	3.2 +0.5%+22	0	0	0	85	93	96	53
Pxlm&Clpy&Flox+2,4-D +AMS	3.2+5 +22	0	0	0	89	97	98	52
Pxlm-TM+Clpy&Flox&MCPA +AMS	0.21+8.5 +22	0	0	0	80	90	89	50
Brox&Pyst&Thcz	3	0	0	0	80	91	92	51
Pinoxaden+Clpy&Flox +AMS	0.86+3 +22	0	0	0	96	97	99	55
Flcz2.0+Clpy&Flox +NIS+AMS	0.32+3 +0.25%+22	0	0	0	79	91	88	48
Untreated Check	0	0	0	0	0	0	0	44
CV		0	0	0	2	2	2	8
LSD P=.05		.	.	.	3	2	2	6

Herbicides did not cause visible injury to wheat. None of the pyroxsulam treatments matched the speed of control provided by pinoxaden, 96% on June 8. But pyroxsulam premix treatments gave better control on this date than thiencarbazone, flucarbazone, or the pyroxsulam WDG formulation, pxlm-TM. At later evaluations, the pyroxsulam WDG formulation gave an average of 90% control while the premix formulations of pyroxsulam averaged 96% control.

Postemergence Options for Weed Control in Spring Wheat

Caleb Dalley, HREC, Hettinger, ND, 2016

A field trial was conducted to evaluate weed control and spring wheat tolerance to several POST herbicides. Spring wheat 'Elgin' was planted on May 6, 2016 at a rate of 100 lbs/A using a John Deere 1590 no-till drill into barley stubble using no-till practices. At planting, starter fertilizer (18-46-0) was applied to the drill at a rate of 40 lbs/A. Prior to planting, urea was broadcast applied at a rate of 120 lbs/A. Wheat emerged on May 15. Treatments were applied on June 10 using a tractor mounted research sprayer with flat fan nozzles spaced at 20 inches using a spray volume of 10 gal/A to wheat that was in the tillering stage with an average height of 11 inches to the longest extended leaf. Weeds present at time of application included prickly lettuce (1/m2, 26.5 cm in height), green foxtail (156/m2, 7.4 cm in height), Shepherd's purse (0.5/m2, 53 cm in height), wild oat (4.5/m2, 32.4 cm in height), common lambsquarters (1/m2, 2 cm in height), kochia (0.5/m2, 16 cm in height), horseweed (0.5/m2, 19 cm in height), and Japanese brome (2.5/m2, 39.5 cm in height). Wheat injury was evaluated at 7, 13, 21, and 28 days after treatment (DAT) and weed control was evaluated at 13, 21, and 28 DAT. Injury, in the form of slight chlorosis (yellowing) of wheat was observed at 7 DAT with nearly all treatments. However, injury was slight and was not observed at later evaluations. There was some wheat injury in the form of slight stunting observed in later evaluations, but it was inconsistent and did not result in any significant differences between treatments. Wild oat control was greatest (93%) at 28 DAT with the Axial XL + WideMatch treatment; all other treatments provided good wild oat control (77 to 82%). Prickly lettuce control was greatest with PerfectMatch + 2,4-D (93%) and Huskie Complete (94%); All other treatments control prickly lettuce within a range of 80 to 87%. Common lambsquarters control was greatest with Goldsky + 2.4-D (100%), PerfectMatch + 2.4-D (98%), TeamMate + Hat Trick (100%), and Huskie Complete (100%); poor control was observed with Glodsky (68%), Axial SL + WideMatch (55%), and Everest + WideMatch (63%); PerfectMatch alone controlled common lambsquarters at 84%. Kochia control was greatest with Goldsky + 2,4-D (99%); Goldsky alone (72%) and TeamMate + Hat Trick (78%) provided fair control; all other treatment provided good control of kochia (83-89%). Horseweed control was greatest with Huskie Complete (100%); PerfectMatch + 2,4-D (94%) and TeamMate + Hat Trick (93%) provided excellent control; all other treatments provided good control of horseweed (81-85%). Green foxtail control was greatest with Axial XL + WideMatch (88%); other treatments controlled green foxtail in a range from 78 to 83%. Wheat was harvested on August 4 using a Kincaid plot harvester with a 5 foot head. No differences in wheat yield was observed for any of the treatments in this trial. Weed densities were relatively low and did not significantly reduce wheat yield in the untreated control compared to other treatments, although yield was in most cases lower than in treatments where weeds were controlled.

Treatment	Rate	Wheat injury			Wild Oat	Green foxtail	Kochia	Prickly Lettuce	Common lamsquaters	Test wt	Yield
		7 DAT	13 DAT	21 DAT							
		——%——			——control at 28 DAT (%)——					lbs/bu	bu/A
1 Untreated		0	0	0	0	0	0	0	0	55 a	39.9 a
2 Goldsky	16 oz/a	5 ab	0 a	1 a	81 bc	81 bcd	72 c	85 cd	68 c	55 a	40.5 a
Activator 90	0.5 % v/v										
AMS	1.51 lb/a										
3 Goldsky	16 oz/a	6 a	2 a	3 a	82 b	80 cde	99 a	87 bc	100 a	55 a	43.7 a
2,4-D ester LV	7.26 oz/a										
AMS	1.51 lb/a										
4 PerfectMatch	16 oz/a	3 c	1 a	0 a	82 b	79 de	85 b	85 cd	84 b	55 a	42.6 a
Activator 90	0.5 % v/v										
AMS	1.51 lb/a										
5 PerfectMatch	16 oz/a	4 bc	0 a	3 a	80 bc	82 bc	83 bc	93 ab	98 a	55 a	39.3 a
2,4-D ester LV	7.26 oz/a										
AMS	1.51 lb/a										
6 TeamMate	1 oz/a	0 d	0 a	3 a	77 c	78 e	78 bc	83 cd	100 a	55 a	39.6 a
Hat Trick	1.5 pt/a										
AMS	1.51 lb/a										
7 Huskie complete	13.7 oz/a	7 a	3 a	3 a	82 b	78 e	89 ab	94 a	100 a	55 a	42.6 a
8 Axial SL	16.4 oz/a	2 cd	0 a	0 a	93 a	88 a	84 bc	82 cd	55 d	55 a	40.5 a
WideMatch	16 oz/a										
AMS	1.51 lb/a										
9 Everest 2.0	0.75 oz/a	7 a	0 a	3 a	81 bc	83 b	83 bc	80 d	63 cd	54 a	43.4 a
WideMatch	16 oz/a										
Activator 90	0.25 % v/v										
AMS	1.51 lb/a										
LSD P=.10		2.3	NS	NS	4.2	2.5	14.2	6.8	10.5	1.1	4.77
Standard Deviation		1.9	2.0	2.7	3.4	1.9	11.1	5.5	8.6	0.9	3.94
CV		45.8	271	150	4.2	0.56	13.2	1.46	10.3	1.67	9.53
Treatment F		6.780	1.262	0.816	7.197	10.693	2.068	2.844	19.644	6.780	1.262
Treatment Prob(F)		0.0003	0.3154	0.584	0.0002	0.0001	0.1436	0.0349	0.0001	0.0003	0.3154

Adjuvants with Pyroxsulam control of wild oat. Howatt, Roach, and Harrington. 'Prosper' hard red spring wheat was seeded near Fargo on May 2. Treatments were applied to 4 leaf wheat and 3 to 3.5 leaf wild oat on June 2 with 72°F, 31% relative humidity, 5% cloud cover, 2 to 6 mph wind velocity at 270°, and dry topsoil at 66°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 40 psi through 11001 TT nozzles to a 7 foot wide area the length of 10 by 30 foot plots. The experiment was a randomized complete block design with four replicates.

		June 16		June 30
Treatment	Rate	wht	wioa	wioa
	oz/A	%	%	%
Pxlm-TM	0.17	0	64	73
Pxlm-TM+Preference	0.17+0.25%	0	70	90
Pxlm-TM+Preference+AG02013	0.17+0.25%+4	0	76	89
Pxlm-TM+AG13063	0.17+1%	0	75	84
Pxlm-TM+AG13063	0.17+1.25%	0	71	83
Pxlm-TM+AG14039	0.17+4	0	78	90
Pxlm-TM+AG8050	0.17+6.4	0	75	81
Pxlm-TM+AG14039	0.17+6.4	0	76	87
Pxlm-TM+AG14039	0.17+8	0	79	86
Pxlm-TM+AG05006	0.17+8	0	79	84
Pxlm-TM+AG14039	0.17+1%	0	80	90
Pxlm-TM+AG05006	0.17+1%	0	81	92
CV		0	4	4
LSD P=.05		.	4	5

Pyroxsulam did not cause visible injury to wheat. All adjuvants improved pyroxsulam control of wild oat. AG05006 at 1% improved pyroxsulam control the most, 81% on June 16. Treatments similar to this included the other rate of AG05006 or AG14039. Preference, AG14039, or AG05006 increased pyroxsulam control of wild oat to 90% or more on June 30.

Adjuvants with Pyroxsulam for yellow foxtail control. Howatt, Roach, and Harrington. 'Prosper' hard red spring wheat was seeded near Fargo on May 3. Treatments were applied to 3 leaf wheat and 1 to 2 leaf yellow foxtail on June 2 with 66°F, 45% relative humidity, 25% cloud cover, 5.8 mph average wind velocity at 225°, and damp topsoil at 54°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 40 psi through 11001 TT nozzles to a 7 foot wide area the length of 10 by 30 foot plots. The experiment was a randomized complete block design with four replicates.

		June 16		July 6
Treatment	Rate	wht	yeft	yeft
	oz/A	%	%	%
Pxlm-TM	0.17	0	38	25
Pxlm-TM+Preference	0.17+0.25%	0	81	76
Pxlm-TM+Preference+AG02013	0.17+0.25%+4	0	80	79
Pxlm-TM+AG13063	0.17+1%	0	71	76
Pxlm-TM+AG13063	0.17+1.25%	0	73	81
Pxlm-TM+AG14039	0.17+4	0	79	76
Pxlm-TM+AG8050	0.17+6.4	0	74	76
Pxlm-TM+AG14039	0.17+6.4	0	80	80
Pxlm-TM+AG14039	0.17+8	0	84	79
Pxlm-TM+AG05006	0.17+8	0	83	84
Pxlm-TM+AG14039	0.17+1%	0	68	73
Pxlm-TM+AG05006	0.17+1%	0	90	90
CV		0	6	6
LSD P=.05		.	7	6

All adjuvants improved pyroxsulam control of yellow foxtail. AG05006 at 1% improved control the most to 90%. The same adjuvant at 8 fl oz/A (approximately 0.75% by volume based on 8.5 gpa) provided the next greatest improvement of pyroxsulam activity and resulted in 84% control. Other adjuvants with pyroxsulam were rated as 81% foxtail control or less. Pyroxsulam plus Preference gave 76% control in July.