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Anthem in corn. Zollinger, Richard K., Jerry L. Ries, and Angela J. Kazmierczak. An experiment was conducted near Prosper, ND, to evaluate weed efficacy to PRE and EPOST herbicide programs in corn. DeKalb DKC35-43 Roundup Ready corn was planted on May 26, 2011, followed by the application of PRE treatments at 9:25 pm with 58 F air, 54 F soil at a four inch depth, 39% relative humidity, 60% cloud cover, 3 to 5 mph SE wind, moist soil surface and wet subsoil. Soil characteristics were: 22.5% sand, 33.8% silt, 43.8% clay, clay texture, 4.3% OM and 7.5 pH. EPOST treatments were applied on June 28 at 10:00 am with 79 F air, 72 F soil surface, 66% relative humidity, 10% cloud cover, 1 to 3 mph SE wind, wet soil surface, wet subsoil, poor (excess water) to good crop vigor and no dew present to V1 to V4 (3 to 12 inch) corn. Weed species present at the time of EPOST were: 4 to 6 inch (10 to 25/ft²) yellow foxtail; 1 to 3 inch (5 to 10/ft²) common lambsquarters; 1 to 3 inch (3 to 5/ft²) redroot pigweed; 2 to 4 inch (10 to 20/ft²) hairy nightshade; 3 to 6 inch (1/yd²) common cocklebur; and 3 to 6 inch (3 to 5/yd²) common ragweed. On June 9, Roundup PowerMax was also applied to PRE treatments at 22 fl oz/A plus AMS at 8.5lb/100 gal (see table below) with the following weeds present: 1 to 2 inch (1 to 30/ yd²) yellow foxtail; 1 to 2 inch (1/ yd²) common cocklebur; and 2 to 4 inch (1/yd²) common cocklebur. Treatments were applied to the center 6.7 feet of the 10 by 40 foot plots with a backpack-type plot sprayer delivering 17 gpa at 40 psi through 11002 Turbo TeeJet nozzles for PRE treatments and 8.5 gpa at 40 psi through 11001 Turbo TeeJet nozzles for POST treatments. The experiment had a randomized complete block design with three replicates per treatment.

Wet spring and early summer conditions caused delayed planting and flooding after crop emergence. Some plots or parts of studies were damaged by standing water. Yields were not taken due to injury from excessive water. Anthem is a premix of pyroxasulfone + Cadet (fluthiacet). Fluthiacet is for POST weed control and has no residual weed control, therefore, PRE weed control values in this study are from pyroxasulfone. Anthem provided good to excellent control of grass weeds and most small-seeded broadleaf weeds. Control from Anthem was equal to or greater than comparable treatments. Atrazine generally improved weed control. The low weed ratings for Roundup PowerMax was from several flushes of weeds that emerged after application from several rain events. Anthem applied with RUPM EPOST controls several weeds through PRE activity. Previous studies show residual soil activity from pyroxasulfone is at least 8 to 12 weeks long. No corn injury was observed at 14 days after emergence (DAE), and 7, 14, 28 days after treatment (DAT) (data not shown). (Department of Plant Sciences, North Dakota State University, Fargo).

Table. Anthem in corn (Zollinger, Ries, Kazmierczak).

Treatment	Rate (product/A)	21 DAT						28 DAT					
		Yeft	Ripw	Colq	Hans	Conw	Cocb	Yeft	Ripw	Colq	Hans	Conw	Cocb
		-----% control-----											
<u>PRE w/ Glyphosate</u>													
Anthem	8fl oz	83	90	90	90	50	20	87	88	93	93	50	20
Anthem	10fl oz	93	91	91	91	50	20	83	91	93	91	50	20
Anthem+Atrazine	8fl oz+1lb	87	90	90	90	70	60	82	78	93	85	70	60
Anthem+Atrazine	10fl oz+1.25lb	93	96	96	96	78	63	72	87	88	92	88	62
Verdict	13fl oz	70	70	70	71	93	93	70	83	92	87	93	93
Harness	2pt	77	70	70	70	20	20	77	77	78	83	20	20
Harness Xtra	2qt	70	80	80	80	80	70	73	72	72	72	72	70
Lumax	2qt	82	91	91	91	93	72	87	91	91	91	93	75
<u>PRE w/o Glyphosate</u>													
Anthem	10fl oz	96	96	96	96	77	30	96	96	80	96	77	37
Anthem+Atrazine	10fl oz+1.25lb	99	99	99	99	99	72	99	99	99	99	99	78
Harness	2pt	80	70	70	70	30	20	80	70	70	70	30	20
<u>EPOST</u>													
Anthem+RUPM+	7fl oz+22fl oz+	98	90	90	90	80	63	91	87	90	90	83	73
R-11+AMS	0.25% v/v+8.5lb/100gal												
Anthem+RUPM+	9fl oz+22fl oz+	96	96	96	96	92	85	96	96	96	96	92	85
R-11+AMS	0.25% v/v+8.5lb/100gal												
Anthem+RUPM+Atrazine+	7fl oz+22fl oz+0.875lb+	99	99	99	99	99	99	99	99	99	99	99	99
R-11+AMS	0.25%+8.5lb/100gal												
Halex GT+R-11+AMS	3.6pt+0.25% v/v+8.5lb/100gal	93	90	90	90	82	83	88	88	88	88	80	82
RUPM+AMS	22fl oz+8.5lb/100gal	83	73	73	73	55	55	78	70	70	70	55	55
<u>LSD (0.05)</u>		9	9	9	9	8	10	9	10	9	8	5	11

Fierce and other tank-mixes in corn. Zollinger, Richard K., Jerry L. Ries, and Angela J. Kazmierczak. An experiment was conducted near Prosper, ND, to evaluate weed efficacy of herbicide tank-mixes and application timings in corn. EPP applications were made on May 19, 2011 at 10:15 am with 53 F air, 46 F soil at a four inch depth, 41% relative humidity, 30% cloud cover, 5 to 8 mph NE wind, wet soil surface, and wet subsoil. Soil characteristics were: 22.5% sand, 33.8% silt, 43.8% clay, clay texture, 4.3% OM and 7.5 pH. Dekalb 'DKC35-43' Roundup Ready corn was planted May 26 followed by the application of PRE treatments at 9:20 pm with 58 F air, 58 F soil at a four inch depth, 40% relative humidity, 60% cloud cover, 3 to 5 mph SE wind, moist soil surface, wet subsoil and no dew present. POST treatments were applied June 28 at 10:30 am with 79 F air, 72 F soil surface, 65% relative humidity, 10% cloud cover, 1 to 3 mph SE wind, wet soil surface, wet subsoil, poor to good crop vigor and dew present to V2 to V3 (4 to 8 inch) corn. Weeds species present at the time of POST were: 1 to 2 inch (1 to 30/yard²) yellow foxtail; 1 to 2 inch (1/yard²) common ragweed; 2 to 4 inch (1/yard²) common cocklebur; cotyledon to 2 inch (1 to 2/yard²) wild mustard; 1 to 3 inch (1 to 5/yard²) redroot pigweed; and 1 to 4 inch (5 to 10/yard²) common lambsquarters. Treatments were applied to the center 6.7 feet of the 10 by 40 foot plots with a backpack-type plot sprayer delivering 17 gpa at 40 psi through 11002 Turbo TeeJet nozzles for EPP and PRE treatments and 8.5 gpa at 40 psi through 11001 Turbo TeeJet nozzles for POST treatments. The experiment had a randomized complete block design with three replicates per treatment.

Wet spring and early summer conditions caused delayed planting and flooding after crop emergence. Some plots or parts of studies were damaged by standing water. Yields were not taken due to injury from excessive water. Fierce is a premix of pyroxasulfone + Valor. Pyroxasulfone controls many grasses and some broadleaf weeds. Weed control increased as Fierce rate increased. Weed control was acceptable for most all treatments except for foxtail as wet conditions produced several flushes and treatments with weak residual products allowed foxtail flushed to emerge. No corn injury 28 days after planting, 14, 28, and 56 days after POST applications (data not shown). 99% control of yellow foxtail, wild mustard, common lambsquarters, and redroot pigweed 28 days after planting (data not shown). 99% control of wild mustard 14, 28, 56 days after POST (data not shown). (Department of Plant Sciences, North Dakota State University, Fargo).

Table. Fierce and other tank-mixes in corn (Zollinger, Ries, Kazmierczak).

Treatment	Rate (product/A)	June 23			July 12			July 26			
		Conw	Cocb	Yeft	Ripw	Conw	Cocb	Yeft	Ripw	Conw	Cocb
		- % control -									
<u>EPP/POST</u>											
RUPM+Fierce+AMS/RUPM+AMS	22fl oz+3oz+2.5lb/22fl oz+2.5lb	72	0	77	75	88	70	68	72	87	67
RUPM+Fierce+Atrazine+AMS/RUPM+AMS	22fl oz+3oz+0.56lb+2.5lb/22fl oz+2.5lb	99	0	75	80	99	85	67	68	85	77
RUPM+Fierce+AMS/RUPM+AMS	22fl oz+3.75oz+2.5lb/22fl oz+2.5lb	99	13	83	85	99	67	73	85	99	67
RUPM+Fierce+AMS/RUPM+AMS	22fl oz+4.5oz+2.5lb/22fl oz+2.5lb	99	20	85	90	99	75	80	92	99	78
<u>PRE/POST</u>											
RUPM+Harness Xtra+AMS/RUPM+AMS	22fl oz+1.4qt+2.5lb/22fl oz+2.5lb	99	20	82	72	99	65	70	65	99	70
RUPM+Lexar+AMS/RUPM+AMS	22fl oz+2.25qt+2.5lb/22fl oz+2.5lb	99	88	85	95	99	87	85	95	99	87
RUPM+Corvus+Atrazine+AMS/RUPM+AMS	22fl oz+3fl oz+0.56lb+2.5lb/22fl oz+2.5lb	99	55	85	98	99	91	80	98	99	91
RUPM+Verdict+AMS/RUPM+AMS	22fl oz+13fl oz+2.5lb/22fl oz+2.5lb	99	99	73	60	99	99	63	73	99	99
LSD (0.05)		2	8	8	9	2	10	7	4	2	8

Table cont. Fierce and other tank-mixes in corn (Zollinger, Ries, Kazmierczak).

Treatment	Rate (product/A)	August 23		
		Yeft	Ripw	Cocb
		- % control -		
<u>EPP/POST</u>				
RUPM+Fierce+AMS/RUPM+AMS	22fl oz+3oz+2.5lb/22fl oz+2.5lb	68	72	99
RUPM+Fierce+Atrazine+AMS/RUPM+AMS	22fl oz+3oz+0.56lb+2.5lb/22fl oz+2.5lb	65	73	85
RUPM+Fierce+AMS/RUPM+AMS	22fl oz+3.75oz+2.5lb/22fl oz+2.5lb	73	88	99
RUPM+Fierce+AMS/RUPM+AMS	22fl oz+4.5oz+2.5lb/22fl oz+2.5lb	78	95	99
<u>PRE/POST</u>				
RUPM+Harness Xtra+AMS/RUPM+AMS	22fl oz+1.4qt+2.5lb/22fl oz+2.5lb	70	83	99
RUPM+Lexar+AMS/RUPM+AMS	22fl oz+2.25qt+2.5lb/22fl oz+2.5lb	80	96	99
RUPM+Corvus+Atrazine+AMS/RUPM+AMS	22fl oz+3fl oz+0.56lb+2.5lb/22fl oz+2.5lb	83	98	99
RUPM+Verdict+AMS/RUPM+AMS	22fl oz+13fl oz+2.5lb/22fl oz+2.5lb	53	87	99
LSD (0.05)		7	3	1

Zidua in corn. Zollinger, Richard K., Jerry L. Ries, and Angela J. Kazmierczak. An experiment was conducted near Prosper, ND, to evaluate weed efficacy and crop response to Zidua (pyoxasulfone) in corn. Dekalb 'DKC35-43' was planted May 26, 2011, followed by the application of PRE treatments at 9:10 pm with 59 F air, 54 F soil at a four inch depth, 40% relative humidity, 60% cloud cover, 3 to 5 mph NW wind, moist soil surface, and wet subsoil. Soil characteristic were: 32.5% sand, 21.3% silt, 46.3% clay, clay texture, 4.3% OM, and 7.7 pH. POST treatments were applied June 11 at 10:10 am with 68 F air, 68 F soil surface, 96% relative humidity, 100% cloud cover, 5 to 10 mph wind, wet soil surface, wet subsoil, good crop vigor and no dew present to V2 to V3 (4 to 6 inch) corn. Weeds present at the time of POST application were: 1 to 2 inch (0 to 5/ft²) yellow foxtail; <1 inch (0 to 1/yd²) common lambsquarters; 0.5 to 1 inch (2 to 30/ft²) hairy nightshade; 2 to 3 inch (<1/yd²) common cocklebur; 1 to 2 inch (<1/yd²) common ragweed; and 1 to 2 inch (1 to 2/yd²) redroot pigweed. Treatments were applied to the center 6.7 feet of the 10 by 40 foot plots with a backpack-type plot sprayer delivering 17 gpa at 40 psi through 11002 Turbo TeeJet nozzles for PRE treatments and 8.5 gpa at 40 psi through 11001 Turbo TeeJet nozzles for POST treatments. The experiment had a randomized complete block design with three replicates per treatment.

Wet spring and early summer conditions caused delayed planting and flooding after crop emergence. Some plots or parts of studies were damaged by standing water. Yields were not taken due to injury from excessive water. Zidua is a stand alone pyoxasulfone product. Pyroxasulfone provides at least 8 to 12 weeks of good to excellent soil residual control of grass weeds and most small-seeded broadleaf weeds. No injury observed, and 99% control of wild mustard at all ratings (data not shown). 99% control of common lambsquarters, hairy nightshade, redroot pigweed, common ragweed, and common cocklebur at the 7 DAT POST ratings (data not shown). Evaluation percentages dropped on the 14 and 28 DAT POST ratings caused by weed emergence. All POST applications were applied with Roundup PowerMax at 22 fl oz + AMS at 17lb/100gal. (Department of Plant Sciences, North Dakota State University, Fargo).

Table. Zidua in corn (Zollinger, Ries, Kazmierczak).

Treatment ¹	Rate (product/A)	16 DAT - PRE					7 DAT - POST					14 and 28 DAT - POST									
		Yeft	Rpww	Colq	Hans	Coww	Cocb	Yeft	Colq	Hans	Coww	Cocb	Yeft	Colq	Hans	Coww	Cocb				
PRE																					
RUPM+AMS	22fl oz+17lb/100gal+	99	99	99	99	99	99	99	99	99	99	90	80	73	70	67	99	99	99	99	99
Harness Xtra	2qt	70	99	99	53	70	78	20	93	93	93	92	70	67	50	50	99	99	99	99	99
Surestart	1.75pt	99	99	99	99	99	77	99	99	99	99	99	99	99	99	83	99	99	99	99	99
Lumax	2qt	98	99	99	99	99	88	99	99	99	99	99	99	99	99	72	99	99	99	99	99
Verdict	13fl oz	87	99	99	99	93	63	99	99	99	99	99	99	99	89	60	99	99	99	99	99
Zidua+Sharpen	2oz+2.5fl oz	78	99	99	99	99	99	99	98	98	98	98	99	99	99	75	99	99	99	99	99
Zidua+Sharpen	2.5oz+2.5fl oz	57	60	60	60	60	30	60	88	88	88	94	99	99	99	93	99	99	99	99	99
Zidua	2oz	83	70	70	70	70	23	70	93	93	93	99	99	99	99	89	99	99	99	99	99
Zidua	2.5oz																				
LSD (0.05)		8	9	8	7	11	10	10	7	7	7	7	6	5	10	12					

¹RUPM was applied to all treatments as a POST on June 11 at 22 fl oz/A + AMS at 17lb/100gal.

Weed control with Zidua herbicide in corn, Carrington, 2011. Greg Endres. The experiment was conducted at the NDSU Carrington Research Extension Center in cooperation with BASF. Experimental design was a randomized complete block with three replicates. The conventional-till trial was conducted on previous wheat ground with spring soil analysis indicating 3.8% organic matter and 6.3 pH. DeKalb 'DKC33-53' Roundup Ready corn was planted May 6 at 28,700 seeds/A in 30-inch rows. Treatments were applied with a hand-held boom sprayer delivering PRE herbicides at 21 gal/A and POST herbicides at 9 gal/A at 35 psi through 8001 flat fan nozzles to the center 6.7 ft of 10- by 25-ft plots. PRE treatments were applied on May 7 with 65 F, 36% RH, and no wind. Rainfall totaled 0.75" during the 3 days following application of herbicides (NDAWN). POST treatments were applied on July 2 with 74 F, 43% RH, and 6 mph wind to V6 stage corn, 3- to 8-inch tall yellow and green foxtail, 12-inch tall volunteer wheat, 6-inch wide and tall redroot and prostrate pigweed, vining (12- to 24-inch wide) wild buckwheat, 2- to 16-inch tall common lambsquarters, and 2- to 6-inch tall Eastern black and hairy nightshade. Hail severely damaged the trial on July 24. The trial was not harvested for grain yield.

Corn emerged about May 26 and no crop response from PRE herbicides was noted on June 3. Before application of POST treatments, weed control was visually evaluated on July 1 (Table). Grass control was similar among treatments with soil residual activity. Harness Xtra, SureStart, Lumax, Verdict and Zidua + Sharpen generally provided excellent (86 to 99%) control of common lambsquarters and pigweed. Excellent wild buckwheat (99%) control was achieved with SureStart and Zidua and Sharpen (2 oz wt + 2.5 fl oz/A). Grass and broadleaf weed control was excellent one month after POST application of treatments.

Table.												
Herbicide				Weed control (%) ¹								
Treatment ²		Rate	Timing ³	1-Jul				3-Aug				
No.		fl oz product/A		grass	cola	piwe	wibw	yefo	colq	piwe	wibw	nish
1	Harness Xtra	64	PRE	79	90	98	82	94	99	99	99	99
2	SureStart	28	PRE	73	86	94	99	95	99	99	99	99
3	Lumax	64	PRE	72	99	95	60	96	99	99	99	99
4	Verdict	13	PRE	74	99	96	85	96	99	99	99	99
5	Zidua + Sharpen	2 oz wt + 2.5	PRE	73	96	99	99	96	99	99	99	99
6	Zidua + Sharpen	2.5 oz wt + 2.5	PRE	77	99	98	87	97	99	99	98	99
7	Zidua	2.5 oz wt	PRE	74	48	83	40	97	99	99	99	99
8	Zidua	2 oz wt	PRE	75	30	86	37	97	99	99	98	99
	Zidua	1 oz wt	POST									
9			PRE	0	0	0	0	95	99	99	98	99
C.V. (%)				7.1	28.5	8.7	37.5	1.7	0.0	0.0	1.0	0.2
LSD (0.05)				8	36	13	44	NS	NS	NS	NS	NS
¹ grass=yellow foxtail and volunteer wheat; colq=common lambsquarters; piwe=prostrate and redroot pigweed; wibw=wild buckwheat; yefo=yellow foxtail; nish=Eastern black and hairy nightshade.												
² All PRE and POST treatments include Roundup PowerMax at 22 fl oz/A plus Class Act NG at 16 fl oz/A. Zidua and Sharpen treatments also include Destiny HC at 12 fl oz/A.												
³ PRE=May 7; POST=July 2.												

Metolachlor formulations. Zollinger, Richard K., Jerry L. Ries, and Angela J. Kazmierczak. An experiment was conducted near Prosper, ND, to evaluate weed efficacy and crop response to metolachlor formulations and application timing corn. Dekalb 'DKC35-43' Roundup Ready corn was planted May 26, 2011, followed by the application of PRE treatments at 7:45 pm with 61 F air, 54 F soil at a four inch depth, 60% relative humidity, 60% cloud cover, 3 to 5 mph SE wind, dry soil surface, and moist subsoil. Soil characteristic were: 32.5% sand, 21.3% silt, 46.3% clay, 4.3% OM, and 7.7 pH. POST treatments were applied June 20 at 10:40 am with 71 F air, 70 F surface soil, 75% relative humidity, 100% cloud cover, 3 to 5 mph SE wind, wet soil surface, wet subsoil, good crop vigor, and no dew present to V4 to V6 (8 to 24 inch) corn. Weeds species present at the time of POST were: 1 to 3 inch (10 to 25/ft²) yellow foxtail; 1 to 2 inch (1 to 3/ yd²) common lambsquarters; 0.5 to 1.5 inch (10 to 25/ft²) redroot pigweed; 0.5 to 1.5 inch (10 to 25/ft²) hairy nightshade; 1 to 3 inch (<1/ yd²) common cocklebur; 1 to 2 inch (<1/ yd²) wild mustard; 1 to 2 inch (<1/ yd²) common ragweed; and 1 to 2 inch diameter (<1/ yd²) wild buckwheat. The center of each plot for the entire study had an application of Glyphogan Plus at 1qt/A + AMS at 8.5lb/100gal on July 7, 42 DAE (days after emergence) at 10:15 am with 78 F air, 82 F soil, 46% relative humidity, 10% cloud cover, 3 to 5 mph SE wind, dry soil surface, wet subsoil and no dew present to V4 to V6 (8 to 24 inch) corn. Weed species present at the time of 42 DAE were: 6 to 10 inch (5 to 10/ yd²) yellow foxtail; 1 to 2 inch (1/ yd²) common lambsquarters; 1 to 3 inch (1 to 3/ yd²) redroot pigweed; cotyledon to 3 inch (5 to 10/ yd²) hairy nightshade; cotyledon to 4 inch (1/ yd²) common cocklebur; cotyledon to 4 inch (1/ yd²) wild mustard; emergence to 1 inch (1/ yd²) common ragweed; and 2 to 3 inch diameter (1/ yd²) wild buckwheat. Treatments were applied to the center 6.7 feet of the 10 by 40 foot plots with a backpack-type plot sprayer delivering 17 gpa at 40 psi through 11002 Turbo TeeJet nozzles for PRE treatments and 8.5 gpa at 40 psi through 11001 Turbo TeeJet nozzles for POST treatments and Glyphogan application. The experiment had a randomized complete block design with three replicates per treatment.

No injury was observed at any rating (data not shown). All PRE treatments on June 23, 14 DAE (days after emergence), gave greater than 90% control of yellow foxtail, redroot pigweed, common lambsquarters, wild mustard, hairy nightshade, wild buckwheat, and common ragweed (data not shown). Except for Parallel Plus at 1.5 qt and Bicep II Magnum, all treatments gave 99% control of wild mustard, redroot pigweed, common lambsquarters, wild buckwheat, and common ragweed (data not shown). Weed control ratings with Parallel Plus at 1.5 qt/A gave 70 to 77% wild mustard, 70 to 72% redroot pigweed and common lambsquarters, 77% wild buckwheat, and 92% common ragweed control at all ratings after the Glyphogan Plus was supplied (data not shown). Weed control ratings with Bicep II Magnum at 1.35 qt/A gave 82 to 95% wild mustard, 85 to 95% redroot pigweed and common lambsquarters, 85 to 95% wild buckwheat, and 93% common ragweed control at all ratings after the Glyphogan Plus was supplied (data not shown). (Department of Plant Sciences, North Dakota State University, Fargo).

Table. Metolachlor formulations (Zollinger, Ries, Kazmierczak).

Treatment	Rate (product/A)	14 DAE	July 4, 14 DAT POST							
		Cocb - % control -	Yeft	Wimu	Rrpw	Colq	Hans	Wibw	Corw	Cocb
<u>PRE</u>										
Parallel Plus	1.5qt	25	93	99	96	98	99	99	92	25
Bicep II Magnum	1.35qt	20	90	99	95	98	99	99	91	20
Parallel Plus	2.83qt	28	99	99	99	99	99	99	99	28
Bicep II Magnum	2.5qt	28	99	99	99	99	99	99	99	28
Parallel Plus+ Callisto	1.5qt+4fl oz	99	96	99	99	99	99	99	99	99
Parallel Plus+ Callisto	1.35qt+6.25fl oz	99	98	99	99	99	99	99	99	99
<u>POST</u>										
Parallel Plus+Herbimax	1.5qt+1% v/v	-	47	53	53	53	53	53	53	50
Bicep II Magnum+Herbimax	1.5qt+1% v/v	-	50	70	70	70	70	70	70	50
Parallel Plus+Herbimax	2.83qt+1% v/v	-	88	87	85	86	85	85	80	50
Bicep II Magnum+Herbimax	2.83qt+1% v/v	-	82	82	82	82	82	75	75	90
Parallel Plus+Callisto+Herbimax	1.4qt+3fl oz+1% v/v	-	99	99	99	99	99	99	99	99
Parallel Plus+Callisto+Herbimax	2qt+3fl oz+1% v/v	-	99	99	99	99	99	99	99	99
LSD (0.05)		4	8	6	7	6	6	11	13	3

Table cont. Metolachlor formulations (Zollinger, Ries, Kazmierczak).

Treatment	Rate (product/A)	July 21 - 14 DAT Glyphogan			Aug 4 - 28 DAT Glyphogan			Aug 18 - 42 DAT Glyphogan		
		Yeft	Hans	Cocb	Yeft	Hans	Cocb	Yeft	Hans	Cocb
<u>PRE</u>										
Parallel Plus	1.5qt	87	70	25	87	70	53	80	72	62
Bicep II Magnum	1.35qt	93	85	20	93	95	70	95	95	87
Parallel Plus	2.83qt	99	80	28	99	95	70	99	95	82
Bicep II Magnum	2.5qt	99	80	28	99	95	68	96	95	82
Parallel Plus+ Callisto	1.5qt+4fl oz	96	90	99	95	93	99	95	95	99
Parallel Plus+ Callisto	1.35qt+6.25fl oz	98	80	99	98	96	99	90	96	99
<u>POST</u>										
Parallel Plus+Herbimax	1.5qt+1% v/v	99	99	99	85	99	99	85	99	99
Bicep II Magnum+Herbimax	1.5qt+1% v/v	99	99	99	85	99	99	70	99	99
Parallel Plus+Herbimax	2.83qt+1% v/v	99	99	99	93	99	99	90	99	99
Bicep II Magnum+Herbimax	2.83qt+1% v/v	99	99	99	90	99	99	85	99	99
Parallel Plus+Callisto+Herbimax	1.4qt+3fl oz+1% v/v	99	99	99	90	99	99	90	99	99
Parallel Plus+Callisto+Herbimax	2qt+3fl oz+1% v/v	99	99	99	96	99	99	95	99	99
LSD (0.05)		8	3	3	7	2	3	4	2	4

Balance and Capreno in corn. Zollinger, Richard K., Jerry L. Ries, and Angela J. Kazmierczak. An experiment was conducted near Prosper, ND, to evaluate weed efficacy and crop response to multiple tank-mixes and application timings in corn. Northrop King 'NK23K-3000GT' Roundup Ready/LibertyLink corn was planted on May 26, 2011, followed by PRE treatments at 9:40 pm with 57 F air, 54 F soil at a four inch depth, 39% relative humidity, 60% cloud cover, 3 to 5 mph SE wind, moist soil surface and wet subsoil. Soil characteristics were: 22.5% sand, 33.8% silt, 43.8% clay, clay texture, 4.3% OM and 7.5 pH. EPOST treatments were applied on June 17 at 9:00 am with 67 F air, 68 F soil surface, 88% relative humidity, 40% cloud cover, 10 to 15 mph SE wind, wet soil surface, wet subsoil, good crop vigor and no dew present to V1 to V2 (3 to 5 inch) corn. Weed species present at the time of EPOST were: 1 to 3 inch (5 to 15/ft²) yellow foxtail; 1 to 2 inch (1 to 5/ft²) common lambsquarters; 0.5 to 1 inch (1 to 5/ft²) hairy nightshade; 1 to 3 inch (5 to 30/ft²) common cocklebur; cotyledon to 1 inch (1 to 2/ft²) wild mustard; 1 to 2 inch (1 to 2/ft²) common ragweed; and 0.5 to 1.5 inch (5 to 25/ft²) redroot pigweed. MPOST treatments were applied June 17 at 9:20 am with 77 F air, 70 F soil surface, 70% relative humidity, 10% cloud cover, 1 to 3 mph SE wind, wet soil surface, wet subsoil, poor (excess water) good crop vigor, and no dew present to V1 to V3 (4 to 10 inch) corn. Weed species present at the time of MPOST application were: 3 to 6 inch (10 to 20/ft²) yellow foxtail; 1 to 4 inch (3 to 5/ft²) common lambsquarters; 1 to 4 inch (5 to 10/ft²) hairy nightshade; 2 to 8 inch (5 to 20/ft²) common cocklebur; 1 to 4 inch (3 to 5/ft²) common ragweed; and 1 to 4 inch (3 to 5/ft²) redroot pigweed. Weed species in plots that received a PRE at the time of MPOST were: 1 to 5 inch (1 to 25/ft²) yellow foxtail; 1 to 2 inch (1 to 3/ft²) hairy nightshade; 1 to 3 inch (1/ft²) common cocklebur; and 1 to 2 inch (1/ft²) common ragweed. Crop conditions were: V2 to V3, V1 to V2 corn in water; both weeds and crop were water damaged. POST treatments were applied July 5 at 11:05 am with 77 F air, 81 F soil surface, 43% relative humidity, 0% cloud cover, 3 to 5 mph NW wind, dry soil surface, wet subsoil, poor (excessive water) crop vigor and no dew present to V3 to V4 (6 to 18 inch) corn. Weed species present at the time of POST were: 1 to 3 inch (1 to 5/ft²) yellow foxtail; 1 to 3 inch (1 to 2/ft²) common lambsquarters; 2 to 3 inch (1 to 3/ft²) hairy nightshade; 4 to 10 inch (5 to 10/ft²) common cocklebur; 1 to 3 inch (1/ft²) common ragweed; and 1 to 2 inch (1/ft²) redroot pigweed. Treatments were applied to the center 6.7 feet of the 10 by 40 foot plots with a backpack-type plot sprayer delivering 17 gpa at 40 psi through 11002 Turbo TeeJet nozzles for PRE treatments and 8.5 gpa at 40 psi through 11001 Turbo TeeJet nozzles for POST treatments. The experiment had a randomized complete block design with three replicates per treatment.

Wet spring and early summer conditions caused delayed planting and flooding after crop emergence. Some plots or parts of studies were damaged by standing water. Yields were not taken due to injury from excessive water. Sequential applications, whether PRE fb POST or EPOST fb POST, had the greatest weed control. Capreno is a premix of thiencazabone + Laudis. Thiencazabone controls many grasses and some broadleaf weeds. No injury observed at 6 days after EPOST, 7 days after MPOST, 7 days after POST, and all other ratings (data not shown). All treatments gave 99% control of wild mustard, common lambsquarters, hairy nightshade at all ratings (data not shown). Common ragweed had greater than 96% control at all ratings (data not shown). (Department of Plant Sciences, North Dakota State University, Fargo).

Table. Balance and Capreno in corn (Zollinger, Ries, Kazmierczak).

Treatment	Rate (product/A)	July 26			August 23		
		Yeft	Rrpw	Cocb	Yeft	Rrpw	Cocb
		----- % control -----			----- % control -----		
PRE/MPOST							
Balance Flexx/Laudis+Atrazine+ Soy-Stik+28%	3fl oz/3fl oz+0.42lb+ 1% v/v+1.5qt	98	99	93	98	99	93
Balance Flexx/Laudis+Atrazine+RUPM+ Destiny HC+AMS	3fl oz/2fl oz+0.425lb+22fl oz+ 1% v/v+8.5lb/100gal	99	99	99	99	99	99
Balance Flexx/Ignite+Laudis+ Atrazine+AMS	3fl oz/22fl oz+3fl oz+ 0.42lb+8.5lb/100gal	96	99	92	96	99	95
Lumax/Touchdown Total+AMS	1qt/24fl oz+8.5lb/100gal	85	87	70	87	82	70
MPOST							
Laudis+Atrazine+Soy-Stik+28%	3fl oz+0.42lb+1% v/v+1.5qt	80	99	70	77	99	70
Impact+Atrazine+ Soy-Stik+AMS	0.75fl oz+0.42lb+ 1% v/v+8.5lb/100gal	88	93	52	93	95	53
RUPM+Impact+Atrazine+ Soy-Stik+AMS	22fl oz+0.5fl oz+0.42lb+ 1% v/v+8.5lb/100gal	92	91	50	93	93	53
EPOST/POST							
Capreno/Laudis+RUPM	3fl oz/2fl oz+22fl oz	99	99	99	99	99	89
Lumax/Touchdown Total+AMS	1.25qt/24fl oz+8.5lb/100gal	93	99	81	95	99	82
LSD (0.05)		7	6	7	3	4	7

Corvus and Capreno in corn. Zollinger, Richard K., Jerry L. Ries, and Angela J. Kazmierczak. An experiment was conducted near Prosper, ND, to evaluate weed efficacy to EPOST and MPOST herbicide programs in corn. Northrop King 'NK23K-3000GT' Roundup Ready/LibertyLink corn was planted on May 26, 2011. EPOST treatments were applied on June 17 at 9:10 am with 67 F air, 68 F soil surface, 88% relative humidity, 40% cloud cover, 10 to 15 mph SE wind, wet soil surface, wet subsoil, good crop vigor and no dew present to V1 to V2 corn (3 to 5 inch) corn. Weed species present at the time of EPOST were: 1 to 3 inch (5 to 15/ft²) yellow foxtail, 1 to 2 inch (1 to 5/yd²) common lambsquarters; 0.5 to 1.5 inch (5 to 25/ft²) redroot pigweed; 1 to 3 inch (5 to 30/yd²) common cocklebur; cotyledon to 1 inch (1 to 2/yd²) wild mustard; 1 to 2 inch (1 to 2/yd²) common ragweed; and 0.5 to 1 inch (1 to 5/yd²) hairy nightshade. MPOST treatments were applied June 28 at 9:00 am with 76 F air, 70 F soil surface, 72% relative humidity, 10% cloud cover, 1 to 3 mph SE wind, wet soil surface, wet subsoil, poor (excess water) to good crop vigor and no dew present to V2 to V3 (5 to 10 inch) corn. Weed species present at the time of MPOST were: 3 to 6 inch (5 to 25/ft²) yellow foxtail, 1 to 4 inch (1 to 3/yd²) common lambsquarters; 1 to 3 inch (1 to 2/yd²) redroot pigweed; 4 to 8 inch (5 to 20/ft²) common cocklebur; 2 to 5 inch (5 to 25/yd²) common ragweed; and 1 to 5 inch (5 to 20/ft²) hairy nightshade. Treatments were applied to the center 6.7 feet of the 10 by 40 foot plots with a backpack-type plot sprayer delivering 8.5 gpa at 40 psi through 11001 Turbo TeeJet nozzles. The experiment had a randomized complete block design with three replicates per treatment.

Wet spring and early summer conditions caused delayed planting and flooding after crop emergence. Some plots or parts of studies were damaged by standing water. Yields were not taken due to injury from excessive water. Corvus is a premix of Balance Flexx and thien carbazole and Capreno is a premix of thien carbazole + Laudis. Thien carbazole controls many grasses and some broadleaf weeds. No injury observed at 6 days after EPOST, and 7, 14, 28, and 56 days after MPOST (data not shown). All treatments gave 99% control of wild mustard, common lambsquarters, hairy nightshade at all ratings (data not shown). Common ragweed had greater than 93% control at all ratings (data not shown). (Department of Plant Sciences, North Dakota State University, Fargo).

Table. Corvus and Capreno in corn (Zollinger, Ries, Kazmierczak).

Treatment	Rate (product/A)	July 26					August 23				
		Yeft	Rrpw	Colq	Corw	Cocb	Yeft	Rrpw	Colq	Conw	Cocb
----- % control -----											
EPOST											
Corvus+Atrazine	5.6oz+0.56lb	93	99	99	99	90	99	99	99	99	94
Lumax	1.25qt	92	99	99	99	99	99	99	99	99	99
MPOST											
Capreno+RUPM+AMS	3fl oz+22fl oz+8.5lb/100gal	80	88	91	93	78	92	93	94	94	83
Halex GT+Atrazine+	3.6pt+0.42lb+										
R-11+AMS	0.25% v/v+1.5lb	96	96	99	99	99	96	99	99	99	99
Impact+Atrazine+	0.75oz+0.42lb+										
Soy-Stik+AMS	1% v/v+8.5lb/100gal	90	98	99	99	99	98	99	99	99	99
RUPM+Impact+Atrazine+	22fl oz+0.5fl oz+0.42lb+										
Soy-Stik+AMS	1% v/v+8.5lb/100gal	92	93	96	99	90	96	97	99	99	92
LSD (0.05)		9	7	6	8	12	4	4	6	6	6

Mesotrione premixes in corn. Zollinger, Richard K., Jerry L. Ries, and Angela J. Kazmierczak. An experiment was conducted near Prosper, ND, to evaluate weed efficacy and crop response to tank-mixes and application timings in corn. A PPI application was made May 26, 2011 at 7:35 pm with 62 F air, 54 F soil at a four inch depth, 41% relative humidity, 30% cloud cover, 3 to 5 mph SE wind, moist soil surface, and wet subsoil. Dekalb 'DKC35-43' Roundup Ready corn was then planted followed by the application of PRE treatments at 8:45 pm with 62 F air, 54 F soil at a four inch depth, 41% relative humidity, 30% cloud cover, 3 to 5 mph SE wind, moist soil surface and wet subsoil. Soil characteristic were: 32.5% sand, 21.3% silt, 46.3% clay, 4.3% OM and 7.7 pH. EPOST applications were applied on June 20 at 10:30 am with 71 F air, 70 F soil surface, 75% relative humidity, 100% cloud cover, 3 to 5 mph SE wind, wet soil surface, wet subsoil, good crop vigor, and no dew present to V2 (3 to 5 inch) corn. Weed species present at the time of EPOST were: 1 to 3 inch (1 to 3ft²) yellow foxtail; 0.1 to 1 inch (1 to 2/yd²) common lambsquarters; 0.5 to 1 inch (5 to 10/ft²) redroot pigweed; 0.5 to 1 inch (3 to 5/yd²) hairy nightshade, 1 to 2 inch (1/yd²) common ragweed; 1 to 3 inch (1/yd²) common cocklebur; and 1 to 2 inch (1/yd²) wild mustard. POST applications were applied on July 6 at 10:25 am with 78F air, 82 F soil surface, 46% relative humidity, 10% cloud cover, 3 to 5 mph SE wind, dry soil surface, wet subsoil, poor crop vigor (excess water, V4, 8 to 14 inches) to excellent crop vigor (V5 to V6, 20 to 30 inch). Weeds species present at the time of POST were: emergence to 10 inch (5 to 30/yd²) yellow foxtail; emergence to 3 inch (1 to 5/yd²) common lambsquarters; emergence to 4 inch (1 to 25/yd²) redroot pigweed; and emergence to 2 inch (1/yd²) wild mustard. Treatments were applied to the center 6.7 feet of the 10 by 40 foot cotyledon to 4 inch (1/yd²) common cocklebur; and emergence to 2 inch (1/yd²) hairy nightshade; emerging (1/yd²) common ragweed; cotyledon to 4 inch (1/yd²) common cocklebur; and emergence to 2 inch (1/yd²) wild mustard. Treatments were applied to the center 6.7 feet of the 10 by 40 foot plots with a backpack-type plot sprayer delivering 17 gpa at 40 psi through 11002 Turbo TeeJet nozzles for PPI and PRE treatments and 8.5 gpa at 40 psi through 11001 Turbo TeeJet nozzles for POST treatments. The experiment had a randomized complete block design with three replicates per treatment.

Wet spring and early summer conditions caused delayed planting and flooding after crop emergence. Some plots or parts of studies were damaged by standing water. Yields were not taken due to injury from excessive water. No corn injury observed from PRE or POST treatments (data not shown). All EPOST and POST applications gave 99% control of wild mustard, redroot pigweed, common lambsquarters, hairy nightshade, common ragweed, and common cocklebur (data not shown). (Department of Plant Sciences, North Dakota State University, Fargo).

Table. Mesotrione premixes in corn (Zollinger, Ries, Kazmierczak).

Treatment ¹	Rate (product/A)	July 4			July 20			Aug 3			Aug 17			
		Yeft	Wimu	Rpww	Colq	Hans	Conw	Cocb	Yeft	% control	Yeft	% control	Yeft	% control
PPI/POST														
Dual II Magnum/Callisto Xtra+ TD Total+AMS	1pt/20fl oz+24fl oz+8.5lb/100gal	70	45	70	70	60	7	7	99	99	99	99	99	
PRE/POST														
A17227C/TD Total+AMS	4pt/24fl oz+8.5lb/100gal	99	99	99	99	99	99	99	99	99	99	99	99	
A17227C/Halex GT+AMS	4pt/3.6pt+8.5lb/100gal	99	99	99	99	99	99	99	90	99	98	98	98	
Dual II Magnum/Halex GT+R-11+AMS	1pt/3.6pt+0.25% v/v+8.5lb/100gal	88	99	99	99	99	99	99	92	99	96	97	97	
A18263D/TD Total+AMS	1.3qt/24fl oz+8.5lb/100gal	85	96	99	99	99	99	7	99	99	99	99	99	
Sequence/TD Total+AMS	2.5pt/24fl oz+8.5lb/100gal	86	20	60	60	60	7	7	99	99	99	99	96	
EPOST/POST														
TD Total+AMS/ TD Total+AMS	24fl oz+8.5lb/100gal/ 24fl oz+8.5lb/100gal	95	99	99	99	99	99	99	95	99	95	95	90	
POST														
Callisto Xtra+TD Total+AMS	20fl oz+24fl oz+8.5lb/100gal	-	-	-	-	-	-	-	95	95	96	96	96	
LSD (0.05)		8	9	2	3	3	9	9	7	4	4	3	3	

¹TD Total = Touchdown Total; A compounds = proprietary compounds from Syngenta.

Resolve and Mesotrione in corn. Zollinger, Richard K., Jerry L. Ries, and Angela J. Kazmierczak. An experiment was conducted near Prosper, ND, to evaluate weed efficacy and crop response tank-mixes of Resolve and Mesotrione in corn. Dekalb 'DKC35-43' was planted May 26, 2011 followed by the application of PRE treatments at 8:40 pm with 59 F air, 54 F soil at a four inch depth, 41% relative humidity, 60% cloud cover, 3 to 5 mph NW wind, moist soil surface, and wet subsoil. Soil characteristic were: 32.5% sand, 21.3% silt, 46.3% clay, 4.3% OM, 7.7 pH. POST treatments were applied on June 30 at 11:10 am with 77 F air, 81 F soil surface, 43% relative humidity, 0% cloud cover, 3 to 5 mph NW wind, dry soil surface, wet subsoil, fair to good crop vigor, and no dew present to V3 to V5 (8 to 20 inch) corn. Fair corn was V3 to V4 (8 to 14 inches), good corn was V4 to V5 (18 to 20 inch). Weed species present at the time of POST were: 6 to 12 inch, T2 (5 to 20/ft²) yellow foxtail; 1 to 5 inch (1 to 2/yd²) common lambsquarters; 2 to 4 inch (1 to 2/yd²) redroot pigweed; 1 to 5 inch (5 to 15/yd²) hairy nightshade; 3 to 10 inch (1/yd²) common cocklebur; 1 to 6 inch (1 to 2/yd²) common ragweed. Weeds species present with PRE applications at the time of POST applications were: emerging (1 to 3/yd²) yellow foxtail; emerging (1/yd²) common lambsquarters; emerging (1/yd²) redroot pigweed; emerging (5 to 25/ft²) hairy nightshade; and 0.5 inch (1/yd²) common ragweed. Treatments were applied to the center 6.7 feet of the 10 by 40 foot plots with a backpack-type plot sprayer delivering 17 gpa at 40 psi through 11002 Turbo TeeJet nozzles for PRE treatments and 8.5 gpa at 40 psi through 11001 Turbo TeeJet nozzles for POST treatments. The experiment had a randomized complete block design with three replicates per treatment.

Weed control was acceptable for most all treatments except for foxtail as wet conditions produced several flushes and treatments with weak residual products allowed foxtail flushed to emerge. No corn injury observed (data not shown). 99% control of wild mustard, redroot pigweed, common lambsquarters, and common ragweed (data not shown). (Department of Plant Sciences, North Dakota State University, Fargo).

Table. Resolve and Mesotrione in corn (Zollinger, Ries, Kazmierczak).

Treatment ¹	Rate	June 16			June 30			July 19			Aug 2		
		Yeft	Hans	Coch	Yeft	Hans	Coch	Yeft	Hans	Coch	Yeft	Hans	Coch
PRE	(product/A)	----- % control -----											----- % control -----
Resolve+Mesotrione	1oz+4.5oz	72	60	75	77	93	68	90	94	76	90	98	81
Resolve+Mesotrione	1.5oz+4.5oz	73	60	73	72	88	57	85	93	70	85	96	76
Resolve+Harmony SG+Mesotrione	1oz+0.5oz+4.5oz	72	70	72	77	99	72	90	92	53	90	95	77
Resolve+Mesotrione+Atrazine	1oz+4.5oz+1.11lb	70	85	72	95	99	53	87	92	50	90	95	70
Resolve+Mesotrione+Atrazine	1.5oz+4.5oz+1.11lb	70	85	70	92	99	45	88	95	62	91	96	68
Resolve+Harmony SG+Mesotrione+Atrazine	1oz+0.5oz+4.5oz+1.11lb	70	88	70	96	99	47	86	95	62	91	96	68
Lumax	3qt	99	99	83	99	99	73	90	90	67	88	93	67
PRE/POST													
Resolve+Mesotrione+Atrazine/Abundit+AMS	1oz+4.5oz+1.11lb/1qt+2lb	70	83	70	91	99	65	90	91	68	86	95	75
Resolve+Mesotrione+Atrazine/Abundit+AMS	1.5oz+4.5oz+1.11lb/1qt+2lb	75	83	70	93	99	43	86	90	68	85	93	70
Resolve+Harmony SG+Mesotrione+Atrazine/Abundit+AMS	1oz+0.5oz+4.5oz+1.11lb/1qt+2lb	83	85	70	91	99	35	90	90	67	88	93	67
Lumax/Abundit+AMS	3qt/1qt+2lb	99	99	88	99	99	83	94	90	67	94	93	77
POST													
Solida+Glyphs X-tra+AMS	1oz+1qt+8.5lb/100gal	-	-	-	-	-	-	83	90	62	85	93	68
LSD (0.05)		3	2	3	8	3	11	9	6	14	9	4	13

¹Mesotrione = 50 WG.

Realm Q in corn. Zollinger, Richard K., Jerry L. Ries, and Angela J. Kazmierczak. An experiment was conducted near Prosper, ND, to evaluate weed efficacy and crop response to tank-mixes in corn. Northrop King 'NK23K-3000GT' Roundup Ready/LibertyLink corn was planted May 26, 2011, followed by the application of PRE treatments at 9:45 pm with 57 F air, 54 F soil at a four inch depth, 38% relative humidity, 60% cloud cover, 3 to 5 mph SE wind, moist soil surface, and wet subsoil. Soil characteristics were: 22.5% sand, 33.8% silt, 43.8% clay, 4.3% OM and 7.5 pH. POST treatments were applied on June 20 at 9:50 am with 68 F air, 68 F soil surface, 96% relative humidity, 100% cloud cover, 5 to 10 mph SE wind, wet soil surface, wet subsoil, good crop vigor and no dew present to V2 to V3 (5 to 7 inch) corn. Weed species present at the time of POST were: 2 to 5 inch (5 to 15/ft²) yellow foxtail; 1 to 2 inch (1 to 5/yd²) common lambsquarters; 1 to 3 inch (5 to 25/ft²) redroot pigweed; 0.5 to 1 inch (1 to 2/yd²) hairy nightshade; 2 to 5 inch (5 to 30/yd²) common cocklebur; cotyledon to 1 inch (1 to 2/yd²) wild mustard; and 1 to 3 inch (3 to 5/yd²) common ragweed. Weeds present with PRE applications at the time of POST applications were: 2 to 5 inch (5 to 15/yd²) yellow foxtail; cotyledon to 1 inch (1 to 2/yd²) common lambsquarters; cotyledon to 1 inch (5 to 10/ ft²) redroot pigweed; cotyledon to 1 inch (10 to 15/yd²) hairy nightshade; 2 to 5 inch (5 to 10/yd²) common cocklebur; and 1 to 3 inch (1 to 2/yd²) common ragweed. LPOST treatments were applied on July 5 at 11:00 am with 77 F air, 81 F soil surface, 43% relative humidity, 0% cloud cover, 3 to 5 mph NW wind, dry soil surface, wet subsoil, poor (excess water) to good crop vigor and no dew present to V3 to V4 (6 to 18 inch) corn. Weeds present at the time of LPOST were all dying; the species were: yellow foxtail, common lambsquarters, redroot pigweed, hairy nightshade, common cocklebur, and common ragweed. Treatments were applied to the center 6.7 feet of the 10 by 40 foot plots with a backpack-type plot sprayer delivering 17 gpa at 40 psi through 11002 Turbo TeeJet nozzles for PRE treatments and 8.5 gpa at 40 psi through 11001 Turbo TeeJet nozzles for POST treatments. The experiment had a randomized complete block design with three replicates per treatment.

Weed control was acceptable for most all treatments except for foxtail as wet conditions produced several flushes and treatments with weak residual products allowed foxtail flushed to emerge. Sequential applications of PRE fb POST or POST treatments had the greatest weed control. Weed control was acceptable for most all treatments except for POST fb LPOST treatments which were sprayed to larger weeds. No crop injury observed (data not shown). All treatments gave 99% control of wild mustard on July 4, 18, and August 15 (data not shown). (Department of Plant Sciences, North Dakota State University, Fargo).

Table. Realm Q in corn (Zollinger, Ries, Kazmierczak).

Treatment ¹	Rate (product/A)	June 27, 7 DAT POST					July 4, 14 DAT POST							
		Yeft	Wimu	Rrpw	Colq	Hans	Conw	Cocb	Yeft	Rrpw	Colq	Hans	Conw	Cocb
<u>PRE/POST</u>														
Breakfree/Resolve+Isox+Meso+Abundit+AMS	1pt/1.2oz+0.3oz+2.5oz+1qt+17lb/100gal	88	88	88	88	88	88	88	88	88	88	88	88	88
Breakfree/Abundit+AMS	1pt/1qt+17lb/100gal	96	96	96	96	96	96	96	96	96	96	96	96	96
<u>POST</u>														
Resolve+Isox+Meso+Abundit+AMS	1.2oz+0.3oz+2.5oz+1qt+17lb/100gal	75	75	75	75	75	75	75	75	75	75	75	75	75
Breakfree+Resolve+Isox+Meso+Abundit+AMS	1pt+1.2oz+0.3oz+2.5oz+1qt+17lb/100gal	77	77	77	77	77	77	77	77	77	77	77	77	77
Resolve+Isox+Meso+Abundit+Atrazine+AMS	1.2oz+0.3oz+2.5oz+1qt+0.56lb+17lb/100gal	72	72	72	72	72	72	72	72	72	72	72	72	72
Halex GT+R-11+AMS	3.6pt+0.25% v/v+8.5lb/100gal	77	77	77	77	77	77	77	77	77	77	77	77	77
<u>POST/LPOST</u>														
Resolve+Isox+Meso+Herbimax+AMS/Abundit+AMS	1.2oz+0.3oz+2.5oz+1% v/v+17lb/100gal/1qt+17lb/100gal	50	50	50	50	50	43	35	90	80	80	70	67	53
Resolve+Isox+Meso/Ignite+AMS	1.2oz+0.3oz+2.5oz/22fl oz+17lb/100gal	63	63	63	63	63	53	20	78	76	76	66	66	43
LSD (0.05)		13	13	13	13	13	18	12	12	15	15	13	18	27

¹Isox = Isoxadifen safener; Meso = 50 WG Mesotrione.

Table cont. Realm Q in corn (Zollinger, Ries, Kazmierczak).

Treatment ¹	Rate (product/A)	July 18, 28 DAT POST					Aug 15, 56 DAT POST, 28 LPOST							
		Yeft	Rrpw	Colq	Hans	Conw	Cocb	Yeft	Rrpw	Colq	Hans	Conw	Cocb	
<u>PRE/POST</u>														
Breakfree/Resolve+Isox+Meso+Abundit+AMS	1pt/1.2oz+0.3oz+2.5oz+1qt+17lb/100gal	99	99	99	99	96	88	88	99	99	99	99	98	82
Breakfree/Abundit+AMS	1pt/1qt+17lb/100gal	98	99	99	99	82	50	50	77	99	99	99	82	53
<u>POST</u>														
Resolve+Isox+Meso+Abundit+AMS	1.2oz+0.3oz+2.5oz+1qt+17lb/100gal	99	99	99	99	99	90	90	99	99	99	99	99	83
Breakfree+Resolve+Isox+Meso+Abundit+AMS	1pt+1.2oz+0.3oz+2.5oz+1qt+17lb/100gal	96	99	99	99	80	80	80	98	99	99	99	99	78
Resolve+Isox+Meso+Abundit+Atrazine+AMS	1.2oz+0.3oz+2.5oz+1qt+0.56lb+17lb/100gal	99	99	99	99	99	99	99	99	99	99	99	99	99
Halex GT+R-11+AMS	3.6pt+0.25% v/v+8.5lb/100gal	98	96	96	96	96	90	90	98	96	96	96	96	93
<u>POST/LPOST</u>														
Resolve+Isox+Meso+Herbimax+AMS/Abundit+AMS	1.2oz+0.3oz+2.5oz+1% v/v+17lb/100gal/1qt+17lb/100gal	99	99	99	99	99	99	99	99	99	99	99	99	88
Resolve+Isox+Meso/Ignite+AMS	1.2oz+0.3oz+2.5oz/22fl oz+17lb/100gal	91	99	89	89	89	73	73	20	94	89	93	80	20
LSD (0.05)		9	10	10	10	15	9	9	5	10	10	7	10	6

¹Isox = Isoxadifen safener; Meso = 50 WG Mesotrione.

Weed control systems in corn. Zollinger, Richard K., Jerry L. Ries, and Angela J. Kazmierczak. An experiment was conducted near Prosper, ND, to evaluate weed efficacy and crop response to PRE/POST programs in corn that do not contain atrazine. The plot was double worked with a field cultivator, staked, planted, and PRE treatments applied. Several hours later glyphosate plus AMS was broadcast across the entire plot area to ensure a complete weed-free study. Dekalb 'DKC35-43' Roundup Ready corn was planted May 26, 2011 followed by the application of PRE treatments at 8:00 pm with 60 F air, 54 F soil at a four inch depth, 41% relative humidity, 60% cloud cover, 3 to 5 mph SE wind, moist soil surface, and wet subsoil. Soil characteristic were: 32.5% sand, 21.3% silt, 46.3% clay, 4.3% OM, and 7.7 pH. POST treatments were applied on June 28 at 10:30 am with 80 F air, 73 F soil surface, 65% relative humidity, 10% cloud cover, wet soil surface, wet subsoil, poor (excess water) to good crop vigor and no dew present to V2 to V3 (6 to 10 inch) corn. Weed species present at the time of POST were: 3 to 5 inch (5 to 30/ft²) foxtail; 1 to 4 inch (2 to 5/yd²) common lambsquarters; 1 to 3 inch (1 to 3/yd²) redroot pigweed; 3 to 5 inch (3 to 10/ft²) hairy nightshade; 3 to 6 inch (1/yd²) common cocklebur; 2 to 4 inch (1 to 3/yd²) common ragweed; cotyledon to 5 inch (1/yd²) wild mustard; and 1 to 3 inch diameter (1/yd²) wild buckwheat. Treatments were applied to the center 6.7 feet of the 10 by 40 foot plots with a backpack-type plot sprayer delivering 17 gpa at 40 psi through 11002 Turbo TeeJet nozzles for PRE treatments and 8.5 gpa at 40 psi through 11001 Turbo TeeJet nozzles for POST treatments and the over-spray of glyphosate. The experiment had a randomized complete block design with three replicates per treatment.

Wet spring and early summer conditions caused delayed planting and flooding after crop emergence. Some plots or parts of studies were damaged by standing water. Yields were not taken due to injury from excessive water. Sequential applications had the greatest weed control. Weed control was acceptable for most all treatments except for foxtail as wet conditions produced several flushes and treatments with weak residual products allowed foxtail flushed to emerge. 7 DAT crop injury observed was stunting and slight chlorosis. No injury observed 14, 28, and 42 days after POST applications (data not shown). 99% control of common lambsquarters, wild mustard, common ragweed, and hairy nightshade, 93% or greater wild buckwheat control, and greater than 92% control of redroot pigweed, at 28 and 42 days after POST applications (data not shown). (Department of Plant Sciences, North Dakota State University, Fargo).

Table. Weed control systems in corn (Zollinger, Ries, Kazmierczak).

Treatment	Rate (product/A)	7 DAT	28 DAT		42 DAT	
		Corn - injury -	Yeft - % control -	Cocb - % control -	Yeft - % control -	Cocb - % control -
PRE						
Degree Extra+BalanceFlexx+Atrazine+RUPM+Class Act NG	5pt+2.5fl oz+0.56lb+22fl oz+2.5% v/v	0	88	90	92	90
Corvus+Atrazine+RUPM+Class Act NG	4.5fl oz+0.56lb+22fl oz+2.5% v/v	0	91	80	92	87
PRE/POST						
RUPM+Class Act NG/	22fl oz+2.5% v/v/					
RUPM+Triple Flex+Class Act NG	22fl oz+2pt+2.5% v/v	10	85	89	78	89
RUPM+Callisto+Class Act NG	22fl oz+3fl oz+2.5% v/v	0	77	85	68	87
RUPM+Laudis+Destiny HC	22fl oz+2fl oz+0.5% v/v	7	94	93	78	95
RUPM+Lumax+Class Act NG	22fl oz+6pt+2.5% v/v	12	95	99	97	99
Halex GT+Class Act NG	4pt+2.5% v/v	0	94	99	88	99
RUPM+Warrant+Callisto+Class Act NG	22fl oz+3pt+3fl oz+2.5% v/v	0	94	99	96	99
RUPM+Triple Flex+Callisto+Class Act NG	22fl oz+1.79pt+3fl oz+2.5% v/v	0	87	94	92	96
RUPM+Triple Flex+Callisto+Class Act NG	22fl oz+2.04pt+3fl oz+2.5% v/v	5	90	99	87	99
RUPM+Triple Flex+Callisto+Class Act NG	22fl oz+3.07pt+3fl oz+2.5% v/v	17	94	99	92	99
RUPM+Triple Flex+Laudis+Destiny HC	22fl oz+1.79pt+1.34pt+0.5% v/v	10	93	95	96	95
RUPM+Triple Flex+Laudis+Destiny HC	22fl oz+2.04pt+1.34pt+0.5% v/v	12	89	99	93	99
RUPM+Triple Flex+Laudis+Destiny HC	22fl oz+3.07pt+1.34pt+0.5% v/v	15	91	96	93	96
RUPM+Triple Flex+Atrazine+Class Act NG	22fl oz+3.07pt+0.56lb+2.5% v/v	13	96	99	97	99
LSD (0.05)		3	8	6	9	4

Weed control in corn. Zollinger, Richard K., Jerry L. Ries, and Angela J. Kazmierczak. An experiment was conducted near Thompson, ND, to evaluate weed efficacy in corn. No crop was planted, weeds were allowed to germinate the spring of 2011 in the previous year's tilled corn residue. PRE treatments were applied on May 19 at 10:15 am with 51 F air, 47 F soil at a four inch depth, 40% relative humidity, 50% cloud cover, 3 to 5 mph NE wind, moist soil surface, and wet subsoil. Soil characteristics were: 27.5% sand, 38.8% silt, 33.8% clay, 2.9% OM, and 8.0 pH. POST treatments were applied on June 16 at 9:45 am with 71 F air, 68 F soil surface, 83% relative humidity, 90% cloud cover, 1 to 3 mph NE wind, wet soil surface, wet subsoil, and no dew present. Weed species present at the time of POST were: 3 to 8 inch (10 to 50/yard²) Kochia; 1 to 6 inch (5 to 10/yard²) common cocklebur; 1 to 2 inch (3 to 5/yard²) redroot pigweed; 3 to 8 inch (5 to 10/yard²) common lambsquarters; and 1 to 4 inch diameter (5 to 30/yard²) atriplex. Treatments were applied to the center 6.7 feet of the 10 by 40 foot plots with a backpack-type plot sprayer delivering 15 gpa at 40 psi through 11002 Turbo Teejet nozzles for PRE treatments and 15 gpa at 40 psi through 11001 Turbo Teejet nozzles for POST treatments. The experiment had a randomized complete block design with three replicates per treatment.

Most treatments controlled weeds. Low redroot pigweed control from Durango applied alone at 28 DAT were from successive flushes and waterhemp as part of the pigweed mixture that shows some level of resistance (suspected) to glyphosate. (Dept of Plant Sciences, North Dakota State University, Fargo).

Table. Weed control in corn (Zollinger, Ries, Kazmierczak).

Treatment ¹	Rate (product/A)	14 DAT					28 DAT				
		Rrpw	Colq	Atri ²	Koch	Cocb	Rrpw	Colq	Atri	Koch	Cocb
----- % control -----											
PRE/POST											
SureStart/Durango+AMS	1.75pt/24fl oz+2% v/v	99	99	99	97	99	99	99	99	99	99
SureStart+Atrazine/Durango+AMS	1.75pt+1.11lb/24fl oz+2% v/v	99	99	99	99	99	99	99	99	99	99
POST											
Durango+N-Pac AMS	0.75qt+3pt	83	85	83	92	88	70	90	93	93	73
Durango+N-Pac AMS	1qt+3pt	98	98	96	96	91	73	98	96	95	93
Durango+N-Pac AMS	1.5qt+3pt	99	99	99	99	96	86	96	99	96	95
GF-2726+N-Pac AMS	1.17qt+3pt	99	99	99	94	96	89	99	99	91	94
GF-2726+N-Pac AMS	1.75qt+3pt	99	99	99	98	98	94	99	99	93	98
GF-2726+N-Pac AMS	2.34qt+3pt	99	99	99	99	99	99	99	99	98	95
Durango+DMA 4+N-Pac AMS	0.75qt+1.58pt+3pt	99	99	99	92	99	94	99	99	91	96
Durango+Clarity+N-Pac AMS	0.75qt+0.5pt+3pt	99	99	99	96	99	99	99	99	96	99
Durango+Clarity+N-Pac AMS	0.75qt+0.75pt+3pt	99	99	99	95	99	99	99	99	97	99
Durango+Clarity+N-Pac AMS	0.75qt+1pt+3pt	99	99	99	95	99	99	99	99	97	99
Ignite+Atrazine+N-Pac AMS	22fl oz+1.11lb+3pt	99	99	99	98	99	99	99	99	98	99
LSD (0.05)		5	4	6	5	8	10	3	3	6	6

¹GF-2726 = a proprietary product from Dow.

²Atri = atriplex species.

Weed control from Alert in soybean. Zollinger, Richard K., Jerry L. Ries, and Angela J. Kazmierczak. An experiment was conducted near Mayville, ND, to evaluate weed efficacy and crop response from Alert in soybeans. Asgrow 'AG0808' Roundup Ready soybeans were planted on May 26, 2011, followed by PRE treatments at 12:40 pm with 70 F air, 52 F soil at a four inch depth, 10% relative humidity, 0% cloud cover, 7 to 10 mph SE wind, dry soil surface, and moist subsoil. Soil characteristics were: 65 sand, 10% silt, 25% clay, sandy clay loam texture, 2.7% OM and 6.4 pH. Treatments were applied to the center 6.7 feet of the 10 by 40 foot plots with a backpack-type plot sprayer delivering 17 gpa at 40 psi through 11002 Turbo TeeJet nozzles. The experiment had a randomized complete block design with three replicates per treatment.

Alert is a generic formulation of Command (clomazone) and Dawn is a generic formulation of Reflex (fomesafen). No crop injury observed (data not shown). (Department of Plant Sciences, North Dakota State University, Fargo).

Table. Weed control from Alert in soybean (Zollinger, Ries, Kazmierczak).

Treatment	Rate (product/A)	7 DAE					14 DAE					
		Fxtl	V	Wht	Rrpw	Colq	Corw	Fxtl	V	Wht	Rrpw	Colq
----- % control -----												
Alert	21.3fl oz	78	99	99	78	99	99	99	77	43	70	70
Alert	32fl oz	87	98	99	60	99	99	99	93	47	99	99
Alert	42.7fl oz	93	99	99	78	99	99	99	98	82	99	99
Alert+Dawn	21.3fl oz+16fl oz	87	99	99	87	99	99	73	90	96	98	99
Alert+Dawn	21.3fl oz+24fl oz	93	96	99	99	99	99	99	92	87	99	99
Alert+Dawn	32fl oz+16fl oz	93	99	99	96	99	99	99	95	89	99	99
Alert+Dawn	32fl oz+24fl oz	89	99	99	95	99	99	98	92	90	99	99
Dual II Magnum	16.8fl oz	37	77	82	82	75	20	70	20	70	68	20
Prefix	40fl oz	70	77	99	99	73	62	60	47	99	99	75
Untreated		0	0	0	0	0	0	0	0	0	0	0
LSD (0.05)		4	4	4	7	3	2	2	8	10	2	5

Table cont. Weed control from Alert in soybean (Zollinger, Ries, Kazmierczak).

Treatment	Rate (product/A)	28 DAE					42 DAE					
		Fxtl	V	Wht	Rrpw	Colq	Corw	Fxtl	V	Wht	Rrpw	Colq
----- % control -----												
Alert	21.3fl oz	98	70	43	70	70	70	98	77	50	73	73
Alert	32fl oz	99	93	47	95	99	99	99	95	48	96	99
Alert	42.7fl oz	99	98	85	99	99	99	99	98	83	99	99
Alert+Dawn	21.3fl oz+16fl oz	77	90	82	94	99	99	87	93	88	96	99
Alert+Dawn	21.3fl oz+24fl oz	99	90	85	99	96	96	99	92	88	99	96
Alert+Dawn	32fl oz+16fl oz	99	95	85	98	99	99	99	95	92	98	99
Alert+Dawn	32fl oz+24fl oz	98	78	80	90	96	96	98	78	83	91	96
Dual II Magnum	16.8fl oz	70	27	70	68	20	20	70	27	70	68	20
Prefix	40fl oz	60	47	93	95	70	70	70	70	93	95	70
Untreated		0	0	0	0	0	0	0	0	0	0	0
LSD (0.05)		2	9	10	7	3	3	2	8	6	6	4

Anthem in soybean. Zollinger, Richard K., Jerry L. Ries, and Angela J. Kazmierczak. An experiment was conducted near Mayville, ND, to evaluate weed efficacy and crop response in soybeans. Asgrow 'AG 0808' Roundup Ready soybeans were planted on May 26, 2011, followed by PRE treatment applications at 1:10 pm with 71 F air, 52 F soil at a four inch depth, 10% relative humidity, 0% cloud cover, 7 to 10 mph SE wind, dry soil surface, and moist subsoil. Soil characteristics were: 65% sand, 10% silt, 25% clay, sandy clay loam texture, 2.7% OM and 6.4 pH. POST treatments were applied June 24 at 12:00 pm with 80 F air, 84 F soil surface, 34% relative humidity, 20% cloud cover, 1 to 3 mph SW wind, wet soil surface, wet subsoil, good crop vigor and no dew present to V1 soybean. Weeds present at the time of POST applications were: 1 to 4 inch (5 to 10/ft²) common lambsquarters; 2 to 4 inch (3 to 5/ft²) redroot pigweed; 2 to 4 inch (5 to 15/ft²) common ragweed; 1 to 5 inch (1 to 5/ft²) foxtail; and 1 to 4 inch diameter (<1/yd²) wild buckwheat. RUPM was sprayed on PRE's (see table) at 22 fl oz/a + 8.5lb/100gal AMS on June 24 with the following species: 1 to 2 inch (1/yd²) redroot pigweed; 1 to 4 inch (5 to 10/yd²) common lambsquarters; and 2 to 4 inch (3 to 5/yd²) common ragweed. Treatments were applied to the center 6.7 feet of the 10 by 40 foot plots with a backpack-type plot sprayer delivering 17 gpa at 40 psi through 11002 Turbo TeeJet nozzles for PRE treatments and 8.5 gpa at 40 psi through 11001 Turbo TeeJet nozzles for POST treatments. The experiment had a randomized complete block design with three replicates per treatment.

No soybean injury observed 14 DAE (days after emergence) to all PRE treatments (data not shown). All treatments gave 99% control of redroot pigweed, and easternblack nightshade (data not shown). Injury was stunting. Generally, 28 DAT POST treatment ratings did not change (data not shown). (Department of Plant Sciences, North Dakota State University, Fargo).

Table. Anthem in soybean (Zollinger, Ries, Kazmierczak).

Treatment	Rate (product/A)	14 DAE				7 DAT				14 DAT - POST				Yield	
		Fxtl	Colq	Wibw	Corw	Soyb	injury -	Soyb	injury -	Fxtl	Colq	Wibw	Corw	Soyb	bu/A -
PRE w/o glyphosate															
Anthem	8fl oz	99	99	72	62	0	0	0	0	99	99	72	68	27.5	
Authority First	6.4fl oz	50	99	99	72	0	0	0	0	99	99	99	92	33.3	
Authority Assist	9fl oz	70	99	99	28	0	0	0	0	98	99	99	62	22.4	
Anthem+Authority First	7fl oz+3.2oz	99	99	99	95	0	0	0	0	99	99	99	95	28.4	
Authority MTZ	14 oz	99	99	99	95	0	0	0	0	99	99	99	94	28.9	
Fierce	3oz	99	99	77	90	0	0	0	0	99	99	92	90	32.4	
Prefix	2pt	99	88	99	72	0	0	0	0	99	88	99	72	32.8	
PRE w/o glyphosate															
Anthem	8fl oz	99	92	72	78	0	0	0	0	99	92	78	75	34.7	
Anthem+Authority First	7fl oz+3.2oz	99	99	99	99	0	0	0	0	99	99	99	99	36.0	
Fierce	3oz	99	73	99	83	0	0	0	0	99	77	99	74	30.4	
POST															
Anthem+RUPM+AMS	8fl oz+22fl oz+8.5lb/100gal					20	18			99	99	99	62	19.7	
Prefix+RUPM+AMS	2pt+22fl oz+8.5lb/100gal					27	8			99	99	99	87	25.5	
Flexstar GT 3.5+AMS	3.5pt+8.5lb/100gal					11	0			50	99	99	90	21.2	
Extreme+AMS	3pt+8.5lb/100gal					0	10			99	99	99	62	27.4	
LSD (0.05)		4	3	3	4	3	4			1	2	5	7	9.4	

Length of residual weed control products in soybean. Zollinger, Richard K., Jerry L. Ries, and Angela J. Kazmierczak. An experiment was conducted near Buffalo, ND, to evaluate weed efficacy to residual products in soybeans. Pioneer '90M92' Roundup Ready soybeans were planted on June 7, 2011. PRE treatments were applied June 9 at 12:40 pm with 68 F air, 61 F soil at a four inch depth, 33% relative humidity, 25% cloud cover, 3 to 8 mph E wind, dry soil surface, and moist subsoil. Soil characteristics were: 37.5% sand, 23.8% silt, 38.8% clay, clay loam texture, 4.0% OM, and 7.8 pH. Treatments were applied to the center 6.7 feet of the 10 by 40 foot plots with a backpack-type plot sprayer delivering 17 gpa at 40 psi through 11002 Turbo TeeJet nozzles. The experiment had a randomized complete block design with three replicates per treatment.

Wet spring and early summer conditions caused delayed planting and flooding after crop emergence. Some plots or parts of studies were damaged by standing water. Yields were not taken due to injury from excessive water. Fierce is a premix of pyroxasulfone + Valor. Pyroxasulfone controls many grasses and some broadleaf weeds. Weed control increased as Fierce rate increased. No injury observed, and 99% control of redroot pigweed for all treatments and ratings (data not shown). Because of a late spring and exceptionally wet conditions, earlier ratings were not taken. (Department of Plant Sciences, North Dakota State University, Fargo).

Table. Length of residual weed control products in soybean (Zollinger, Ries, Kazmierczak).

Treatment ¹	Rate (product/A)	28 DAT - PRE			35 DAT - PRE		
		Colq	Biww	Corw	Colq	Biww	Corw
		----- % control -----			----- % control -----		
Valor SX	2oz	72	47	78	72	47	78
Fierce	3oz	65	43	82	65	43	82
Fierce	3.75oz	77	45	83	77	45	83
Fierce	4.5oz	99	67	90	99	67	90
Authority Assist	5fl oz	99	67	87	99	67	87
Prefix	1qt	70	67	95	70	67	95
Authority First	3.2oz	99	96	99	99	96	99
Optill	2oz	99	75	99	99	75	99
V-10206+Valor SX+Classic	1.5oz+2oz+0.35oz	83	63	99	83	63	99
Optill+V-10206	2oz+1.5oz	98	78	93	98	78	93
Authority MTZ	11oz	98	96	97	98	96	97
LSD (0.05)		6	8	7	6	8	7

¹V-10206 = pyroxasulfone from Valent.

Weed control with Zidua herbicide in soybean, Carrington, 2011. Greg Endres. The experiment was conducted at the NDSU Carrington Research Extension Center in cooperation with BASF. Experimental design was a randomized complete block with three replicates. The field trial was established on a Heimdal-Emrick loam soil with 4.1% organic matter and 6.6 pH. 'DSR0401' Roundup Ready soybean was direct seeded into flax stubble May 25 in 30-inch rows. Treatments were applied with a hand-held boom sprayer delivering 14 gal/A at 35 psi through 8001 flat fan nozzles to the center 6.7 ft of 10- by 25-ft plots. PRE treatments were applied on May 26 with 46 F, 51% RH, and no wind to 1- to 2-leaf yellow and green foxtail, 1- to 2-inch tall wild buckwheat, and 0.5- to 1-inch tall kochia. Rainfall totaled 0.6" during the 6 days following application of herbicides (NDAWN). POST treatments were applied on July 7 with 80 F, 54% RH, and 6 mph wind to 2- to 4-stage soybean, 3- to 8-inch tall foxtail, and 6- to 9-inch wide sheperdspurse. The trial was harvested for grain yield on October 5.

Soybean emerged about June 6 and no crop response from PRE herbicides was noted on June 13. Foxtail control on June 20 was good to excellent (84-98%) with all PRE Zidua tank mixtures (Table). Wild buckwheat control was excellent with all treatments when evaluated on June 20. On July 2 (before application of POST treatments) Zidua at 2.5 oz wt/A + Sharpen generally provided excellent (86-92%) control of foxtail and sheperdspurse. Extreme + Sharpen + Zidua generally provided excellent (88-99%) weed control throughout the trial period and increased soybean seed yield compared to other PRE treatments. Sequential POST treatments provided excellent control of foxtail and sheperdspurse on July 28 and resulted in the highest soybean yield.

Table.												
Herbicide			Weed control (%) ¹									Soybean
Treatment ²		Rate	Timing ³	20-Jun			2-Jul			28-Jul		Yield
No.		fl oz product/A		fota	shpu	wibw	fota	shpu	KOCZ	fota	shpu	bu/A
1	Sharpen	1	PRE	78	82	99	65	77	78	37	77	10.9
2	Zidua + Sharpen	2 oz wt + 1	PRE	91	83	99	86	80	95	65	77	19.4
3	Zidua + Sharpen	2.5 oz wt + 1	PRE	94	90	97	90	90	99	65	83	17.9
4	Zidua + Verdict	2.5 oz wt + 5	PRE	92	92	98	87	87	99	65	86	20.0
5	ValorSX	2 oz wt	PRE	74	77	98	68	77	70	13	78	13.6
6	Zidua + ValorSX	1.5 oz wt + 2 oz wt	PRE	84	73	99	80	80	87	58	83	17.9
7	Authority First	3 oz wt	PRE	83	78	99	75	76	99	42	73	12.4
8	Zidua + Sharpen	2.5 oz wt + 1	PRE	92	83	99	92	86	99	98	98	29.9
	Zidua	1 oz wt	POST									
9	ValorSX	2 oz wt	PRE	78	86	90	75	81	70	97	98	27.1
	Warrant	40	POST									
10	Zidua + ValorSX	1.5 oz wt + 2 oz wt	PRE	90	84	95	82	84	99	97	99	30.6
	Warrant	40	POST									
11	Extreme + Sharpen + Zidua	36 + 1 + 2.5 oz wt	PRE	98	93	98	98	97	99	88	96	27.6
C.V. (%)				9.5	9.0	2.2	7.3	7.9	19.7	18.5	6.4	22.3
LSD (0.05)				14	NS	4	10	11	NS	21	9	7.9

¹fota=yellow and green foxtail; shpu=shepherdspurse; wibw=wild buckwheat; KOCZ=kochia.

²All treatments include PRE and POST Roundup PowerMax at 22 fl oz/A plus Class Act NG at 16 fl oz/A. All PRE treatments 1-8 and 11 also include Destiny HC at 12 fl oz/A.

³PRE=May 26; POST=July 7.

Timing of weed control in soybean, Carrington, 2011. Greg Endres, Lucas Walter, Bill Hodous, and Eric Allmaras. The study was conducted to build a North Dakota database documenting response of soybean to timing of weed control. Experimental design was a randomized complete block with four replicates. The field trial was conducted at the NDSU Carrington Research Extension Center on a conventional-till, Heimdal-Emrick loam soil with 4.1% organic matter and 6.6 pH with flax as the previous crop. 'DSR0401' Roundup Ready inoculated soybean was planted May 19 in 15-inch rows. Treatments were applied with a hand-held boom 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. Extreme at 36 fl oz/A plus Class Act NG at 16 fl oz/A was PRE applied May 19 with 71 F, 43% RH, and no wind. Rainfall totaled 0.5" during the 7 days following PRE application (NDAWN). Table 1 provides POST application details for glyphosate (Roundup PowerMax at 22 fl oz/A plus Class Act NG at 16 fl oz/A). The trial received significant hail injury on July 24 but was harvested for grain yield on October 5.

The untreated check yielded less compared to yield with herbicides (Table 2). Early weed control with the PRE herbicide and early POST application of glyphosate in treatments 2-4 provided the highest yield. Test weight, seed count, oil, and protein were similar among treatments.

Table 1. POST glyphosate application details for soybean response to timing of weed control, Carrington, 2011.

Application date ¹	POST treatment	Soybean stage	Weed ² stage (height) inches	Weed density		Environment			
				Grass	Broad-leaf	Air temp.	RH	Wind speed	Clouds
				square foot		F	%	MPH	%
23-Jun	A	V1-2	0.5 to 8	30	2	67	71	1	40
30-Jun	B	V2-3	0.5 to 14	19	2	72	86	7	65
7-Jul	C	V4	2 to 18	22	2	80	54	6	5
21-Jul	D	R1	NA	NA	NA	68	84	0	10

¹Soybean density on June 24 averaged 101,200 plants/A.

²Weeds include yellow and green foxtail, common lambsquarters, kochia, redroot and prostrate pigweed, common purslane, volunteer flax, wild buckwheat, and wild mustard.

Table 2. Soybean response to timing of weed control, Carrington, 2011.

Treatment		Seed yield	Test weight	Seeds/lb	Oil	Protein
Number	Description ¹	bu/A	lb/bu		%	
1	untreated	15.5	56.5	3782	19.7	32.8
2	PRE/POSTA/POSTD	41.9	56.9	3799	20.0	32.5
3	POSTA/POSTD	38.6	56.7	3817	19.8	32.6
4	POSTB	38.8	56.7	3900	19.9	29.1
5	POSTC	29.5	56.7	3952	20.0	28.7
C.V. (%)		20.4	0.3	3.1	0.4	0.8
LSD (0.05)		10.3	NS	NS	NS	NS

¹PRE=Extreme at 36 fl oz/A;POSTA-D=Roundup PowerMax at 22 fl oz/A. All herbicide applications included Class Act NG at 16 fl oz/A.

Timing of weed control in soybean, Doyon, 2011. Greg Endres, Lucas Walter, and Bill Hodous. The study was conducted to build a North Dakota database documenting response of soybean to timing of weed removal. Experimental design was a randomized complete block with four replicates. The trial was conducted in a commercial field using 'Asgrow 0202' Roundup Ready soybean planted June 5 in 15-inch rows. Treatments were applied with a hand-held boom 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. Extreme at 36 fl oz/A plus Class Act NG at 16 fl oz/A was PRE applied June 6 with 74 F, 44% RH, and 9 mph wind. Rainfall totaled 0.5" during the 9 days following PRE application (NDAWN – Crary location). Table 1 provides POST application details for glyphosate (Roundup PowerMax at 22 fl oz/A plus Class Act NG at 16 fl oz/A). The trial was harvested for grain yield on October 3.

Soybean seed yield statistically was similar (Table 2) which likely was due to excellent crop density and low weed density. However, yield with the late POST application of glyphosate and especially the untreated check tended to be reduced. Also, oil and protein with the untreated check tended to be less compared to yield with herbicide treatments.

Table 1. POST glyphosate application details for soybean response to timing of weed control, Doyon, 2011.

Application date ¹	POST treatment	Soybean stage	Weed ² stage (height)	Weed density		Environment			
				Grass	Broad-leaf	Air temp.	RH	Wind speed	Clouds
			inches	square foot		F	%	MPH	%
28-Jun	A	unifoliate to V1	0.5 to 8	2	1	70	65	11	25
11-Jul	B	V3-4	1 to 24	1	1	74	51	6	60
25-Jul	C	R2	NA	NA	NA	79	50	6	0

¹Soybean density on June 28 averaged 216,600 plants/A.

²Weeds include barnyardgrass, volunteer wheat, biennial wormwood, Canada thistle, common lambsquarters, prostrate and redroot pigweed, sheperdspurse, smartweed, sowthistle, wild buckwheat, and wild mustard.

Table 2. Soybean response to timing of weed control, Doyon, 2011.

Treatment		Seed yield	Test weight	Seeds/lb	Oil	Protein
Number	Description ¹	bu/A	lb/bu		%	
1	untreated	35.6	58.4	2672	18.2	24.1
2	PRE	55.4	58.5	2835	18.6	32.2
3	POSTA	55.5	58.4	2806	19.1	31.2
4	POSTB	56.3	58.5	2788	18.8	31.6
5	POSTC	53.7	58.3	2697	18.7	32.0
C.V. (%)		21.9	0.6	3.3	1.3	24.2
LSD (0.05)		NS	NS	NS	0.4	NS

¹PRE=Extreme at 36 fl oz/A;POSTA-D=Roundup PowerMax at 22 fl oz/A. All herbicide applications included Class Act NG at 16 fl oz/A.

Cobra in soybeans. Zollinger, Richard K., Jerry L. Ries, and Angela J. Kazmierczak. An experiment was conducted near Mayville, ND, to evaluate weed efficacy and crop response to Cobra in soybeans. Asgrow 'AG0808' Roundup Ready soybeans were planted on May 26, 2011. POST treatments were applied June 24 at 11:40 am with 77 F air, 84 F soil surface, 40% relative humidity, 20% cloud cover, 1 to 3 mph SW wind, wet soil surface, wet subsoil, good crop vigor and no dew present to V1 soybeans. All plots were over-sprayed with Select Max at 10 fl oz/A + Herbimax at 1 qt/A to control grasses. Weeds present at the time of POST were: 1 to 4 inch (5 to 10/ft²) common lambsquarters; 2 to 5 inch (5 to 7/ft²) redroot pigweed; and 2 to 5 inch (5 to 15/ft²) common ragweed. Treatments were applied to the center 6.7 feet of the 10 by 40 foot plots with a backpack-type plot sprayer delivering 8.5 gpa at 40 psi through 11001 Turbo TeeJet nozzles for POST treatments. The experiment had a randomized complete block design with three replicates per treatment.

Weed pressure was very high for all weed species. (Department of Plant Sciences, North Dakota State University, Fargo).

Table. Cobra in soybeans (Zollinger, Ries, Kazmierczak).

Treatment ¹	Rate (product/A)	7 DAT			14 DAT			28 DAT		
		Soyb	- % injury -	Corw	Soyb	- % injury -	Corw	Soyb	- % injury -	Corw
Cobra+Herbimax	8fl oz+1pt	15	10	90	38	82	0	90	30	99
Cobra+Herbimax	10fl oz+1pt	20	15	95	40	92	8	95	30	99
Cobra+Herbimax	12fl oz+1pt	23	18	93	50	96	8	96	30	99
Cobra+V-10206+Herbimax	8fl oz+1.5oz+1pt	25	23	99	40	93	13	99	30	99
Cobra+V-10206+Herbimax	10fl oz+1.87oz+1pt	30	23	96	40	92	12	96	30	99
Cobra+V-10206+Herbimax	12fl oz+2.25oz+1pt	33	30	98	40	96	20	98	30	98
Prefix+Herbimax	1.5pt+1pt	25	22	99	58	82	10	99	30	99
LSD (0.05)		4	5	7	3	4	4	6	NS	1

¹V-10206 = pyroxasulfone from Valent.

Weed control systems in soybean. Zollinger, Richard K., Jerry L. Ries, and Angela J. Kazmierczak. An experiment was conducted near Mayville, ND, to evaluate weed efficacy to Anthem in soybeans. Asgrow 'AG 0808' Roundup Ready soybeans was planted on May 26, 2011 followed by PRE treatments at 1:00 pm with 71 F air, 52 F soil at a four inch depth; 10% relative humidity; 0% cloud cover; 7 to 10 mph SE wind, dry soil surface, and moist subsoil. Soil characteristics were: 65% sand, 10% silt, 25% clay, sandy clay loam texture, 2.7% OM and 6.4 pH. POST treatments were applied on June 24 at 12:15 pm with 81 F air, 84 F soil surface, 33% relative humidity; 20% cloud cover; 1 to 3 mph SW wind, moist soil surface, wet subsoil, good crop vigor and no dew present to V1 to V2 soybeans. Weeds present at the time of POST treatments were: 1 to 3 inch (1 to 5/yd²) common lambsquarters; 1 to 2 inch (1 to 2/yd²) redroot pigweed; 1 to 3 inch (1 to 2/yd²) common ragweed; 6 to 8 inch, T2 (5 to 25/yd²) wheat; 2 to 5 inch (5 to 10/yd²) foxtail; and 1 to 4 inch diameter (1/yd²) wild buckwheat. Treatments were applied to the center 6.7 feet of the 10 by 40 foot plots with a backpack-type plot sprayer delivering 17 gpa at 40 psi through 11002 Turbo TeeJet nozzles for PRE treatments and 8.5 gpa at 40 psi through 11001 Turbo TeeJet nozzles for POST treatments. The experiment had a randomized complete block design with three replicates per treatment.

Most treatments gave excellent weed control at the later evaluations. Variability in yield may be due to wet spring and early summer conditions that caused a delayed in planting and flooding after crop emergence. Some plots or parts of studies may have been affected by standing water. No crop injury observed from any treatment (data not shown). Very little differences in ratings taken 28 and 42 DAT POST (42 DAT data not shown). (Department of Plant Sciences, North Dakota State University, Fargo).

Table. Weed control systems in soybean (Zollinger, Ries, Kazmierczak).

Treatment	Rate (product/A)	June 24 - 30 DAT PRE					July 6, 14 DAT POST						
		Fxtl	V Wht	Rrpw	Colq	Wibw	Conw	Fxtl	V Wht	Rrpw	Colq	Wibw	Conw
		-----% control-----											
<u>PRE/POST</u>													
Sequence+AMS/ Flexstar GT 3.5+AMS	2.5pt+8.5lb/100gal/ 2.68pt+8.5lb/100gal	87	65	85	40	20	20	93	65	85	43	20	20
Boundary/ Flexstar GT 3.5+AMS	1.5pt/ 2.68pt+8.5lb/100gal	99	77	99	99	99	99	99	99	99	99	99	99
Dual Magnum/ Flexstar GT 3.5+AMS	1.25pt/ 2.68pt+8.5lb/100gal	78	58	99	53	33	20	99	99	99	99	99	99
Dual Magnum/ Flexstar+Herbimax	1.25pt/ 2.68pt+8.5lb/100gal	82	62	99	53	37	20	82	65	99	83	99	99
Boundary/ Flexstar+Herbimax	1.5pt/ 0.75pt+1qt	99	73	99	99	99	99	99	70	99	99	99	99
Untreated	0.75pt+1qt	0	0	0	0	0	0	0	0	0	0	0	0
<u>LSD (0.05)</u>		7	8	4	10	6	5	3	5	4	5	5	6

Table cont. Weed control systems in soybean (Zollinger, Ries, Kazmierczak).

Treatment	Rate (product/A)	July 22, 28 DAT POST					Yield			
		Fxtl	V Wht	Rrpw	Colq	Wibw	Conw	Soyb	Soyb	
		-----% control-----							- bu/A - - test wt -	
<u>PRE/POST</u>										
Sequence+AMS/ Flexstar GT 3.5+AMS	2.5pt+8.5lb/100gal/ 2.68pt+8.5lb/100gal	93	75	92	43	20	20	20.8	57	
Boundary/ Flexstar GT 3.5+AMS	1.5pt/ 2.68pt+8.5lb/100gal	99	99	99	99	99	99	23.1	57	
Dual Magnum/ Flexstar GT 3.5+AMS	1.25pt/ 2.68pt+8.5lb/100gal	99	99	99	99	99	99	23.6	57	
Dual Magnum/ Flexstar+Herbimax	1.25pt/ 2.68pt+8.5lb/100gal	88	77	99	92	99	99	30.8	57	
Boundary/ Flexstar+Herbimax	1.5pt/ 0.75pt+1qt	99	70	99	99	99	99	23.2	57	
Untreated	0.75pt+1qt	0	0	0	0	0	0	20.3	57	
<u>LSD (0.05)</u>		3	4	2	5	6	7	9.4	NS	

Soybean weed control systems. Zollinger, Richard K., Jerry L. Ries, and Angela J. Kazmierczak. An experiment was conducted near Prosper, ND, to evaluate weed efficacy and crop response from application treatment timings and tank-mixtures in soybeans. Asgrow 'AG0808' Roundup Ready soybeans were planted on May 26, 2011. PRE treatments were applied on June 3 at 8:30 am with 78F air, 62 F soil at a four inch depth, 89% relative humidity, 10% cloud cover, 1 to 3 mph NW wind, moist soil surface, and wet subsoil. Soil characteristic were: 45% sand, 12.5% silt, 42.5% clay, sandy clay texture, 4.5% OM, and 7.6 pH. EPOST treatments were applied on July 8 at 9:45 am with 79 F air, 81 F soil surface, 40% relative humidity, 10% cloud cover, 3 to 5 mph SE wind, dry soil surface, moist subsoil, poor (excess water) to good crop vigor and no dew present to V4 (6 to 8 inch) soybeans. Weeds present at the time of EPOST applications were: 2 to 8 inch, T2 (5 to 30/ ft²) yellow foxtail; 2 to 4 inch (1 to 2/ yd²) common lambsquarters; emerging to 4 inch (5 to 15/ yd²) redroot pigweed; 1 to 5 inch (5 to 25/ ft²) hairy nightshade; 2 to 3 inch (1/ yd²) wild common ragweed; 4 to 8 inch diameter (1/ yd²) wild buckwheat; 2 to 6 inch (1/ yd²) common cocklebur; and emerging to 1 inch (1 to 2/ yd²) wild mustard. POST treatments were applied on July 25 at 9:40 am with 82 F air, 88 F soil surface, 0% cloud cover, 3 to 5 mph NE wind, moist soil surface, wet subsoil, poor to fair crop vigor (excess water), and no dew present to R1 (4 to 14 inch) soybeans (short soybeans were caused by PRE injury). POST applications were delayed one week due to rain events. Weeds present at the time of POST applications were: 2 to 24 inch, T3 (5 to 25/ yd²) yellow foxtail; 1 to 8 inch (0 to 2/ yd²) common lambsquarters; 1 to 8 inch (0 to 3/ yd²) redroot pigweed; 1 to 10 inch (0 to 5/ yd²) hairy nightshade; 2 to 18 inch (0 to 15/ yd²) common ragweed; 2 to 14 inch (0 to 5/ yd²) common cocklebur; and cotyledon to 10 inch, flowering (1 to 5/ yd²) wild mustard. LPOST treatment was not applied. Treatments were applied to the center 6.7 feet of the 10 by 40 foot plots with a backpack-type plot sprayer delivering 17 gpa at 40 psi through 11002 Turbo TeeJet nozzles for PRE treatments and 8.5 gpa at 40 psi through 11001 Turbo TeeJet nozzles for POST treatments. The experiment had a randomized complete block design with three replicates per treatment.

Wet spring and early summer conditions caused delayed planting and flooding after crop emergence. Some plots or parts of studies may have been damaged by standing water. Yields were taken due as limited injury from excessive water was observed. No soybean injury was observed on June 10 and 24, conditions were wet and cool with little crop growth (data not shown). After July 18, injury was stunting to chlorosis. All treatments and rating dates gave 99% control of wild mustard, 99% yellow foxtail control on August 8 and 22 (data not shown). August 22 ratings are very similar to August 8 ratings, therefore, data is not shown. Poor weed control from Roundup PowerMax + AMS was due to successive weed flushes from lack of residual control from glyphosate and multiple rain events.

Table. Soybean weed control systems (Zollinger, Ries, Kazmierczak).

Treatment ¹	Rate (product/A)	July 18						
		Soyb - % injury -	Rrpw	Colg	Hans	Wlwb	Conw	Cocb
		----- % control -----						
<u>PRE/POST</u>								
Warrant/RUPM+AMS	3pt/22fl oz+2% v/v	0	99	99	99	99	99	99
Valor SX/RUPM+AMS	2oz/22fl oz+2% v/v	13	99	99	99	99	99	99
Valor SX/RUPM+AMS+Warrant	2oz/22fl oz+2% v/v+3pt	10	99	99	99	99	99	99
Ganster FirstRate+Gangster Valor/ RUPM+AMS	0.4oz+2oz/ 22fl oz+2% v/v	17	99	99	99	99	99	99
Ganster FirstRate+Gangster Valor/ RUPM+AMS+Warrant	0.4oz+2oz/ 22fl oz+2% v/v+3pt	10	99	99	99	99	99	99
Authority First/RUPM+AMS	3.2oz/22fl oz+2% v/v	10	99	99	99	99	99	99
Authority First/RUPM+AMS+Warrant	3.2oz/22fl oz+2% v/v+3pt	0	99	99	99	99	99	99
Valor XLT/RUPM+AMS	3oz/22fl oz+2% v/v	47	99	99	99	99	99	99
Valor XLT/RUPM+AMS+Warrant	3oz/22fl oz+2% v/v+3pt	48	99	99	99	99	99	99
Authority XL/RUPM+AMS	4oz/22fl oz+2% v/v	25	99	99	99	99	99	99
Authority XL/RUPM+AMS+Warrant	4oz/22fl oz+2% v/v+3pt	23	99	99	99	99	99	99
V-10233/RUPM+AMS	3oz/22fl oz+2% v/v	25	99	99	99	99	99	99
V-10233/RUPM+AMS+Warrant	3oz/22fl oz+2% v/v+3pt	22	99	99	99	99	99	99
<u>EPOST</u>								
RUPM+AMS+Warrant	22fl oz+2% v/v+3pt	0	99	98	99	85	87	99
<u>EPOST/LPOST</u> (LPOST not applied)								
RUPM+AMS/RUPM+AMS	22fl oz+2% v/v/22fl oz+2% v/v	0	78	99	99	75	82	99
RUPM+AMS+Warrant/RUPM+AMS	22fl oz+2% v/v+3pt/22fl oz+2% v/v	0	99	99	99	82	83	99
RUPM+AMS+Warrant/RUPM+AMS+Warrant	22fl oz+2% v/v+3pt/22fl oz+2% v/v+3pt	0	90	90	99	85	83	99
<u>POST</u>								
RUPM+AMS	22fl oz+2% v/v	0	70	70	70	50	50	70
<u>LSD (0.05)</u>		4	1	1	5	2	2	1

¹V-10233 = a proprietary product from Valent.

Table. Soybean weed control systems (Zollinger, Ries, Kazmierczak).

Treatment ¹	Rate (product/A)	August 8								Yield		
		Soyb - % injury -	Yeft	Ripw	Colq	Hans % control	Wibw	Conw	Cocb	Soyb	- bu/A -	
PRE/POST												
Warrant/RUPM+AMS	3pt/22fl oz+2% v/v	0	73	95	94	72	20	20	7	23.9		
Valor SX/RUPM+AMS	2oz/22fl oz+2% v/v	8	90	92	98	75	99	47	13	19.1		
Valor SX/RUPM+AMS+Warrant	2oz/22fl oz+2% v/v+3pt	5	95	93	99	78	99	47	43	23.1		
Ganster FirstRate+Gangster Valor/ RUPM+AMS	0.4oz+2oz/ 22fl oz+2% v/v	7	99	99	99	99	99	99	95	16.0		
Ganster FirstRate+Gangster Valor/ RUPM+AMS+Warrant	0.4oz+2oz/ 22fl oz+2% v/v+3pt	13	99	99	99	99	99	99	93	22.8		
Authority First/RUPM+AMS	3.2oz/22fl oz+2% v/v	10	70	99	99	82	99	95	99	29.4		
Authority First/RUPM+AMS+Warrant	3.2oz/22fl oz+2% v/v+3pt	0	75	99	99	82	99	73	99	29.1		
Valor XLT/RUPM+AMS	3oz/22fl oz+2% v/v	30	99	96	99	80	99	50	43	5.2		
Valor XLT/RUPM+AMS+Warrant	3oz/22fl oz+2% v/v+3pt	27	97	93	99	80	99	50	43	3.6		
Authority XL/RUPM+AMS	4oz/22fl oz+2% v/v	15	82	99	99	99	99	60	43	13.8		
Authority XL/RUPM+AMS+Warrant	4oz/22fl oz+2% v/v+3pt	12	83	99	99	99	99	50	40	11.5		
V-10233/RUPM+AMS	3oz/22fl oz+2% v/v	27	99	99	99	99	99	99	53	17.4		
V-10233/RUPM+AMS+Warrant	3oz/22fl oz+2% v/v+3pt	22	99	99	99	99	99	99	45	14.3		
EPOST												
RUPM+AMS+Warrant	22fl oz+2% v/v+3pt	0	99	99	99	99	82	82	99	23.7		
EPOST/LPOST (LPOST not applied)												
RUPM+AMS/ RUPM+AMS	22fl oz+2% v/v/ 22fl oz+2% v/v	0	99	99	99	99	72	82	99	24.9		
RUPM+AMS+Warrant/ RUPM+AMS	22fl oz+2% v/v+3pt/ 22fl oz+2% v/v	0	99	99	99	99	73	83	99	20.0		
RUPM+AMS+Warrant/ RUPM+AMS+Warrant	22fl oz+2% v/v+3pt/ 22fl oz+2% v/v+3pt	0	99	99	99	99	73	83	99	27.4		
POST												
RUPM+AMS	22fl oz+2% v/v	0	99	70	70	70	50	50	70	31.1		
LSD (0.05)		4	5	3	1	6	2	6	9	11.0		

¹V-10233 = a proprietary product from Valent.

Weed control with Ignite in soybean. Zollinger, Richard K., Jerry L. Ries, and Angela J. Kazmierczak. An experiment was conducted near Prosper, ND, to evaluate weed efficacy and crop response to Ignite using several tank-mixtures and application timings. A LibertyLink soybean variety was planted on June 6, 2011, followed by PRE treatments at 10:30 am with 85 F air, 68 F soil at a four inch depth, 27% relative humidity, 0% cloud cover, 1 to 2 mph SE wind, moist soil surface, and wet subsoil. Soil characteristic were: 45% sand, 12.5% silt, 42.5% clay, sandy clay texture, 4.5% OM, and 7.6 pH. EPOST treatments were applied on July 6 at 10:00 am with 78 F air, 82 F soil surface, 46% relative humidity, 10% cloud cover, 3 to 5 mph SE wind, dry soil surface, wet subsoil, poor (excess water) to good crop vigor and no dew present to V2 soybeans. Weeds present at the time of EPOST application were: 4 to 8 inch, T2 (5 to 10/ft²) yellow foxtail; 1 to 3 inch (1 to 2/yd²) common lambsquarters; 1 to 3 inch (5 to 15/yd²) redroot pigweed; 3 to 5 inch (5 to 20/ft²) hairy nightshade; 4 to 8 inch (1/yd²) common cocklebur; and 3 to 5 inch (1/yd²) common ragweed. MPOST treatments were applied on July 12 at 9:50 am with 71 F air, 75 F soil surface, 51% relative humidity, 0% cloud cover, 10 to 13 mph NE wind, dry soil surface, wet subsoil, poor (excess water) to good crop vigor and no dew present to V3 soybeans. Weeds present at the time of MPOST applications were: 6 to 12 inch, T2 (5 to 10/ft²) yellow foxtail; 3 to 5 inch (1 to 2/yd²) common lambsquarters; 2 to 5 inch (5 to 15/yd²) redroot pigweed; 4 to 8 inch (5 to 20/ft²) hairy nightshade; 4 to 10 inch (1/yd²) common cocklebur; 4 to 8 inch (1/yd²) common ragweed, cotyledon to 10 inch (1/yd²) wild mustard; and 1 to 4 inch diameter (1/yd²) wild buckwheat. Ignite followed by Ignite (EPOST/MPOST) treatment application, weeds were burning down. Weeds found in treatments with PRE/MPOST applications were: 1 to 2 inch (1 to 10/yd²) yellow foxtail; 1 to 3 inch (1 to 10/yd²) common lambsquarters; 1 to 2 inch (1/yd²) redroot pigweed; and 1 to 2 inch (1/yd²) hairy nightshade. Treatments were applied to the center 6.7 feet of the 10 by 40 foot plots with a backpack-type plot sprayer delivering 17 gpa at 40 psi through 11002 Turbo TeeJet nozzles for PRE treatments and 8.5 gpa at 40 psi through 11001 Turbo TeeJet nozzles for POST treatments. The experiment had a randomized complete block design with three replicates per treatment.

No crop injury was observed from all PRE herbicides on July 7 and July 12 (5 DAT, EPOST) (data not shown). All PRE herbicides gave greater than 90% control of yellow foxtail, wild mustard, redroot pigweed, common lambsquarters, hairy nightshade, wild buckwheat, and common ragweed (data not shown). On July 26, August 9 and 16 (ratings after MPOST applications on July 12) ratings were generally unchanged (data not shown).

Table. Weed control with Ignite in soybean (Zollinger, Ries, Kazmierczak).

Treatment	Rate (product/A)	July 7					July 12				
		Cocb	Yeft	Wimu	Rrpw	Colq	Hans	Wibw	Corw	Cocb	
- % control -											
<u>PRE/IMPOST</u>											
Prefix/Ignite+AMS	2.5pt/29fl oz+8.5lb/100gal	72	96	99	99	99	92	99	99	99	91
Authority First/Ignite+AMS	6oz/29fl oz+8.5lb/100gal	93	93	99	98	98	94	98	98	98	92
<u>EPOST</u>											
Ignite+Prefix+AMS	29fl oz+2.5pt+8.5lb/100gal	-	70	99	99	99	99	99	99	99	99
Ignite+Dual II Magnum+AMS	29fl oz+1.33pt+8.5lb/100gal	-	70	99	99	99	99	99	99	99	99
<u>EPOST/IMPOST</u>											
Ignite+AMS/Ignite+AMS	29fl oz+8.5lb/100gal/29fl oz+8.5lb/100gal	-	70	99	98	98	93	98	99	99	99
<u>MPOST</u>											
Ignite+AMS	36fl oz+8.5lb/100gal	-	-	-	-	-	-	-	-	-	-
Untreated		0	0	0	0	0	0	0	0	0	0
LSD (0.05)		5	2	NS	2	2	4	2	2	2	9

Table cont. Weed control with Ignite in soybean (Zollinger, Ries, Kazmierczak).

Treatment	Rate (product/A)	July 20								
		Soyb	Yeft	Wimu	Rrpw	Colq	Hans	Wibw	Corw	Cocb
- % injury -										
- % control -										
<u>PRE/IMPOST</u>										
Prefix/Ignite+AMS	2.5pt/29fl oz+8.5lb/100gal	0	96	99	99	99	93	99	99	99
Authority First/Ignite+AMS	6oz/29fl oz+8.5lb/100gal	0	96	99	98	98	96	98	98	96
<u>EPOST</u>										
Ignite+Prefix+AMS	29fl oz+2.5pt+8.5lb/100gal	12	73	99	99	99	99	99	99	99
Ignite+Dual II Magnum+AMS	29fl oz+1.33pt+8.5lb/100gal	3	99	99	99	99	99	99	99	99
<u>EPOST/IMPOST</u>										
Ignite+AMS/Ignite+AMS	29fl oz+8.5lb/100gal/29fl oz+8.5lb/100gal	0	98	99	98	98	93	98	99	99
<u>MPOST</u>										
Ignite+AMS	36fl oz+8.5lb/100gal	0	50	73	73	73	73	73	73	73
Untreated		0	0	0	0	0	0	0	0	0
LSD (0.05)		4	5	4	5	5	5	5	4	4

Table cont. Weed control with Ignite in soybean (Zollinger, Ries, Kazmierczak).

Treatment	Rate (product/A)	July 26									
		Soyb	Yeft	Wirnu	Rpww	Colq	Hans	Wfbw	Corw	Cocb	
		- % injury -									
		- % control -									
<u>PRE/MPOST</u>											
Prefix/Ignite+AMS	2.5pt/29fl oz+8.5lb/100gal	0	96	99	99	99	93	99	99	99	99
Authority First/Ignite+AMS	6oz/29fl oz+8.5lb/100gal	0	96	99	98	98	96	98	98	98	96
<u>EPOST</u>											
Ignite+Prefix+AMS	29fl oz+2.5pt+8.5lb/100gal	27	77	99	99	99	99	99	99	99	99
Ignite+Dual II Magnum+AMS	29fl oz+1.33pt+8.5lb/100gal	0	99	99	99	99	99	99	99	99	99
<u>EPOST/MPOST</u>											
Ignite+AMS/Ignite+AMS	29fl oz+8.5lb/100gal/29fl oz+8.5lb/100gal	15	98	99	98	98	93	98	99	99	99
<u>MPOST</u>											
Ignite+AMS	36fl oz+8.5lb/100gal	15	86	99	80	83	85	87	87	95	95
Untreated		0	0	0	0	0	0	0	0	0	0
LSD (0.05)		2	3	NS	2	3	3	2	2	2	1

Weed control in Optimum GAT soybean. Zollinger, Richard K., Jerry L. Ries, and Angela J. Kazmierczak. An experiment was conducted near Prosper, ND, to evaluate weed control and crop response Optimum GAT soybeans. Optimum Gat 'CEK-11-156' soybeans were planted on May 26, 2011. PRE treatments were applied on June 3 at 8:50 am with 78 F air, 62 F soil at a four inch depth, 0% cloud cover, 1 to 3 mph NW wind, moist soil surface, and wet subsoil. Soil characteristics were: 45% sand, 12.5% silt, 42.5% clay, 4.5% OM and 7.6 pH. POST treatments were applied on July 9 at 9:30 am with 79 F air, 82 F soil surface, 41% relative humidity, 10% cloud cover, 3 to 5 mph SE wind, dry soil surface, moist subsoil, poor (excess water) to good crop vigor and no dew present to V3 to V4 (4 to 6 inch) soybeans. Weeds present at the time of POST were: 6 to 14 inch, T2-T4 (5 to 15/ft²) yellow foxtail; 1 to 4 inch (1 to 2/yd²) common lambsquarters; 1 to 3 inch (3 to 10/ft²) redroot pigweed; 2 to 5 inch (5 to 25/ft²) hairy nightshade; 2 to 10 inch (1/yd²) wild mustard; 1 to 3 inch (1 to 2/yd²) common ragweed; and 2 to 5 inch (1/yd²) common cocklebur. Weeds noted in plots with PRE treatments were: emerging to 1 inch (1 to 2/yd²) yellow foxtail; emerging to cotyledon (1/yd²) common lambsquarters; emerging to 1 inch (1 to 8/ft²) redroot pigweed; emerging to 0.5 inch (2 to 10/ft²) hairy nightshade; and 3 to 6 inch (1 to 7/yd²) common ragweed. Treatments were applied to the center 6.7 feet of the 10 by 40 foot plots with a backpack-type plot sprayer delivering 17 gpa at 40 psi through 11002 Turbo TeeJet nozzles for PRE treatments and 8.5 gpa at 40 psi through 11001 Turbo TeeJet nozzles for POST treatments. The experiment had a randomized complete block design with three replicates per treatment.

No crop injury observed at 7 and 14 DAE (days after emergence) (data not shown). 99% control of yellow foxtail, wild mustard, redroot pigweed, common lambsquarters, hairy nightshade, common ragweed, and wild buckwheat, 14 DAE, 28 DAE, and 14 DAT POST (data not shown). The study was destroyed at stage R1 on July 25. (Department of Plant Sciences, North Dakota State University, Fargo).

Table. Weed control in Optimum GAT soybean (Zollinger, Ries, Kazmierczak).

Treatment	Rate (product/A)	14 DAE		28 DAE		14 DAT - POST	
		Cocb % control	Soyb % injury	Cocb % control	Soyb % injury	Cocb % control	
PRE/POST							
Diligent/RUPM+AMS	4oz/22fl oz+2lb	87	12	99	12	99	
Valor SX/RUPM+AMS	2oz/22fl oz+2lb	20	8	58	8	99	
Diligent/RUPM+Synchrony XP+AMS	4oz/RUPM+0.6oz+2lb	20	7	52	12	99	
Classic+Harmony SG+Valor SX/ RUPM+Harmony SG+Express SG+AMS	0.33oz+0.5oz+2oz/ 22fl oz+0.25oz+0.25oz+2lb	30	8	53	8	99	
POST							
RUPM+AMS	22fl oz+2lb	-	-	-	0	99	
LSD (0.05)		8	3	5	5	NS	

Management of glyphosate-resistant waterhemp with Zidua in Roundup Ready soybean, Holloway, MN, 2011. (Stachler) 'Asgrow A1026649 RR' Roundup Ready soybean was seeded May 4 at 139,500 seeds per acre was seeded in six row plots 30 feet in length in a cooperators field having glyphosate-resistant waterhemp. Preemergence treatments were applied May 4. Postemergence treatments were applied May 26 and June 24. All treatments were applied in 17 gpa water at 40 psi through XR8002 nozzles to the center four rows of six row plots. All postemergence treatments included AMS at 5% v/v. Soygreen+Premier 90 at 1.5 lb product/A + 0.25% v/v was applied to the entire experiment June 15. Soybean injury was evaluated May 26, June 2, June 24, July 8. Waterhemp control was evaluated June 2, June 16, June 24, July 8, July 20 and September 27. Common lambsquarters and annual grass control were evaluated June 16, June 24, July 8, July 20 and September 27. Wild buckwheat control was evaluated June 24, July 8, July 20 and September 27. All evaluations are a visual estimate of percent weed control or percent soybean injury in the treated plot compared to the adjacent untreated strips and plots. Soybean from the center four rows in each plot was harvested September 29.

Table 1. Application information.

Date of Application	May 4	May 26	June 24
Time of Day	2:40 pm	12:15 pm	12:35 pm
Air Temperature (°F)	66	69	69
Relative Humidity (%)	24	28	59
Soil Temp. (°F at 6")	41	55	63
Wind Velocity (mph)	21	3	7
Cloud Cover (%)	75	5	90
Soil Moisture	good	good	good
Soybean Stage (range/Avg)	PRE	cot-unifoliolate / unifoliolate	3Trif-beg. bloom / beg. bloom
Waterhemp (range/Avg) Trt. 1	PRE	-	2-23 lf/15 lf; 0.25-25"/14"
Waterhemp (avg. density) Trt. 1	PRE	-	102/M ²
Waterhemp (range/Avg) Trt. 2	PRE	cot-4 lf/2 lf; 0.125-0.25"/0.125"	cot-22 lf/13 lf; 0.25-20"/9.5"
Waterhemp (avg. density) Trt. 2	PRE	56/M ²	18/M ²
Waterhemp (range/Avg) Trt. 3	PRE	-	6-16 lf/13 lf; 2-12"/7"
Waterhemp (avg. density) Trt. 3	PRE	-	0.5/M ²
Com. Lambsquarters (range/Avg) Trt. 1	PRE	-	6-25lf/19lf; 1-22"/13"
Com. Lambsquarters (avg. density) Trt. 1	PRE	-	10/M ²
Com. Lambsquarters (range/Avg) Trt. 2	PRE	cot-6 lf/2lf; 0.25-1"/0.5"	cot-24lf/11lf; 0.25-18"/4"
Com. Lambsquarters (avg. density) Trt. 2	PRE	9/M ²	3/M ²
Com. Lambsquarters (range/Avg) Trt. 3	PRE	-	-
Com. Lambsquarters (avg. density) Trt. 3	PRE	-	0/M ²
Annual Grasses (range/Avg) Trt. 1	PRE	-	2 lf-8T/4T; 3-18"/13"
Annual Grasses (avg. density) Trt. 1	PRE	-	18/M ²
Annual Grasses (range/Avg) Trt. 2	PRE	1-4 lf/3 lf; 0.25-1.5"/0.75"	2-5 lf/3 lf; 1-2"/1.5"
Annual Grasses (avg. density) Trt. 2	PRE	6/M ²	4/M ²
Annual Grasses (range/Avg) Trt. 3	PRE	-	2 lf-11T/4T; 1-12"/6"
Annual Grasses (avg. density) Trt. 3	PRE	-	2/M ²
Wild Buckwheat (range/Avg) Trt. 2	PRE	cot-2 lf/1 lf; 0.25-1.25"/0.67"	-
Wild Buckwheat (avg. density) Trt. 2	PRE	3/M ²	-

Summary:

Valor plus Zidua caused the greatest soybean injury during the season on June 2, but injury declined over time. Treatments containing Sharpen caused soybean injury to increase by June 24. Negligible injury was observed for all treatments on July 8. Of the preemergence herbicides, treatment 6 controlled the fewest waterhemp and wild buckwheat on June 24. Roundup PowerMAX (32 fl oz/A) caused 80% mortality (data not shown) of ten flagged waterhemp plants per plot on June 24, indicating some frequency of resistant plants. Increasing the number of Roundup PowerMAX applications and making the initial application to small (0.25" tall) waterhemp plants improved control of glyphosate-resistant waterhemp, although not adequately. A single postemergence application of Roundup PowerMAX following a preemergence treatment providing excellent ($\geq 90\%$) waterhemp control, may provide excellent season-long control of most weeds and glyphosate-resistant waterhemp when the frequency of resistant plants is low.

Experiment continued on next page.

Table 2. Management of glyphosate-resistant waterhemp with Zidua in Roundup Ready soybean, Holloway, MN, 2011.
(Stachler)

Treatment ¹	Rate lb ai/A or lb ae/A	Date of Applic.	June 2	June 24	June 24	June 24	June 24	June 24
			Soyb Inj %	Soyb Inj %	Wahe Cntl %	Colq Cntl %	Wibw Cntl %	Grass Cntl %
1. Roundup PowerMax	22 fl oz/A	June 24	0	0	0	0	0	0
2 Roundup PowerMax	32 fl oz/A	May 26						
Roundup PowerMax	32 fl oz/A	June 24	0	0	72	89	72	91
3. Sharpen+Zidua (PRE)	1 fl oz/A+2 oz/A	May 4						
Roundup PowerMax	22 fl oz/A	June 24	1	5	97	91	85	74
4. Sharpen+Zidua (PRE)	1 fl oz/A+2.5 oz/A	May 4						
Roundup PowerMax	22 fl oz/A	June 24	3	7	97	97	76	82
5. Valor SX+Zidua (PRE)	2 oz/A+1.5 oz/A	May 4						
Roundup PowerMax	22 fl oz/A	June 24	11	4	98	99	84	90
6. Verdict+Zidua (PRE)	5 fl oz/A+1.5 oz/A	May 4						
Roundup PowerMax	22 fl oz/A	June 24	4	7	90	95	71	87
7. Verdict+Zidua (PRE)	5 fl oz/A+2 oz/A	May 4						
Roundup PowerMax	22 fl oz/A	June 24	3	6	98	96	84	82
LSD (5%)			2.9	3.4	6.6	7.7	15.0	9.1

¹N-Pak AMS (liquid ammonium sulfate from Winfield Solutions) was included in all postemergence treatments at 5% v/v. Grass = annual grasses (75% white robust foxtail and 25% yellow foxtail).

Table 2 continued. Management of glyphosate-resistant waterhemp with Zidua in Roundup Ready soybean, Holloway, MN, 2011. (Stachler)

Treatment ¹	Rate lb ai/A or lb ae/A	Date of Applic.	July 8	Sept. 27	Sept. 27	Sept. 27	Sept. 27	Sept. 29
			Soyb Inj %	Wahe Cntl %	Colq Cntl %	Wibw Cntl %	Grass Cntl %	Soyb Yield Bu/A
Roundup PowerMax	22 fl oz/A	June 24	0	58	93	93	98	38.5
Roundup PowerMax	32 fl oz/A	May 26						
Roundup PowerMax	32 fl oz/A	June 24	0	79	100	100	100	40.4
Sharpen+Zidua (PRE)	1 fl oz/A+2 oz/A	May 4						
Roundup PowerMax	22 fl oz/A	June 24	3	99	100	100	99	45.5
Sharpen+Zidua (PRE)	1 fl oz/A+2.5 oz/A	May 4						
Roundup PowerMax	22 fl oz/A	June 24	3	100	100	100	99	45.1
Valor SX+Zidua (PRE)	2 oz/A+1.5 oz/A	May 4						
Roundup PowerMax	22 fl oz/A	June 24	2	100	100	100	100	39.6
Verdict+Zidua (PRE)	5 fl oz/A+1.5 oz/A	May 4						
Roundup PowerMax	22 fl oz/A	June 24	3	99	100	100	100	42.3
Verdict+Zidua (PRE)	5 fl oz/A+2 oz/A	May 4						
Roundup PowerMax	22 fl oz/A	June 24	4	100	100	100	100	41.9
LSD (5%)			2.4	9.9	3.6	NS	NS	NS

¹N-Pak AMS (liquid ammonium sulfate from Winfield Solutions) was included in all postemergence treatments at 5% v/v. Grass = annual grasses (75% white robust foxtail and 25% yellow foxtail).

Management of glyphosate-resistant waterhemp in Roundup Ready soybean with preemergence herbicides followed by Flexstar GT 3.5, Holloway, MN, 2011. (Stachler) 'Asgrow A1026649' Roundup Ready soybean at 139,500 seeds per acre was seeded May 4 in six row plots 30 feet in length in a cooperators field having glyphosate-resistant waterhemp. Preemergence treatments were applied May 5. Postemergence treatments were applied June 13. All treatments were applied in 17 gpa water at 40 psi through XR8002 nozzles to the center four rows of six row plots. All postemergence treatments included AMS at 2.5% v/v. Soygreen at 1.5 pounds product per acre plus Premier 90 at 0.25% v/v was applied to the entire experiment June 15. Soybean injury was evaluated May 26, June 13, June 24, June 27 and July 12. Waterhemp, common lambsquarters and annual grass (75% white robust foxtail and 25% yellow foxtail) control were evaluated June 13, June 27, July 12 and September 27. Wild buckwheat and common ragweed were evaluated June 27, July 12 and September 27. All evaluations are a visual estimate of percent weed control or percent soybean injury in the treated plot compared to the adjacent untreated strips and plots. Soybean from the center four rows in each plot was harvested September 29.

Table 1. Application information.

Date of Application	May 4	June 13
Time of Day	2:40 pm	12:30 pm
Air Temperature (°F)	66	69
Relative Humidity (%)	24	65
Soil Temp. (°F at 6")	41	56
Wind Velocity (mph)	21	11
Cloud Cover (%)	75	75
Soil Moisture	good	good
Soybean Stage (range/Avg)	PRE	2-3 Trifoliolate / 3 Trifoliolate
Waterhemp (range/Avg) Trt. 1	PRE	3-16 lf/10 lf; 0.5-7"/5"
Waterhemp (avg. density) Trt. 1	PRE	109/M ²
Waterhemp (range/Avg) Trt. 13	PRE	2-7 lf/5 lf; 1.25-1.5"/1"
Waterhemp (avg. density) Trt. 13	PRE	0.75/M ²
Common Lambsquarters (range/Avg) Trt. 1	PRE	6-22 lf/12 lf; 1.5-9"/5"
Common Lambsquarters (avg. density) Trt. 1	PRE	17/M ²
Common Lambsquarters (range/Avg) Trt. 13	PRE	-/14 lf; 2.5-9"/5.75"
Common Lambsquarters (avg. density) Trt. 13	PRE	0.5/M ²
Annual Grasses (range/Avg) Trt. 1	PRE	3 lf-7lf Tiller/7lf Tiller; 1.5-10"/10"
Annual Grasses (avg. density) Trt. 1	PRE	6/M ²
Annual Grasses (range/Avg) Trt. 13	PRE	-/Tillering; -/5"
Annual Grasses (avg. density) Trt. 13	PRE	0.25/M ²
Common Ragweed (range/Avg) Trt. 1	PRE	Cotyledon-5 node/3 node; 0.5-5"/4"
Common Ragweed (avg. density) Trt. 1	PRE	2/M ²
Wild Buckwheat (range/Avg) Trt. 1	PRE	1-12 lf/3 lf; 1-13"/4"
Wild Buckwheat (avg. density) Trt. 1	PRE	2/M ²

Experiment continued on next page.

Table 2. Management of glyphosate-resistant waterhemp in Roundup Ready soybean with preemergence herbicides followed by Flexstar GT 3.5, Holloway, MN, 2011. (Stachler)

Treatment ¹	Rate lb ai/A or lb ae/A	Date of Applic.	June 13	June 13	June 13	June 13
			Soyb Inj %	Wahe Cntl %	Colq Cntl %	Ann. Grs. Cntl %
1. Untreated Check	0	---	0	0	0	0
2. Boundry (PRE)	1.8 pt/A	May 4				
Touchdown Total	30.7 fl oz/A	June 13	5	89	91	94
3. Boundry (PRE)	1.8 pt/A	May 4				
Flexstar GT 3.5+MSO	3.5 pt/A+1	June 13	4	92	86	92
4. Boundry (PRE)	1.8 pt/A	May 4				
Flexstar GT 3.5+MSO	5.3 pt/A+1	June 13	3	95	85	83
5. Valor SX (PRE)	2 oz/A	May 4				
Flexstar GT 3.5+MSO	3.5 pt/A+1	June 13	6	92	91	69
6. Valor SX (PRE)	2 oz/A	May 4				
Flexstar GT 3.5+MSO	5.3 pt/A+1	June 13	7	79	91	63
7. Authority MTZ (PRE)	11 oz/A	May 4				
Flexstar GT 3.5+MSO	3.5 pt/A+1	June 13	1	85	91	58
8. Authority MTZ (PRE)	11 oz/A	May 4				
Flexstar GT 3.5+MSO	5.3 pt/A+1	June 13	1	77	87	59
9. Outlook+Verdict (PRE)	8+5 fl oz/A	May 4				
Flexstar GT 3.5+MSO	3.5 pt/A+1	June 13	4	95	94	90
10. Outlook+Verdict (PRE)	8+5 fl oz/A	May 4				
Flexstar GT 3.5+MSO	5.3 pt/A+1	June 13	4	93	87	88
11. Boundry (PRE)	1.8 pt/A	May 4				
RUPowerMax+Cobra+COC	28.4+10 fl oz/A+1	June 13	5	87	87	83
12. Valor SX (PRE)	2 oz/A	May 4				
RUPowerMax+Warrant	28.4 fl oz/A+3 pt/A	June 13	7	90	88	73
13. Boundry (PRE)	1.8 pt/A	May 4				
Flexstar GT 3.5+MSO	2.65 pt/A+1	June 13	4	96	92	90
14. Boundry (PRE)	1.8 pt/A	May 4				
Sequence	2.5 pt/A	June 13	5	89	85	81
15. Sharpen (PRE)	1 fl oz/A	May 4				
Touchdown Total+Prefix	30.7 fl oz/A+2 pt/A	June 13	0	78	76	40
LSD (5%)			2.2	8	11.1	14.9

¹N-Pak AMS (liquid ammonium sulfate from Winfield Solutions) was included in all postemergence treatments at 2.5% v/v. RUPowerMAX=Roundup PowerMAX; MSO=Leci-Tech methylated seed oil from Loveland; COC=Premium COC from West Central; Ann. Grs.=Annual grasses (75% white robust foxtail & 25% yellow foxtail).

Table continued on next page.

Table 2. Management of glyphosate-resistant waterhemp in Roundup Ready soybean with preemergence herbicides followed by Flexstar GT 3.5, Holloway, MN, 2011. (Stachler)

Treatment ¹	Rate lb ai/A or lb ae/A	Date of Applic.	June 27	June 27	June 27	June 27	June 27	June 27
			Soyb Inj %	Wahe Cntl %	Colq Cntl %	Wibw Cntl %	Corw Cntl %	Ann. Grs. Cntl %
Untreated Check	0	---	0	0	0	0	0	0
Boundry (PRE)	1.8 pt/A	May 4						
Touchdown Total	30.7 fl oz/A	June 13	9	91	99	92	100	100
Boundry (PRE)	1.8 pt/A	May 4						
Flexstar GT 3.5+MSO	3.5 pt/A+1	June 13	29	100	100	100	100	100
Boundry (PRE)	1.8 pt/A	May 4						
Flexstar GT 3.5+MSO	5.3 pt/A+1	June 13	37	100	100	100	100	100
Valor SX (PRE)	2 oz/A	May 4						
Flexstar GT 3.5+MSO	3.5 pt/A+1	June 13	28	100	100	99	100	100
Valor SX (PRE)	2 oz/A	May 4						
Flexstar GT 3.5+MSO	5.3 pt/A+1	June 13	39	100	100	100	100	100
Authority MTZ (PRE)	11 oz/A	May 4						
Flexstar GT 3.5+MSO	3.5 pt/A+1	June 13	24	100	100	100	100	100
Authority MTZ (PRE)	11 oz/A	May 4						
Flexstar GT 3.5+MSO	5.3 pt/A+1	June 13	35	100	100	100	100	99
Outlook+Verdict (PRE)	8+5 fl oz/A	May 4						
Flexstar GT 3.5+MSO	3.5 pt/A+1	June 13	27	100	100	100	100	100
Outlook+Verdict (PRE)	8+5 fl oz/A	May 4						
Flexstar GT 3.5+MSO	5.3 pt/A+1	June 13	36	100	100	100	100	100
Boundry (PRE)	1.8 pt/A	May 4						
RUPowerMax+Cobra+COC	28.4+10 fl oz/A+1	June 13	51	100	99	99	100	100
Valor SX (PRE)	2 oz/A	May 4						
RUPowerMax+Warrant	28.4 fl oz/A+3 pt/A	June 13	13	100	98	99	100	100
Boundry (PRE)	1.8 pt/A	May 4						
Flexstar GT 3.5+MSO	2.65 pt/A+1	June 13	21	100	98	99	100	100
Boundry (PRE)	1.8 pt/A	May 4						
Sequence	2.5 pt/A	June 13	12	96	98	99	100	100
Sharpen (PRE)	1 fl oz/A	May 4						
Touchdown Total+Prefix	30.7 fl oz/A+2 pt/A	June 13	31	100	100	100	100	99
LSD (5%)			6.4	2.1	2	3.9	NS	1

¹N-Pak AMS (liquid ammonium sulfate from Winfield Solutions) was included in all postemergence treatments at 2.5% v/v. RUPowerMAX=Roundup PowerMAX; MSO=Leci-Tech methylated seed oil from Loveland; COC=Premium COC from West Central; Ann. Grs.=Annual grasses (75% white robust foxtail & 25% yellow foxtail).

Table continued on next page.

Table 2. Management of glyphosate-resistant waterhemp in Roundup Ready soybean with preemergence herbicides followed by Flexstar GT 3.5, Holloway, MN, 2011. (Stachler)

Treatment ¹	Rate lb ai/A or lb ae/A	Date of Applic.	July 7	Sept. 27	Sept. 27	Sept. 27	Sept. 27	Sept. 29
			Soyb Inj %	Wahe Cntl %	Colq Cntl %	Wibw Cntl %	Ann. Grs. Cntl %	Soyb Yield Bu/A
Untreated Check	0	---	0	0	0	0	0	2
Boundry (PRE)	1.8 pt/A	May 4						
Touchdown Total	30.7 fl oz/A	June 13	1	85	97	100	100	37.9
Boundry (PRE)	1.8 pt/A	May 4						
Flexstar GT 3.5+MSO	3.5 pt/A+1	June 13	9	100	100	98	100	42.6
Boundry (PRE)	1.8 pt/A	May 4						
Flexstar GT 3.5+MSO	5.3 pt/A+1	June 13	18	100	100	100	100	35.8
Valor SX (PRE)	2 oz/A	May 4						
Flexstar GT 3.5+MSO	3.5 pt/A+1	June 13	13	100	100	100	100	40.3
Valor SX (PRE)	2 oz/A	May 4						
Flexstar GT 3.5+MSO	5.3 pt/A+1	June 13	19	100	100	99	100	42.2
Authority MTZ (PRE)	11 oz/A	May 4						
Flexstar GT 3.5+MSO	3.5 pt/A+1	June 13	8	100	99	100	100	40.4
Authority MTZ (PRE)	11 oz/A	May 4						
Flexstar GT 3.5+MSO	5.3 pt/A+1	June 13	16	100	100	99	100	42.9
Outlook+Verdict (PRE)	8+5 fl oz/A	May 4						
Flexstar GT 3.5+MSO	3.5 pt/A+1	June 13	14	100	100	100	100	40.6
Outlook+Verdict (PRE)	8+5 fl oz/A	May 4						
Flexstar GT 3.5+MSO	5.3 pt/A+1	June 13	21	100	100	98	100	37.7
Boundry (PRE)	1.8 pt/A	May 4						
RUPowerMax+Cobra+COC	28.4+10 fl oz/A+1	June 13	33	91	93	91	100	30.6
Valor SX (PRE)	2 oz/A	May 4						
RUPowerMax+Warrant	28.4 fl oz/A+3 pt/A	June 13	3	100	99	98	100	37.9
Boundry (PRE)	1.8 pt/A	May 4						
Flexstar GT 3.5+MSO	2.65 pt/A+1	June 13	6	100	97	98	100	38.7
Boundry (PRE)	1.8 pt/A	May 4						
Sequence	2.5 pt/A	June 13	1	94	100	100	100	42.1
Sharpen (PRE)	1 fl oz/A	May 4						
Touchdown Total+Prefix	30.7 fl oz/A+2 pt/A	June 13	10	98	99	95	100	37.8
LSD (5%)			4	3.8	3.6	4.8	NS	6.1

¹N-Pak AMS (liquid ammonium sulfate from Winfield Solutions) was included in all postemergence treatments at 2.5% v/v. RUPowerMAX=Roundup PowerMAX; MSO=Leci-Tech methylated seed oil from Loveland; COC=Premium COC from West Central; Ann. Grs.=Annual grasses (75% white robust foxtail & 25% yellow foxtail).

Summary:

Up to 10 waterhemp plants were flagged per plot prior to the application of Touchdown following Boundry. Touchdown caused 72 and 83% mortality of flagged waterhemp plants on June 29 and September 27, respectively, indicating the presence of glyphosate-resistant waterhemp at this site. Minimal soybean injury was observed on June 13 from the preemergence herbicides, although Valor caused the greatest injury. The greatest soybean injury of the season was observed on June 27 from Cobra followed by Flexstar GT at 5.3 pt/A. Injury declined over time, but was still high on July 7.

Outlook plus Verdict, Boundry, and Valor controlled glyphosate-resistant waterhemp similarly and most effectively at the time of the postemergence application. Touchdown (30.7 fl oz/A) controlled only 85% of waterhemp on September 27 following Boundry, indicating that glyphosate applied alone, even following a preemergence herbicide will not control all resistant waterhemp. On September 27, all treatments controlled greater than 97% waterhemp, except those postemergence treatments with Touchdown, Cobra, and Sequence. Flexstar GT 3.5 at all rates improved control of waterhemp compared to Touchdown applied alone. Due to the severe soybean injury from Cobra, weed emergence occurred after treatment. Soybean yield was similar for all treatments, except Boundry followed by Flexstar GT 3.5 (5.3 pt/A) and Cobra (10 fl oz/A) plus Roundup PowerMAX. Glyphosate-resistant waterhemp can be managed in Roundup Ready soybean when an effective preemergence herbicide is applied followed by Flexstar GT as long as the waterhemp is not resistant to the Flexstar.

Management of glyphosate-resistant waterhemp with preemergence herbicides in LibertyLink soybean, Holloway, MN, 2011. (Stachler) ‘Croplan LC 2060 HS05-628’ LibertyLink soybean were seeded May 4 at 139,500 seeds per acre in six row plots 30 feet in length in a cooperators field having glyphosate-resistant waterhemp. Preemergence treatments were applied May 4. Postemergence treatments were applied June 2 and June 24. All treatments were applied in 17 gpa water at 40 psi through XR8002 nozzles to the center four rows of six row plots. All post treatments included AMS at 5.2% v/v. Soygreen plus Premier 90 (1.5 lb product per acre+0.25% v/v) was applied to the entire experiment June 15. Soybean injury was evaluated May 26, June 24, July 8 and July 20. Common lambsquarters, waterhemp and annual grass control was evaluated June 24, July 8, July 20 and September 27. Wild buckwheat control was evaluated June 24, July 8 and July 20. All evaluations are a visual estimate of percent weed control or percent soybean injury in the treated plot compared to the adjacent untreated strips and plots. Soybean from the center four rows in each plot was harvested September 29.

Table 1. Application information.

Date of Application	May 4	June 2	June 24
Time of Day	2:40 pm	11:45 am	12:35 pm
Air Temperature (°F)	66	80	69
Relative Humidity (%)	24	45	59
Soil Temp. (°F at 6")	41	58	63
Wind Velocity (mph)	21	28	7
Cloud Cover (%)	75	90	90
Soil Moisture	good	good	good
Soybean Stage (range/Avg)	PRE	unifol-1 Trif / early 1 Trif	3-5 Trif / 4 Trif
Waterhemp (range/Avg) Trt. 1	PRE	-	2-20 lf/12 lf; 0.25-20"/7.5"
Waterhemp (avg. density) Trt. 1	PRE	-	19/M ²
Waterhemp (range/Avg) Trt. 17	PRE	cot-7 lf/4 lf; 0.125-1.25"/0.5"	cot-19 lf/14 lf; 0.125-15"/8"
Waterhemp (avg. density) Trt. 17	PRE	95/M ²	20/M ²
Waterhemp (range/Avg) Trt. 18	PRE	cot-7 lf/4 lf; 0.125-1.25"/0.5"	cot-22 lf/17 lf; 0.125-22"/16"
Waterhemp (avg. density) Trt. 18	PRE	88/M ²	75/M ²
Common Lambsquarters (range/Avg) Trt. 1	PRE	-	6-24lf/17 lf; 1-18"/9.5"
Common Lambsquarters (avg. density) Trt. 1	PRE	-	5/M ²
Common Lambsquarters (range/Avg) Trt. 17	PRE	4-6 lf/6 lf; 0.25-1"/0.75"	4-22lf/16 lf; 0.25-13"/6.5"
Common Lambsquarters (avg. density) Trt. 17	PRE	2/M ²	1/M ²
Common Lambsquarters (range/Avg) Trt. 18	PRE	cot-11 lf/7 lf; 0.25-2"/0.75"	6-25lf/20 lf; 1-24"/17"
Common Lambsquarters (avg. density) Trt. 18	PRE	4/M ²	5/M ²
Annual Grasses (range/Avg) Trt. 1	PRE	-	2 lf-12T/6T; 1-14"/11"
Annual Grasses (avg. density) Trt. 1	PRE	-	7/M ²
Annual Grasses (range/Avg) Trt. 17	PRE	4 lf-1T/4 lf; 1-1.75"/1.25"	-/ 6.5T; - / 5"
Annual Grasses (avg. density) Trt. 17	PRE	5/M ²	0.5/M ²
Annual Grasses (range/Avg) Trt. 18	PRE	4 lf-1T/4 lf; 1-1.75"/1.25"	2-13 T/5T; 1-14"/9"
Annual Grasses (avg. density) Trt. 18	PRE	5/M ²	6/M ²
Wild Buckwheat (range/Avg) Trt. 1	PRE	-	-
Wild Buckwheat (avg. density) Trt. 1	PRE	-	0/M ²
Wild Buckwheat (range/Avg) Trt. 17	PRE	1-4 lf/3 lf; 0.5-2"/1"	-
Wild Buckwheat (avg. density) Trt. 17	PRE	6/M ²	0/M ²
Wild Buckwheat (range/Avg) Trt. 18	PRE	cot-3 lf/3 lf; 0.5-2.5"/1.25"	-/beg. flower; 8-24"/20"
Wild Buckwheat (avg. density) Trt. 18	PRE	14/M ²	3/M ²

Experiment continued on next page.

Table 2. Management of glyphosate-resistant waterhemp with preemergence herbicides in LibertyLink soybean, Holloway, MN, 2011. (Stachler)

Treatment ¹	Rate lb ai/A or lb ae/A	Date of Applic.	May 26	June24	June24	June24	June24	June24
			Soyb Inj %	Soyb Inj %	Wahe Cntl %	Colq Cntl %	Wibw Cntl %	Grass Cntl %
1. Sharpen (PRE)	1 fl oz/A	May 4						
Ignite 280	22 fl oz/A	June 24	1	3	73	77	71	0
2. Sharpen (PRE)	2 fl oz/A	May 4						
Ignite 280	22 fl oz/A	June 24	2	5	84	88	94	0
3. Sharpen+Zidua (PRE)	1 fl oz/A+2 oz/A	May 4						
Ignite 280	22 fl oz/A	June 24	0	6	99	93	85	88
4. Sharpen+Zidua (PRE)	1 fl oz/A+2.5 oz/A	May 4						
Ignite 280	22 fl oz/A	June 24	0	5	97	93	92	86
5. Sharpen+Zidua (PRE)	2 fl oz/A+2 oz/A	May 4						
Ignite 280	22 fl oz/A	June 24	2	7	98	99	98	81
6. Zidua+Verdict (PRE)	2.5 oz/A+5 fl oz/A	May 4						
Ignite 280	22 fl oz/A	June 24	1	4	99	96	87	90
7. Verdict+Outlook (PRE)	5 fl oz/A+8 fl oz/A	May 4						
Ignite 280	22 fl oz/A	June 24	0	5	99	98	91	88
8. Verdict+Outlook (PRE)	5 fl oz/A+14 fl oz/A	May 4						
Ignite 280	22 fl oz/A	June 24	2	6	99	98	97	91
9. Sharpen+Dual MagnumII (PRE)	1 fl oz/A+1.67 pt/A	May 4						
Ignite 280	22 fl oz/A	June 24	2	5	99	95	98	89
10. Valor SX (PRE)	2.5 oz/A	May 4						
Ignite 280	22 fl oz/A	June 24	14	6	87	95	78	81
11. Zidua+Valor SX (PRE)	1.5+2 oz/A	May 4						
Ignite 280	22 fl oz/A	June 24	14	9	96	98	77	89
12. Prefix (PRE)	2 pt/A	May 4						
Ignite 280	22 fl oz/A	June 24	1	3	93	87	55	74
13. Sharpen+Dimetric (PRE)	1 fl oz/A+5.33 oz/A	May 4						
Ignite 280	22 fl oz/A	June 24	2	5	91	92	85	26
14. Sharpen+Dimetric+Zidua (PRE)	1 fl oz/A+5.33+2 oz/A	May 4						
Ignite 280	22 fl oz/A	June 24	2	4	99	99	87	76
15. Sharpen+Zidua (PRE)	1 fl oz/A+2.5 oz/A	May 4						
Ignite 280+Zidua	22 fl oz/A+1 oz/A	June 24	1	5	98	95	77	80
16. Zidua+Valor SX (PRE)	1.5+2 oz/A	May 4						
Ignite 280+Warrant	22 fl oz/A+1.25 qt/A	June 24	15	7	98	97	91	93
17. Ignite 280	22 fl oz/A	June 2						
Ignite 280	22 fl oz/A	June 24	1	4	68	92	75	85
18. Untreated Check	-	-	0	0	0	0	0	0
LSD (5%)			2	3.4	5.1	9.3	17.2	17.8

¹N-Pak AMS (liquid ammonium sulfate from Winfield Solutions) was included in all postemergence treatments at 5.2% v/v. Grass = annual grass (75% white robust foxtail & 25% yellow foxtail).

Table continued on next page.

Table 2. Management of glyphosate-resistant waterhemp with preemergence herbicides in LibertyLink soybean, Holloway, MN, 2011. (Stachler)

Treatment ¹	Rate lb ai/A or lb ae/A	Date of Applic.	July 8	Sept. 27	Sept. 27	Sept. 27	Sept. 29
			Soyb Inj %	Wahe Cntl %	Colq Cntl %	Grass Cntl %	Soyb Yield Bu/A
1. Sharpen (PRE) Ignite 280	1 fl oz/A 22 fl oz/A	May 4 June 24	2	90	98	96	47.6
2. Sharpen (PRE) Ignite 280	2 fl oz/A 22 fl oz/A	May 4 June 24	3	99	100	100	51.8
3. Sharpen+Zidua (PRE) Ignite 280	1 fl oz/A+2 oz/A 22 fl oz/A	May 4 June 24	1	100	100	100	44.1
4. Sharpen+Zidua (PRE) Ignite 280	1 fl oz/A+2.5 oz/A 22 fl oz/A	May 4 June 24	2	100	100	100	45.6
5. Sharpen+Zidua (PRE) Ignite 280	2 fl oz/A+2 oz/A 22 fl oz/A	May 4 June 24	4	100	100	100	44.8
6. Zidua+Verdict (PRE) Ignite 280	2.5 oz/A+5 fl oz/A 22 fl oz/A	May 4 June 24	1	100	100	100	43.6
7. Verdict+Outlook (PRE) Ignite 280	5 fl oz/A+8 fl oz/A 22 fl oz/A	May 4 June 24	2	100	100	100	46.8
8. Verdict+Outlook (PRE) Ignite 280	5 fl oz/A+14 fl oz/A 22 fl oz/A	May 4 June 24	3	100	100	100	44.6
9. Sharpen+Dual MagnumII (PRE) Ignite 280	1 fl oz/A+1.67 pt/A 22 fl oz/A	May 4 June 24	0	100	100	100	45.4
10. Valor SX (PRE) Ignite 280	2.5 oz/A 22 fl oz/A	May 4 June 24	2	100	100	100	54.4
11. Zidua+Valor SX (PRE) Ignite 280	1.5+2 oz/A 22 fl oz/A	May 4 June 24	2	100	100	100	43.3
12. Prefix (PRE) Ignite 280	2 pt/A 22 fl oz/A	May 4 June 24	0	98	100	100	44.4
13. Sharpen+Dimetric (PRE) Ignite 280	1 fl oz/A+5.33 oz/A 22 fl oz/A	May 4 June 24	1	100	100	100	46.0
14. Sharpen+Dimetric+Zidua (PRE) Ignite 280	1 fl oz/A+5.33+2 oz/A 22 fl oz/A	May 4 June 24	2	100	100	100	44.5
15. Sharpen+Zidua (PRE) Ignite 280+Zidua	1 fl oz/A+2.5 oz/A 22 fl oz/A+1 oz/A	May 4 June 24	3	100	100	100	40.7
16. Zidua+Valor SX (PRE) Ignite 280+Warrant	1.5+2 oz/A 22 fl oz/A+1.25 qt/A	May 4 June 24	4	100	100	100	42.5
17. Ignite 280 Ignite 280	22 fl oz/A 22 fl oz/A	June 2 June 24	1	92	100	100	48.2
18. Untreated Check	-	-	0	0	0	0	2.2
LSD (5%)			2.5	3.8	1.7	1.6	11.9

¹N-Pak AMS (liquid ammonium sulfate from Winfield Solutions) was included in all postemergence treatments at 5.2% v/v. Grass = annual grass (75% white robust foxtail & 25% yellow foxtail).

Summary:

Soybean injury was greatest on May 26 and for those treatments containing Valor. Soybean injury declined for the most part over time and was negligible for all treatments on July 8. This location has glyphosate-resistant waterhemp. On June 24, all preemergence treatments provided waterhemp control greater than 90%, except Sharpen at 1 and 2 fl oz/A and Valor at 2.5 oz/A. On June 24, all treatment provided common lambsquarters control similarly to waterhemp, except Valor was better and Prefix poorer. On June 24, only Sharpen (2 fl oz/A) plus Zidua (2.0 oz/A), Verdict (5 fl oz/A) plus Outlook (14 fl oz/A), and Sharpen (1 fl oz/A) plus Dual Magnum II (1.67 pt/A) controlled wild buckwheat greater than 95% and Prefix was poor (55%). Only Verdict (5 fl oz/A) plus Outlook (14 fl oz/A) and Valor (1.5 oz/A) plus Zidua (2.0 oz/A) controlled annual grass greater than 90% and Sharpen (1 and 2 fl oz/A) and Sharpen plus Dimetric were poor (0 and 26%, respectively). All weeds were larger than planned on June 24 in treatments 1 and 17, causing Ignite to be less effective. All treatments provided greater than 95% control of all weeds, except waterhemp in treatments 1 and 17. Soybean yields were similar for all treatments, except treatment 15. Glyphosate-resistant waterhemp, common lambsquarters, wild buckwheat, and annual grasses can be effectively controlled in LibertyLink soybean when the appropriate preemergence herbicide is applied and Ignite 280 is applied timely.

Preemergence and lay-by herbicides for LibertyLink soybean, Mayville, MN, 2011. (Stachler) 'Peterson Seed L05-11NLL' Liberty Link soybean was seeded May 5 at 139,500 seeds per acre in six row plots 30 feet in length in a cooperator's field having glyphosate-resistant common ragweed. Preemergence treatments were applied May 5. Postemergence treatments were applied June 2 and June 20. All treatments were applied in 17 gpa water at 40 psi through XR8002 nozzles to the center four rows of six row plots. All postemergence treatments included AMS at 5.2% v/v. Lorsban 4E insecticide at 1 quart per acre was applied to the entire experiment July 19 to control soybean aphids. Soybean injury was evaluated June 3, June 20, and July 5. Common lambsquarters, common ragweed, redroot pigweed and annual grasses were evaluated June 20, July 5 and September 26. All evaluations are a visual estimate of percent weed control or percent soybean injury in the treated plot compared to the adjacent untreated strips and plots. Soybean from the center two rows in each plot was harvested October 13.

Table 1. Application information.

Date of Application	May 5	June 2	June 20
Time of Day	6:45 pm	2:00 pm	11:15 am
Air Temperature (°F)	59	70	64
Relative Humidity (%)	46	60	70
Soil Temp. (°F at 6")	47	61	58
Wind Velocity (mph)	5	8	12
Cloud Cover (%)	75	100	100
Soil Moisture	good	good	good
Soybean Stage (range/Avg)	PRE	unifoliate-1 Trif / unifoliate	3-4 Trif / 3.5 Trif
Redroot Pigweed (range/Avg) Trt. 1	PRE	-	cot-10 lf/6 lf; 0.125-3"/1.5"
Redroot Pigweed (avg. density) Trt. 1	PRE	-	77/M ²
Redroot Pigweed (range/Avg) Trt. 6	PRE	-	-
Redroot Pigweed (avg. density) Trt. 6	PRE	-	0/M ²
Redroot Pigweed (range/Avg) Trt. 12	PRE	cot-2 lf/cot; 0.1-0.25"/0.1"	cot-7 lf/4 lf; 0.125-3"/1.25"
Redroot Pigweed (avg. density) Trt. 12	PRE	128/M ²	67/M ²
Common Lambsquarters (range/Avg) Trt. 1	PRE	-	cot-19lf/8lf; 0.125-9"/2.75"
Common Lambsquarters (avg. density) Trt. 1	PRE	-	177/M ²
Common Lambsquarters (range/Avg) Trt. 6	PRE	-	cot-17lf/12lf; 0.25-7.5"/3.5"
Common Lambsquarters (avg. density) Trt. 6	PRE	-	34/M ²
Common Lambsquarters (range/Avg) Trt. 12	PRE	cot-8 lf/4 lf; 0.1-1.5"/0.67"	cot-15lf/7lf; 0.125-6"/1.75"
Common Lambsquarters (avg. density) Trt. 12	PRE	208/M ²	169/M ²
Annual Grasses (range/Avg) Trt. 1	PRE	-	2 lf-13T/9T; 0.5-7"/4"
Annual Grasses (avg. density) Trt. 1	PRE	-	8/M ²
Annual Grasses (range/Avg) Trt. 6	PRE	-	4 lf-3T/2T; 0.5-5"/3.5"
Annual Grasses (avg. density) Trt. 6	PRE	-	3/M ²
Annual Grasses (range/Avg) Trt. 12	PRE	-	1 lf-4T/3T; 0.5-3"/1.5"
Annual Grasses (avg. density) Trt. 12	PRE	-	28/M ²
Common Ragweed (range/Avg) Trt. 1	PRE	-	cot-7N/4N; 0.25-8"/2.5"
Common Ragweed (avg. density) Trt. 1	PRE	-	126/M ²
Common Ragweed (range/Avg) Trt. 6	PRE	-	cot-8N/5N; 0.25-9"/4"
Common Ragweed (avg. density) Trt. 6	PRE	-	440/M ²
Common Ragweed (range/Avg) Trt. 12	PRE	cot-6 lf/2 lf; 0.25-1.5"/0.75"	cot-4N/3N; 0.25-2.5"/1.125"
Common Ragweed (avg. density) Trt. 12	PRE	540/M ²	79/M ²

Experiment continued on next page.

Table 2. Preemergence and lay-by herbicides for LibertyLink soybean, Mayville, MN, 2011. (Stachler)

Treatment ¹	Rate lb ai/A or lb ae/A	Date of Applic.	June 3	June20	June20	June20	June20	June20
			Soyb Inj %	Soyb Inj %	Corw Cntl %	Colq Cntl %	Rrpw Cntl %	Grass Cntl %
1. Sharpen (PRE) Ignite 280	1 fl oz/A 22 fl oz/A	May 5 June 20	2	0	66	74	66	39
2. Sharpen+Zidua (PRE) Ignite 280	1 fl oz/A+2 oz/A 22 fl oz/A	May 5 June 20	5	0	86	94	99	82
3. Sharpen+Zidua (PRE) Ignite 280	1 fl oz/A+2.5 oz/A 22 fl oz/A	May 5 June 20	3	1	85	91	99	83
4. Zidua+Verdict (PRE) Ignite 280	2.5 oz/A+5 fl oz/A 22 fl oz/A	May 5 June 20	4	1	90	96	99	96
5. Sharpen+Dual MagnumII (PRE) Ignite 280	1 fl oz/A+1.67 pt/A 22 fl oz/A	May 5 June 20	8	2	67	93	99	79
6. Valor SX (PRE) Ignite 280	2 oz/A 22 fl oz/A	May 5 June 20	11	9	25	84	99	81
7. Zidua+Valor SX (PRE) Ignite 280	1.5+2 oz/A 22 fl oz/A	May 5 June 20	15	7	45	92	99	97
8. Authority First (PRE) Ignite 280	3 oz/A 22 fl oz/A	May 5 June 20	3	0	73	96	96	41
9. Zidua+Sharpen (PRE) Ignite 280+Zidua	2.5 oz/A+1fl oz/A 22 fl oz/A+1 oz/A	May 5 June 20	5	1	81	93	99	80
10. Valor SX (PRE) Ignite 280+Warrant	2 oz/A 22 fl oz/A+1.25 qt/A	May 5 June 20	10	7	29	84	99	83
11. Zidua+Valor SX (PRE) Ignite 280+Warrant	1.5+2 oz/A 22 fl oz/A+1.25 qt/A	May 5 June 20	14	8	46	94	99	98
12. Ignite 280 Ignite 280	22 fl oz/A 22 fl oz/A	June 2 June 20	0	1	81	80	78	82
13. Untreated Check	-	-	0	0	0	0	0	0
LSD (5%)			3	2	8	5	6	23

¹N-Pak AMS (liquid ammonium sulfate from Winfield Solutions) was included in all postemergence treatments at 5.2% v/v.

Table continued on next page.

Table 2. Preemergence and lay-by herbicides for LibertyLink soybean, Mayville, MN, 2011. (continued)

Treatment ¹	Rate lb ai/A or lb ae/A	Date of Applic.	July 5	July 5	July 5	July 5	July 5
			Soyb Inj %	Corw Cntl %	Colq Cntl %	Rrpw Cntl %	Grass Cntl %
Sharpen (PRE) Ignite 280	1 fl oz/A 22 fl oz/A	May 5 June 20	0	93	92	91	95
Sharpen+Zidua (PRE) Ignite 280	1 fl oz/A+2 oz/A 22 fl oz/A	May 5 June 20	0	96	97	99	97
Sharpen+Zidua (PRE) Ignite 280	1 fl oz/A+2.5 oz/A 22 fl oz/A	May 5 June 20	1	94	97	99	99
Zidua+Verdict (PRE) Ignite 280	2.5 oz/A+5 fl oz/A 22 fl oz/A	May 5 June 20	0	98	97	99	99
Sharpen+Dual MagnumII (PRE) Ignite 280	1 fl oz/A+1.67 pt/A 22 fl oz/A	May 5 June 20	0	93	97	98	98
Valor SX (PRE) Ignite 280	2 oz/A 22 fl oz/A	May 5 June 20	3	87	92	99	90
Zidua+Valor SX (PRE) Ignite 280	1.5+2 oz/A 22 fl oz/A	May 5 June 20	0	87	97	99	98
Authority First (PRE) Ignite 280	3 oz/A 22 fl oz/A	May 5 June 20	0	95	98	98	91
Zidua+Sharpen (PRE) Ignite 280+Zidua	2.5 oz/A+1 fl oz/A 22 fl oz/A+1 oz/A	May 5 June 20	1	98	98	99	99
Valor SX (PRE) Ignite 280+Warrant	2 oz/A 22 fl oz/A+1.25 qt/A	May 5 June 20	2	82	87	99	86
Zidua+Valor SX (PRE) Ignite 280+Warrant	1.5+2 oz/A 22 fl oz/A+1.25 qt/A	May 5 June 20	1	81	95	99	99
Ignite 280 Ignite 280	22 fl oz/A 22 fl oz/A	June 2 June 20	0	95	95	90	93
Untreated Check	-	-	0	0	0	0	0
LSD (5%)			1	4	3	2	7

¹N-Pak AMS (liquid ammonium sulfate from Winfield Solutions) was included in all postemergence treatments at 5.2% v/v.

Table continued on next page.

Table 2. Preemergence and lay-by herbicides for LibertyLink soybean, Mayville, MN, 2011. (continued)

Treatment ¹	Rate lb ai/A or lb ae/A	Date of Applic.	Sept26	Sept26	Sept26	Sept26	Oct.13	Oct.13
			Corw Cntl %	Colq Cntl %	Rrpw Cntl %	Grass Cntl %	Soyb Yield bu/A	Soyb Moist. %
Sharpen (PRE) Ignite 280	1 fl oz/A 22 fl oz/A	May 5 June 20	78	81	86	88	32.0	10.6
Sharpen+Zidua (PRE) Ignite 280	1 fl oz/A+2 oz/A 22 fl oz/A	May 5 June 20	94	95	99	98	46.3	11.6
Sharpen+Zidua (PRE) Ignite 280	1 fl oz/A+2.5 oz/A 22 fl oz/A	May 5 June 20	91	91	99	99	36.0	10.8
Zidua+Verdict (PRE) Ignite 280	2.5 oz/A+5 fl oz/A 22 fl oz/A	May 5 June 20	94	90	98	99	29.5	10.7
Sharpen+Dual MagnumII (PRE) Ignite 280	1 fl oz/A+1.67 pt/A 22 fl oz/A	May 5 June 20	84	90	97	99	44.5	11.9
Valor SX (PRE) Ignite 280	2 oz/A 22 fl oz/A	May 5 June 20	61	69	92	79	26.4	10.9
Zidua+Valor SX (PRE) Ignite 280	1.5+2 oz/A 22 fl oz/A	May 5 June 20	71	92	99	93	40.6	11.9
Authority First (PRE) Ignite 280	3 oz/A 22 fl oz/A	May 5 June 20	89	95	98	88	47.4	12.2
Zidua+Sharpen (PRE) Ignite 280+Zidua	2.5 oz/A+1fl oz/A 22 fl oz/A+1 oz/A	May 5 June 20	95	98	99	99	44.4	12.0
Valor SX (PRE) Ignite 280+Warrant	2 oz/A 22 fl oz/A+1.25 qt/A	May 5 June 20	47	71	97	79	30.1	12.1
Zidua+Valor SX (PRE) Ignite 280+Warrant	1.5+2 oz/A 22 fl oz/A+1.25 qt/A	May 5 June 20	61	91	99	99	37.1	11.4
Ignite 280 Ignite 280	22 fl oz/A 22 fl oz/A	June 2 June 20	91	94	89	91	42.6	11.5
Untreated Check	-	-	0	0	0	0	0	-
LSD (5%)			8	7	4	11	13.4	1.4

¹N-Pak AMS (liquid ammonium sulfate from Winfield Solutions) was included in all postemergence treatments at 5.2% v/v.

Summary:

This research location has glyphosate-resistant common ragweed. Soybean injury was greatest on June 3rd and for all treatments containing Valor, but declined to negligible levels as over time. On June 20, weed density and size varied based upon the treatment applied and weed size was shortest for treatment 12 (Ignite). Only Zidua (2.5 oz/A) plus Verdict (5 fl oz/A) and Sharpen (1 fl oz/A) plus Zidua (2.0 and 2.5 oz/A) controlled greater than or equal to 85% of glyphosate-resistant common ragweed on June 20, at the time of the postemergence application. Sharpen (1 fl oz/A) plus Zidua (2.5 oz/A) provided the greatest preemergence weed control on June 20 for all species. The weeds were larger than desired on June 20 for most preemergence treatments, reducing the efficacy of Ignite. Ignite improved common ragweed control for all treatments. The most effective weed control in LibertyLink soybean will be to apply the most effective preemergence herbicide for the most difficult to control species within a field and apply Ignite 280 at maximum rates to 2 to 3 inch tall weeds and scout to determine need for a second postemergence application.