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**Grass control with Luxxur herbicide in barley, Carrington, 2020.**

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The field experiment was conducted at the NDSU Carrington Research Extension Center in cooperation with Bayer CropScience to examine weed efficacy and crop tolerance with Luxxur and broadleaf herbicide tank mixtures. Experimental design was a randomized complete block with three replicates. 'ND-Genesis' barley was seeded May 14 on 2019 wheat ground. Herbicide treatments were applied with a CO<sub>2</sub>-hand-boom plot sprayer delivering 10 gal/A at 35 psi through flat fan 8001 nozzles to the center 6.7 ft of 10- by 25-ft plots. Treatments were applied on June 11 with 74 F, 36% RH and 3 mph wind to 3- to 5-leaf barley and 3- to 4-leaf yellow and green foxtail.

Green:yellow foxtail ratio in the trial was estimated at 20:80%. Foxtail control visually evaluated 15, 26, and 48 days after treatment (DAT) ranged from 55-71% with all herbicide treatments except Huskie Complete was less than 50% with the last two evaluations (Table). Barley biomass reduction with all herbicide treatments ranged from 18-52% when visually evaluated 15 and 26 DAT. Luxxur B plus A with tank mixtures of Starane Flex, Starane Flex plus 2,4-D ester, Sentrallas, Sentrallas plus 2,4-D, and Pixxaro reduced biomass 31-52%. Heading dates with all herbicide treatments were delayed 3-6 days compared to the untreated check.

Table.								
Herbicide			Weed control			Barley		
Herbicide			Green and yellow foxtail			Biomass reduction		Heading date
No.	Treatment	Rate	26-Jun	7-Jul	29-Jul	%		Day of Year
		fl oz product/A	%			26-Jun	7-Jul	
1	Untreated check	x	0	0	0	0	0	196
2	Luxxur B + Luxxur A	6.85 + 0.21 oz wt	65	66	62	22	20	200
3	Luxxur B + Luxxur A + Starane Flex	6.85 + 0.21 oz wt + 13.5	70	70	68	48	35	202
4	Luxxur B + Luxxur A + 2,4-D ester	6.85 + 0.21 oz wt + 8	66	65	59	25	18	201
5	Luxxur B + Luxxur A + Starane Flex + 2,4-D ester	6.85 + 0.21 oz wt + 13.5 + 8	71	69	69	47	35	202
6	Luxxur B + Luxxur A + Sentrallas	6.85 + 0.21 oz wt + 10	71	69	67	43	31	201
7	Luxxur B + Luxxur A + Sentrallas + 2,4-D ester	6.85 + 0.21 oz wt + 10 + 8	73	70	69	52	37	201
8	Luxxur B + Luxxur A + Bromac	6.85 + 0.21 oz wt + 16	70	68	57	21	20	200
9	Huskie Complete	13.7	69	43	27	52	18	199
10	Luxxur B + Luxxur A + Pixxaro	6.85 + 0.21 oz wt + 6	60	67	55	50	32	200
C.V. (%)			10.4	9.0	15.2	37.8	60.5	0.4
LSD (0.10)			9	7	11	19	NS	1

**Volunteer Hemp Control for Wheat Location 1.** Dr. Howatt and Mettler. Hemp variety 'X-59' was seeded near Fargo on May 29, 2020. Treatments were applied to 3 to 4 hemp leaf pairs from 3 to 8 inches on June 24 with 76°F, 50% relative humidity, 0% cloud-cover, 7 mph wind velocity at 45°, and dry soil surface at 75°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. A single evaluation was made approximately 14 days after treatment (DAT).

Treatment	Rate OZ AI/A, % V/V	7/7 Hemp -----%-----
Untreated Check		0
Flox-C (Comet)	1.5	84
Flox&Haux + NIS (Pixxaro EC)	1.8 + 0.25%	82
Haux + NIS (Elevore)	0.075 + 0.5%	15
Haux&Flos + NIS (Quelex)	0.15 + 0.25%	74
2,4-D (Salvo)	6	81
MCPA (Sword)	6	71
NUP17063 (2,4-Dp)	6	62
Dica-C (Clarity)	1.5 + 3.4	12
Brox&Pyst (Huskie)	3.4	86
CoAct + Brox&Bcyp (Talinor)+ PO	0.91 + 3 + 1%	76
Thif-sg + Trib-sg + NIS (Affinity BS)	0.15 + 0.15 + 0.25%	87
Flcz-3.0 (Everest 3.0)	0.35 + 1%	88
Pxlm + BB (Teammate)	0.21 + 1%	86
Thcz + BB (Varro)	0.072 + 1%	92
CV		5
LSD P=0.05		5

Hemp is resilient and if not controlled well by 14 DAT has the ability to overcome a variety of herbicides. The industry needs to have the ability to control volunteer hemp in a succeeding wheat crop. Group 2 herbicides such as thiencazzone, flucarbazone and pyroxulam, along with Huskie (Group 6 + Group 27) performed well resulting in greater than 85% control of volunteer hemp. Products such as Comet, Pixxaro and Affinity BroadSpec also controlled hemp fairly well. Dicamba and halauxifen resulted in very poor control. No crop was planted in this experiment, so perhaps better control of hemp would be observed with crop competition present.

**Volunteer Hemp Control for Wheat Location 2.** Dr. Howatt and Mettler. Hemp variety CFX-2 was seeded near Casselton on May 27, 2020. Treatments were applied to 2 to 6 inch hemp on June 24 with 72°F, 60% relative humidity, 0% cloud-cover, 3 mph wind velocity at 45°, and dry soil surface 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. A single evaluation was made approximately 14 days after treatment.

Treatment	Rate OZ AI/A, % V/V	7/9 Hemp -----%-----
Untreated Check		0
Flox-C (Comet)	1.5	83
Flox&Halx + NIS (Pixxaro EC)	1.8 + 0.25%	81
Haux + NIS (Elevore)	0.075 + 0.5%	24
Halx&Flos + NIS (Quelex)	0.15 + 0.25%	66
2,4-D (Salvo)	6	90
MCPA (Sword)	6	65
NUP17063 (2,4-Dp)	6	57
Dica-C (Clarity)	1.5 + 3.4	14
Brox&Pyst (Huskie)	3.4	77
CoAct + Brox&Bcyp (Talinor) + PO	0.91 + 3 + 1%	65
Thif-sg + Trib-sg + NIS	0.15 + 0.15 + 0.25%	84
Flcz-3.0 (Everest 3.0)	0.35 + 1%	85
Pxlm + BB (Teammate)	0.21 + 1%	84
Thcz + BB (Varro)	0.072 + 1%	94
CV		7
LSD P=0.05		7

Note that CFX-2 cultivar was planted at location 2 rather than X-59. X-59 is known to be a little more herbicide susceptible. Very similar control patterns exist between the two locations. 2, 4-D resulted in 90% control at this location compared to 81% control in location 1, while Huskie dropped in control from 86% to 77% at this location. Otherwise, thiencazone, flucarbazon and pyroxulam maintained a consistent level of control at about 85% or greater. Thiencazone (Group 2) resulted in greater than 90% control at both locations. MCPA and 2,4-Dp consistency resulted in moderate control (55-67%), being out performed by 2, 4-D (80-90%). Dicamba and halauxifen resulted in similarly poor control, less than 25%.

**Volunteer Soybean Control for Wheat.** Dr. Howatt and Mettler.

CZ0301LL/CZ0729GTLL soybean was planted near Fargo, ND on May 20, 2020.

Treatments were applied to V2 soybean on June 22 at 76°F, 55% relative humidity, 20% cloud-cover, 6 mph wind velocity at 315°, and dry soil surface 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.

Treatment	Rate	7/7 Soybean	7/23 Soybean
	-----OZ AI/A, %V-----	-----%-----	
Untreated Check		0	0
NUP17063	6	10	5
2,4-De (Salvo)	6	76	57
MCPA (Sword)	6	56	21
Dicamba-C	1	77	65
Flox-C	1.5	84	85
Clpy	1.5	94	99
Haux + NIS	0.075 + 0.25%	89	94
Trib-sg (Express-sg) + NIS	0.2 + 0.25%	75	45
Flcz-3 + NIS	0.32 + 0.25%	55	37
Pxlm (Teammate) + NIS	0.21 + 0.25%	81	89
Thcz (Varro) + NIS	0.072 + 0.25%	69	45
Brox-2 (Maestro)	4	29	2
Brox&Pyst (Huskie)	3.4	37	20
CoAct + Brox&Bcpy + PO	0.91 + 3 + 1	56	37
CV		10	13
LSD P=0.05		9	9

**Wheat Response to Herbicide-Fungicide Combinations.** Dr. Howatt and Mettler. ND Vitpro hard red spring wheat was seeded on May 4, 2020. Treatments were applied to 3 to 4 leaf wild oat, 2 leaf volunteer wheat, 2 leaf yellow foxtail, and 1 to 3-inch wild buckwheat on June 11 with 66°F, 6% relative humidity, 0% cloud-cover, 7 mph wind velocity at 315° and dry soil surface 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	Appl Timing	6/19 Wheat	6/25 Wheat	7/9 Wheat	8/22 Yield
	OZ AI/A		-----%-----			(Bu/acre)
Fenx&Brox&Pyst+2,4-D ester	5.4 + 4	2L	0	0	0	56
Fenx&Brox&Pyst+2,4-D ester/COCH	5.4 + 4 / 4.5	2L/3L	0	0	0	62
Fenx&Brox&Pyst+2,4-D ester/COCH	5.4 + 4 / 8.2	2L/3L	0	0	0	60
Fenx&Brox&Pyst+2,4-D ester+COCH	5.4 + 4 + 4.5	3L	0	0	0	61
Fenx&Brox&Pyst+2,4-D ester+COCH	5.4 + 4 + 8.2	3L	2	0	0	59
Fenx&Brox&Pyst+2,4-D ester/Pyrac	5.4 + 4 / 2	2L/3L	0	0	0	59
Fenx&Brox&Pyst+2,4-D ester/Pyrac	5.4 + 4 + 2	3L	7	0	0	60
CV			61	0.0	0.0	7
LSD P=.05			1	.	.	7

**Broadleaf Weed Control in Wheat.** Dr. Howatt and Mettler. Linkert what was seeded near Fargo, ND on May 19, 2020. Treatments were applied to 3 leaf wheat, 2 inch common lambsquarters, and 2 inch waterhemp on June 4 with 86°F, 34% relative humidity, 20% cloud-cover, 5 mph wind velocity at 315° and dry soil surface at 72°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	6/19 Wahe	6/19 Colq	7/2 Wahe	7/2 Colq
	-----OZ AI/A, %V-----	-----%-----			
1 Fenx + 2,4-D ester (salvo)	0.8 + 8	75	79	80	94
2 Fenx + Clpy&flox (widematch)	0.8 + 3	60	59	64	70
3 Fenx + Clpy&flox&haux (WideRmatch)	0.8 + 3.36	71	79	84	82
4 Fenx + Clpy&Flox + Carf	0.8 + 3 + 0.128	67	74	57	69
5 Fenx + Clpy&Flox&MCPA	0.8 + 8	69	80	80	91
6 Fenx + Dccp (2, 4-Dp)	0.8 + 8	72	61	83	90
7 Fenx + Haux + MSO	0.8 + 0.07 + 16	77	80	83	86
8 Fenx + Haux&Flas (Quelex) + NIS	0.8 + 0.15 + 0.25	76	55	79	75
9 Fenx + Haux&Flox (Pixxaro)	0.8 + 1.8	75	75	86	88
10 Fenx + Carf + NIS	0.8 + 0.26 + 0.25	75	75	70	72
11 Fenx + Carf + 2,4-D ester	0.8 + 0.128 + 8	85	89	91	95
12 Fenx + Thif-sg + Trib-sg + MCPA + NIS	0.8 + 0.24 + 0.06 + 4 + 0.25	79	87	79	95
13 Fenx + Brox&MCPA (Bison)	0.8 + 8	64	84	56	89
14 Fenx + Brox&Pyst (Huskie)	0.8 + 3.4	96	97	96	97
15 Fenx + CoAct + Brox&Bcpy	0.8 + 0.91 + 3	94	96	94	96
16 Fenx + Brox&Flox&MCPA	0.8 + 0.8	64	87	81	95
CV		6	6	7	5
LSD P=0.5		6	6	8	6

Wahe: Waterhemp

Colq: Common lambsquarters

**Partners for Halauxifen.** Dr. Howatt and Mettler. Linkert wheat was seeded near Fargo on May 12, 2020. Treatments were applied to 3 to 4 inch wheat, 2 inch common lambsquarters, 2 inch wild buckwheat, and 2 inch venice mallow on June 4<sup>th</sup> with 85°F, 34% relative humidity, 20% cloud cover, 5 mph wind velocity at 225°, and dry soil surface at 72°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 plots. The experiment was a randomized complete block design with four replicates.

Treatment	Rate	6/20	6/20	6/20	6/20	7/2	7/2	7/2
		Wht	Wibw	Vema	Colq	Wibw	Vema	Colq
-----OZ AI/A, %V-----		-----%-----						
1 Fenx + haux + MSO	0.8 + 0.07 + 16	0	70	81	86	90	91	99
2 Fenx + Haux&Flas + NIS	0.8 + 0.15 + 0.25	0	86	89	37	87	84	30
3 Fenx + Haux&Flox	0.8 + 1.8	0	74	83	89	87	84	85
4 Fenx + Haux + Thif + NIS	0.8 + 0.07 + 0.25 + 0.25	0	94	91	92	95	85	96
5 Fenx + Haux + Brox-2	0.8 + 0.07 + 4	0	94	89	93	82	87	93
6 Fenx + Haux + Carf + NIS	0.8 + 0.07 + 0.128 + 0.25	0	64	80	88	64	83	94
7 Fenx + Haux + 2, 4-D ester	0.8 + 0.07 + 4	0	74	84	92	74	89	96
8 Fenx + Haux + MCPA ester	0.8 + 0.07 + 4	0	69	79	86	74	82	93
9 Fenx + Clpy&Flox&Haux	0.8 + 3.36	0	89	83	90	92	85	97
10 Fenx + Haux + Dica	0.8 + 0.07 + 1	0	81	81	95	90	86	96
CV		0	5	4	6	4	4	4
LSD P=0.5		.	6	5	7	5	5	5

**Broadleaf Control with Halauxifen Premixes.** Dr. Howatt and Mettler. Linkert wheat was seeded near Fargo on May 12, 2020. Treatments were applied to 3 to 4-inch wheat, 2-inch common lambsquarters, 2-inch wild buckwheat, 3-inch venice mallow on June 4 with 87°F, 34% relative humidity, 20% cloud-cover, 5 mph wind velocity at 225° and dry soil surface at 72°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	6/20	6/20	6/20	6/20	6/20	7/2	7/2	7/2	7/2
		Wht	Wibw	Vema	Colq	Corw	Wibw	Vema	Colq	Corw
	-----OZ AI/A, %V-----	-----%-----								
1 Fenx	0.8	0	0	0	0	0	0	0	0	0
2 Fenx + Haux&Flox	0.8 + 1.8	0	85	86	83	95	89	86	94	99
3 Fenx + Haux&Flox + 2,4-De	0.8 + 1.8 + 4	0	89	89	94	95	99	93	99	99
4 Fenx + Clpy&Flox&Haux	0.8 + 3.36	0	91	84	91	96	99	92	97	99
5 Fenx + Clpy&Flox&Haux + 2,4-De	0.8 + 3.36 + 4	0	94	94	95	96	99	95	99	99
6 Fenx + Clpy&Flox + Haux&Flas	0.8 + 3 + 0.15	0	96	95	94	96	99	97	91	99
7 Pxl&Flox + NIS	2.1 + 0.25%	0	88	92	90	92	97	97	88	98
8 Fenx + Brox&Pyst	0.8 + 3.4	0	94	92	94	97	96	94	98	99
9 Thcz + Trib-sg + MCPAe	0.072 + 0.11 + 4	0	90	92	97	96	94	92	98	97
10 Fenx + Brox&MCPA&Flox	0.8 + 8	0	95	92	95	96	97	92	98	99
CV		0	3	4	3	2	2	4	2	1
LSD P=0.5		.	4	5	4	2	3	5	3	1

**Broadleaf Control with Halauxifen Premixes Location 2.** Dr. Howatt and Mettler. Linkert wheat was seeded near Fargo on May 12, 2020. Treatments were applied to 4-inch wheat, 2-inch common ragweed, 1 to 3-inch waterhemp, 1 to 3-inch common lambsquarters on June 5 with 64°F, 53% relative humidity, 0% cloud-cover, 2 mph wind velocity at 315° and dry soil surface 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	6/19 Wht	6/19 Wahe	6/19 Colq	6/26 Wahe	6/26 Colq
	-----OZ AI/A, %V-----	-----%-----				
1 Fenx	0.8	0	0	0	0	0
2 Fenx + Haux&Flox	0.8 + 1.8	0	72	67	95	99
3 Fenx + Haux&Flox + 2,4-De	0.8 + 1.8 + 4	0	77	72	98	99
4 Fenx + Clpy&Flox&Haux	0.8 + 3.36	0	85	85	96	99
5 Fenx + Clpy&Flox&Haux + 2,4-De	0.8 + 3.36 + 4	0	88	90	94	99
6 Fenx + Clpy&Flox + Haux&Flas	0.8 + 3 + 0.15	0	90	92	97	99
7 Pxlm&Flox + NIS	2.1 + 0.25%	0	73	87	96	98
8 Fenx + Brox&Pyst	0.8 + 3.4	0	94	96	99	99
9 Thcz + Trib-sg + MCPAe	0.072 + 0.11 + 4	0	81	85	92	99
10 Fenx + Brox&MCPA&Flox	0.8 + 8	0	88	90	87	99
CV		0	5	5	4	0
LSD P=0.5		.	6	7	6	1

**New Pyroxasulfone Premix Control of Kochia.** Dr. Howatt and Mettler. Barley was seeded near Valley City, North Dakota. Treatments were applied to 8 to 10-inch kochia on June 18 with 72°F, 85% relative humidity, 50% cloud-cover, 7 mph wind velocity at 270°, and damp soil surface at 73°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 plots. The experiment was a randomized complete block design with four replicates.

Treatment	Rate -----OZ AI/A, %V-----	6/25	6/25	7/2	7/23
		Barley	Kochia	Kochia	Kochia
1 Untreated Check		0	0	0	0
2 Brox&Flox&Pyst	4.47	0	83	89	89
3 Brox&Flox&Pyst	5.2	0	92	96	98
4 Clpy&Flox + MCPAe	3 + 4	11	78	73	85
5 CoAct + Brox&Bcpy + PO	0.91 + 3 + 1	0	80	88	93
6 Brox + MCPA	8	0	75	73	82
7 Thcz + Trib-sg + Brox&Flox&Pyst	0.072 + 0.11 + 4.47	40	82	86	82
8 Psdn&Fenx + Brox&Flox&Pyst	1.3 + 4.47	5	87	92	97
9 Pdxn&Fenx + Brox&MCPA&Flox	1.3 + 8	0	85	84	93
10 Pdxn&Fenx + Clpy&Flox&MCPA	1.3 + 9.5	0	82	82	88
CV		31	5	6	4
LSD P=0.5		3	6	8	6

**New Pyroxasulfone Premix Control of Wild Buckwheat.** Dr. Howatt and Mettler. Linkert wheat was seeded near Fargo on May 12, 2020. Treatments were applied to 3 to 4 inch wheat, 2 to 4 inch common lambsquarters, 3 to 6 leaf wild buckwheat, 3 inch common ragweed, 3 inch waterhemp and 2 inch yellow foxtail on June 4 with 73°F, 25% relative humidity, 3% cloud-cover, 3 mph wind velocity at 225° and dry soil surface at 72°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	6/13	6/13	6/13	6/13	6/13	6/25	6/25
		Wht	Wahe	Colq	Wibw	Vema	Wahe	Colq
	OZ AI/A, %V	-----%-----						
1 Untreated Check		0	0	0	0	0	0	0
2 Brox&Flox&Pyst	4.47	0	95	95	95	91	97	97
3 Brox&Flox&Pyst	5.2	0	95	95	93	93	98	98
4 Clpy&Flox + MCPAe	3 + 4	0	82	81	76	76	91	89
5 CoAct + Brox&Bcpy + PO	0.91 + 3 + 1	0	91	89	88	90	98	92
6 Brox + MCPA	8	0	90	91	87	82	88	93
7 Thcz + Trib-sg + Brox&Flox&Pyst	0.072 + 0.11 + 4.47	0	95	93	93	93	98	96
8 Psdn&Fenx + Brox&Flox&Pyst	1.3 + 4.47	0	95	95	94	93	98	99
9 Pdxn&Fenx + Brox&MCPA&Flox	1.3 + 8	0	94	95	91	90	97	98
10 Pdxn&Fenx + Clpy&Flox&MCPA	1.3 + 9.5	0	81	86	80	80	89	93
CV		0	3	3	3	4	4	3
LSD P=0.5		.	4	4	4	5	4	4

Treatment	Rate	6/25	6/25	7/24	7/24	7/24	7/24
		Wibw	Vema	Wahe	Colq	Wibw	Vema
-----OZ AI/A, %V-----		-----%-----					
1	Untreated Check	0	0	0	0	0	0
2	Brox&Flox&Pyst	4.47	98	93	97	97	94
3	Brox&Flox&Pyst	5.2	98	96	95	98	95
4	Clpy&Flox + MCPAe	3 + 4	90	85	89	97	92
5	CoAct + Brox&Bcpy + PO	0.91 + 3 + 1	96	93	96	95	94
6	Brox + MCPA	8	92	89	92	97	89
7	Thcz + Trib-sg + Brox&Flox&Pyst	0.072 + 0.11 + 4.47	98	97	98	98	99
8	Psdn&Fenx + Brox&Flox&Pyst	1.3 + 4.47	98	92	99	99	99
9	Pdxn&Fenx + Brox&MCPA&Flox	1.3 + 8	97	92	90	97	96
10	Pdxn&Fenx + Clpy&Flox&MCPA	1.3 + 9.5	90	90	89	97	98
	CV		4	4	3	3	3
	LSD P=0.5		5	4	4	4	3

**Kochia Control with Dichlorprop.** Dr. Howatt and Mettler. The experiment was established in a non-cropped field near Rogers, North Dakota on June 18, 2020. Treatments were applied to 15 to 20-inch kochia, and 8 to 12-inch dandelion on June 18 with 72°F, 58% relative humidity, 50% cloud-cover, 7 to 10 mph wind velocity at 270°, and damp soil surface at 73°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 plots. The experiment was a randomized complete block design with four replicates.

Treatment	Rate OZ AI/A, % V/V	6/25	7/2
		Kochia -----%-----	Kochia
Untreated Check		0	0
NUP20005 + NIS	8 + 0.5	66	67
NUP20005 + NIS	10 + 0.5	74	80
NUP20005 + NIS	13.3 + 0.5	80	89
NUP17063 + Brox-M + NIS	6 + 4 + 0.5	69	69
NUP17063 + NIS	8 + 0.5	71	66
Brox-M + NIS	6 + 0.5	64	55
NUP20006 + NIS	0.07 + 0.5	17	16
NUP20005 + NUP20006 + NIS	10 + 0.07 + 0.5	70	77
NUP20005 + NUP20006 + NIS	8 + 0.058 + 0.5	64	79
Clpy&Flox&MCPA (Weld) + NIS	7.5 + 0.5	69	62
CV		7	8
LSD P=0.05		6	7

**Kochia Control with Dichlorprop.** Dr. Howatt and Mettler. Barley was seeded near Valley City, North Dakota. Treatments were applied to 3 to 4 leaf barley, and 4 to 8 inch kochia on June 18 with 68°F, 72% relative humidity, 70% cloud-cover, 7 mph wind velocity at 270°, and moist soil surface 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 a 10 by 30 foot plot. The experiment was a randomized complete block design with four replicates.

Treatment	Rate OZ AI/A, % V/V	6/25	6/25	7/2
		Barley	Kochia	Kochia
		-----%-----		
Untreated Check		0	0	0
NUP20005 + NIS	8 + 0.5	0	68	77
NUP20005 + NIS	10 + 0.5	0	77	93
NUP20005 + NIS	13.3 + 0.5	0	80	87
NUP17063 + Brox-M + NIS	6 + 4 + 0.5	0	78	85
NUP17063 + NIS	8 + 0.5	0	67	80
Brox-M + NIS	6 + 0.5	0	78	57
NUP20006 + NIS	0.07 + 0.5	0	17	10
NUP20005 + NUP20006 + NIS	10 + 0.07 + 0.5	0	82	90
NUP20005 + NUP20006 + NIS	8 + 0.058 + 0.5	0	75	86
Clpy&Flox&MCPA (Weld) + NIS	7.5 + 0.5	9	63	70
CV		6	5	5
LSD P=0.05		1	6	6

**Broadleaf Control with Dichlorprop.** Dr. Howatt and Mettler. Linkert spring wheat was seeded near Fargo on May 12, 2020. Treatments were applied to 3 leaf wheat, 2 to 6 leaf common lambsquarters, 2 to 4 leaf common ragweed, 2 to 4 leaf waterhemp and 3 to 6 leaf wild buckwheat on June 4 with 75°F, 25% relative humidity, 45% cloud-cover, 4 mph wind velocity at 225°, and dry soil surface at 72°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 OZ AI/A, % V/V	6/13	6/13	6/13	6/13	6/13	7/2	7/2	7/2	7/2
		Wht	Wahe	Colq	Wibw	Vema	Wahe	Colq	Wibw	Vema
		-----%-----								
Pdxn	0.86	0	0	0	0	0	0	0	0	0
Pdxn + NUP20005 + NIS	0.86 + 8 + 0.5	0	92	95	95	65	94	99	97	84
Pdxn + NUP20005 + NIS	0.86 + 10 + 0.5	0	95	95	94	79	99	98	97	90
Pdxn + NUP20005 + NIS	0.86 + 13.3 + 0.5	0	94	94	94	87	93	99	99	86
Pdxn + NUP17063 + Brox-M + NIS	0.86 + 6 + 4 + 0.5	0	94	95	94	66	94	98	90	80
Pdxn + NUP17063 + NIS	0.86 + 8 + 0.5	0	94	90	73	65	99	99	89	67
Pdxn + Brox-M + NIS	0.86 + 6 + 0.5	0	94	95	89	75	96	98	98	81
Pdxn + NUP20006 + NIS	0.86 + 0.07 + 0.5	0	95	92	93	84	97	95	96	89
Pdxn + NUP20005 + NUP20006 + NIS	0.86 + 10 + 0.07 + 0.5	0	94	95	95	87	98	99	94	92
Pdxn + NUP20005 + NUP20006 + NIS	0.86 + 8 + 0.058 + 0.5	0	94	95	94	88	97	99	98	96
Pdxn + Cipy&Flox&MCPA + NIS	0.86 + 7.5 + 0.5	0	90	91	94	75	97	97	95	88
Pdxn + Brox&MCPA&Flox + NIS	0.86 + 8 + 0.5	0	92	95	94	82	97	97	98	90
CV		-	3	2	5	5	3	1	2	4
LSD P=0.05		-	3	2	4	5	4	2	3	5

Wht: Wheat  
 Wahe: Waterhemp  
 Colq: Common lambsquarters  
 Wibw: Wild buckwheat  
 Vema: Venice mallow

**Broadleaf Control with Dichlorprop.** Dr. Howatt and Mettler. ND Vitpro hard red spring wheat was seeded near Fargo on May 4, 2020. Treatments were applied to 4 leaf wheat, 2 to 4 inch common ragweed, 3 inch waterhemp, and 3 inch common lambsquarters on June 5 with 64°F, 53% relative humidity, 0% cloud-cover, 3 mph wind velocity at 315°, and dry soil surface 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 OZ AI/A, % V/V	6/13	6/13	6/13	6/13	7/2	7/2	7/2
		Wht	Colq	Wahe	Corw	Colq	Wahe	Corw
		-----%-----						
Pdxn	0.86	0	0	0	0	0	0	0
Pdxn + NUP20005 + NIS	0.86 + 8 + 0.5	0	83	85	88	99	98	99
Pdxn + NUP20005 + NIS	0.86 + 10 + 0.5	0	88	83	87	99	92	99
Pdxn + NUP20005 + NIS	0.86 + 13.3 + 0.5	0	85	83	88	99	98	99
Pdxn + NUP17063 + Brox-M + NIS	0.86 + 6 + 4 + 0.5	0	87	87	88	96	97	99
Pdxn + NUP17063 + NIS	0.86 + 8 + 0.5	0	80	78	80	94	96	99
Pdxn + Brox-M + NIS	0.86 + 6 + 0.5	0	83	78	83	99	95	99
Pdxn + NUP20006 + NIS	0.86 + 0.07 + 0.5	0	75	75	70	87	94	99
Pdxn + NUP20005 + NUP20006 + NIS	0.86 + 10 + 0.07 + 0.5	0	87	85	88	99	96	99
Pdxn + NUP20005 + NUP20006 + NIS	0.86 + 8 + 0.058 + 0.5	0	85	82	85	88	97	99
Pdxn + Clpy&Flox&MCPA + NIS	0.86 + 7.5 + 0.5	0	88	85	90	99	95	99
Pdxn + Brox&MCPA&Flox + NIS	0.86 + 8 + 0.5	0	92	83	92	99	98	99
CV		0	6	5	6	-	2	0
LSD P=0.05		-	8	7	8	-	4	-

Wht: wheat  
Colq: common lambsquarters  
Wahe: waterhemp  
Corw: common ragweed

**Yellow Foxtail Control in Wheat.** Dr. Howatt and Mettler. Linkert Wheat was seeded near Fargo on May 4, 2020. Treatments were applied to 5 leaf wheat and 4 leaf yellow foxtail on June 19 with 57°F, 57°F, 57% relative humidity, 20% cloud-cover, 5 mph wind velocity at 315° and damp soil surface 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.

Treatment	Rate	7/2 Yeft	7/16 Yeft
	-----OZ AI/A, %V-----	-----%-----	
1 Untreated Check		0	0
2 Brox&MCPA (Bison 4#)	8	25	0
3 Flucz-3.0 + Brox&MCPA + BB	0.44 + 8 + 1	69	72
4 Pxlm + Brox&MCPA + BB	0.21 + 8 + 1	69	66
5 Pxlm&Clpy&Flox + BB	3.2 + 1	66	67
6 Pxlm&Flox + Thif + BB	2.1 + 0.2 + 1	70	74
7 Thcz + Brox&MCPA + BB	0.072 + 8 + 1	72	84
8 Thcz + Trib + 2,4-D ester (Salvo)	0.072 + 0.25 + 4	72	79
9 Brox&Pyst&Thcz + UAN	3 + 16	74	72
10 Fenx + Brox&MCPA	0.8 + 8	73	42
11 Fenx&Brox&Pyst	5.4	82	66
12 Pxdn (Axial XL) + Brox&MCPA	0.86 + 8	91	92
13 Pxdn + Haux&Flox	0.86 + 1.8	91	93
14 Pxdn&Fenx + Brox&MCPA	1.28 + 8	91	90
CV		6	9
LSD P=0.5		6	8

Yeft: Yellow Foxtail

**Halauxifen Antagonism of Foxtail Control.** Dr. Howatt and Mettler. Linkert wheat was seeded near Fargo on May 19, 2020. Treatments were applied to 3 leaf wheat, 4 leaf yellow foxtail, 5 to 7 inch redroot pigweed, 4 inch wild buckwheat, 2 to 11 inch common lambsquarters, on June 19 with 57°F, 57% relative humidity, 20% cloud-cover, 5 mph wind velocity at 315° and damp soil surface 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.

Treatment	Rate	7/2 Yeft	7/9 Yeft
	-----OZ AI/A, %V-----	-----%-----	
1 Untreated Check		0	0
2 Pxdn + Haux&Flox	0.86 + 1.8	91	94
3 Pxdn + Haux&Flox + Flas&MCPA	0.86 + 1.8 + 5	72	69
4 Pxdn + Haux&Flox + Thif-sg + Trib-sg	0.86 + 1.8 + 0.24 + 0.06	75	65
5 Pxdn + Haux&Flox + Thif-sg + Trib-sg + MCPAe	0.86 + 1.8 + 0.24 + 0.06 + 6	71	60
6 Pxm&Flox + NIS	2.1 + 0.25	89	95
7 Pxdn&Flox	2.36	.	.
8 Pxdn + Thif-sg + Trib-sg + 2,4-De	0.86 + 0.24 + 0.06 + 6	75	66
9 Fenx + Clpy&Flox	0.8 + 3	75	75
10 Fenx + Clpy&Flox&Haux	0.8 + 3.36	79	85
11 Fenx + Thif-sg + Trib-sg + 2,4-De	0.8 + 0.24 + 0.06 + 6	66	65
CV		6	8
LSD P=0.5		6	8

\*No Data for Treatment 7

**Yellow Foxtail Control with Pinoxaden & Fenoxaprop Tankmixes.** Dr. Howatt and Mettler. Linkert wheat was seeded near Fargo on May 19, 2020. Treatments were applied to 3 to 4 leaf wheat, 4 to 5 leaf yellow foxtail, 5 to 7 inch redroot pigweed, 4 inch wild buckwheat, and 2 to 11 inch common lambsquarters on June 19 with 63°F, 49% relative humidity, 25% cloud-cover, 5 mph wind velocity at 315° and dry soil surface at 70°F. Follow-up treatments were applied on June 24 with 79°F, 40% relative humidity, 0% cloud-cover, 3 mph wind velocity at 45° and dry soil surface at 78°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 -----OZ AI/A, %V-----	7/2 Fxtl -----%-----	7/16 Fxtl -----%-----
1 Brox&MCPA	8	0	0
2 Pxdn&Fenx	1.28	86	96
3 Pxdn&Fenx + Flas&MCPA	1.28 + 5	75	76
4 Pxdn&Fenx + CoAct + Brom&Bcpy	1.28 + 0.91 + 3	86	87
5 Pxdn&Fenx + Flas&MCPA + CoAct + Brom&Bcpy	1.28 + 5.0 + 0.91 + 3	75	75
6 Thcz + Trib-sg + NIS	0.072 + 0.11 + 0.25%	72	75
7 Pxdn&Fenx + Pxsf + Flas&MCPA + CoAct + Brom&Bcpy	1.28 + 2.0 + 5.0 + 0.91 + 3.0	75	74
8 Pxdn&Fenx + Haux&Flox	1.28 + 1.8	86	91
9 Pxdn&Fenx / <b>Flas&amp;MCPA + CoAct + Brom&amp;Bcpy + PO</b>	1.28 / 5.0 + 0.91 + 0.91 + 1%	85	94
10 Pxdn&Fenx + Thif-sg + Trib-sg + 2,4-Da-4	1.28 + 0.125 + 0.125 + 6.8	71	65
11 Pxdn&Fenx + Thif-sg + Trib-sg + Dcpp	1.28 + 0.125 + 0.125 + 6.8	76	75
12 Pxdn + Thif-sg + Trib-sg + 2,4-Da-4	0.86 + 0.125 + 0.125 + 6.8	65	47
13 Pxdn + Thif-sg + Trib-sg + Dcpp	0.86 + 0.125 + 0.125 + 6.8	70	72
CV		6	7
LSD P=0.5		6	7

**Yellow Foxtail Control with Tribenuron to Improve Perennial Control.** Dr. Howatt and Mettler. ND Vitpro hard red spring wheat was seeded near Fargo on May 4, 2020. Treatments were applied to 4 leaf wheat, 2 inch common lambsquarters, 2 to 3 leaf common ragweed, 3 to 6 inch Canada thistle, and 1 to 3 leaf yellow foxtail on June 4 with 70°F, 38% relative humidity, 25% cloud-cover, 3 mph wind velocity at 240° and dry soil surface at 72°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	6/13	6/13	6/13	6/13	6/13	6/13	6/25
		Wht	Yeft	Cath	Colq	Corw	Wibw	Yeft
-----OZ AI/A, %V-----		-----%-----						
1 Untreated Check		0	0	0	0	0	0	0
2 Thcz + Trib-sg	0.072 + 0.11	0	40	62	80	30	63	93
3 Thcz + Trib-sg + Flox&Flas	0.072 + 0.11 + 1.48	0	62	65	87	70	72	93
4 Thcz + Trib-sg + 2,4-De	0.072 + 0.11 + 4	0	57	65	87	53	67	93
5 Thcz + Trib-sg + Flox&Flas + 2,4-De	0.072 + 0.11 + 1.48 + 4	0	57	70	88	63	72	90
6 Thcz + Trib-sg + Flox&Thif	0.072 + 0.11 + 1.94	0	57	73	82	67	68	93
7 Thcz + Trib-sg + Flox&Thif + 2,4-De	0.072 + 0.11 + 1.94 + 4	0	55	75	87	73	77	93
8 Thcz + Trib-sg + Brox&MCPA	0.072 + 0.11 + 8	0	50	75	88	58	77	91
9 Thcz + Trib-sg + Haux&Flox	0.072 + 0.11 + 1.8	0	58	73	92	77	77	89
10 Thcz + Trib-sg + Clpy&2,4-D	0.072 + 0.11 + 6.2	0	50	73	83	75	70	93
11 Brox&Pyst&Thcz	3	0	50	85	93	93	93	93
12 Pxdn&Fenx + Clpy&Flox&MCPA	1.3 + 6	0	90	78	87	85	43	98
CV		0	14	8	4	10	9	3
LSD P=0.5		.	13	10	6	11	11	5

Treatment	Rate	6/25	6/25	6/25	6/25	7/24	7/24	7/24	7/24
		Cath	Colq	Corw	Wibw	Cath	Colq	Corw	Wibw
	-----OZ AI/A, %V-----	-----%-----							
1 Untreated Check		0	0	0	0	0	0	0	0
2 Thcz + Trib-sg	0.072 + 0.11	82	97	30	89	93	99	30	77
3 Thcz + Trib-sg + Flox&Flas	0.072 + 0.11 + 1.48	87	96	75	87	95	98	93	94
4 Thcz + Trib-sg + 2,4-De	0.072 + 0.11 + 4	88	97	87	86	96	99	93	92
5 Thcz + Trib-sg + Flox&Flas + 2,4-De	0.072 + 0.11 + 1.48 + 4	86	98	92	93	93	99	98	96
6 Thcz + Trib-sg + Flox&Thif	0.072 + 0.11 + 1.94	85	95	89	89	95	99	96	95
7 Thcz + Trib-sg + Flox&Thif + 2,4-De	0.072 + 0.11 + 1.94 + 4	90	98	92	95	93	99	94	98
8 Thcz + Trib-sg + Brox&MCPA	0.072 + 0.11 + 8	87	97	94	90	94	99	94	90
9 Thcz + Trib-sg + Haux&Flox	0.072 + 0.11 + 1.8	85	97	92	92	93	99	98	92
10 Thcz + Trib-sg + Clpy&2,4-D	0.072 + 0.11 + 6.2	90	93	95	93	95	99	97	92
11 Brox&Pyst&Thcz	3	80	98	96	94	87	99	98	90
12 Pxdn&Fenx + Clpy&Flox&MCPA	1.3 + 6	92	99	95	84	98	99	98	88
CV		3	2	4	4	5	0	4	6
LSD P=0.5		5	3	6	5	7	1	6	8

**Antagonism of Fenoxaprop on Yellow Foxtail.** Dr. Howatt and Mettler. Linkert wheat was seeded near Fargo on May 19, 2020. Treatments were applied to 3 leaf yellow foxtail on June 19 with 67°F, 45% relative humidity, 30% cloud-cover, 7 mph wind velocity at 220° and dry soil surface 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.

Treatment	Rate	7/2 Yeft	7/16 Yeft
	-----OZ AI/A, %V-----	-----%-----	
1 Fenx	0.8	86	90
2 Fenx + 2, 4-De (Salvo)	0.8 + 8	79	85
3 Fenx + MCPAe (Sword)	0.8 + 8	84	89
4 Fenx + NUP17063	0.8 + 8	84	80
5 Fenx + Flox	0.8 + 2	84	86
6 Fenx + Brox-M	0.8 + 4	82	75
7 Fenx + Brox-M + 2,4-De	0.8 + 4 + 8	77	61
8 Fenx + Brox-M + MCPAe	0.8 + 4 + 8	71	65
9 Fenx + Brox-M + NUP17063	0.8 + 4 + 8	74	74
10 Fenx + Brox-M + Flox	0.8 + 4 + 2	71	69
11 Fenx + Thif-sg + Trib-sg	0.8 + 0.24 + 0.06	76	79
12 Fenx + Thif-sg + Trib-sg + 2,4-De	0.8 + 0.24 + 0.06 + 8	72	64
13 Fenx + Thif-sg + Trib-sg + MCPA	0.8 + 0.24 + 0.06 + 8	82	82
14 Fenx + Thif-sg + Trib-sg + NUP-17063	0.8 + 0.24 + 0.06 + 8	76	82
15 Fenx + Thif-sg + Trib-sg + Flox	0.8 + 0.24 + 0.06 + 2	79	75
CV		7	7
LSD P=0.5		8	7

**Yellow Foxtail Control with Dichlorprop Tank Mixes.** Dr. Howatt and Mettler. Linkert spring wheat was seeded near Fargo, North Dakota on May 19, 2020. Treatments were applied to 4 leaf yellow foxtail, 6 to 8 inch redroot pigweed, 4 inch wild buckwheat, and 2 to 11 inch common lambsquarters on June 19 with 63°F, 48% relative humidity, 25% cloud-cover, 4 to 6 mph wind velocity at 315°, and dry soil surface 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.

Treatment	Rate OZ AI/A, % V/V	7/2 Fxtl -----%-----	7/16 Fxtl
Untreated Check		0	0
NUP-17063 + Fenx	8 + 0.8	76	79
NUP20005 + Fenx	10 + 0.8	73	57
NUP20005 + Fenx	13.3 + 0.8	69	57
Brox-M + Fenx	6 + 0.8	70	65
2,4-D-W + Fenx	8.2 + 0.8	66	61
NUP-17063 + Flcz-3.0	8 + 0.44 + 32	75	85
NUP20005 + Flcz-3.0 + UAN	10 + 0.44 + 32	72	74
NUP20005 + FLcz-3.0 + UAN	13.3 + 0.44 + 32	74	85
Brox+M + Flcz + UAN	6 + 0.44 + 32	72	72
NUP20005 + Pxdn	13.3 + 0.86	81	72
Fenx	0.8	81	89
Pxdn (Axial XL)	0.86	87	95
Flcz-3.0 + NIS + UAN	0.44 + 0.25 + 32	77	84
CV		8	7
LSD P=0.05		8	7

Fxtl: Foxtail

**Foxtail and Broadleaf Control with Flucarbazone Premixes.** Dr. Howatt and Mettler. Linkert wheat was seeded near Fargo on May 12, 2020. Treatments were applied to 3 to 4 leaf wheat, 2 to 4 leaf common lambsquarters, 2 to 4 leaf waterhemp, 2 to 5 leaf wild buckwheat, 1 to 2 leaf venice mallow, and 1 leaf yellow foxtail on June 4 with 75°F, 27% relative humidity, 30% cloud-cover, 3 mph wind velocity at 225° and dry soil surface at 72°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	6/13 Wht	6/13 Wahe	6/13 Colq	6/13 Wibw	6/13 Vema	6/13 Yeft	7/2 Wahe
	-----OZ AI/A, %V-----	-----%-----						
1 Untreated Check		0	0	0	0	0	0	0
2 X3193 + NIS	5.9 + 0.25%	0	94	95	94	94	79	96
3 X1973 + NIS	14.6 + 0.25%	0	95	95	95	94	81	98
4 X1973 + NIS	17.6 + 0.25%%	0	93	90	91	91	79	97
5 X3193 + TPP27 + NIS	5.9 + 0.2 + 0.25%	0	94	94	94	94	79	99
6 X1973 + TPP27 + NIS	14.6 + 0.2 + 0.25%	0	95	95	95	94	82	99
7 X1973 + TPP27 + NIS	17.6 + 0.2 + 0.25%	0	95	95	95	94	85	99
8 X1581 + Clpy&Flox + NIS	0.44 + 3 + 0.25%	0	89	85	81	89	80	93
9 X1581 + Haux&Flox + NIS	0.44 + 1.8 + 0.25	0	90	84	85	88	75	83
10 Brox&Pyst&Thcz	4.1	0	94	94	94	92	75	98
11 Pxlm&Clpy&Flox + NIS	3.2 + 0.25%	0	90	84	85	89	71	92
12 Flcz-3 + Clpy&Flox&MCPA + NIS	0.35 + 7.5 + 0.25%	0	88	86	85	87	74	99
CV		0	3	4	3	3	6	2
LSD P=0.5		.	3	4	4	4	7	2

Treatment	7/2	7/2	7/2	7/2	7/24	7/24	7/24	7/24	7/24
	Colq	Wibw	Vema	Yeft	Wahe	Colq	Wibw	Vema	Yeft
	-----%-----								
1 Untreated Check	0	0	0	0	0	0	0	0	0
2 X3193 + NIS	98	98	95	94	98	97	98	97	98
3 X1973 + NIS	98	98	98	98	98	96	99	97	99
4 X1973 + NIS	99	99	98	98	97	97	99	97	99
5 X3193 + TPP27 + NIS	99	98	98	95	99	98	99	97	98
6 X1973 + TPP27 + NIS	99	98	99	99	98	98	98	98	99
7 X1973 + TPP27 + NIS	99	99	99	98	99	98	97	98	99
8 X1581 + Clpy&Flox + NIS	96	92	96	95	96	91	99	96	98
9 X1581 + Haux&Flox + NIS	87	88	92	92	98	97	96	95	99
10 Brox&Pyst&Thcz	97	99	98	95	99	98	99	98	98
11 Pxm&Clpy&Flox + NIS	95	96	94	91	99	98	99	97	92
12 Flcz-3 + Clpy&Flox&MCPA + NIS	99	96	97	95	99	99	99	98	99
CV	1	2	2	2	2	2	1	2	2
LSD P=0.5	2	2	2	3	2	2	2	2	2

**Basic Blend Comparison for Wheat Herbicides.** Dr. Howatt and Mettler. The experiment was established in a non-cropped field near Fargo, North Dakota on June 19, 2020. Treatments were applied to 3 leaf yellow foxtail on June 19 with 75°F, 45% relative humidity, 35% cloud-cover, 2 mph wind velocity at 270°, and dry soil surface 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 plots. The experiment was a randomized complete block design with four replicates.

Treatment	Rate	7/2 Yeft
	---OZ AI/A, %V---	----%----
1 Flcz-3.0 + Brox&MCPA + CARidion	0.35 + 8 + 1%	64
2 Flcz-3.0 + Brox&MCPA + Quad 7	0.35 + 8 1%	75
3 Flcz-3.0 + Brox&MCPA + Linkage	0.35 + 8 + 1%	72
4 Flcz-3.0 + Brox&MCPA + Cue	0.35 + 8 + 0.5%	72
5 Flcz-3.0 + Brox&MCPA + Cue	0.35 + 8 + 1%	74
6 PxlM + Brox&MCPA + CARidion	0.21 + 8 + 1%	55
7 PxlM + Brox&MCPA + Quad 7	0.21 + 8 + 1%	57
8 PxlM + Brox&MCPA + Linkage	0.21 + 8 + 1%	57
9 PxlM + Brox&MCPA + Cue	0.21 + 8 + 0.5%	52
10 PxlM + Brox&MCPA + Cue	0.21 + 8 + 1%	52
11 Thcz + Brox&MCPA + CARidion	0.072 + 8 + 1%	70
12 Thcz + Brox&MCPA + Quad 7	0.072 + 8 + 1%	71
13 Thcz + Brox&MCPA + Linkage	0.072 + 8 + 1%	71
14 Thcz + Brox&MCPA + Cue	0.072 + 8 + 0.5%	70
15 Thcz + Brox&MCPA + Cue	0.072 + 8 + 1%	71
CV		6
LSD P=0.5		5

Yeft: Yellow foxtail

**Wild Oat Control in Wheat.** Dr. Howatt and Mettler. Established in a non-cropped area, treatments were applied to 3 to 4 leaf wild oat on June 11 with 66°F, 60% relative humidity, 0% cloud-cover, 7 mph wind velocity at 315° and dry soil surface 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	6/24 Wioa	7/9 Wioa
	-----OZ AI/A, %V-----	-----%	
1 Untreated Check		5	0
2 Brox&MCPA (Bison 4#)	8	6	0
3 Flucz-3.0 + Brox&MCPA + BB	0.35 + 8 + 1	66	86
4 PxlM + Brox&MCPA + BB	0.21 + 8 + 1	52	30
5 PxlM&Clpy&Flox + BB	3.2 + 1	55	45
6 PxlM&Flox + Thif + BB	2.1 + 0.2 + 1	62	57
7 Thcz + Brox&MCPA + BB	0.072 + 8 + 1	57	67
8 Thcz + Thib + 2,4-D ester	0.072 + 0.2 + 4	62	71
9 Brox&Pyst&Thcz + UAN	3 + 16	61	81
10 Fenx + Brox&MCPA	1.32 + 8	50	42
11 Fenx&Brox&Pyst	5.4	52	40
12 Pxdn (Axial XL) + Brox&MCPA	0.86 + 8	75	95
13 Pxdn + Haux&Flox	0.86 + 1.8	77	96
14 Pxdn&Fenx + Brox&MCPA	1.28 + 8	80	95
CV		6	7
LSD P=0.5		5	6

Wioa: Wild Oat

**Wild Oat Control with Pinoxaden & Fenoxaprop Tankmixes.** Dr. Howatt and Mettler. The experiment was established in a non-cropped area near Fargo, North Dakota on June 11, 2020. Treatments were applied to 2 leaf yellow foxtail, 3 to 4 leaf volunteer wheat, 3 to 4 leaf wild oat, 1 to 4 inch wild buckwheat, and 3 to 5 inch common lambsquarters on June 11 with 66°F, 61% relative humidity, 0% cloud-cover, 8 mph wind velocity at 315°, and damp soil surface at 63°F. Follow-up treatments were applied on June 16 at 74°F, 69% relative humidity, 0% cloud-cover, 4 mph wind velocity at 135°, and damp soil surface at 72°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 plots. The experiment was a randomized complete block design with four replicates.

Treatment		Rate	6/24 Wioa	6/24 Wibw	7/9 Wioa	7/9 Wibw
		-----OZ AI/A, %V-----	-----%-----			
1	Brox&MCPA	8	5	92	0	99
2	Pxdn&Fenx	1.28	71	0	97	0
3	Pxdn&Fenx + Flas&MCPA	1.28 + 5	67	59	95	66
4	Pxdn&Fenx + CoAct + Brom&Bcpy	1.28 + 0.91 + 3	61	90	70	99
5	Pxdn&Fenx + Flas&MCPA + CoAct + Brom&Bcpy	1.28 + 5.0 + 0.91 + 3	57	94	71	99
6	Thcz + Trib-sg + NIS	0.072 + 0.11 + 0.25%	55	47	70	81
7	Pxdn&Fenx + Pxsf + Flas&MCPA + CoAct + Brom&Bcpy	1.28 + 2.0 + 5.0 + 0.91 + 3.0	57	96	82	96
8	Pxdn&Fenx + Haux&Flox	1.28 + 1.8	75	67	98	86
9	Pxdn&Fenx / Flas&MCPA + CoAct + Brom&Bcpy + PO	1.28 / 5.0 + 0.91 + 0.91 + 1%	70	74	99	94
10	Pxdn&Fenx + Thif-sg + Trib-sg + 2,4-Da-4	1.28 + 0.125 + 0.125 + 6.8	66	72	98	79
11	Pxdn&Fenx + Thif-sg + Trib-sg + Dcpp	1.28 + 0.125 + 0.125 + 6.8	65	66	98	76
12	Pxdn + Thif-sg + Trib-sg + 2,4-Da-4	0.86 + 0.125 + 0.125 + 6.8	69	72	95	77
13	Pxdn + Thif-sg + Trib-sg + Dcpp	0.86 + 0.125 + 0.125 + 6.8	62	66	96	80
	CV		6	8	5	5
	LSD P=0.5		5	8	6	6

Wioa: Wild Oat

Wibw: Wild Buckwheat

**Antagonism of Fenoxaprop on Wild Oat.** Dr. Howatt and Mettler. Established in a non-cropped area, treatments were applied to 2 to 4 leaf wild oat on June 11 with 61°F, 68% relative humidity, 5% cloud-cover, 5 mph wind velocity at 315°, and dry soil surface 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.

Treatment	Rate	6/24 Wioa
	-----OZ AI/A, %V-----	-----%------
1 Fenx	1.32	72
2 Fenx + 2, 4-De (Salvo)	1.32 + 8	65
3 Fenx + MCPAe (Sword)	1.32 + 8	60
4 Fenx + NUP17063	1.32 + 8	67
5 Fenx + Flox	1.32 + 2	67
6 Fenx + Brox-M	1.32 + 4	62
7 Fenx + Brox-M + 2,4-De	1.32 + 4 + 8	56
8 Fenx + Brox-M + MCPAe	1.32 + 4 + 8	61
9 Fenx + Brox-M + NUP17063	1.32 + 4 + 8	61
10 Fenx + Brox-M + Flox	1.32 + 4 + 2	65
11 Fenx + Thif-sg + Trib-sg	1.32 + 0.24 + 0.06	62
12 Fenx + Thif-sg + Trib-sg + 2,4-De	1.32 + 0.24 + 0.06 + 8	55
13 Fenx + Thif-sg + Trib-sg + MCPA	1.32 + 0.24 + 0.06 + 8	59
14 Fenx + Thif-sg + Trib-sg + NUP-17063	1.32 + 0.24 + 0.06 + 8	62
15 Fenx + Thif-sg + Trib-sg + Flox	1.32 + 0.24 + 0.06 + 2	62
CV		6
LSD P=0.5		5

**Wild Oat Control with Dichlorprop Tank Mixes.** Dr. Howatt and DeSimini. The experiment was established in a non-cropped field near Fargo, North Dakota. Treatments were applied to 3 to 4 leaf volunteer wheat, 2 to 3 leaf wild oat, 2 leaf yellow foxtail, and 3-inch wild buckwheat on June 11 with 63°F, 68% relative humidity, 8 mph wind velocity at 315°, slightly dry soil surface 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.

Treatment	Rate OZ AI/A, % V/V	6/24 Wioa -----%-----	7/9 Wioa
Untreated Check		7	0
NUP-17063 + Fenx	8 + 1.32	70	84
NUP20005 + Fenx	10 + 1.32	50	57
NUP20005 + Fenx	13.3 + 1.32	52	50
Brox-M + Fenx	6 + 1.32	52	66
2,4-D-W + Fenx	8.2 + 1.32	60	60
NUP-17063 + Flcz-3.0	8 + 0.44 + 32	66	75
NUP20005 + Flcz-3.0 + UAN	10 + 0.44 + 32	66	74
NUP20005 + FLcz-3.0 + UAN	13.3 + 0.44 + 32	64	77
Brox+M + Flcz + UAN	6 + 0.44 + 32	69	80
NUP20005 + Pxdn	13.3 + 0.86	71	87
Fenx (Tacoma)	1.32	71	82
Pxdn (Axial XL)	0.86	69	98
Flcz-3.0 + NIS + UAN	0.44 + 0.25 + 32	66	90
CV		7	10
LSD P=0.05		6	11

Wioa: wild oat

**Wild Oat and Broadleaf Control with Flucarbazone Premixes.** Dr. Howatt and Mettler. The experiment was established in a non-cropped field near Fargo, North Dakota on June 11, 2020. Treatments were applied to 2 to 3 leaf wild oat, 2 leaf yellow foxtail, 3 to 4 leaf volunteer wheat, 3 inch wild buckwheat, and 3 inch common lambsquarters on June 11 with 56°F, 75% relative humidity, 15% cloud-cover, 4 mph wind velocity at 300°, and damp soil surface 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 plots. The experiment was a randomized complete block design with four replicates.

Treatment	Rate	6/19	6/19	6/19	6/24	6/24	6/24	7/9	7/9	7/9
		Wioa	Yeft	Wibw	Wioa	Yeft	Wibw	Wioa	Yeft	Wibw
	----OZ AI/A, %V----	-----%-----								
1 Untreated Check		0	0	0	6	3	0	0	0	0
2 X3193 + NIS	5.9 + 0.25%	35	45	84	60	70	97	70	40	99
3 X1973 + NIS	14.6 + 0.25%	30	35	85	64	71	97	67	40	98
4 X1973 + NIS	17.6 + 0.25%%	30	30	86	60	67	97	62	40	99
5 X3193 + TPP27 + NIS	5.9 + 0.2 + 0.25%	0	0	0	4	1	0	0	0	0
6 X1973 + TPP27 + NIS	14.6 + 0.2 + 0.25%	32	32	84	66	71	97	62	40	99
7 X1973 + TPP27 + NIS	17.6 + 0.2 + 0.25%	35	45	85	62	71	97	57	40	99
8 X1581 + Clpy&Flox + NIS	0.44 + 3 + 0.25%	30	35	57	60	70	62	71	40	86
9 X1581 + Haux&Flox + NIS	0.44 + 1.8 + 0.25	25	27	57	59	70	64	66	40	84
10 Brox&Pyst&Thcz	4.1	25	25	77	60	70	97	52	40	99
11 Pxlm&Clpy&Flox + NIS	3.2 + 0.25%	20	20	52	52	60	64	54	40	94
12 Flcz-3 + Clpy&Flox&MCPA + NIS	0.35 + 7.5 + 0.25%	32	37	60	64	71	64	74	40	87
CV		24	22	6	9	3	3	12	0	3
LSD P=0.5		8	7	6	6	3	3	9	.	3

**Basic Blend Comparison for Wheat Herbicides.** Dr. Howatt and Mettler. The experiment was established in a non-cropped field near Fargo, North Dakota on June 11, 2020. Treatments were applied to 3 to 4 leaf volunteer wheat, 2 to 3 leaf wild oat, and 2 leaf wild foxtail on June 11 with 56°F, 75% relative humidity, 20% cloud-cover, 6 mph wind velocity at 300°, and dry soil surface 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 plots. The experiment was a randomized complete block design with four replicates.

Treatment	Rate	6/24 Wioa	6/24 Yeft	7/9 Wioa	7/9 Yeft
	-----OZ AI/A, %V-----	-----%-----			
1 Flcz-3.0 + Brox&MCPA + CARidion	0.35 + 8 + 1%	66	72	61	60
2 Flcz-3.0 + Brox&MCPA + Quad 7	0.35 + 8 1%	66	74	74	60
3 Flcz-3.0 + Brox&MCPA + Linkage	0.35 + 8 + 1%	67	71	64	60
4 Flcz-3.0 + Brox&MCPA + Cue	0.35 + 8 + 0.5%	66	74	70	60
5 Flcz-3.0 + Brox&MCPA + Cue	0.35 + 8 + 1%	64	67	64	60
6 PxlM + Brox&MCPA + CARidion	0.21 + 8 + 1%	55	52	45	60
7 PxlM + Brox&MCPA + Quad 7	0.21 + 8 + 1%	57	57	51	60
8 PxlM + Brox&MCPA + Linkage	0.21 + 8 + 1%	55	57	50	60
9 PxlM + Brox&MCPA + Cue	0.21 + 8 + 0.5%	59	60	50	60
10 PxlM + Brox&MCPA + Cue	0.21 + 8 + 1%	55	57	50	60
11 Thcz + Brox&MCPA + CARidion	0.072 + 8 + 1%	64	72	45	60
12 Thcz + Brox&MCPA + Quad 7	0.072 + 8 + 1%	64	72	50	60
13 Thcz + Brox&MCPA + Linkage	0.072 + 8 + 1%	62	71	45	60
14 Thcz + Brox&MCPA + Cue	0.072 + 8 + 0.5%	65	71	57	60
15 Thcz + Brox&MCPA + Cue	0.072 + 8 + 1%	62	71	50	60
CV		6	5	11	0
LSD P=0.5		5	5	9	.