



2021 Wisconsin Weed Science Research Report

Ryan DeWerff, Nick Arneson, and Rodrigo Werle



Cropping Systems Weed Science
UNIVERSITY OF WISCONSIN-MADISON



2021 Wisconsin Cropping Systems Weed Science Research Team

Dr. Rodrigo Werle

Assistant Professor, Extension Cropping Systems Weed Scientist

MSc. Ryan DeWerff

Weed Science Research Specialist, Wisconsin Herbicide Evaluation
Program Coordinator

MSc. Nick Arneson

Weed Science Outreach Program Manager

MSc. Nikola Arsenijevic

Weed Science Research Assistant

MSc. Dan Smith

UW-NPM Southwest Wisconsin Regional Agronomy Specialist

Weed Science Graduate Research Assistants:

Kolby Grint, Felipe Faleco, José Junior Nunes, Tatiane Severo

Visiting Research Scholar:

Bruna Fontana

Undergraduate Research Assistant:

Matt Humbolt, UW-Madison; Frank Lazar, UW-Platteville

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A3646, Pest Management in Wisconsin Field Crops
Available at: <https://learningstore.uwex.edu/>

Despite careful proof reading, there may be some typing or compilation errors in the report. Should you find any information presented to be unreasonably questionable, please contact:

MSc. Ryan DeWerff
Weed Science Research Specialist
Wisconsin Herbicide Evaluation Program Coordinator
Department of Agronomy
University of Wisconsin-Madison
dewerff@wisc.edu

or

Dr. Rodrigo Werle
Extension Weed Scientist
Department of Agronomy
University of Wisconsin-Madison
rwerle@wisc.edu
(608) 262-7130

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Project Goal: Gain exposure to Bayer and Valent corn herbicide product offerings to support potential recommendations.

Site Description:

Location:	Janesville, WI	Crop:	Corn
Field #:	4	Hybrid:	DKC54-38 RIB
Soil type:	Plano silt loam	Planting Date:	4/26
% OM:	3.3	Emergence Date:	5/11
pH:	6.7	Population:	35,000 seeds/acre
Fertilization:	180 lbs N/acre	Depth:	2.25 in
Previous crop:	Soybean	Row spacing:	30 in
Tillage:	conventional	Plot Size:	10 x 30 ft
Weed species:	giant ragweed (AMBTR)		

Herbicide Application Information:

Date:	4/27	5/21	5/26
Treatment:	PRE (A)	EPOST (B)	POST (C)
Air Temp (°F):	88	75	73
2" Soil Temp (°F):	72	64	68
Soil moisture [surface]:	dry	moist	moist
RH %:	36	67	58
Cloud cover %	35	80	0
Wind speed (mph)/direction	3-7/NNE	3-8/SSE	5-11/WNW
Rainfall (in) 1 wk after APP:	1.2"	0.88"	0.5"
GPA:	15	15	15
PSI:	34	35	34
Nozzle:	TTI 110015	TTI 110015	TTI 110015
Nozzle spacing (in):	20	20	20
Boom Height (in):	20	23	23

Crop and weed information at application:

	Date:	4/27	5/21	5/26
Corn	Height:	-	2.5-3.5"	8-10"
	Stage:	-	V2	V3/V4
Giant ragweed	Height:	-	0.5-4"	0.5-4"
	Density:	-	31-74 m ²	3-16 m ²

Trt #	Treatment	Formulation	SOA Group	Rate	App Timing	App Code
1	Corvus atrazine	2.63 lb/gal 4 lb/gal	2, 27 5	5.6 fl oz/a 2 pt/a	A A	PRE PRE
2	Corvus Harness XTRA 5.6L	2.63 lb/gal 5.6 lb/gal	2, 27 5, 15	4.5 fl oz/a 1.5 qt/a	A A	PRE PRE
3	Harness MAX atrazine	3.85 lb/gal 4 lb/gal	15, 27 5	2 qt/a 2 pt/a	A A	PRE PRE
4	Harness Laudis Roundup PowerMAX II atrazine AMS (liquid)	7 lb/gal 3.5 lb/gal 4.5 lbae/gal 4 lb/gal	15 27 9 5	2 pt/a 3 fl oz/a 32 fl oz/a 1 pt/a 2.5% v/v	A C C C C	PRE POST POST POST POST
5	Balance Flexx atrazine Diflexx Laudis Roundup PowerMAX II AMS (liquid)	2 lb/gal 4 lb/gal 4 lbae/gal 3.5 lb/gal 4.5 lbae/gal	27 5 4 27 9	4 fl oz/a 2 pt/a 6 fl oz/a 3 fl oz/a 32 fl oz/a 2.5% v/v	A A C C C C	PRE PRE POST POST POST POST
6	TripleFlex II Diflexx DUO Roundup PowerMAX II Destiny HC Class Act Ridion	4.25 lb/gal 2.13 lb/gal 4 lb/gal 4.5 lbae/gal	2, 4, 15 4, 27 9	1 qt/a 24 fl oz/a 32 fl oz/a 1% v/v 1% v/v	A C C C C	PRE POST POST POST POST
7	Harness Xtra 5.6L Capreno Roundup PowerMAX II AMS (liquid)	5.6 lb/gal 3.45 lb/gal 4.5 lbae/gal	5, 15 2, 27 9	1.5 qt/a 3 fl oz/a 32 fl oz/a 2.5% v/v	A C C C	PRE POST POST POST
8	Harness MAX atrazine Capreno Roundup PowerMAX II AMS (liquid)	3.85 lb/gal 4 lb/gal 3.45 lb/gal 4.5 lbae/gal	15, 27 5 2, 27 9	2 qt/a 2 pt/a 3 fl oz/a 32 fl oz/a 2.5% v/v	A A C C C	PRE PRE POST POST POST
9	Balance Flexx atrazine Diflexx DUO Roundup PowerMAX II Destiny HC Class Act Ridion	2 lb/gal 4 lb/gal 2.13 lb/gal 4.5 lbae/gal	27 5 4, 27 9	4 fl oz/a 2 pt/a 24 fl oz/a 32 fl oz/a 1% v/v 1% v/v	A A C C C C	PRE PRE POST POST POST POST
10	Harness MAX Roundup PowerMAX II atrazine AMS (liquid)	3.85 lb/gal 4.5 lbae/gal 4 lb/gal	15, 27 9 5	1.5 qt/a 32 fl oz/a 1 pt/a 2.5% v/v	B B B B	EPOST EPOST EPOST EPOST

Trt #	Treatment	Formulation	SOA Group	Rate	App Timing	App Code
11	Maverick*	2.04 lb/gal	4, 15, 27	1 qt/a	A	PRE
	Roundup PowerMAX II	4.5 lbae/gal	9	32 fl oz/a	C	POST
	AMS (liquid)			2.5% v/v	C	POST
12	Maverick*	2.04 lb/gal	4, 15, 27	1 qt/a	A	PRE
	atrazine	4 lb/gal	5	1.5 pt	A	PRE
	Roundup PowerMAX II	4.5 lbae/gal	9	32 fl oz/a	C	POST
	AMS (liquid)			2.5% v/v	C	POST

Adjuvants: AMS = AMSOL; Destiny HC = high surfactant oil concentrate (HSOC); Class Act Ridion = non-AMS water conditioner + NIS

***Maverick** is a new corn herbicide premix from Valent. Maverick is a suspension concentrate that contains 0.523 lb clopyralid, 0.825 lb mesotrione, and 0.690 lb of pyroxasulfone per gallon. Maverick is not yet registered for use at the time of publication of this report.

Trial Summary:

This trial evaluated the weed control and crop safety of various corn herbicide programs from the Bayer and Valent portfolios. There was no significant injury from any of the herbicide programs evaluated.

Giant ragweed was the predominant species in the trial area. Giant ragweed at this research location is a biotype with a prolonged emergence pattern as emergence typically starts in mid-to late-April and continues well into June. The average control of giant ragweed was impacted by herbicide program at all rating timings (Table 1). Most of the PRE herbicides evaluated provided good control (80-92%) 24 days after application. In general, the PRE treatments containing mesotrione (group 27) had longer and more consistent residual control of giant ragweed control than treatments without. None of the herbicide programs evaluated provided >90% control at corn harvest. Giant ragweed control was especially poor (<40%) for all the 1-pass PRE and EPOST herbicide programs. The 2-pass programs on average performed better relative to the 1-pass systems with some treatments averaging over 70% control. 1-pass PRE or EPOST herbicide programs are not recommended in fields with heavy population densities of giant ragweed and/or biotypes with the prolonged emergence pattern similar to this location.

Corn yield was significantly impacted by herbicide program, $p<0.001$ (Table 1). Averaged across all treatments, yield of the 2-pass PRE *fb* POST programs = 202 bu/acre, EPOST = 109 bu/acre and PRE = 56 bu/acre. The untreated check yield = 16 bu/acre.

Plot photos from throughout the growing season are available at [Bayer and Valent Corn Herbicide Programs](#) published on [wiscweeds.info](#).

Table 1. Giant ragweed control ratings and corn grain yield for trial #21-ROK-CN02 at Janesville, WI.^a

Trt #	Herbicide (rate acre ⁻¹)	Giant Ragweed Visual Control (%)					Yield ^b bu acre ⁻¹	
		5/21	5/26	6/8	6/23	11/2		
13	Untreated Check	0	0	0	0	0	16 g	
One-Pass – PRE (4/27)								
1	Corvus (5.6 oz) + atrazine (2 pt)	75	70	58	35	22	29 fg	
2	Corvus (4.5 oz) + Harness XTRA 5.6L (1.5 qt)	81	82	67	41	22	56 ef	
3	Harness MAX (2 qt) + atrazine (2 pt)	86	85	76	55	29	81 de	
One-Pass – EPOST (5/21)								
10	Harness MAX (1.5 qt) + Roundup PMII (32 oz) + atrazine (1 pt) + AMS	NA	94	84	68	38	110 d	
Two-Pass – PRE (4/27) <i>fb</i> POST (5/26)								
4	Harness (2 pt) <i>fb</i> Laudis (3 oz) + Roundup PMII (32 oz) + atrazine (1 pt) + AMS	68	61	94	79	61	175 c	
5	Balance Flexx (4 oz) + atrazine (2 pt) <i>fb</i> Diflexx (6 oz) + Laudis (3 oz) + Roundup PMII (32 oz) + AMS	80	69	97	88	80	223 ab	
6	TripleFlex II (1 qt) <i>fb</i> Diflexx DUO (24 oz) + Roundup PMII (32 oz) + Destiny HC (1% v/v) + Class Act Ridion (1% v/v)	76	69	97	88	85	237 a	
7	Harness Xtra 5.6L (1.5 qt) <i>fb</i> Capreno (3 fl oz) + Roundup PMII (32 oz) + AMS	81	74	96	85	72	187 bc	
8	Harness MAX (2 qt) + atrazine (2 pt) <i>fb</i> Capreno (3 fl oz) + Roundup PMII (32 oz) + AMS	92	87	95	82	65	183 c	
9	Balance Flexx (4 oz) + atrazine (2 pt) <i>fb</i> Diflexx DUO (24 oz) + Roundup PMII (32 oz) + Destiny HC (1% v/v) + Class Act Ridion (1% v/v)	65	43	95	85	75	211 abc	
11	Maverick (1 qt) <i>fb</i> Roundup PMII (32 oz) + AMS	84	84	93	81	66	205 abc	
12	Maverick (1 qt) + atrazine (1.5 pt) <i>fb</i> Roundup PMII (32 oz) + AMS	91	91	93	83	68	200 bc	
		LSD ($\alpha=0.10$)	14	18	11	14	15	36
		p value	0.04	0.002	<0.001	<0.001	<0.001	<0.001

^aVisual control from 70-100% is illustrated on a color scale with green representing greater weed control values.^bYield values with the same letter are not significantly different.

Project Goal: Compare Shieldex applied POST to industry standards for weed control and crop safety.

Site Description:

Location:	Janesville, WI	Crop:	Corn
Field #:	8	Hybrid:	DKC 54-38 RIB
Soil type:	Plano silt loam	Planting Date:	5/24
% OM:	3.3	Emergence Date:	6/2
pH:	6.4	Population:	35,000 seeds/acre
Fertilization:	180 lbs N/acre	Depth:	2 in
Previous crop:	Soybean	Row spacing:	30 in
Tillage:	conventional	Plot Size:	10 x 30 ft
Weed species:	giant ragweed (AMBTR), velvetleaf (ABUTH)		

Herbicide Application Information:

	Date:	5/24	6/15
	Treatment:	PRE (A)	POST (B)
Air Temp (°F):		88	73
2" Soil Temp (°F):		78	67
Soil moisture [surface]:		dry	very dry
RH %:		56	58
Cloud cover %		80	50
Wind speed (mph)/direction		1-8/SW	1-5/NNE
Rainfall (in) 1 wk after APP:		0.64"	1.75"
GPA:		15	15
PSI:		34	34
Nozzle:	TTI 110015	TT 110015	
Nozzle spacing (in):		20	20
Boom Height (in):		20	25

Crop and weed information at application:

	Date:	5/24	6/15
Corn	Height:	-	8-9"
	Stage:	-	V4
giant ragweed	Height:	-	1-5"
	Density:	-	1-43/m ²
velvetleaf	Height:	-	1-3"
	Density:	-	0.2-16/m ²

Trt #	Treatment	Formulation	SOA Group	Rate	App Timing	App Code
1	Bicep Lite II Magnum	6 lb/gal	5, 15	1.5 qt/a	PRE	A
2	Bicep Lite II Magnum	6 lb/gal	5, 15	1.5 qt/a	PRE	A
	Shieldex	3.33 lb/gal	27	1 fl oz/a	POST	B
	AAtrex	4 lb/gal	5	1 pt/a	POST	B
	COC			1% v/v	POST	B
	AMS (liquid)			2.5% v/v	POST	B
3	Bicep Lite II Magnum	6 lb/gal	5, 15	1.5 qt/a	PRE	A
	Impact	2.8 lb/gal	27	0.75 fl oz/a	POST	B
	AAtrex	4 lb/gal	5	1 pt/a	POST	B
	COC			1% v/v	POST	B
	AMS (liquid)			2.5% v/v	POST	B
4	Bicep Lite II Magnum	6 lb/gal	5, 15	1.5 qt/a	PRE	A
	Laudis	3.5 lb/gal	27	3 fl oz/a	POST	B
	AAtrex	4 lb/gal	5	1 pt/a	POST	B
	COC			1% v/v	POST	B
	AMS (liquid)			2.5% v/v	POST	B
5	Bicep Lite II Magnum	6 lb/gal	5, 15	1.5 qt/a	PRE	A
	Shieldex	3.33 lb/gal	27	1 fl oz/a	POST	B
	AAtrex	4 lb/gal	5	1 pt/a	POST	B
	Roundup PowerMax II	4.5 lbae/gal	9	30 fl oz/a	POST	B
	AMS (liquid)			2.5% v/v	POST	B
6	Bicep Lite II Magnum	6 lb/gal	5, 15	1.5 qt/a	PRE	A
	Shieldex	3.33 lb/gal	27	1 fl oz/a	POST	B
	AAtrex	4 lb/gal	15	1 pt/a	POST	B
	Liberty	2.34 lb/gal	10	32 fl oz/a	POST	B
	COC			1% v/v	POST	B
	AMS (liquid)			2.5% v/v	POST	B

Adjuvants: AMS = AMSOL; COC = Crop Oil

Trial Summary:

This trial compared the efficacy and crop safety of Shieldex plus atrazine tank mix applied POST to industry standards.

None of the POST herbicide treatments caused significant corn injury (data not shown). All treatments had <6% corn leaf necrosis 14 days after application and were statistically similar. There was no visible corn injury 30 days after the POST application.

Post-emergence giant ragweed and velvetleaf control was similar amongst the herbicide programs evaluated (Table 2). All POST treatments were effective at controlling emerged giant ragweed; however, a few giant ragweed seedlings emerged after the POST application and control 14 days after application was 86-94%. Shieldex, Impact, Laudis and the low rate of atrazine used have little residual activity on giant ragweed. Shieldex and Laudis treatments had slightly greater giant ragweed control than Impact 30 days after application.

Giant ragweed visual control ratings from this trial should not be compared to trials conducted in other fields at the Rock County Farm in Janesville, WI. Giant ragweed density in this field (field #8) is much lower than other fields containing corn herbicide trials in 2021. This trial was also planted almost a month later (5/24) than other trials (4/26).

Corn grain yield was similar amongst all POST herbicide programs (Table 2). Averaged across all POST programs corn, yield was 249 bu/acre compared to only 77 bu/acre for the 1-pass PRE Bicep Lite II Magnum treatment.

Plot photos from throughout the growing season are available at [Shieldex Weed Control and Crop Safety](#) published on [wiscweeds.info](#).

Table 2. Weed control ratings and corn grain yield for trial #21-ROK-CN03 at Janesville, WI.^a

Trt #	Herbicide (rate acre ⁻¹)	Giant Ragweed (%)			Velvetleaf (%)		Yield ^b bu acre ⁻¹
		6/29	7/15	11/3	6/29	7/15	
One-Pass – PRE (5/24)							
1	Bicep Lite II Magnum (1.5 qt)	0	0	0	0	0	77 b
Two-Pass – PRE (5/24) <i>fb</i> POST (6/15)							
2	Bicep Lite II Magnum (1.5 qt) <i>fb</i> Shieldex (1 oz) + AAtrex (1 pt) + COC 1% v/v + AMS 2.5% v/v	91	89	98	80	75	253 a
3	Bicep Lite II Magnum (1.5 qt) <i>fb</i> Impact (0.75 oz) + AAtrex (1 pt) + COC 1% v/v + AMS 2.5% v/v	86	84	95	83	79	248 a
4	Bicep Lite II Magnum (1.5 qt) <i>fb</i> Laudis (3 oz) + AAtrex (1 pt) + COC 1% v/v + AMS 2.5% v/v	89	87	97	97	90	245 a
5	Bicep Lite II Magnum (1.5 qt) <i>fb</i> Shieldex (1 oz) + AAtrex (1 pt) + Roundup PMII (30 oz) + AMS 2.5% v/v	94	87	98	92	82	252 a
6	Bicep Lite II Magnum (1.5 qt) <i>fb</i> Shieldex (1 oz) + AAtrex (1 pt) + Liberty (32 oz) + COC 1% v/v + AMS 2.5% v/v	87	84	96	85	77	249 a
		LSD ($\alpha=0.10$)	ns	3	ns	ns	19
		p value	0.261	0.032	0.649	0.287	<0.001

^aVisual control from 70-100% is illustrated on a color scale with green representing greater weed control values.^bYield values with the same letter are not significantly different.

Project Goal: Compare single and split applications of Restraint applied PRE and POST to industry standards for weed control and crop safety.

Site Description:

Location:	Janesville, WI	Crop:	Corn
Field #:	8	Hybrid:	DKC 54-38 RIB
Soil type:	Plano silt loam	Planting Date:	5/24
% OM:	3.3	Emergence Date:	6/2
pH:	6.4	Population:	35,000 seeds/acre
Fertilization:	180 lbs N/acre	Depth:	2 in
Previous crop:	Soybean	Row spacing:	30 in
Tillage:	conventional	Plot Size:	10 x 30 ft
Weed species:	giant ragweed (AMBTR), velvetleaf (ABUTH)		

Herbicide Application Information:

Date:	5/24	6/15
Treatment:	PRE (A)	POST (B)
Air Temp (°F):	88	73
2" Soil Temp (°F):	78	67
Soil moisture [surface]:	dry	very dry
RH %:	56	58
Cloud cover %	80	50
Wind speed (mph)/direction	1-8/SW	1-5/NNE
Rainfall (in) 1 wk after APP:	0.64"	1.75"
GPA:	15	15
PSI:	34	34
Nozzle:	TTI 110015	TT 110015
Nozzle spacing (in):	20	20
Boom Height (in):	20	25

Crop and weed information at application:

	Date:	5/24	6/15
Corn	Height:	-	8-9"
	Stage:	-	V4
giant ragweed	Height:	-	1-5"
	Density:	-	1-43/m ²
velvetleaf	Height:	-	1-3"
	Density:	-	0.2-16/m ²

Trt #	Treatment	Formulation	SOA Group	Rate	App Timing	App Code
1	Untreated Check					
2	Restraint	6.5 lb/gal	15, 27	36 fl oz/a	PRE	A
	AAtrex	4 lb/gal	5	2 pt/a	PRE	A
	Shieldex	3.33 lb/gal	27	1 fl oz/a	POST	B
	AAtrex	4 lb/gal	5	1 pt/a	POST	B
	COC			1% v/v	POST	B
3	Restraint	6.5 lb/gal	15, 27	18 fl oz/a	PRE	A
	AAtrex	4 lb/gal	5	2 pt/a	PRE	A
	Restraint	6.5 lb/gal	15, 27	18 fl oz/a	POST	B
	AAtrex	4 lb/gal	5	1 pt/a	POST	B
	COC			1% v/v	POST	B
4	Resicore	3.29 lb/gal	4, 15, 27	40 fl oz/a	PRE	A
	AAtrex	4 lb/gal	5	2 pt/a	PRE	A
	Restraint	6.5 lb/gal	15, 27	30 fl oz/a	POST	B
	AAtrex	4 lb/gal	5	1 pt/a	POST	B
	COC			1% v/v	POST	B
5	Resicore	3.29 lb/gal	4, 15, 27	40 fl oz/a	PRE	A
	AAtrex	4 lb/gal	5	2 pt/a	PRE	A
	Resicore	3.29 lb/gal	4, 15, 27	40 fl oz/a	POST	B
	AAtrex	4 lb/gal	5	1 pt/a	POST	B
	COC			1% v/v	POST	B

Adjuvants: COC = Crop Oil

Trial Summary:

This trial compared single and split applications of Restraint applied PRE and POST to an industry standard for weed control and crop safety. Restraint is a newer herbicide offering from Summit Agro containing a premix of tolypralate (0.094 lbs gal⁻¹; group 14) and acetochlor (6.404 lbs gal⁻¹; group 15).

All the POST herbicide treatments showed visible corn injury (leaf necrosis) 8 and 14 days after application (Table 3). POST applications of Restraint and Resicore had greater corn injury than Shieldex. Restraint at 30 fl oz had slightly more injury than Restraint at 18 fl oz. Corn growth and development was not significantly impacted as there was no visible corn injury 30 days after the POST application (data not shown).

PRE and POST giant ragweed and velvetleaf control was impacted by herbicide program (Table 3). 40 fl oz Resicore + 2 pt AAtrex had greater PRE residual control of both species than either rate of Restraint 15 days after application. The active ingredients in Restraint (acetochlor, tolypralate) don't have great activity on giant ragweed and will only suppress velvetleaf. Giant ragweed and velvetleaf control was similar for all treatments 14 days after the POST application although POST treatments following the PRE application of Resicore had better control up to 30 days after application.

Giant ragweed visual control ratings from this trial should not be compared to trials conducted in other fields at the Rock County Farm in Janesville, WI. Giant ragweed density in this field (field #8) is much lower than other fields containing corn herbicide trials in 2021. This trial was also planted almost a month later (5/24) than other trials (4/26).

Corn grain yield was very similar amongst all herbicide programs (Table 3). Averaged across all POST programs corn yield was 248 bu/acre compared to only 79 bu/acre for the untreated check.

Plot photos from throughout the growing season are available at [Restraint Weed Control and Crop Safety](#) published on [wiscweeds.info](#).

Table 3. Corn injury, weed control ratings, and corn grain yield for trial #21-ROK-CN04 at Janesville, WI.^a

Trt #	Herbicide (rate acre ⁻¹)	Crop Injury (%) ^c		Giant Ragweed (%)				Velvetleaf (%)			Yield ^b bu acre ⁻¹
		6/23	6/29	6/8	6/29	7/15	11/3	6/8	6/29	7/15	
1	Untreated Check	0	0	0	0	0	0	0	0	0	79 b
Two-Pass – PRE (5/24) <i>fb</i> POST (6/15)											
2	Restraint (36 oz) + AAtrex (2 pt) <i>fb</i> Shieldex (1 oz) + AAtrex (1 pt) + COC 1% v/v	5	5	49	88	87	96	37	88	84	250 a
3	Restraint (18 oz) + A Atrex (2 pt) <i>fb</i> Restraint (18 oz) + AAtrex (1 pt) + COC 1% v/v	11	11	39	86	86	96	55	95	89	247 a
4	Resicore (40 oz) + AAtrex (2 pt) <i>fb</i> Restraint (30 oz) + AAtrex (1 pt) + COC 1% v/v	13	11	65	92	91	98	75	99	99	246 a
5	Resicore (40 oz) + AAtrex (2 pt) <i>fb</i> Resicore (40 oz) + AAtrex (1 pt) + COC 1% v/v	10	8	66	96	96	99	72	100	100	250 a
LSD ($\alpha=0.10$)		2	4	10	7	4	2	17	ns	5	29
p value		<0.001	0.063	0.002	0.084	0.005	0.052	0.014	0.304	0.003	<0.001

^aVisual control from 70-100% is illustrated on a color scale with green representing greater weed control values.^bYield values with the same letter are not significantly different.^cCrop injury symptoms included leaf necrosis and chlorosis.

Project Goal: Evaluate early postemergence and sequential split applications of Maverick, a new corn herbicide premix from Valent.

*Maverick is a suspension concentrate that contains 0.523 lb clopyralid, 0.825 lb mesotrione, and 0.690 lb of pyroxasulfone per gallon. Maverick is not yet registered for use at the time of publication of this report.

Site Description:

Location:	Janesville, WI	Crop:	Corn
Field #:	4	Hybrid:	DKC54-38 RIB
Soil type:	Plano silt loam	Planting Date:	4/26
% OM:	3.3	Emergence Date:	5/11
pH:	6.7	Population:	35,000 seeds/acre
Fertilization:	180 lbs N/acre	Depth:	2.25 in
Previous crop:	Soybean	Row spacing:	30 in
Tillage:	conventional	Plot Size:	10 x 30 ft
Weed species:	giant ragweed (AMBTR)		

Herbicide Application Information:

	4/27	5/21	6/8
Treatment:	PRE (A)	EPOST (B)	POST (C)
Air Temp (°F):	88	75	78
2" Soil Temp (°F):	72	64	76
Soil moisture [surface]:	dry	moist	very dry
RH %:	36	67	69
Cloud cover %	35	80	90
Wind speed (mph)/direction	3-7/NNE	3-8/SSE	0-0.5/S
Rainfall (in) 1 wk after APP:	1.2"	0.88"	0.05"
GPA:	15	15	15
PSI:	34	34	34
Nozzle:	TTI 110015	TTI 110015	TTI 110015
Nozzle spacing (in):	20	20	20
Boom Height (in):	20	23	23

Crop and weed information at application:

	Date:	4/27	5/21	6/8
Corn	Height:	-	2.5-3.5"	8-12"
	Stage:	-	V2	V5/V6
Giant ragweed	Height:	-	0.5-3"	1-13" avg=5"
	Density:	-	118-112 m ²	38-68 m ²

Trt #	Treatment	Formulation	SOA Group	Rate	App Timing	App Code
1	Untreated Check					
2	Acuron Roundup PowerMAX II NIS AMS	3.44 lb/gal 4.5 lb ae/gal	5, 15, 27 9	1.5 qt/a 32 fl oz/a 0.25% v/v 3 lb/a	EPOST EPOST EPOST EPOST	B B B B
3	Halex GT NIS AMS	4.39 lb/gal	9, 15, 27	4 pt/a 0.25% v/v 3 lb/a	EPOST EPOST EPOST	B B B
4	Armezon PRO Roundup PowerMAX II NIS AMS	5.35 lb/gal 4.5 lb ae/gal	15, 27 9	24 fl oz/a 32 fl oz/a 0.25% v/v 3 lb/a	EPOST EPOST EPOST EPOST	B B B B
5	Resicore Roundup PowerMAX II NIS AMS	3.29 lb/gal 4.5 lb ae/gal	4, 15, 27 9	44 fl oz/a 32 fl oz/a 0.25% v/v 3 lb/a	EPOST EPOST EPOST EPOST	B B B B
6	Maverick* Roundup PowerMAX II NIS AMS	2.04 lb/gal 4.5 lb ae/gal	4, 15, 27 9	14 fl oz/a 32 fl oz/a 0.25% v/v 3 lb/a	EPOST EPOST EPOST EPOST	B B B B
7	Maverick* AAtrex Roundup PowerMAX II NIS AMS	2.04 lb/gal 4 lb/gal 4.5 lb ae/gal	4, 15, 27 5 9	14 fl oz/a 1.5 pt/a 32 fl oz/a 0.25% v/v 3 lb/a	EPOST EPOST EPOST EPOST EPOST	B B B B B
8	Acuron Acuron Roundup PowerMAX II NIS AMS	3.44 lb/gal 3.44 lb/gal 4.5 lb ae/gal	5, 15, 27 5, 15, 27 9	1.5 qt/a 1.5 qt/a 32 fl oz/a 0.25% v/v 3 lb/a	PRE EPOST EPOST EPOST EPOST	A B B B B
9	Maverick* Maverick* Roundup PowerMAX II NIS AMS	2.04 lb/gal 2.04 lb/gal 4.5 lb ae/gal	4, 15, 27 4, 15, 27 9	18 fl oz/a 14 fl oz/a 32 fl oz/a 0.25% v/v 3 lb/a	PRE EPOST EPOST EPOST EPOST	A B B B B
10	Maverick* AAtrex Maverick* AAtrex Roundup PowerMAX II NIS AMS	2.04 lb/gal 4 lb/gal 2.04 lb/gal 4 lb/gal 4.5 lb ae/gal	4, 15, 27 5 4, 15, 27 5 9	18 fl oz 1 pt/a 14 fl oz/a 1 pt/a 32 fl oz/a 0.25% v/v 3 lb/a	PRE PRE EPOST EPOST EPOST EPOST EPOST	A A B B B B B

Adjuvants: AMS = BlueAg spray grade ammonium sulfate; NIS = Induce

Trial Summary:

This trial compared the weed control and crop safety of early postemergence and sequential split applications of Maverick to industry standards.

Minor (<5%) corn leaf necrosis was observed 5 days after the early POST applications (Table 4). Corn growth and development was not significantly impacted as there was no visible injury 17 days after application.

Giant ragweed was the predominant species in the trial area. Giant ragweed at this research location is a biotype with a prolonged emergence pattern as emergence typically starts in mid-to late-April and continues well into June. Giant ragweed visual weed control was impacted by herbicide program at all rating timings (Table 4). The PRE herbicides provided fair residual control (76-82%) 24 days after application. Acuron provided slightly better residual control (73%) 41 days after the PRE application than Maverick (61%) or Maverick + atrazine (60%). All EPOST treatments effectively controlled giant ragweed plants that were emerged at herbicide application. However, none of the EPOST treatments provided acceptable levels of giant ragweed for the duration of the growing season as control for most treatments was <80% at all the later rating dates. Several flushes of giant ragweed emerged after application. All the 1-pass EPOST herbicide programs provided similar levels of giant ragweed control throughout the growing season with exception of Maverick + atrazine + glyphosate which always had greater control. All the 2-pass PRE followed by POST herbicide programs provided excellent (>96%) control after the POST application had been made. Making the POST application 18 days later than the EPOST application allowed most of the giant ragweed to emerge and be controlled by the herbicide's burndown activity. A 1-pass EPOST herbicide program is not recommended in fields with heavy population densities of giant ragweed and/or biotypes with the prolonged emergence pattern similar to this location.

Corn yield was significantly impacted by herbicide program, $p<0.001$ (Table 4). Averaged across all treatments, yield of the 2-pass PRE *fb* POST programs = 218 bu/acre and EPOST = 68 bu/acre. The untreated check yield only yielded 11 bu/acre indicating the very heavy giant ragweed density in this trial.

Plot photos from throughout the growing season are available at [POST and Sequential Weed Control with Maverick](#) published on [wiscweeds.info](#).

Table 4. Corn injury, giant ragweed visual control, and corn grain yield for trial #21-ROK-CN06 at Janesville, WI.^a

Trt #	Herbicide (rate acre ⁻¹)	Crop Injury ^c (%)		Giant Ragweed Control (%)				Yield ^b bu acre ⁻¹	
		5/26	6/7	5/26	6/7	6/18	11/2		
1	Untreated Check	0	0	0	0	0	0	11 d	
One-Pass – EPOST (5/21)									
2	Acuron (1.5 qt) + Roundup PM II (32 oz) + NIS 0.25% v/v + AMS	2.3	0	85	76	53	16	56 c	
3	Halex GT (4 pt) + NIS 0.25% v/v + AMS	3.3	0	86	78	55	19	53 c	
4	Armezon PRO (24 oz) + Roundup PM II (32 oz) + NIS 0.25% v/v + AMS	1.3	0	91	79	57	25	66 c	
5	Resicore (44 oz) + Roundup PM II (32 oz) + NIS 0.25% v/v + AMS	4.3	0	90	79	56	20	68 c	
6	Maverick ^d (14 oz) + Roundup PM II (32 oz) + NIS 0.25% v/v + AMS	3.5	0	90	78	58	19	64 c	
7	Maverick ^d (14 oz) + AAtrex (1.5 pt) + Roundup PM II (32 oz) + NIS 0.25% v/v + AMS	2.5	0	95	85	73	34	101 b	
Two-Pass – PRE (4/27) fb POST (6/8)									
8	Acuron (1.5 qt) fb Acuron (1.5 qt) + Roundup PM II (32 oz) + NIS 0.25% v/v + AMS	0	0	82	73	99	100	221 a	
9	Maverick ^d (18 oz) fb Maverick ^d (14 oz) + Roundup PM II (32 oz) + NIS 0.25% v/v + AMS	0	0	77	61	97	98	209 a	
10	Maverick ^d (18 oz) + AAtrex (1 pt) fb Maverick ^d (14 oz) + AAtrex (1 pt) + Roundup PM II (32 oz) + NIS 0.25% v/v + AMS	0	0	76	60	99	99	224 a	
		LSD ($\alpha=0.10$)	0.6	ns	5	10	10	14	26
		p value	<0.001	ns	<0.001	0.003	<0.001	<0.001	<0.001

^aVisual control from 70-100% is illustrated on a color scale with green representing greater weed control values.^bYield values with the same letter are not significantly different.^cVisual corn injury rated was leaf necrosis.^dMaverick is a suspension concentrate that contains 0.523 lb clopyralid, 0.825 lb mesotrione, and 0.690 lb of pyroxasulfone per gallon. Maverick is not yet registered for use at the time of publication of this report.

Project Goal: Compare the efficacy and crop safety of early POST applications of Armezon PRO, Empyros, Impact Core, and Katagon.

Site Description:

Location:	Janesville, WI	Crop:	Corn
Field #:	8	Hybrid:	DKC 54-38 RIB
Soil type:	Plano silt loam	Planting Date:	5/24
% OM:	3.3	Emergence Date:	6/2
pH:	6.4	Population:	35,000 seeds/acre
Fertilization:	180 lbs N/acre	Depth:	2 in
Previous crop:	Soybean	Row spacing:	30 in
Tillage:	conventional	Plot Size:	10 x 30 ft
Weed species:	giant ragweed, velvetleaf, redroot pigweed, smooth pigweed, waterhemp, giant foxtail, fall panicum, barnyardgrass		

Herbicide Application Information:

Date:	5/24	6/11
Treatment:	PRE (A)	EPOST (B)
Air Temp (°F):	88	80
2" Soil Temp (°F):	78	-
Soil moisture [surface]:	dry	very dry
RH %:	56	67
Cloud cover %	80	0
Wind speed (mph)/direction	1-8/SW	2-5
Rainfall (in) 1 wk after APP:	0.64"	1.5"
GPA:	15	15
PSI:	34	34
Nozzle:	TTI 110015	TT 110015
Nozzle spacing (in):	20	20
Boom Height (in):	20	25

Crop and weed information at application:

	Date:	5/24	6/11
Corn	Height:	-	5-7"
	Stage:	-	V3
giant ragweed	Height:	-	1-4"
	Density:	-	1-43/m ²
velvetleaf	Height:	-	1-3"
	Density:	-	0.2-16/m ²
pigweed sp.	Height:	-	0.5-1"
	Density:	-	0.5-4/m ²
annual grasses	Height:	-	1-4"
	Density:	-	-

Trt #	Treatment	Formulation	SOA Group	Rate	App Timing	App Code
1	Untreated Check					
2	Empyros atrazine Zaar (MSO)	3.82 lb/gal 4 lb/gal	15, 27 5	32 fl oz/a 1 pt/a 1 pt/a	B B B	EPOST EPOST EPOST
3	Armezon PRO atrazine Zaar (MSO)	5.35 lb/gal 4 lb/gal	15, 27 5	16 fl oz/a 1 pt/a 1 pt/a	B B B	EPOST EPOST EPOST
4	Empyros atrazine Zaar (MSO)	3.82 lb/gal 4 lb/gal	15, 27 5	48 fl oz/a 1.5 pt/a 1 pt/a	B B B	EPOST EPOST EPOST
5	Armezon PRO atrazine Zaar (MSO)	5.35 lb/gal 4 lb/gal	15, 27 5	24 fl oz/a 1.5 pt/a 1 pt/a	B B B	EPOST EPOST EPOST
6	Empyros atrazine Zaar (MSO)	3.82 lb/gal 4 lb/gal	15, 27 5	64 fl oz/a 2 pt/a 1 pt/a	B B B	EPOST EPOST EPOST
7	Armezon PRO atrazine Zaar (MSO)	5.35 lb/gal 4 lb/gal	15, 27 5	32 fl oz/a 2 pt/a 1 pt/a	B B B	EPOST EPOST EPOST
8	Armezon PRO atrazine Zaar (MSO)	5.35 lb/gal 4 lb/gal	15, 27 5	20 fl oz/a 1 pt/a 1 pt/a	B B B	EPOST EPOST EPOST
9	Impact Core atrazine Zaar	7.5 lb/gal 4 lb/gal	15, 27 5	28 fl oz/a 1 pt/a 1 pt/a	B B B	EPOST EPOST EPOST
10	Impact Core atrazine Zaar	7.5 lb/gal 4 lb/gal	15, 27 5	22.5 fl oz/a 1 pt/a 1 pt/a	B B B	EPOST EPOST EPOST
11	Fearless* Katagon Destiny HC	7 lb/gal 2 lb/gal	15 2, 27	14 fl oz/a 3.2 fl oz/a 1% v/v	A B B	PRE EPOST EPOST
12	Fearless* Katagon atrazine Destiny HC	7 lb/gal 2 lb/gal 4 lb/gal	15 2, 27 5	14 fl oz/a 3.2 fl oz/a 2 pt/a 1% v/v	A B B B	PRE EPOST EPOST EPOST

Adjuvants: Zaar=MSO + water conditioner; Destiny HC = high surfactant oil concentrate (HSOC)

*Fearless was applied at ½ the recommended labeled rate to allow weed escapes in order to evaluate the POST efficacy of Katagon.

Trial Summary:

This trial compared the efficacy and crop safety of early POST applications of Armezon PRO, Empyros, Impact Core, and Katagon. Empyros and Katagon are premixes that both contain the relatively new HPPD active ingredient tolypyralate.

All POST herbicide treatments showed visible corn injury 7 days after application (Table 6). Empyros at all rates showed significant corn bleaching and leaf necrosis. Armezon PRO and Impact Core had similar levels of corn leaf necrosis. The Katagon and Katagon + atrazine treatments had leaf bleaching and minor leaf necrosis with the later showing greater injury. Only the Empyros treatments showed any significant injury later in the growing season. At 26 DAT, plots sprayed with Empyros at all rates were stunted 3-5% relative to the untreated check. All other treatments had minimal corn stunting. Applications were made in a very hot and dry period of early June, thus corn injury observed in this trial may be higher than normal.

Large seeded broadleaf control (giant ragweed; velvetleaf) was similar across all treatments (Table 5). Initial control 7 days after application was excellent >90%; however, control fell below 90% for most treatments later in the season due to seedling emergence after application. Pigweed sp. control was excellent for most herbicide programs at all rating dates (Table 5). Only Empyros at the lowest rate (32 fl oz) fell below 90%. Annual grass control varied among treatments (Table 5). Empyros and Katagon both had good initial control of grass weeds. Armezon PRO and Impact Core had very poor control of emerged grass weeds. Annual grass species included a mixture of giant foxtail, fall panicum, and barnyardgrass. Grass pressure was generally low and inconsistent across the trial area.

Giant ragweed visual control ratings from this trial should not be compared to trials conducted in other fields at the Rock County Farm in Janesville, WI. Giant ragweed density in this field (field #8) is much lower than in other fields containing corn herbicide trials in 2021. This trial was also planted almost a month later (5/24) than other trials (4/26).

Corn grain yield differed amongst herbicide programs (Table 6); however, yield was good (>230 bu acre⁻¹) for all herbicide treatments. Averaged across all use rates and atrazine rates, yield of each herbicide in order of highest to lowest was Armezon PRO (254) > Katagon (247) > Impact Core (242) > Empyros (239). Yield of the untreated check was 54 bu acre⁻¹.

Plot photos from throughout the growing season are available at [Weed Control and Crop Safety with EPOST Herbicide Applications](#) published on [wiscweeds.info](#).

Table 5. Weed control visual ratings for trial #21-ROK-CN08 at Janesville, WI.^a

Trt #	Herbicide (rate acre ⁻¹)	Giant Ragweed (%)			Velvetleaf (%)			Pigweed ^b (%)			Annual Grasses ^c (%)		
		6/18	7/7	7/28	6/18	7/7	7/28	6/18	7/7	7/28	6/18	7/7	7/28
1	Untreated Check	0	0	0	0	0	0	0	0	0	0	0	0
One-Pass – EPOST (6/11)													
2	Empyros (32 oz) + atrazine (1 pt) + Zaar (1 pt)	99	89	79	100	84	70	100	95	84	100	94	89
3	Armezon PRO (16 oz) + atrazine (1 pt) + Zaar (1pt)	98	92	83	100	91	79	100	97	93	45	73	71
4	Empyros (48 ox) + atrazine (1.5 pt) + Zaar (1pt)	99	89	81	100	85	76	100	98	93	100	94	83
5	Armezon PRO (24 oz) + atrazine (1.5 pt) + Zaar (1pt)	98	90	83	100	89	79	100	97	94	70	79	79
6	Empyros (64 ox) + atrazine (2 pt) + Zaar (1pt)	99	88	80	100	91	80	100	99	96	100	97	92
7	Armezon PRO (32 oz) + atrazine (2 pt) + Zaar (1 pt)	99	95	88	100	95	85	100	100	97	88	85	86
8	Armezon PRO (20 oz) + atrazine (1 pt) + Zaar (1 pt)	99	91	90	100	88	79	100	98	90	59	70	71
9	Impact Core (28 oz) + atrazine (1 pt) + Zaar (1 pt)	98	91	83	100	90	76	100	100	99	49	65	69
10	Impact Core (22.5 oz) + atrazine (1 pt) + Zaar (1 pt)	98	89	84	100	92	80	100	99	97	41	66	63
Two-Pass – PRE (5/24) fb POST (6/11)													
11	Fearless (14 oz) fb Katagon (3.2 oz) + Destiny HC 1% v/v	93	90	85	100	90	79	100	99	94	80	90	83
12	Fearless (14 oz) fb Katagon (3.2 oz) + atrazine (2 pt) + Destiny HC 1% v/v	99	87	81	100	93	82	100	99	97	99	96	90
LSD ($\alpha=0.10$)		2	ns	ns	ns	ns	ns	ns	ns	7	28	13	13
p value		<0.001	0.579	0.103	0.465	0.107	0.218	1.00	0.24	0.068	0.001	<0.001	0.006

^aVisual control from 70-100% is illustrated on a color scale with green representing greater weed control values.^bPigweed species included a mixture of redroot and smooth pigweed (~50%) and common waterhemp (~50%).^cAnnual grass species included a mixture of giant foxtail, fall panicum, and barnyardgrass. Grass pressure was generally low and inconsistent across the trial area.

Table 6. Corn injury ratings and grain yield for trial #21-ROK-CN08 at Janesville, WI

Trt #	Herbicide (rate acre ⁻¹)	Crop Injury (%)		Yield ^c (bu acre ⁻¹)
		6/18 ^a	7/7 ^b	
1	Untreated Check	0.0	0.0	54 e
One-Pass – EPOST (6/11)				
2	Empyros (32 oz) + atrazine (1 pt) + Zaar (1 pt)	11.5	3.5	235 d
3	Armezon PRO (16 oz) + atrazine (1 pt) + Zaar (1pt)	6.5	0.0	250 abc
4	Empyros (48 ox) + atrazine (1.5 pt) + Zaar (1pt)	11.3	4.8	243 a-d
5	Armezon PRO (24 oz) + atrazine (1.5 pt) + Zaar (1pt)	8.0	0.5	256 ab
6	Empyros (64 ox) + atrazine (2 pt) + Zaar (1pt)	12.1	4.5	239 cd
7	Armezon PRO (32 oz) + atrazine (2 pt) + Zaar (1 pt)	8.0	0.8	252 abc
8	Armezon PRO (20 oz) + atrazine (1 pt) + Zaar (1 pt)	7.8	0.5	257 a
9	Impact Core (28 oz) + atrazine (1 pt) + Zaar (1 pt)	8.5	1.5	242 bcd
10	Impact Core (22.5 oz) + atrazine (1 pt) + Zaar (1 pt)	8.3	1.0	243 a-d
Two-Pass – PRE (5/24) <i>fb</i> POST (6/11)				
11	Fearless (14 oz) <i>fb</i> Katagon (3.2 oz) + Destiny HC 1% v/v	2.5	0.5	253 abc
12	Fearless (14 oz) <i>fb</i> Katagon (3.2 oz) + atrazine (2 pt) + Destiny HC 1% v/v	7.0	2.5	242 bcd
		LSD ($\alpha=0.10$)	1.2	1.2
		p value	<0.001	<0.001
				14 <0.001

^aCrop injury symptoms at 6/18 rating included leaf necrosis and leaf bleaching. Empyros treatments had both bleaching and necrosis; Armezon PRO and Impact Core had necrosis; Katagon had bleaching and minor necrosis.

^bCrop injury was rated for corn stunting at the 7/7 rating.

^cYield values with the same letter are not significantly different.

Project Goal: Evaluate the residual control of troublesome weeds with single and multiple SOA herbicide products commonly used in corn production systems in Wisconsin.

Site Description:

Trial #:	21-ROK-CN11	21-LAN-CN11
Location:	Janesville, WI	Lancaster, WI
Field #:	3	SIDS-SW
Soil Type:	Plano silt loam	Fayette silt loam
Soil Texture % sand/silt/clay:	8/66/26	-
% OM:	3.3	2.5
pH:	6.7	7.2
Fertilization:	180 lb N/acre	115 lb N/acre
Previous Crop:	soybean	soybean
Tillage:	conventional	conventional
Hybrid:	NK 9653-5222EZ	B97T04SXE
Planting Date:	4/26	4/28
Emergence Date:	5/11	5/11
Seeding Rate (seeds acre⁻¹):	35,000	32,500
Depth:	2.25 in	1.75 in
Row Spacing:	30 in	30 in
Plot Size:	10 x 30 ft	10 x 30 ft

Herbicide Application Information:

Date:	4/27	4/29
Treatment:	PRE (A)	PRE (A)
Air Temp (°F):	88	66
2" Soil Temp (°F):	72	64
Soil moisture [surface]:	dry	dry
RH %:	36	30
Cloud cover %:	35	5
Wind speed (mph)/direction:	3-7/NNE	11/NNE
Rainfall (in) 1 wk after APP:	1.20	1.25
Rainfall (in) 2 wks after APP:	1.55	1.26
GPA:	15	15
PSI:	34	35
Nozzle:	TTI 110015	TTI 110015

Trt #	Treatment	Formulation	SOA Group	Rate	App Timing	App Code
1	Untreated Check					
2	Diflexx	4 lb ae/gal	4	16 fl oz/a	PRE	A
3	AAtrex	4 lb/gal	5	2 pt/a	PRE	A
4	Princep 4FL	4 lb/gal	5	2 qt/a	PRE	A
5	Harness	7 lb/gal	15	2 pt/a	PRE	A
6	Dual II Magnum	7.64 lb/gal	15	1.67 pt/a	PRE	A
7	Balance Flexx	2 lb/gal	27	4.5 fl oz/a	PRE	A
8	Callisto	4 lb/gal	27	5 fl oz/a	PRE	A
9	Harness Max	3.85 lb/gal	15, 27	2 qt/a	PRE	A
10	Corvus	2.63 lb/gal	2, 27	5.6 fl oz/a	PRE	A
11	Bicep Lite II Magnum	6 lb/gal	5, 15	1.75 qt/a	PRE	A
12	Harness Xtra	6 lb/gal	5, 15	2 qt/a	PRE	A
13	Verdict	5.57 lb/gal	14, 15	15 fl oz/a	PRE	A
14	Hornet WDG	78.5% w/w	2, 4	4 oz/a	PRE	A
15	Acuron Flexi	3.26 lb/gal	15, 27	2 qt/a	PRE	A
16	Acuron	3.44 lb/gal	5, 15, 27	2.5 qt/a	PRE	A
17	Surestart II	4.25 lb/gal	2, 4, 15	2.5 pt/a	PRE	A
18	Resicore	3.29 lb/gal	4, 15, 27	2.5 qt/a	PRE	A
19	Maverick*	2.04 lb/gal	4, 15, 27	1 qt/a	PRE	A

*Maverick is a suspension concentrate that contains 0.523 lb clopyralid, 0.825 lb mesotrione, and 0.690 lb of pyroxasulfone per gallon. Maverick is not yet registered for use at the time of publication of this report.

Rate equivalents of herbicide premixes at rates used in trial.

Herbicide Premix	Rate	Rate Equivalents (rate acre ⁻¹)
Harness Max	2 qt/a	2 pt Harness + 5.3 fl oz Callisto
Corvus	5.6 fl oz/a	5.3 fl oz Balance Flexx + 0.525 oz ai thiencarbazone
Bicep Lite II Magnum	1.75 qt/a	1.53 pt Dual II Magnum + 2.34 pt AAtrex 4L
Harness Xtra	2 qt/a	2.46 pt Harness + 1.7 pt AAtrex 4L
Verdict	15 fl oz/a	3 fl oz Sharpen + 12.5 fl oz Outlook
Hornet WDG	4 oz/a	0.93 oz Python + 5.3 fl oz Stinger
Acuron Flexi	2 qt/a	1.5 pt Dual II Magnum + 5.1 fl oz Callisto + 0.64 oz bicyclopyrone
Acuron	2.5 qt/a	1.4 pt Dual II Magnum + 4.8 fl oz Callisto + 1.25 pt AAtrex 4L + 0.6 oz bicyclopyrone
Surestart II	2.5 pt/a	1.34 pt Harness + 3.8 fl oz Stinger + 0.75 oz Python
Resicore	2.5 qt/a	2 pt Harness + 6 fl oz Callisto + 5.1 fl oz Stinger
Maverick	1 qt/a	5.3 fl oz Zidua SC + 6.6 fl oz Callisto + 5.6 fl oz Stinger

Trial Summary:

This study was a joint effort between the [UW-Madison Nutrient and Pest Management Program](#) (NPM; Dan Smith) and the WiscWeed team. The purpose of this study was to evaluate and demonstrate the efficacy of multiple PRE-emergence corn herbicides on difficult to control weed species like giant ragweed and waterhemp. Treatments consisted of PRE-emergence corn herbicides containing one, two and three different active ingredients and/or sites of action. Since we wanted to evaluate the residual activity of the PRE-emergence herbicide treatments throughout the season, no POST-emergence herbicides were sprayed to the research plots. Our intent was not to promote one product versus another, instead, demonstrate the value of using an effective PRE-emergence herbicide program.

The trial was conducted at two locations in southern Wisconsin: Rock County Farm near Janesville, WI and Lancaster Agricultural Research Station near Lancaster, WI. Giant ragweed was the predominant species and at the Janesville location and the population consists of a biotype with a prolonged emergence pattern as emergence typically starts in mid- to late-April and continues well into June. Waterhemp and common lambsquarters were the predominant species at the Lancaster location.

While these results should be taken with a grain of salt (only one year of data), they clearly indicate the value of PRE-emergence herbicides and the residual programs that don't work so well. This study will be replicated at both locations in 2022.

Key Take Home Points from 2021 Data:

- Several of the PRE-emergence corn herbicides evaluated provided adequate levels of giant ragweed control (>70%) 23 days after application (Table 7).
- Giant ragweed control was poor for most herbicides at 42 days after application (Table 7).
 - Demonstrates that a 1-pass herbicide program is not recommended for giant ragweed control
- Treatments containing mesotrione (Callisto) had longer residual control of giant ragweed than most other herbicides. Verdict also provided similar levels of control as mesotrione containing products.
- Herbicides with 2 or more active ingredients/sites of action generally improved residual control of giant ragweed.
- All herbicides provided excellent control of common lambsquarters 21 DAT (Table 7).
- Most of the herbicides evaluated provide excellent control (>90%) of waterhemp, even at 41 days after application (Table 7).

Plot photos from throughout the growing season are available at [Evaluation of Corn PRE-Emergence Herbicides](#) published on [wiscweeds.info](#).

Table 7. Weed control visual ratings (%) for trials #21-ROK-CN11 at Brooklyn, WI and #21-LAN-CN11 at Lancaster, WI

Trt #	Herbicide (rate acre ⁻¹)	Janesville, WI		Lancaster, WI		
		AMBTR ^b		AMATA ^b	CHEAL ^b	
		23 DAT	42 DAT	41 DAT	21 DAT	41 DAT
1	Untreated Check	0	0	0	0	0
One-Pass PRE						
2	Diflexx (16 fl oz)	79	48	44	100	65
3	AAtrex (2 pt)	13	20	49	100	98
4	Princep 4FL (2 qt)	9	22	60	100	98
5	Harness (2 pt)	60	39	100	100	77
6	Dual II Magnum (1.67 pt)	6	14	93	100	65
7	Balance Flexx (4.5 fl oz)	33	26	92	100	91
8	Callisto (5 fl oz)	57	66	100	100	96
9	Harness Max (2 qt)	72	56	100	100	100
10	Corvus (5.6 fl oz)	59	58	89	100	93
11	Bicep Lite II Magnum (1.75 qt)	18	26	95	100	99
12	Harness Xtra (2 qt)	68	51	100	100	99
13	Verdict (15 fl oz)	80	72	94	100	80
14	Hornet WDG (4 oz)	80	53	57	99	98
15	Acuron Flexi (2 qt)	78	78	98	100	98
16	Acuron (2.5 qt)	82	78	100	100	100
17	Surestart II (2.5 pt)	81	36	98	100	93
18	Resicore (2.5 qt)	87	72	100	100	100
19	Maverick ^c (1 qt)	79	68	100	100	100
		LSD ($\alpha=0.10$)	12	23	ns	8
		p value	<0.001	<0.001	0.159	<0.001

^aVisual control from 70-100% is illustrated on a color scale with green representing greater weed control values.^bAMBTR, giant ragweed; AMATA, common waterhemp; CHEAL, common lambsquarters^cMaverick is a suspension concentrate that contains 0.523 lb clopyralid, 0.825 lb mesotrione, and 0.690 lb of pyroxasulfone per gallon. Maverick is not yet registered for use at the time of publication of this report.

Project Goal: Evaluate differences in weed control and crop safety among 2-pass programs containing Acuron GT and other competitor programs.

Site Description:

Location:	Janesville, WI	Crop:	Corn
Field #:	3	Hybrid:	NK9653-5222 EZ
Soil type:	Plano silt loam	Planting Date:	4/26
% OM:	3.3	Emergence Date:	5/11
pH:	6.9	Population:	35,000 seeds/acre
Fertilization:	180 lbs N/acre	Depth:	2.25 in
Previous crop:	Soybean	Row spacing:	30 in
Tillage:	conventional	Plot Size:	10 x 30 ft
Weed species:	giant ragweed (AMBTR)		

Herbicide Application Information:

Date:	4/27	5/26
Treatment:	PRE (A)	POST (B)
Air Temp (°F):	88	73
2" Soil Temp (°F):	72	68
Soil moisture [surface]:	dry	moist
RH %:	36	58
Cloud cover %	35	0
Wind speed (mph)/direction	3-7/NNE	5-11
Rainfall (in) 1 wk after APP:	1.2"	0.5"
GPA:	15	15
PSI:	34	34
Nozzle:	TTI 110015	TTI 110015
Nozzle spacing (in):	20	20
Boom Height (in):	20	23

Crop and weed information at application:

	Date:	4/27	5/26
Corn	Height:	-	8-10"
	Stage:	-	V3/V4
Giant ragweed	Height:	-	0.5-4"
	Density:	-	56-72/m ²

Trt #	Treatment	Formulation	SOA Group	Rate	App Timing	App Code
1	Untreated Check					
2	Bicep Lite II Magnum	6 lb/gal	5, 15 9, 15, 27	1 qt/a	A	PRE
	Acuron GT	4.3 lb/gal		3.75 pt/a	B	POST
	NIS			0.25% v/v	B	POST
	AMS			2.5 qt/a	B	POST
3	Lumax EZ	3.67 lb/gal	5, 15, 27 9, 15, 27	1.5 qt/a	A	PRE
	Acuron GT	4.3 lb/gal		3.75 pt/a	B	POST
	NIS			0.25% v/v	B	POST
	AMS			2.5 qt/a	B	POST
4	SureStart II	4.25 lb/gal	2, 4, 15 9, 15, 27	1.75 pt	A	PRE
	Acuron GT	4.3 lb/gal		3.75 pt/a	B	POST
	NIS			0.25% v/v	B	POST
	AMS			2.5 qt/a	B	POST
5	Harness	7 lb/gal	15 9, 15, 27	1.5 pt/a	A	PRE
	Acuron GT	4.3 lb/gal		3.75 pt/a	B	POST
	NIS			0.25% v/v	B	POST
	AMS			2.5 qt/a	B	POST
6	Verdict	5.57 lb/gal	14, 15 9, 15, 27	14 fl oz/a	A	PRE
	Acuron GT	4.3 lb/gal		3.75 pt/a	B	POST
	NIS			0.25% v/v	B	POST
	AMS			2.5 qt/a	B	POST
7	Surestart II	4.25 lb/gal	2, 4, 15 4, 15, 27 9	1.75 pt/a	A	PRE
	Resicore	3.29 lb/gal		1.25 qt/a	B	POST
	Roundup PowerMAX II	4.5 lbae/gal		26.6 fl oz/a	B	POST
	AMS			2.5 qt/a	B	POST
8	Harness	7 lb/gal	15 27 9	1.5 pt/a	A	PRE
	Laudis	3.5 lb/gal		3 fl oz/a	B	POST
	Roundup PowerMAX II	4.5 lbae/gal		26.6 fl oz/a	B	POST
	Superb HC			0.5% v/v	B	POST
	AMS			2.5 qt/a	B	POST
9	Verdict	5.57 lb/gal	2, 4, 15 15, 27 9	10 fl oz/a	A	PRE
	Armezon PRO	5.35 lb/gal		18 fl oz/a	B	POST
	Roundup PowerMAX II	4.5 lbae/gal		26.6 fl oz/a	B	POST
	AMS			2.5 qt/a	B	POST
10	Acuron Flexi XR	3.13 lb/gal	15, 27	3 qt/a	A	PRE
11	Acuron XR	3.54 lb/gal	5, 15, 27	3 qt/a	A	PRE
12	Harness Max	3.85 lb/gal	15, 27	75 fl oz/a	A	PRE
13	Acuron	3.44 lb/gal	5, 15, 27	3 qt/a	A	PRE
14	Harness Max	3.85 lb/gal	15, 27 15, 27 9	37.5 fl oz/a	A	PRE
	Harness Max	3.85 lb/gal		37.5 fl oz/a	B	POST
	Roundup PowerMAX II	4.5 lbae/gal		26.6 fl oz/a	B	POST
	AMS			0.5% v/v	B	POST
15	Acuron	3.44 lb/gal	5, 15, 27 5, 15, 27 9	1.5 qt/a	A	PRE
	Acuron	3.44 lb/gal		1.5 qt/a	B	POST
	Roundup PowerMAX II	4.5 lbae/gal		26.6 fl oz/a	B	POST
	AMS			0.5% v/v	B	POST

Adjuvants: AMS = Amsol (liquid AMS); NIS = Prefer 90; Superb HC = high surfactant oil concentrate (HSOC)

Trial Summary:

This trial evaluated differences in weed control and crop safety among 2-pass programs containing Acuron GT and other competitor programs. **Acuron GT** is a new premix for corn containing bicyclopyrone (27), mesotrione (27), s-metolachlor (15), and glyphosate (9). Acuron GT does NOT contain atrazine. Acuron GT will have a similar utility as Halex GT. **Acuron XR** and **Acuron Flexi XR** are new formulations of Acuron and Acuron Flexi that contain higher concentrations of S-metolachlor and mesotrione. Both products are not yet registered for use as of 2021.

There was not any significant corn injury from the PRE herbicides (data not shown). All POST herbicide treatments had some leaf necrosis (burn) at 7 and 28 days after application (Table 8).

Giant ragweed was the predominant species and density in this trial was extremely high. Giant ragweed at this research location is a biotype with a prolonged emergence pattern as emergence typically starts in mid- to late-April and continues well into June. The average control of giant ragweed was impacted by herbicide program at all rating timings (Table 8). Most of the PRE herbicides evaluated were effective at suppressing giant ragweed growth prior to the POST application. The higher rate of Verdict, Acuron, Acuron XR, and Acuron Flexi XR provided the best early season residual control (79-88%). Harness MAX, Lumax EZ, SureStart II, and the lower rates of Acuron and Verdict did suppress early season giant ragweed growth (~61-74% control). All POST herbicide programs were effective at controlling giant ragweed plants emerged at application (data not shown); however, by 29 days after application no program provided >81% control. Several giant ragweed seedlings emerged after the POST application and were not controlled by the herbicides. End-of-season control was poor for all two-pass herbicide programs (28-62%). End-of-season control for the one-pass PRE only programs was 11-33%. The extremely high giant ragweed density in this trial would have required a 3-pass herbicide program to achieve acceptable levels of control. It is reasonable to expect that several of these programs would perform much better in a more typical field setting with lower weed infestation levels.

Corn yield was significantly impacted by herbicide program, $p<0.001$ (Table 8). Yield was poor across all herbicide programs. The untreated check only yielded 3 bu/acre, indicating the very high giant ragweed density and competition in this trial. Averaged across all treatments, yield of the 2-pass PRE *fb* POST programs = 135 bu/acre and PRE only = 70 bu/acre. Among the 2-pass programs, yields were generally higher in treatments that had greater PRE residual control early in the season.

Plot photos from throughout the growing season are available at [Evaluation of Acuron GT in a Two-Pass System](#) published on [wiscweeds.info](#).

Table 8. Corn injury, weed control ratings, and corn grain yield for trial #21-ROK-CN13 at Janesville, WI.

Trt #	Herbicide (rate acre ⁻¹)	Crop Injury (%) ^c		Giant Ragweed ^a (%)				Yield ^b bu acre ⁻¹
		6/2	6/23	5/26	6/23	7/20	11/3	
1	Untreated Check	0	0	0	0	0	0	3 i
One-Pass – PRE (4/27)								
10	Acuron Flexi XR (3 qt)	0.3	0.3	80	53	16	28	81 g
11	Acuron XR (3 qt)	0	0	87	60	22	33	81 g
12	Harness Max (75 fl oz)	0	0	71	25	11	11	28 h
13	Acuron (3 qt)	0.3	1.5	88	60	21	26	88 fg
Two-Pass – PRE (4/27) fb POST (5/36)								
2	Bicep Lite II Magnum (1 qt) fb Acuron GT (3.75 pt) + NIS 0.25% v/v + AMS (2.5 qt)	5.3	6.0	11	75	44	47	135 bcd
3	Lumax EZ (1.5 qt) fb Acuron GT (3.75 pt) + NIS 0.25% v/v + AMS (2.5 qt)	4.8	6.0	67	81	49	62	161 a
4	Surestart II (1.75 pt) fb Acuron GT (3.75 pt) + NIS 0.25% v/v + AMS (2.5 qt)	5.8	5.5	64	70	38	38	123 de
5	Harness (1.5 pt) fb Acuron GT (3.75 pt) + NIS 0.25% v/v + AMS (2.5 qt)	5.3	5.8	29	74	41	48	134 bcd
6	Verdict (14 fl oz) fb Acuron GT (3.75 pt) + NIS 0.25% v/v + AMS (2.5 qt)	6.0	5.8	79	81	52	53	146 abc
7	Surestart II (1.75 pt) fb Resicore (1.25 qt) + Roundup PM (26.6 oz) + AMS (2.5 qt)	5.8	5.5	74	80	52	55	149 ab
8	Harness (1.5 pt) fb Laudis (3 oz)+Roundup PM (26.6 oz)+Superb HC 0.5% v/v	4.0	4.3	24	65	28	28	107 ef
9	Verdict (10 fl oz) fb Armezon PRO(18 oz)+Roundup PM(26.6 oz)+AMS(2.5 qt)	7.3	4.8	61	79	45	37	124 de
14	Harness Max (37.5 oz) fb Harness Max(37.5 oz)+Roundup PM(26.6 oz)+AMS 2.5% v/v	5.3	6.0	64	76	43	38	127 cd
15	Acuron (1.5 qt) fb Acuron (1.5 qt) + Roundup PM (26.6 oz) + AMS 2.5% v/v	6.8	6.0	68	80	46	53	148 ab
		LSD ($\alpha=0.10$)	1.1	1.1	12	6	9	10
		p value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

^a Visual control from 70-100% is illustrated on a color scale with green representing greater weed control values.^b Yield values with the same letter are not significantly different.^c Crop injury symptoms included leaf necrosis.

Project Goal: Evaluate Reviton for control of weeds in a burndown management situation.

Site Description:

Location:	Arlington, WI	Crop:	Corn
Field #:	452	Hybrid:	B97T04SXE
Soil type:	Plano silt loam	Planting Date:	5/21
% OM:	3.2	Emergence Date:	5/31
pH:	6.7	Population:	36,000 seeds/acre
Fertilization:	225 lbs urea/acre 100 lbs AMS/acre	Depth:	2 in
Previous crop:	Soybean	Row spacing:	30 in
Tillage:	no-till	Plot Size:	10 x 25 ft
Weed species:	glyphosate resistant marestail (ERICA); dandelion (TAROF); common lambsquarters (CHEAL)		

Herbicide Application Information:

Date:	5/12
Treatment:	Burndown (A)
Air Temp (°F):	66
2" Soil Temp (°F):	65
Soil moisture [surface]:	dry
RH %:	20
Cloud cover %	40
Wind speed (mph)/direction	0-2
Rainfall (in) 1 wk after APP:	0.3"
GPA:	15
PSI:	34
Nozzle:	TT 110015
Nozzle spacing (in):	20
Boom Height (in):	23

Crop and weed information at application:

	Date:	5/12
Corn	Height:	-
	Stage:	-
Marestail	Height:	0.5-2"
	Density:	2-8/ft ²
Dandelion	Diameter:	1-7"
	Density:	0-2/ft ²
Lambsquarters	Height:	1-2"
	Density:	2-5/ft ²

Trt #	Treatment	Formulation	SOA Group	Rate	App Timing	App Code
1	Untreated Check					
2	Reviton Destiny HC	2.83 lb/gal	14	2 fl oz/a 0.25% v/v	Burndown Burndown	A A
3	Reviton Roundup PowerMAX II Destiny HC AMS	2.83 lb/gal 4.5 lbae/gal	14 9	1 fl oz/a 22 fl oz/a 0.25% v/v 8.5 lb/100 gal	Burndown Burndown Burndown Burndown	A A A A
4	Sharpen Roundup PowerMAX II Destiny HC AMS	2.85 lb/gal 4.5 lbae/gal	14 9	1.5 fl oz/a 22 fl oz/a 0.25% v/v 8.5 lb/100 gal	Burndown Burndown Burndown Burndown	A A A A
5	Reviton Argos Fearless Roundup PowerMAX II Destiny HC AMS	2.83 lb/gal 4 lb/gal 7 lb/gal 4.5 lbae/gal	14 27 15 9	1 fl oz/a 5 fl oz/a 2 pt/a 22 fl oz/a 0.25% v/v 8.5 lb/100 gal	Burndown Burndown Burndown Burndown Burndown Burndown	A A A A A A

Adjuvants: AMS = BlueAg spray grade ammonium sulfate; Destiny HC = high surfactant oil concentrate (HSOC)

Trial Summary:

This trial evaluated Reviton for control of weeds in a burndown management situation before planting corn. Reviton (taifenacil; group 14) is a relatively new herbicide offering from Helm Agro which can be used as part of a pre-plant burndown before corn, soybean, and wheat. Corn can be planted immediately after application. For this trial, corn was planted 9 days after the burndown application. There was no observable corn injury from any of the herbicide programs (data not shown).

Glyphosate-resistant marestail was the predominant weed species in the trial area. Dandelion and common lambsquarters were also rated for burndown control. Weed control was impacted by burndown herbicide program (Table 9). Initial control was excellent for all treatments across all 3 weed species 5 days after treatment (DAT); however, there was regrowth of previously controlled marestail and dandelion plants. Sharpen + Roundup outperformed Reviton and Reviton + Roundup in marestail control. Reviton + Argos + Roundup was similar to that of Sharpen + Roundup. If horseweed is present, an appropriate tank mix partner should be included with Reviton to achieve adequate control.

Plot photos from throughout the growing season are available at [Reviton Burndown Programs in Corn](#) published on [wiscweeds.info](#).

Table 9. Weed control ratings for trial #21-ARL-CN15 at Arlington, WI.^a

Trt #	Herbicide (rate acre ⁻¹)	Marestail ^b (%)			Dandelion (%)			Lambsquarters (%)			
		5 DAT	14 DAT	22 DAT	5 DAT	14 DAT	22 DAT	5 DAT	14 DAT	22 DAT	
1	Untreated Check	0	0	0	0	0	0	0	0	0	
One-Pass – Pre-plant Burndown (5/12)											
2	Reviton (2 oz) + Destiny HC 0.25% v/v	99	90	77	98	68	40	95	79	61	
3	Reviton (1 oz) + Roundup PM (22 oz) + Destiny HC 0.25% v/v + AMS ^c	99	87	80	98	93	86	99	100	98	
4	Sharpen (1.5 oz) + Roundup PM (22 oz) + Destiny HC 0.25% v/v + AMS ^c	100	99	98	98	96	88	98	99	99	
5	Reviton (1 oz) + Argos (5 oz) + Fearless (2 pt) + Roundup PM (22 oz) + Destiny HC 0.25% v/v + AMS ^c	97	100	100	97	99	99	97	100	100	
		LSD ($\alpha=0.10$)	1	6	8	2	5	10	2	3	5
		p value	0.017	0.005	<0.001	0.447	<0.001	<0.001	0.032	<0.001	<0.001

^aVisual control from 70-100% is illustrated on a color scale with green representing greater weed control values.^bMarestail population is glyphosate resistant.^cSpray grade AMS applied at 8.5 lb/100 gal.

Project Goal: Evaluate multiple one- and two-pass corn herbicide programs for weed control and crop safety.

Site Description:

Location:	Arlington, WI	Crop:	Corn
Field #:	453	Hybrid:	DKC 54-38RIB
Soil type:	Plano silt loam	Planting Date:	5/8
% OM:	3.8	Emergence Date:	5/20
pH:	5.9	Population:	34,500 seeds/acre
Fertilization:	149 lbs N/acre	Depth:	2 in
Previous crop:	Soybean	Row spacing:	30 in
Tillage:	conventional	Plot Size:	10 x 25 ft
Weed species:	common ragweed (AMBEL); velvetleaf (ABUTH); giant foxtail (SETFA)		

Herbicide Application Information:

	Date:	5/10	6/4	6/11
	Treatment:	PRE (A)	EPOST (B)	POST (C)
	Air Temp (°F):	64	68	79
	2" Soil Temp (°F):	59	66	77
	Soil moisture [surface]:	dry	dry	very dry
	RH %:	28	55	73
	Cloud cover %	60	100	0
Wind speed (mph)/direction	2-9/SW	6-10/SW	2-5/SE	
Rainfall (in) 1 wk after APP:	0.02"	0.20"	1.68"	
GPA:	15	15	15	
PSI:	35	35	34	
Nozzle:	TTI 110015	TTI 110015	TTI 110015	
Nozzle spacing (in):	20	20	20	
Boom Height (in):	20	22	24	

Crop and weed information at application:

	Date:	5/10	6/4	6/11
Corn	Height:	-	4 in	10 in
	Stage:	-	V3	V5
common ragweed	Height:	-	0.5-2.25 in	1-3 in
	Density:	-	4-80/m ²	0-17/m ²
velvetleaf	Height:	-	0.5-1.5 in	1-3 in
	Density:	-	1-13/m ²	0-1/m ²
giant foxtail	Height:	-	0.25-2.5 in	0.5-6 in
	Density:	-	19-254/m ²	2-320/m ²
woolly cupgrass	Height:	-	0.25-2 in	0-5-6 in
	Density:	-	0-53/m ²	0-40/m ²

Trt #	Treatment	Formulation	SOA Group	Rate	App Timing	App Code
1	Untreated Check					
2	Acuron Flexi	3.26 lb/gal	15, 27	2.25 qt/a	PRE	A
4	Acuron GT NIS AMS	4.3 lb/gal 0.25% v/v 8.5 lb/100 gal	9, 15, 27	3.75 pt/a EPOST	EPOST	B B B
5	Acuron Flexi Acuron Flexi Roundup PowerMAX II AMS	3.26 lb/gal 3.26 lb/gal 4.5 lbae/gal 8.5 lb/100 gal	15, 27 15, 27 9	1.1 qt/a 1.1 qt/a 32 fl oz/a POST	PRE POST POST POST	A C C C
6	Corvus	2.63 lb/gal	2, 27	5.6 fl oz/a	PRE	A
7	Harness MAX Roundup PowerMAX II AMS	3.85 lb/gal 4.5 lbae/gal 8.5 lb/100 gal	15, 27 9	1.5 qt/a 32 fl oz/a EPOST	EPOST	B B B
8	Harness Capreno Roundup PowerMAX II AMS	7 lb/gal 3.45 lb/gal 4.5 lbae/gal 8.5 lb/100 gal	15 3, 27 9	2 pt/a 3 fl oz/a 32 fl oz/a POST	PRE POST POST POST	A C C C
9	TripleFlex II Diflex Duo Roundup PowerMAX II Destiny HC Class Act Ridion	4.25 lb/gal 2.13 lb/gal 4.5 lbae/gal 1% v/v 1% v/v	2, 4, 15 4, 27 9	2 pt/a 24 fl oz/a 32 fl oz/a POST	PRE POST POST POST	A C C C
10	SureStart II Resicore Durango DMA AMS	4.25 lb/gal 3.29 lb/gal 4 lbae/gal 8.5 lb/100 gal	2, 4, 15 4, 15, 27 9	2 pt/a 1.25 qt/a 32 fl oz/a POST	PRE POST POST POST	A C C C
11	Surpass NXT Resicore Durango DMA AMS	7 lb/gal 3.29 lb/gal 4 lbae/gal 8.5 lb/100 gal	15 4, 15, 27 9	2 pt/a 1.25 qt/a 32 fl oz/a POST	PRE POST POST POST	A C C C
12	Surpass NXT Realm Q Stinger Durango DMA AMS	7 lb/gal 38.75% w/w 3 lbae/gal 4 lbae/gal 8.5 lb/100 gal	15 2, 27 4 9	2 pt/a 4 oz/a 4 fl oz/a 32 fl oz/a POST	PRE POST POST POST POST	A C C C C
13	Verdict Armezon PRO Roundup PowerMAX COC AMS	5.57 lb/gal 5.35 lb/gal 4.5 lbae/gal 1% v/v 8.5 lb/100 gal	14, 15 15, 27 9	10 fl oz/a 16 fl oz/a 32 fl oz/a POST	PRE POST POST POST	A C C C

Trt #	Treatment	Formulation	SOA Group	Rate	App Timing	App Code
14	Verdict	5.57 lb/gal	14, 15	16 fl oz/a	PRE	A
	Status	56% w/w	4	4 oz/a	POST	C
	Roundup PowerMAX	4.5 lbae/gal	9	32 fl oz/a 1% v/v	POST	C
	AMS			8.5 lb/100 gal	POST	C
15	Verdict	5.57 lb/gal	14, 15	10 fl oz/a	PRE	A
	Callisto	4 lb/gal	27	3 fl oz/a	POST	C
	Zidua SC	4.17 lb/gal	15	3 fl oz/a	POST	C
	Roundup PowerMAX	4.5 lbae/gal	9	32 fl oz/a 1% v/v	POST	C
	AMS			8.5 lb/100 gal	POST	C
16	Verdict	5.57 lb/gal	14, 15	10 fl oz/a	PRE	A
	Callisto	4 lb/gal	27	3 fl oz/a	PRE	A
	Armezon PRO	5.35 lb/gal	15, 27	16 fl oz/a	POST	C
	Roundup PowerMAX	4.5 lbae/gal	9	32 fl oz/a 1% v/v	POST	C
	AMS			8.5 lb/100 gal	POST	C
17	Restraint	6.5 lb/gal	15, 27	30 fl oz/a	PRE	A
	Princep 4FL	4 lb/gal	5	1 qt/a	PRE	A
	Restraint	6.5 lb/gal	15, 27	18 fl oz/a 1% v/v	POST	C
	AMS			8.5 lb/100 gal	POST	C
19	Maverick*	2.04 lb/gal	4, 15, 27	1 qt/a	PRE	A
	Roundup PowerMAX	4.5 lbae/gal	9	32 fl oz/a	POST	C
	AMS			8.5 lb/100 gal	POST	C
20	Fearless	7 lb/gal	15	2 pt/a	PRE	A
	Katagon	2 lb/gal	2, 27	3.2 fl oz/a 1% v/v	POST	C
	Destiny HC					
21	Untreated Check					

Adjuvants: AMS = BlueAg spray grade ammonium sulfate; COC = Crop Oil; Destiny HC = high surfactant oil concentrate (HSOC); Class Act Ridion = non-AMS water conditioner + NIS; NIS = Prefer 90

***Maverick** is a suspension concentrate that contains 0.523 lb clopyralid, 0.825 lb mesotrione, and 0.690 lb of pyroxasulfone per gallon. Maverick is not yet registered for use at the time of publication of this report.

Trial Summary:

This trial evaluated multiple one- and two-pass corn herbicide programs from several chemical manufacturer portfolios for weed control and crop safety. Atrazine was not included in any treatment since this trial was conducted in an atrazine prohibition area at the Arlington Ag Research Station. The main purpose of this study was to evaluate corn herbicide performance on weed species other than giant ragweed and waterhemp.

None of the PRE herbicides caused visible corn injury symptoms 22 days after application (data not shown). There was ~5-8% frost damage (necrotic leaf tips and margins) at this time due to temperature dropping below 32° F on the night of May 29th. There was minor leaf necrosis 13 days after EPOST and 6 days after the POST applications in 4 of the treatments: Harness MAX - EPOST (trt 7); Resicore – POST (trt 10); and Callisto + Zidua SC - POST (trt 15) had ~4-5% injury. Restraint + Princep 4FL - POST (trt 17) had slightly greater leaf necrosis at 6%. Further corn growth was not significantly impacted as there were no further injury symptoms present 14 days after the POST application.

Several of the corn herbicide programs provided excellent season long control of both broadleaf (common ragweed, velvetleaf) and grass (giant foxtail, woolly cupgrass) weed species (Table 10). All treatments provided >90% control of common ragweed and velvetleaf at corn harvest. Both of the one-pass PRE only herbicide programs failed to adequately control giant foxtail and woolly cupgrass at corn harvest. 13 out of the 14 PRE followed by POST 2-pass herbicide programs had excellent end-of-season grass control. Both one-pass EPOST treatments had excellent broadleaf control and good-excellent grass control indicating that a one-pass EPOST herbicide program can be effective for season long weed control if timed appropriately and if difficult to control weeds like giant ragweed are not present in a conventional tillage system. A burndown application may be necessary in no-till or reduced tillage systems to start with a clean seedbed.

Corn grain yield differed amongst treatments (Table 10). In general yields amongst the one-pass EPOST and two-pass herbicide programs were statistically similar (average = 221 bu acre⁻¹) with only a few exceptions. The PRE only treatments had significantly lower yield (average = 193 bu acre⁻¹). Yield of the untreated check averaged 103 bu acre⁻¹, a 47% and 53% reduction from the average of the PRE only and the EPOST/PRE fb POST programs respectively.

Plot photos from throughout the growing season are available at [Corn Herbicide Showcase](#) published on [wiscweeds.info](#).

Table 10. Weed control visual ratings and corn grain yield for trial #21-ARL-CN16 at Arlington, WI.^a

Trt # Herbicide (rate acre ⁻¹)	C. Ragweed (%)			Velvetleaf (%)			Annual Grass ^b (%)			Yield ^c bu acre ⁻¹
	6/10	6/25	10/19	6/10	6/25	10/19	6/10	6/25	10/19	
1 Untreated Check	0	0	0	0	0	0	0	0	0	95 e
21 Untreated Check	0	0	0	0	0	0	0	0	0	111 e
One-Pass – PRE (5/10)										
2 Acuron Flexi (2.25 qt)	93	79	91	100	99	100	88	69	55	187 d
6 Corvus (5.6 oz)	98	96	95	100	100	100	92	81	81	199 cd
One-Pass – EPOST (6/4)										
4 Acuron GT (3.75 pt) + NIS 0.25% v/v + AMS ^d	100	99	100	100	100	100	100	93	89	218 a-d
7 Harness MAX (1.5 qt) + Roundup PM (32 oz)+ AMS	100	97	99	100	99	100	100	97	92	221 abc
Two-Pass – PRE (5/10) /b POST (6/11)	POST			POST			POST			
5 Acuron Flexi (1.1 qt) fb Acuron Flexi (1.1 qt) + Roundup PM (32 oz) + AMS	92	98	100	100	100	100	89	99	99	215 a-d
8 Harness (2 pt) fb Capreno (3 oz) + Roundup PM (32 oz) + AMS	96	100	100	96	100	100	95	99	100	199 cd
TripleFlex II (2 pt) fb	93	100	99	100	100	100	93	97	96	208 bcd
9 Diflexx Duo (24 oz) + Roundup PM (32 oz) + Destiny HC 1% v/v + Class Act Ridion 1% v/v	93	100	99	99	100	100	95	100	100	219 a-d
10 SureStart II (2 pt) fb Resicore (1.25 qt) + Durango DMA (32 oz) + AMS	97	99	100	99	100	100	95	100	100	214 bcd
11 Surpass NXT (2 pt) fb Resicore (1.25 qt) + Durango DMA (32 oz) + AMS	90	97	100	94	100	100	95	100	100	218 a-d
Surpass NXT (2 pt) fb	92	98	100	93	100	100	95	99	98	232 abc
12 Realm Q (4 oz) + Stinger (4 oz) + Durango DMA (32 oz) + AMS	84	97	99	99	100	100	83	95	98	229 abc
Verdict (10 oz) fb	90	99	99	100	100	100	91	96	96	223 abc
13 Armezon PRO (16 oz) + Roundup PM (32 oz) + COC 1% v/v + AMS	86	97	100	100	100	100	77	97	98	230 abc
Verdict (16 oz) fb	87	99	100	100	100	100	83	96	100	217 a-d
14 Status (4 oz) + Roundup PM (32 oz) + COC 1% v/v + AMS	93	99	100	95	99	100	50	85	82	247 a
Verdict (10 oz) + Callisto (3 oz) fb	93	99	100	96	100	100	77	98	99	232 ab
15 Callisto (3 oz) + Zidua SC (3 oz) + Roundup PM (32 oz) + COC 1% v/v + AMS	80	100	100	93	96	97	95	96	96	<0.001
Verdict (10 oz) + Callisto (3 oz) fb	80	100	100	95	99	100	95	96	96	<0.001
16 Armezon PRO (16 oz) + Roundup PM (32 oz) + COC 1% v/v + AMS	93	99	100	96	100	100	95	98	99	<0.001
17 Restraint (30 oz) + Princep 4FL (1 qt) fb Restraint (18 oz) + COC 1% v/v + AMS	93	99	100	96	100	100	95	96	96	<0.001
19 Maverick (1 qt) fb Roundup PM (32 oz) + AMS	93	99	100	96	100	100	95	96	96	<0.001
20 Fearless (2 pt) fb Katagon (3.2 oz) + Destiny HC 1%v/v	93	97	99	93	96	97	95	96	96	<0.001
LSD ($\alpha=0.10$)			7	4	3	5	1	1	9	3
p value			<.001	<.001	<.001	0.071	<.001	0.003	9	3

^aVisual control from 70-100% is illustrated on a color scale with green representing greater weed control values.^bAnnual grass species in the trial area consisted of giant foxtail and woolly cupgrass. Giant foxtail was the predominant species.^cYield values with the same letter are not significantly different.^dSpray grade AMS applied at 8.5 lb/100 gal.

Trial: Herbicide Programs for Conventional Corn**21-ARL-CN18****21-BRO-CN18**

Project Goal: Evaluate various corn herbicide programs without glyphosate for season long weed control in conventional corn.

Site Description

Trial #:	21-ARL-CN18	21-BRO-CN18
Location:	Arlington, WI	Brooklyn, WI
Soil Type:	Plano silt loam	Dresden loam
Soil Texture % sand/silt/clay:	7 / 70 / 23	50 / 39 / 12
% OM:	3.8	1.2
pH:	5.9	7.1
Fertilization:	148 lb N/acre	none
Previous Crop:	Soybean	Corn
Tillage:	conventional	conventional
Hybrid :	DKC 54-36	DKC 54-36
Planting Date:	5/10	5/13
Emergence Date:	5/20	5/22
Seeding Rate:	34,500 seeds/acre	32,000 seeds/acre
Depth:	2 in	2 in
Row Spacing:	30 in	30 in
Plot Size:	10 x 25 ft	10 x 25 ft

Herbicide Application Information

Trial #:	21-ARL-CN18		21-BRO-CN18	
Date:	5/10	6/10	5/14	6/10
Treatment:	PRE (A)	POST (B)	PRE (A)	POST (B)
Air Temp (°F):	64	98	72	87
2" Soil Temp (°F):	59	92	65	80
Soil moisture [surface]:	dry	dry	dry	very dry
RH %:	28	46	24	65
Cloud cover %:	60	15	10	0
Wind speed (mph)/direction:	2-9/SW	0-5/NE	3-7/SE	0-1/W
Rainfall (in) 1 wk after APP:	0.02"	0.42"	0.83"	1.22"
Rainfall (in) 2 wks after APP:	0.62"	3.22"	1.50"	3.22"
GPA:	15		15	
PSI:	34		34	
Nozzle:	TTI 110015		TTI 110015	

Crop and Weed Information at POST Application

Corn	Height	Stage	Height	Stage
	9-12 in	V5	10-12 in	V5
Waterhemp	Height	Density	Height	Density
	-	-	0.5-3 in	1-38/m ²
Velvetleaf	1-3 in	0-1/m ²	1-3 in	0-20/m ²
Common Ragweed	1-3 in	0-17/m ²	-	-
Wild-proso Millet	-	-	0.5-4"	1-3/m ²
Giant Foxtail	1-6 in	2-360/m ²	-	-

Trt #	Treatment	Formulation	SOA Group	Rate	App Timing	App Code
1	Untreated Check					
2	Harness MAX	3.85 lb/gal	15, 27	2 qt/a	PRE	A
	Capreno	3.45 lb/gal	2, 27	3 fl oz/a	POST	B
	Superb HC			0.5% v/v	POST	B
	AMS			2 lb/a	POST	B
3	Harness MAX	3.85 lb/gal	15, 27	2 qt/a	PRE	A
	Diflexx Duo	2.13 lb/gal	4, 27	28 fl oz/a	POST	B
	COC			1% v/v	POST	B
	AMS			2 lb/a	POST	B
4	Acuron Flexi	3.26 lb/gal	15, 27	1.1 qt/a	PRE	A
	Acuron Flexi	3.26 lb/gal	15, 27	1.1 qt/a	POST	B
	NIS			0.25% v/v	POST	B
	AMS			2 lb/a	POST	B
5	Verdict	5.57 lb/gal	14, 15	16 fl oz/a	PRE	A
	Armezon	2.8 lb/gal	27	1 fl oz/a	POST	B
	Status	56% w/w	4	5 oz/a	POST	B
	MSO			1% v/v	POST	B
	AMS			2 lb/a	POST	B
6	Verdict	5.57 lb/gal	14, 15	10 fl oz/a	PRE	A
	Callisto	4 lb/gal	27	3 fl oz/a	PRE	A
	Armezon PRO	5.35 lb/gal	15, 27	16 fl oz/a	POST	B
	MSO			1% v/v	POST	B
	AMS			2 lb/a	POST	B
7	SureStart II	4.25 lb/gal	2, 4, 15	2 pt/a	PRE	A
	Accent Q	54.5% w/w	2	0.9 oz/a	POST	B
	Status	56% w/w	4	5 oz/a	POST	B
	COC			1% v/v	POST	B
	AMS			2 lb/a	POST	B
8	Harness	7 lb/gal	15	2 pt/a	PRE	A
	Princep 4FL	4 lb/gal	5	1 qt/a	PRE	A
	Revolin Q	51.2% w/w	2, 27	4 oz/a	POST	B
	Status	56% w/w	4	5 oz/a	POST	B
	COC			1% v/v	POST	B
	AMS			2 lb/a	POST	B
9	Harness	7 lb/gal	15	2 pt/a	PRE	A
	Princep 4FL	4 lb/gal	5	1 qt/a	PRE	A
	Revolin Q	51.2% w/w	2, 27	4 oz/a	POST	B
	Status	56% w/w	4	5 oz/a	POST	B
	Zidua SC	4.17 lb/gal	15	3 fl oz/a	POST	B
	COC			1% v/v	POST	B
	AMS			2 lb/a	POST	B

Trt #	Treatment	Formulation	SOA Group	Rate	App Timing	App Code
10	Harness	7 lb/gal	15	2 pt/a	PRE	A
	Princep 4FL	4 lb/gal	5	1 qt/a	PRE	A
	Shieldex	3.3 lb/gal	27	1 fl oz/a	POST	B
	Accent Q	54.5% w/w	2	0.9 oz/a	POST	B
	COC			1% v/v	POST	B
	AMS			2 lb/a	POST	B
11	Harness	7 lb/gal	15	2 pt/a	PRE	A
	Princep 4FL	4 lb/gal	5	1 qt/a	PRE	A
	Laudis	3.5 lb/gal	27	3 fl oz/a	POST	B
	Warrant	3 lb/gal	15	48 fl oz/a	POST	B
	MSO			1% v/v	POST	B
	AMS			2 lb/a	POST	B
12	Dual II Magnum	7.64 lb/gal	15	1.67 pt/a	PRE	A
	Princep 4FL	4 lb/gal	5	1 qt/a	PRE	A
	Callisto	4 lb/gal	27	3 fl oz/a	POST	B
	Status	56% w/w	4	5 oz/a	POST	B
	COC			1% v/v	POST	B
	AMS			2 lb/a	POST	B

Adjuvants: AMS = BlueAg spray grade ammonium sulfate; COC = Crop Oil; MSO = Emulate;

Superb HC = high surfactant oil concentrate (HSOC); NIS = Prefer 90

Trial Summary:

Trials were established in May 2021 at the Arlington Ag Research Station near Arlington, WI and at the O'Brien Hybrids farm located north of Brooklyn, WI. Multiple two-pass (PRE followed by POST around V4/V5 corn) herbicide programs were developed for control of waterhemp and annual grass weeds. Atrazine was not included in any treatments as both locations were in atrazine prohibition areas. Corn grain yield data was only collected from the Arlington location.

There was no visible corn injury from any of the PRE herbicides evaluated at either location. At Arlington, there was visible corn stunting (~6-7%) 7 days after the POST application of Capreno (data not shown); however later corn development was not affected as no stunting was evident 14 days after application. At Brooklyn, there was corn "leaning" 8 days following the POST application in all treatments; however, it tended to be worse in treatments containing Status (data not shown). A storm had gone through the night prior to rating. Corn showed no leaning 14 days after application.

Several of the herbicide programs evaluated provided excellent control of broadleaf (waterhemp, common ragweed, velvetleaf) and grass weeds (giant foxtail, wild-proso millet) (Tables 11, 12). The PRE applications of Harness + Princep 4L and Dual II Magnum + Princep 4L did not provide adequate control of velvetleaf at Brooklyn where the velvetleaf population density was much higher than Arlington. The Dual II Magnum + Princep 4L treatment also did not adequately control giant foxtail and the Arlington location. Poor control was likely due to the lack of rain (0.02") 1 week following application as Dual will typically provide excellent grass control if properly activated. Giant foxtail control remained poor in treatment 12 following the POST application as the height and density was too great for Callisto to provide effective POST control.

Corn yield was similar for all treatments except for treatment 12 (Table 11). Giant foxtail control was very poor the entire growing season in this treatment and competition led to yield loss.

Key Take Home Points from 2021 Data:

- Glyphosate was not required to achieve excellent season-long control of troublesome weeds.
- Several of the herbicide programs evaluated provided excellent control of broadleaf (waterhemp, common ragweed, velvetleaf) and grass weeds (giant foxtail, wild-proso millet).
- An effective PRE-emergence herbicide is recommended to reduce early-season crop competition and weed density.
- Lower weed density at POST application can improve the efficacy of a POST herbicide program.

A complete report with plot photos from throughout the growing season is available on the wiscweeds.info blog or as a PDF download at this link [Herbicide Programs for Conventional Corn](#).

Table 11. Weed control ratings and corn grain yield for trial #21-ARL-CN18 at the Arlington Ag Research Station near Arlington, WI.^a

Trt #	Herbicide (rate acre ⁻¹)	Common Ragweed			Velvetleaf			Giant Foxtail			Yield ^b bu acre ⁻¹	
		6/10	6/25	10/19	6/10	6/25	10/19	6/10	6/25	10/19		
1	Untreated Check	0	0	0	0	0	0	0	0	0	158 c	
Two-Pass – PRE (5/10) fb POST (6/10)												
2	Harness MAX (2 qt) fb Capreno (3 oz) + Superb HC 0.5% v/v + AMS (2 lb)	98	100	100	100	100	100	99	95	97	249 a	
3	Harness MAX (2 qt) fb Diflexx Duo (28 oz) + COC 1% v/v + AMS (2 lb)	98	100	100	99	100	100	99	89	83	242 a	
4	Acuron Flexi (1.1 qt) fb Acuron Flexi (1.1 qt) + NIS 0.25% v/v + AMS (2 lb)	93	99	100	100	100	100	88	80	72	243 a	
5	Verdict (16 oz) fb Armezon (1 oz) + Status (5 oz) + MSO 1% v/v + AMS (2 lb)	98	100	100	100	100	100	95	97	100	249 a	
6	Verdict (10 oz) + Callisto (3 oz) fb Armezon PRO (16 fl oz) + MSO 1% v/v + AMS (2 lb)	95	99	100	100	100	100	95	95	99	252 a	
7	Surestart II (2 pt) fb Accent Q (0.9 oz) + Status (5 oz) + COC 1% v/v + AMS (2 lb)	99	100	100	98	99	99	98	97	99	247 a	
8	Harness (2 pt) + Princep 4L (1 qt) fb Revulin Q (4 oz) + Status (5 oz) + COC 1% v/v + AMS (2 lb)	98	100	100	98	100	100	99	98	100	247 a	
9	Harness (2 pt) + Princep 4L (1 qt) fb Revulin Q (4 oz) + Status (5 oz) + Zidua SC (3 oz) + COC 1% v/v + AMS (2 lb)	98	100	100	95	100	100	99	99	98	238 a	
10	Harness (2 pt) + Princep 4L (1 qt) fb Shieldex (1 oz) + Accent Q (0.9 oz) + COC 1% v/v + AMS (2 lb)	98	100	100	94	97	99	99	98	100	248 a	
11	Harness (2 pt) + Princep 4L (1 qt) fb Laudis (3 oz) + Warrant (48 oz) + MSO 1% v/v + AMS (2 lb)	99	100	100	96	99	100	97	100	99	252 a	
12	Dual II Magnum (1.67 pt) + Princep 4L (1 qt) fb Callisto (3 oz) + Status (5 oz) + COC 1% v/v + AMS (2 lb)	88	100	100	90	100	100	59	60	45	219 b	
		LSD ($\alpha=0.10$)	3	1	ns	4	1	ns	7	2	6	
		p value	<0.001	0.036	ns	0.003	<0.001	ns	<0.001	<0.001	<0.001	

^aVisual control from 70-100% is illustrated on a color scale with green representing greater weed control values.^bYield values with the same letter are not significantly different.

Table 12. Weed control ratings for trial #21-BRO-CN18 at Brooklyn, WI.^a

Trt #	Herbicide (rate acre ⁻¹)	Waterhemp			Velvetleaf			Wild-Proso Millet			
		6/10	6/24	7/8	6/10	6/24	7/8	6/10	6/24	7/8	
1	Untreated Check	0	0	0	0	0	0	0	0	0	
Two-Pass – PRE (5/14) <i>fb</i> POST (6/10)											
2	Harness MAX (2 qt) <i>fb</i> Capreno (3 oz) + Superb HC 0.5% v/v + AMS (2 lb)	100	99	96	100	100	100	99	99	100	
3	Harness MAX (2 qt) <i>fb</i> Diflexx Duo (28 oz) + COC 1% v/v + AMS (2 lb)	100	99	97	100	100	98	98	100	98	
4	Acuron Flexi (1.1 qt) <i>fb</i> Acuron Flexi (1.1 qt) + NIS 0.25% v/v + AMS (2 lb)	92	82	83	100	100	100	95	98	98	
5	Verdict (16 oz) <i>fb</i> Armezon (1 oz) + Status (5 oz) + MSO 1% v/v + AMS (2 lb)	95	97	93	100	100	100	97	100	100	
6	Verdict (10 oz) + Callisto (3 oz) <i>fb</i> Armezon PRO (16 fl oz) + MSO 1% v/v + AMS (2 lb)	98	92	90	100	100	100	93	100	99	
7	Surestart II (2 pt) <i>fb</i> Accent Q (0.9 oz) + Status (5 oz) + COC 1% v/v + AMS (2 lb)	95	97	95	92	99	100	91	97	95	
8	Harness (2 pt) + Princep 4L (1 qt) <i>fb</i> Revulin Q (4 oz) + Status (5 oz) + COC 1% v/v + AMS (2 lb)	99	99	98	46	100	100	97	100	96	
9	Harness (2 pt) + Princep 4L (1 qt) <i>fb</i> Revulin Q (4 oz) + Status (5 oz) + Zidua SC (3 oz) + COC 1% v/v + AMS (2 lb)	100	100	100	45	100	100	99	99	99	
10	Harness (2 pt) + Princep 4L (1 qt) <i>fb</i> Shieldex (1 oz) + Accent Q (0.9 oz) + COC 1% v/v + AMS (2 lb)	99	95	89	50	99	100	99	100	100	
11	Harness (2 pt) + Princep 4L (1 qt) <i>fb</i> Laudis (3 oz) + Warrant (48 oz) + MSO 1% v/v + AMS (2 lb)	97	98	94	46	100	98	97	100	100	
12	Dual II Magnum (1.67 pt) + Princep 4L (1 qt) <i>fb</i> Callisto (3 oz) + Status (5 oz) + COC 1% v/v + AMS (2 lb)	76	97	90	20	100	100	96	95	96	
		LSD ($\alpha=0.10$)	4	3	6	15	1	1	4	3	ns
		p value	<0.001	<0.001	<0.001	<0.001	0.014	0.017	0.016	0.07	ns

^aVisual control from 70-100% is illustrated on a color scale with green representing greater weed control values.

Multi-Trial Summary: Giant Ragweed Control in Corn

Multi-Trial Summary:

The following figures summarize giant ragweed control from some of the corn herbicide evaluation trials conducted in 2021 at the Rock County Farm in Janesville, WI. Giant ragweed at the Rock County Farm is a biotype with a prolonged emergence pattern as emergence typically starts in mid- to late-April and continues well into June. Treatments were grouped by one of three herbicide systems: 1-pass preemergence (PRE), 1-PASS early-postemergence (EPOST), and 2-pass (PRE *fb* POST). There were varying levels of effectiveness among the herbicides within each system, but by grouping we can get a better sense of what systems perform best on average. To see how certain herbicides or herbicide tank mixes perform see individual trial data presented in this report.

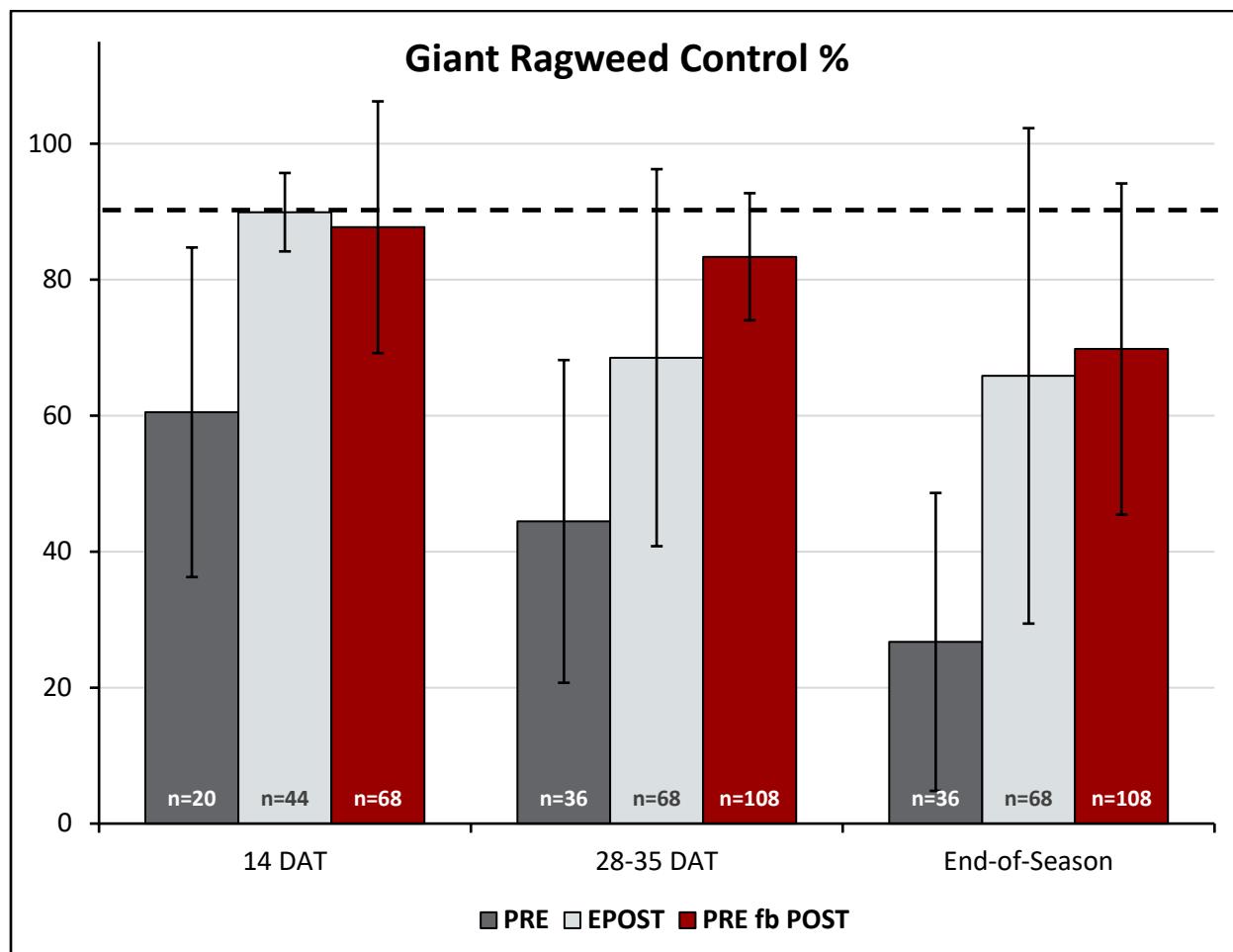


Figure 1. Giant ragweed control (%) of three corn herbicide systems (PRE only, EPOST only, PRE *fb* POST). Bars indicate the average % control ± the standard deviation 14 and 28-35 days after POST herbicide application and at the end of the growing season. n-values at the base of each bar represent the number of observations (plots) evaluated in each herbicide system.

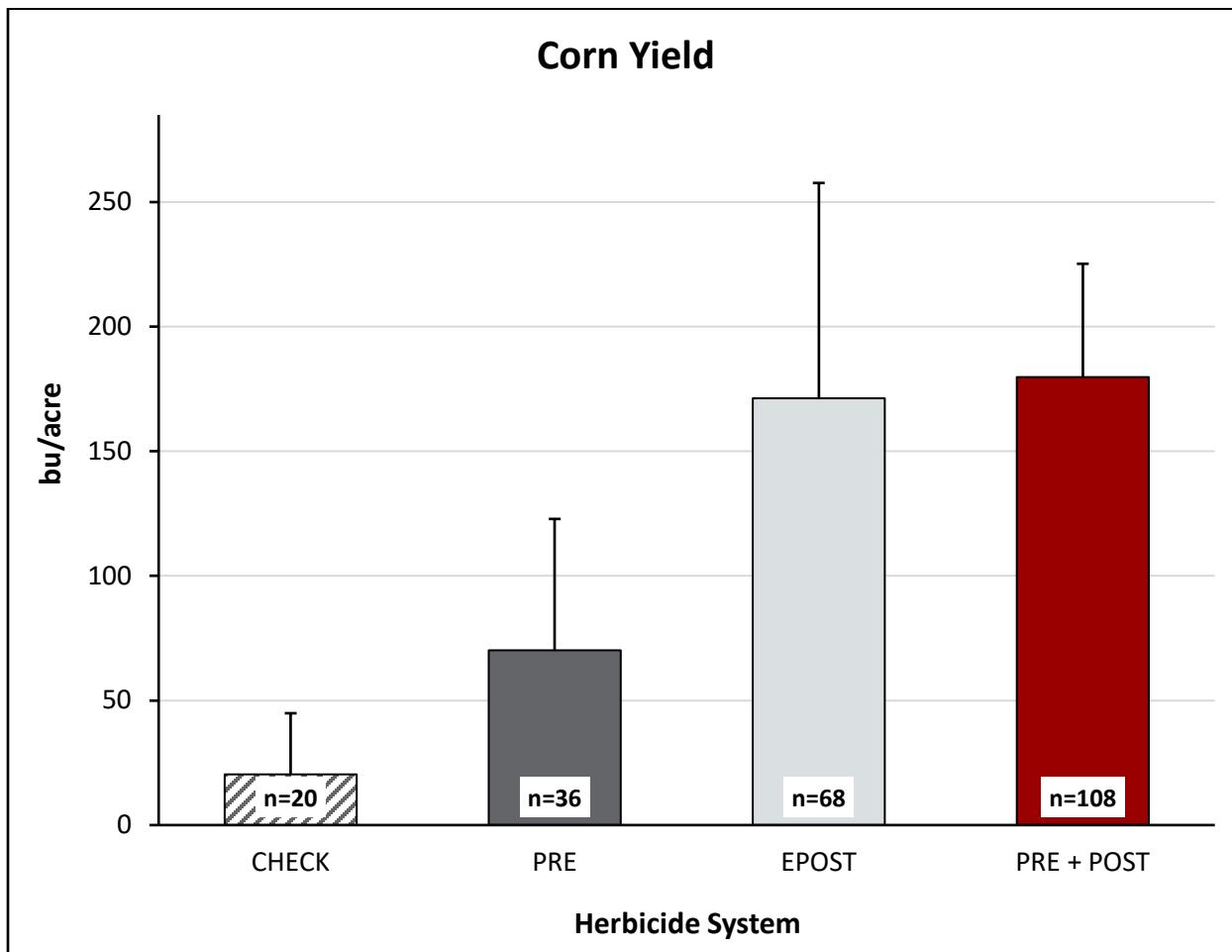


Figure 2. Corn yield (bu/acre) of three corn herbicide systems (PRE only, EPOST only, PRE *fb* POST). Yields of the untreated checks are included for comparison. Bars indicate the average yield + the standard deviation. n-values at the base of each bar represent the number of observations (plots) evaluated in each herbicide system.

Multi-Trial Summary: Giant Ragweed Control in Corn

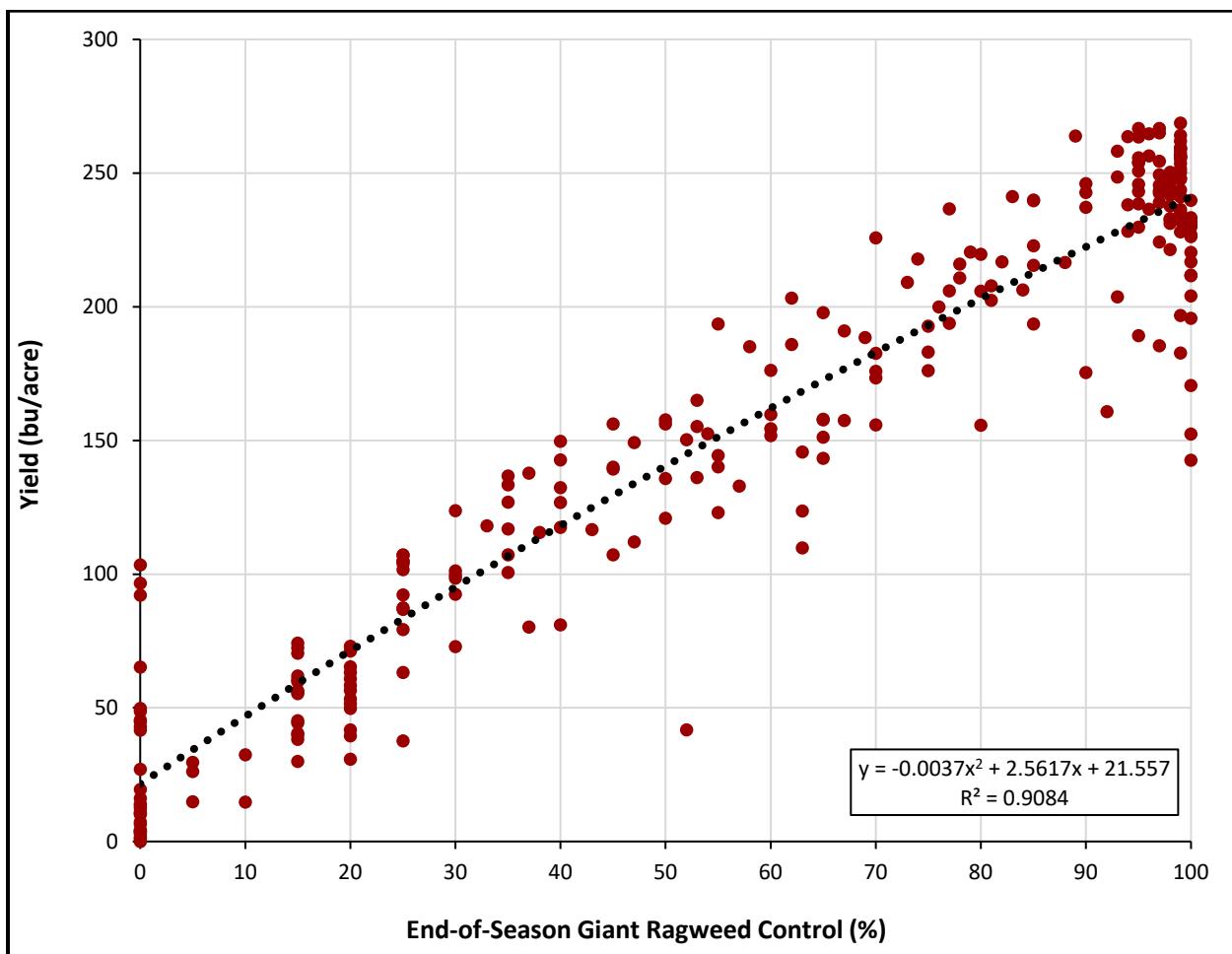


Figure 3. Corn yield regressed over end-of-season giant ragweed control from multiple corn herbicide evaluation trials at Janesville, WI. The formula and corresponding R^2 value is overlayed on the figure.

Project Goal: Evaluate the potential benefit of adding XtendiMax to the tank with traditional PRE herbicides.

Site Description:

Location:	Arlington, WI	Crop:	Soybean
Field #:	362	Variety:	AG20XF1
Soil type:	Plano silt loam	Planting Date:	5/12
% OM:	3.8	Emergence Date:	5/20
pH:	6.6	Population:	140,000 seeds/acre
Fertilization:	-	Depth:	1.5 in
Previous crop:	Corn	Row spacing:	30 in
Tillage:	conventional	Plot Size:	10 x 30 ft
Weed species:	common ragweed (AMBEL); velvetleaf (ABUTH); common lambsquarters (CHEAL; giant foxtail (SETFA)		

Herbicide Application Information:

Date:	5/12
Treatment:	PRE (A)
Air Temp (°F):	70
2" Soil Temp (°F):	65
Soil moisture [surface]:	dry
RH %:	24
Cloud cover %	40
Wind speed (mph)/direction	2-6/ESE
Rainfall (in) 1 wk after APP:	0.30"
GPA:	15
PSI:	30
Nozzle:	TTI 110015
Nozzle spacing (in):	20
Boom Height (in):	20

Trt #	Treatment	Formulation	SOA Group	Rate	App Timing	App Code
1	Untreated Check					
2	MON 301668* Mauler	4.61 lb/gal 4 lb/gal	15 5	30 fl oz/a 8 fl oz/a	PRE	A A
3	MON 301668*	4.61 lb/gal	15	30 fl oz/a	PRE	A
4	Warrant Ultra	3.45 lb/gal	14, 15	50 fl oz/a	PRE	A
5	Fierce EZ	3.04 lb/gal	14, 15	6 fl oz/a	PRE	A
6	Valor EZ	4 lb/gal	14	2 fl oz/a	PRE	A
7	Authority MTZ	45% w/w	5, 14	10 oz/a	PRE	A
8	MON 301668* Mauler XtendiMax VaporGrip Xtra	4.61 lb/gal 4 lb/gal 2.89 lbae/gal	15 5 4	30 fl oz/a 8 fl oz/a 22 fl oz/a 20 fl oz/a	PRE	A A A A
9	MON 301668* XtendiMax VaporGrip Xtra	4.61 lb/gal 2.89 lbae/gal	15 4	30 fl oz/a 22 fl oz/a 20 fl oz/a	PRE	A A A
10	Warrant Ultra XtendiMax VaporGrip Xtra	3.45 lb/gal 2.89 lbae/gal	14, 15 4	50 fl oz/a 22 fl oz/a 20 fl oz/a	PRE	A A A
11	Fierce EZ XtendiMax VaporGrip Xtra	3.04 lb/gal 2.89 lbae/gal	14, 15 4	6 fl oz/a 22 fl oz/a 20 fl oz/a	PRE	A A A
12	Valor EZ XtendiMax VaporGrip Xtra	4 lb/gal 2.89 lbae/gal	14 4	2 fl oz/a 22 fl oz/a 20 fl oz/a	PRE	A A A
13	Authority MTZ XtendiMax VaporGrip Xtra	45% w/w 2.89 lbae/gal	5, 14 4	10 oz/a 22 fl oz/a 20 fl oz/a	PRE	A A A

Adjuvants: VaporGrip Xtra = volatility reducing agent.

***MON301668** is an experimental formulation of encapsulated acetochlor similar to Warrant herbicide with a higher active ingredient load per gallon of formulated product.

Trial Summary:

This trial evaluated the potential benefit of adding XtendiMax to the tank with traditional PRE herbicides. There was visible soybean injury (stunting) from all treatments containing flumioxazin 15 and 22 days after application (Table 13). Fierce EZ (flumioxazin + pyroxasulfone) had greater % stunting than Valor EX (flumioxazin). The addition of XtendiMax to Fierce EZ slightly increased soybean stunting relative to Fierce EZ alone.

The addition of XtendiMax to the tank with traditional PRE herbicides greatly improved large seeded broadleaf (common ragweed, velvetleaf) control of most treatments (Table 13). Averaged across all treatments, common ragweed control of PRE herbicides with XtendiMax was 99% vs 82% without XtendiMax 22 days after application. Similarly, velvetleaf control was 92% with vs 74% without 22 days after application. XtendiMax herbicide has been shown to provide a short period of residual control of broadleaf weeds with very little required moisture for activation. Results from this trial further supports this as only 0.30 inches of rainfall was received within one week of application. When paired with traditional PRE herbicides, there may be some added benefit of weed control in the interim between application and activating precipitation in dry springs.

Plot photos from throughout the growing season are available at [XtendiMax Paired Soil Residual Herbicide Programs](#) published on [wiscweeds.info](#).

Table 13. Crop injury and weed control visual ratings for trial #21-ARL-SB01 at Arlington, WI.^{a,b}

Trt # Herbicide (rate acre ⁻¹)	Injury ^c (%)		AMBEL (%)		ABUTH (%)		CHEAL (%)		SETFA (%)	
	15 DAT	22 DAT	22 DAT	36 DAT	22 DAT	36 DAT	22 DAT	36 DAT	22 DAT	36 DAT
1 Untreated Check	0	0	0	0	0	0	0	0	0	0
One-Pass – PRE (5/12)										
2 MON 301668 (30 fl oz) + Mauler (8 fl oz)	0.0	0.0	94	81	79	61	98	95	100	98
8 MON 301668 (30 fl oz) + Mauler (8 fl oz) + XtendiMax (22 fl oz)*	0.0	0.0	99	97	88	90	100	100	100	96
3 MON 301668 (30 fl oz)	0.0	0.0	83	59	71	34	96	73	99	99
9 MON 301668 (30 fl oz) + XtendiMax (22 fl oz)*	0.0	0.3	99	96	89	89	100	99	99	93
4 Warrant Ultra (50 fl oz)	0.0	0.0	94	85	70	44	95	89	100	83
10 Warrant Ultra (50 fl oz) + XtendiMax (22 fl oz)*	0.0	0.0	99	98	89	92	100	98	100	95
5 Fierce EZ (6 fl oz)	5.8	9.8	81	73	98	97	99	97	98	88
11 Fierce EZ (6 fl oz) + XtendiMax (22 fl oz)*	7.3	12.0	99	96	100	100	100	99	100	96
6 Valor EZ (2 fl oz)	2.8	5.8	77	53	83	83	99	92	93	62
12 Valor EZ (2 fl oz) + XtendiMax (22 fl oz)*	2.8	7.3	99	97	97	99	100	99	98	94
7 Authority MTZ (10 oz)	0.5	0.3	62	31	44	46	96	87	68	47
13 Authority MTZ (10 oz) + XtendiMax (22 fl oz)*	0.0	0.0	99	97	89	93	100	100	95	88
LSD ($\alpha=0.10$)	0.9	1.8	13	17	22	17	3	4	13	22
p value	<0.001	<0.001	<0.001	<0.001	0.011	<0.001	0.011	<0.001	.0011	0.007

^aVisual control from 70-100% is illustrated on a color scale with green representing greater weed control values.^bAMBEL, common ragweed; ABUTH, velvetleaf; CHEAL, common lambsquarters; SETFA, giant foxtail.^cCrop injury rated as % stunting relative to the untreated check.

*All treatments with XtendiMax included 20 fl oz/a VaporGrip Xtra, a volatility reducing agent.

Project Goal: Evaluate weed control and crop safety of MON 301668 vs key competitor herbicides.

MON301668 is an experimental formulation of encapsulated acetochlor similar to Warrant herbicide with a higher active ingredient load per gallon of formulated product.

Site Description:

Location:	Arlington, WI	Crop:	Soybean
Field #:	454	Variety:	AG20XF1
Soil type:	Plano silt loam	Planting Date:	5/17
% OM:	3.5	Emergence Date:	-
pH:	6.7	Population:	140,000 seeds/acre
Fertilization:	-	Depth:	1.5 in
Previous crop:	Corn	Row spacing:	30 in
Tillage:	conventional	Plot Size:	10 x 25 ft
Weed species:	common ragweed (AMBEL); common lambsquarters (CHEAL; giant foxtail (SETFA)		

Herbicide Application Information:

Date:	5/17
Treatment:	PRE (A)
Air Temp (°F):	77
2" Soil Temp (°F):	73
Soil moisture [surface]:	very dry
RH %:	36
Cloud cover %	15
Wind speed (mph)/direction	5-12/SE
Rainfall (in) 1 wk after APP:	0.60"
GPA:	15
PSI:	34
Nozzle:	TTI 110015
Nozzle spacing (in):	20
Boom Height (in):	20

Trt #	Treatment	Formulation	SOA Group	Rate	App Timing	App Code
1	Untreated Check					
2	Warrant	3 lb/gal	15	48 fl oz/a	PRE	A
	XtendiMax	2.89 lbae/gal	4	22 fl oz/a	PRE	A
	VaporGrip Xtra			20 fl oz/a	PRE	A
3	MON 301668*	4.61 lb/gal	15	30 fl oz/a	PRE	A
	XtendiMax	2.89 lbae/gal	4	22 fl oz/a	PRE	A
	VaporGrip Xtra			20 fl oz/a	PRE	A
4	Zidua	85% w/w	15	2 oz/a	PRE	A
	XtendiMax	2.89 lbae/gal	4	22 fl oz/a	PRE	A
	VaporGrip Xtra			20 fl oz/a	PRE	A
5	Outlook	6 lb/gal	15	14 fl oz/a	PRE	A
	XtendiMax	2.89 lbae/gal	4	22 fl oz/a	PRE	A
	VaporGrip Xtra			20 fl oz/a	PRE	A
6	Dual II Magnum	7.64 lb/gal	15	1 pt/a	PRE	A
	XtendiMax	2.89 lbae/gal	4	22 fl oz/a	PRE	A
	VaporGrip Xtra			20 fl oz/a	PRE	A
7	Warrant	3 lb/gal	15	48 fl oz/a	PRE	A
	Mauler	4 lb/gal	5	8 fl oz/a	PRE	A
8	MON 301668*	4.61 lb/gal	15	30 fl oz/a	PRE	A
	Mauler	4 lb/gal	5	8 fl oz/a	PRE	A
9	Zidua	85% w/w	15	2 oz/a	PRE	A
	Mauler	4 lb/gal	5	8 fl oz/a	PRE	A
10	Outlook	6 lb/gal	15	14 fl oz/a	PRE	A
	Mauler	4 lb/gal	5	8 fl oz/a	PRE	A
11	Dual II Magnum	7.64 lb/gal	15	1 pt/a	PRE	A
	Mauler	4 lb/gal	5	8 fl oz/a	PRE	A
12	Warrant	3 lb/gal	15	48 fl oz/a	PRE	A
	Mauler	4 lb/gal	5	8 fl oz/a	PRE	A
	XtendiMax	2.89 lbae/gal	4	22 fl oz/a	PRE	A
	VaporGrip Xtra			20 fl oz/a	PRE	A
13	MON 301668*	4.61 lb/gal	15	30 fl oz/a	PRE	A
	Mauler	4 lb/gal	5	8 fl oz/a	PRE	A
	XtendiMax	2.89 lbae/gal	4	22 fl oz/a	PRE	A
	VaporGrip Xtra			20 fl oz/a	PRE	A
14	Zidua	85% w/w	15	2 oz/a	PRE	A
	Mauler	4 lb/gal	5	8 fl oz/a	PRE	A
	XtendiMax	2.89 lbae/gal	4	22 fl oz/a	PRE	A
	VaporGrip Xtra			20 fl oz/a	PRE	A

Adjuvants: VaporGrip Xtra = volatility reducing agent.

***MON301668** is an experimental formulation of encapsulated acetochlor similar to Warrant herbicide with a higher active ingredient load per gallon of formulated product.

Trt #	Treatment	Formulation	SOA Group	Rate	App Timing	App Code
15	Outlook	6 lb/gal	15	14 fl oz/a	PRE	A
	Mauler	4 lb/gal		8 fl oz/a	PRE	A
	XtendiMax	2.89 lbae/gal		22 fl oz/a	PRE	A
	VaporGrip Xtra			20 fl oz/a	PRE	A
16	Dual II Magnum	7.64 lb/gal	15	1 pt/a	PRE	A
	Mauler	4 lb/gal		8 fl oz/a	PRE	A
	XtendiMax	2.89 lbae/gal		22 fl oz/a	PRE	A
	VaporGrip Xtra			20 fl oz/a	PRE	A

Adjutants: VaporGrip Xtra = volatility reducing agent.

Trial Summary:

This trial evaluated the weed control and crop safety of MON 301668 in various tank mixes against key competitor group 15 herbicides and commercial Warrant. There was no visible soybean injury attributable to any of the herbicide treatments 15 and 23 days after application (data not shown).

Weed control of MON 301668 was similar to that of commercial Warrant and other competitor group 15 herbicides (Table 14). The addition of XtendiMax to the tank improved common ragweed control relative to a group 15 + Mauler tank mix. This is similar to what was observed in trial #21-ARL-SB01. XtendiMax herbicide has been shown to provide a short period of residual control of broadleaf weeds in dry springs with very little required moisture for activation. Results from this trial further supports this as only 0.60 inches of rainfall was received within one week of application. Giant foxtail control was not significantly different among any of the treatments.

Plot photos from throughout the growing season are available at [MON 301668 Residual Weed Control and Crop Safety](#) published on [wiscweeds.info](#).

Table 14. Weed control visual ratings for trial #21-ARL-SB03 at Arlington, WI.^{ab}

Trt # Herbicide (rate acre ⁻¹)	AMBEL (%)		CHEAL (%)		SETFA (%)	
	23 DAT	36 DAT	23 DAT	36 DAT	23 DAT	36 DAT
1 Untreated Check	0	0	0	0	0	0
One-Pass – PRE (5/12)						
2 Warrant (48 fl oz) + XtendiMax (22 fl oz)*	98	96	93	93	99	100
7 Warrant (48 fl oz) + Mauler (8 fl oz)	89	80	92	92	94	91
12 Warrant (48 fl oz) + Mauler (8 fl oz) + XtendiMax (22 fl oz)*	98	96	95	92	100	98
3 MON 301668 (30 fl oz) + XtendiMax (22 fl oz)*	100	96	98	97	100	98
8 MON 301668 (30 fl oz) + Mauler (8 fl oz)	88	81	97	93	99	95
13 MON 301668 (30 fl oz) + Mauler (8 fl oz) + XtendiMax (22 fl oz)*	100	99	97	94	100	98
4 Zidua (2 oz) + XtendiMax (22 fl oz)*	100	99	95	96	100	99
9 Zidua (2 oz) + Mauler (8 fl oz)	84	65	94	93	96	93
14 Zidua (2 oz) + Mauler (8 fl oz) + XtendiMax (22 fl oz)*	100	97	96	94	100	99
5 Outlook (14 fl oz) + XtendiMax (22 fl oz)*	99	98	97	97	100	98
10 Outlook (14 fl oz) + Mauler (8 fl oz)	86	72	97	90	96	93
15 Outlook (14 fl oz) + Mauler (8 fl oz) + XtendiMax (22 fl oz)*	99	98	97	95	99	98
6 Dual II Magnum (1 pt) + XtendiMax (22 fl oz)*	99	98	93	93	99	99
11 Dual II Magnum (1 pt) + Mauler (8 fl oz)	84	59	93	89	96	93
16 Dual II Magnum (1 pt) + Mauler (8 fl oz) + XtendiMax (22 fl oz)*	99	98	98	95	100	97
LSD ($\alpha=0.10$)		4	18	2	3	ns
p value		<0.001	<0.001	<0.001	<0.001	0.175
						0.128

^aVisual control from 70-100% is illustrated on a color scale with green representing greater weed control values.

^bAMBEL, common ragweed; CHEAL, common lambsquarters; SETFA, giant foxtail.

*All treatments with XtendiMax included 20 fl oz/a VaporGrip Xtra, a volatility reduced agent.

Project Goal: Evaluate multiple herbicide programs to provide recommendations for XtendFlex soybean weed management.

Site Description:

Location:	Brooklyn, WI	Crop:	XtendFlex soybean
Field #:	OB-1	Variety:	AG20XF1
Soil type:	Kegonsa silt loam	Planting Date:	5/25
% OM:	2	Emergence Date:	6/2
pH:	7.1	Population:	140,000 seeds/acre
Fertilization:	-	Depth:	1.25 in
Previous crop:	Seed Corn	Row spacing:	30 in
Tillage:	conventional	Plot Size:	10 x 30 ft
Weed species:	gly-R waterhemp (AMATA); velvetleaf (ABUTH); common lambsquarters; (CHEAL); venice mallow (HIBTR)		

Herbicide Application Information:

Date:	5/26	6/22
Treatment:	PRE (A)	POST (B)
Air Temp (°F):	73	65
2" Soil Temp (°F):	69	51
Soil moisture [surface]:	dry	damp
RH %:	58	51
Cloud cover %	55	10
Wind speed (mph)/direction	6-12/NW	3-10/W
Rainfall (in) 1 wk after APP:	0.61"	3.21"
GPA:	15	15
PSI:	34	34
Nozzle:	TTI 110015	TT*/TTI**
Nozzle spacing (in):	20	20
Boom Height (in):	20	24

*Used TT 110015 nozzles for all treatments without XtendiMax.

**Used TTI 110015 nozzles for all treatments with XtendiMax.

Crop and weed information at application:

	Date:	5/26	6/22
Soybean	Height:	-	-
	Stage:	-	V3
waterhemp	Height:	-	0.5-5"
	Density:	-	0-36/m ²
velvetleaf	Height:	-	1-4"
	Density:	-	0-4/m ²
lambsquarters	Height:	-	1-3"
	Density:	-	0-4/m ²
venice mallow	Height:	-	0.5-2"
	Density:	-	0-36/m ²

*Weed density recorded from plots with a previous herbicide treatment.

Density and height varied depending on the effectiveness of the previous herbicide.

Trt #	Treatment	Formulation	SOA Group	Rate	App Timing	App Code
1	Check					
2	XtendiMax	2.9 lbae/gal	4	22 fl oz/a	PRE	A
	MON 301668*	4.61 lb/gal	15	30 fl oz/a	PRE	A
	Mauler	4 lb/gal	5	8 fl oz/a	PRE	A
	VaporGrip Xtra			20 fl oz/a	PRE	A
	XtendiMax	2.9 lbae/gal	4	22 fl oz/a	POST	B
	Roundup PowerMAX 3	4.8 lbae/gal	9	30 fl oz/a	POST	B
	MON 301668*	4.61 lb/gal	15	30 fl oz/a	POST	B
	VaporGrip Xtra			20 fl oz/a	POST	B
	Intact			0.5% v/v	POST	B
	Class Act Ridion			1% v/v	POST	B
3	XtendiMax	2.9 lbae/gal	4	22 fl oz/a	PRE	A
	MON 301668*	4.61 lb/gal	15	30 fl oz/a	PRE	A
	Mauler	4 lb/gal	5	8 fl oz/a	PRE	A
	VaporGrip Xtra			20 fl oz/a	PRE	A
	Liberty	2.34 lb/gal	10	32 fl oz/a	POST	B
	Roundup PowerMAX 3	4.8 lbae/gal	9	30 fl oz/a	POST	B
	MON 301668*	4.61 lb/gal	15	30 fl oz/a	POST	B
	AMS			2.5% v/v	POST	B
4	XtendiMax	2.9 lbae/gal	4	22 fl oz/a	PRE	A
	MON 301668*	4.61 lb/gal	15	30 fl oz/a	PRE	A
	Mauler	4 lb/gal	5	8 fl oz/a	PRE	A
	VaporGrip Xtra			20 fl oz/a	PRE	A
	Liberty	2.34 lb/gal	10	32 fl oz/a	POST	B
	Roundup PowerMAX 3	4.8 lbae/gal	9	30 fl oz/a	POST	B
	AMS			2.5% v/v	POST	B
5	XtendiMax	2.9 lbae/gal	4	22 fl oz/a	PRE	A
	MON 301668*	4.61 lb/gal	15	30 fl oz/a	PRE	A
	Mauler	4 lb/gal	5	8 fl oz/a	PRE	A
	VaporGrip Xtra			20 fl oz/a	PRE	A
	Liberty	2.34 lb/gal	10	32 fl oz/a	POST	B
	Select Max	0.97 lb/gal	1	12 fl oz/a	POST	B
	AMS			2.5% v/v	POST	B
6	XtendiMax	2.9 lbae/gal	4	22 fl oz/a	PRE	A
	Fierce WDG	76% w/w	14, 15	3 oz/a	PRE	A
	VaporGrip Xtra			20 fl oz/a	PRE	A
	Liberty	2.34 lb/gal	10	32 fl oz/a	POST	B
	Roundup PowerMAX 3	4.8 lbae/gal	9	30 fl oz/a	POST	B
	MON 301668*	4.61 lb/gal	15	30 fl oz/a	POST	B
	AMS			2.5% v/v	POST	B

Trt #	Treatment	Formulation	SOA Group	Rate	App Timing	App Code
7	XtendiMax	2.9 lbae/gal	4	22 fl oz/a	PRE	A
	Fierce WDG	76% w/w	14, 15	3 oz/a	PRE	A
	VaporGrip Xtra			20 fl oz/a	PRE	A
	XtendiMax	2.9 lbae/gal	4	22 fl oz/a	POST	B
	Roundup PowerMAX 3	4.8 lbae/gal	9	30 fl oz/a	POST	B
	MON 301668*	4.61 lb/gal	15	30 fl oz/a	POST	B
	Vapor Grip Xtra			20 fl oz/a	POST	B
	Intact			0.5% v/v	POST	B
	Class Act Ridion			1% v/v	POST	B
8	MON 301668*	4.61 lb/gal	15	30 fl oz/a	PRE	A
	Mauler	4 lb/gal	5	8 fl oz/a	PRE	A
	XtendiMax	2.9 lbae/gal	4	22 fl oz/a	POST	B
	Roundup PowerMAX 3	4.8 lbae/gal	9	30 fl oz/a	POST	B
	MON 301668*	4.61 lb/gal	15	30 fl oz/a	POST	B
	Vapor Grip Xtra			20 fl oz/a	POST	B
	Intact			0.5% v/v	POST	B
	Class Act Ridion			1% v/v	POST	B
9	MON 301668*	4.61 lb/gal	15	30 fl oz/a	PRE	A
	Mauler	4 lb/gal	5	8 fl oz/a	PRE	A
	Liberty	2.34 lbae/gal	10	32 fl oz/a	POST	B
	Roundup PowerMAX 3	4.8 lbae/gal	9	30 fl oz/a	POST	B
	MON 301668*	4.61 lb/gal	15	30 fl oz/a	POST	B
	AMS			2.5% v/v	POST	B
10	MON 301668*	4.61 lb/gal	15	30 fl oz/a	PRE	A
	Mauler	4 lb/gal	5	8 fl oz/a	PRE	A
	Liberty	2.34 lb/gal	10	32 fl oz/a	POST	B
	Roundup PowerMAX 3	4.8 lbae/gal	9	30 fl oz/a	POST	B
	AMS			2.5% v/v	POST	B
	MON 301668*	4.61 lb/gal	15	30 fl oz/a	PRE	A
11	Mauler	4 lb/gal	5	8 fl oz/a	PRE	A
	Liberty	2.34 lb/gal	10	32 fl oz/a	POST	B
	Select Max	0.97 lb/gal	1	12 fl oz/a	POST	B
	AMS			2.5% v/v	POST	B
	MON 301668*	4.61 lb/gal	15	30 fl oz/a	PRE	A
12**	Mauler	4 lb/gal	5	8 fl oz/a	PRE	A
	Liberty	2.34 lb/gal	10	32 fl oz/a	POST	B
	Xtendimax	2.9 lbae/gal	4	22 fl oz/a	POST	B
	MON 301668*	4.61 lb/gal	15	30 fl oz/a	POST	B
	Vapor Grip Xtra			20 fl oz/a	POST	B
	Intact			0.5% v/v	POST	B
	Class Act Ridion			1% v/v	POST	B

Trt #	Treatment	Formulation	SOA Group	Rate	App Timing	App Code
13**	MON 301668*	4.61 lb/gal	15	30 fl oz/a	PRE	A
	Mauler	4 lb/gal	5	8 fl oz/a	PRE	A
	Liberty	2.34 lb/gal	10	32 fl oz/a	POST	B
	Xtendimax	2.9 lbae/gal	4	22 fl oz/a	POST	B
	Roundup PowerMAX 3	4.8 lbae/gal	9	30 fl oz/a	POST	B
	MON 301668*	4.61 lb/gal	15	30 fl oz/a	POST	B
	Vapor Grip Xtra			20 fl oz/a	POST	B
	Intact			0.5% v/v	POST	B
	Class Act Ridion			1% v/v	POST	B
14	MON 301668*	4.61 lb/gal	15	30 fl oz/a	PRE	A
	Mauler	4 lb/gal	5	8 fl oz/a	PRE	A
	Warrant Ultra	3.45 lb/gal	14, 15	48 fl oz/a	POST	B
	Liberty	2.34 lb/gal	10	32 fl oz/a	POST	B
	AMS			2.5% v/v	POST	B
15	XtendiMax	2.9 lbae/gal	4	22 fl oz/a	PRE	A
	Warrant Ultra	3.45 lb/gal	14, 15	48 fl oz/a	PRE	A
	VaporGrip Xtra			20 fl oz/a	PRE	A
	XtendiMax	2.9 lbae/gal	4	22 fl oz/a	POST	B
	Roundup PowerMAX 3	4.8 lbae/gal	9	30 fl oz/a	POST	B
	MON 301668*	4.61 lb/gal	15	30 fl oz/a	POST	B
	Vapor Grip Xtra			20 fl oz/a	POST	B
	Intact			0.5% v/v	POST	B
	Class Act Ridion			1% v/v	POST	B
16	XtendiMax	2.9 lbae/gal	4	22 fl oz/a	PRE	A
	Warrant Ultra	3.45 lb/gal	14, 15	48 fl oz/a	PRE	A
	VaporGrip Xtra			20 fl oz/a	PRE	A
	Liberty	2.34 lb/gal	10	32 fl oz/a	POST	B
	Roundup PowerMAX 3	4.8 lbae/gal	9	30 fl oz/a	POST	B
	MON 301668*	4.61 lb/gal	15	30 fl oz/a	POST	B
	AMS			2.5% v/v	POST	B

Adjuvants: AMS = Amsol (liquid AMS); Intact = DRA; Class Act Ridion = non-AMS water conditioner + NIS; VaporGrip Xtra = volatility reducing agent (VRA)

***MON301668** is an experimental formulation of encapsulated acetochlor similar to Warrant herbicide with a higher active ingredient load per gallon of formulated product.

**Treatments 12 and 13 are not an approved tank mixture due to restrictions on the XtendiMax label. Do not tank mix Liberty with XtendiMax.

Trial Summary:

This trial evaluated multiple 2-pass herbicide programs to provide recommendations for weed management in XtendFlex soybeans. There was no observable soybean injury from the PRE herbicides (data not shown). There was visible soybean injury 16 days after the POST application (Table 15). Injury symptoms included leaf necrosis (burn) and leaf crinkling. Warrant Ultra had the greatest % injury. Tank mixes with Liberty + MON 301668 also generally showed greater injury than other POST herbicide treatments.

The trial was conducted in a field infested with a population of glyphosate-resistant waterhemp. All treatments provided excellent season long waterhemp control (Table 15). Waterhemp control from the PRE herbicides at the time of POST application was good to excellent ~87-96%. The addition of XtendiMax to the tank at the PRE application resulted in slightly better control of waterhemp and other broadleaf species (velvetleaf, common lambsquarters, venice mallow) in the trial area. All POST herbicide programs provided excellent waterhemp control.

Yield was very similar among herbicide programs (Table 15). Yield across all herbicide treatments = 62 bu acre⁻¹, while the untreated check was 33 bu acre⁻¹.

Plot photos from throughout the growing season are available at [XtendFlex Soybean Herbicide Programs](#) published on [wiscweeds.info](#).

Table 15. Soybean injury, weed control ratings, and soybean yield for trial #21-BRO-SB04 at Brooklyn, WI.^a

Trt #	Herbicide (rate acre ⁻¹)	Injury ^c (%)	Waterhemp (%)			Overall ^d (%)			Yield ^b bu acre ⁻¹
			7/8	6/22	7/8	6/22	7/8	9/21	
1	Untreated Check	0		0	0	0	0	0	33 c
Two-Pass – PRE (5/26) <i>fb</i> POST (6/22)									
2	XtendiMax (22 oz) + MON 301668 (30 oz) + Mauler (8 oz)* <i>fb</i>	8.8		95	99	99	94	100	99
	XtendiMax (22 oz) + Roundup PM 3 (30 oz) + MON 301668 (30 oz)**			93	100	98	92	99	98
3	XtendiMax (22 oz) + MON 301668 (30 oz) + Mauler (8 oz)* <i>fb</i>	16.3		93	99	100	92	100	100
	Liberty (32 oz) + Roundup PM 3 (30 oz) + MON 301668 (30 oz) + AMS 2.5% v/v			92	99	99	91	99	99
4	XtendiMax (22 oz) + MON 301668 (30 oz) + Mauler (8 oz)* <i>fb</i>	6.3		95	100	100	94	100	100
	Liberty (32 oz) + Roundup PM 3 (30 oz) + AMS 2.5% v/v			96	100	100	96	100	100
5	XtendiMax (22 oz) + MON 301668 (30 oz) + Mauler (8 oz)* <i>fb</i>	5.0		92	99	100	87	100	100
	Liberty (32 oz) + Select Max (12 oz) + AMS 2.5% v/v			90	99	100	90	98	100
6	XtendiMax (22 oz) + Fierce WDG (3 oz) <i>fb</i>	15.0		89	99	100	86	100	100
	Liberty (32 oz) + Roundup PM 3 (30 oz) + MON 301668 (30 oz) + AMS 2.5% v/v			89	99	100	87	98	99
7	XtendiMax (22 oz) + Fierce WDG (3 oz) <i>fb</i>	13.8		90	99	100	85	99	99
	XtendiMax (22 oz) + Roundup PM 3 (30 oz) + MON 301668 (30 oz)**			87	98	100	85	99	99
8	MON 301668 (30 oz) + Mauler (8 oz) <i>fb</i>	11.3		91	100	100	86	98	98
	XtendiMax (22 oz) + Roundup PM 3 (30 oz) + MON 301668 (30 oz)**			92	100	100	91	100	100
9	MON 301668 (30 oz) + Mauler (8 oz) <i>fb</i>	15.0		88	100	100	91	100	100
	Liberty (32 oz) + Roundup PM 3 (30 oz) + MON 301668 (30 oz) + AMS 2.5% v/v			3	ns	ns	4	ns	ns
10	MON 301668 (30 oz) + Mauler (8 oz) <i>fb</i>	5.0		0.004	0.883	0.326	<0.001	0.510	0.567
	Liberty (32 oz) + Roundup PM 3 (30 oz) + AMS 2.5% v/v								
11	MON 301668 (30 oz) + Mauler (8 oz) <i>fb</i>	5.0							
	Liberty (32 oz) + Select Max (12 oz) + AMS 2.5% v/v								
12	MON 301668 (30 oz) + Mauler (8 oz) <i>fb</i>	10.0							
	Liberty (32 oz) + XtendiMax (22 oz) + MON 301668 (30 oz)**								
13	MON 301668 (30 oz) + Mauler (8 oz) <i>fb</i>	8.8							
	Liberty (32 oz)+XtendiMax (22 oz)+Roundup PM 3 (30 oz)+MON 301668 (30 oz)**								
14	MON 301668 (30 oz) + Mauler (8 oz) <i>fb</i>	20.0							
	Warrant Ultra (48 oz) + Liberty (32 oz) + AMS 2.5% v/v								
15	XtendiMax (22 oz) + Warrant Ultra (48 oz)* <i>fb</i>	7.5							
	XtendiMax (22 oz) + Roundup PM 3 (30 oz) + MON 301668 (30 oz)**								
16	XtendiMax (22 oz) + Warrant Ultra (48 oz)* <i>fb</i>	11.3							
	Liberty (32 oz) + Roundup PM 3 (30 oz) + MON 301668 (30 oz) + AMS 2.5% v/v								
		LSD ($\alpha=0.10$)	3.0						
		p value	<0.001						

^aVisual control from 70-100% is illustrated on a color scale with green representing greater weed control values.^bYield values with the same letter are not significantly different.^cCrop injury symptoms included leaf necrosis (burn) and leaf crinkling.^dOverall weed control included all species in the trial area: waterhemp, velvetleaf, common lambsquarters, and venice mallow.

*All PRE applications of XtendiMax included 20 fl oz/a VaporGrip Xtra, a volatility reducing agent.

**All POST applications of XtendiMax included VaporGrip Xtra at 20 fl oz, Class Act Ridion 1% v/v, and Intact 0.5% v/v.

Project Goal: Evaluate the efficacy and crop safety of Authority brand herbicides and similar competitor PRE herbicides in Enlist soybeans.

Site Description:

Location:	Brooklyn, WI	Crop:	Enlist soybean
Field #:	OB-3	Variety:	P20T64E
Soil type:	Dresden loam	Planting Date:	5/13
% OM:	1.2	Emergence Date:	5/22
pH:	7.1	Population:	140,000 seeds/acre
Fertilization:	-	Depth:	1.5
Previous crop:	Seed Corn	Row spacing:	30 in
Tillage:	Conventional	Plot Size:	10 x 25 ft
Weed species:	glyphosate-resistant waterhemp (AMATA); velvetleaf (ABUTH); common lambsquarters (CHEAL); wild-proso millet (PANMI); woolly cupgrass (ERBVI)		

Herbicide Application Information:

Date:	5/14	6/15
Treatment:	PRE (A)	POST (B)
Air Temp (°F):	72	79
2" Soil Temp (°F):	71	80
Soil moisture [surface]:	dry	very dry
RH %:	33	49
Cloud cover %	12	40
Wind speed (mph)/direction	2-10/W	2-5/NNE
Rainfall (in) 1 wk after APP:	0.83"	2.01"
GPA:	15	15
PSI:	34	34
Nozzle:	TTI 110015	TT 110015
Nozzle spacing (in):	20	20
Boom Height (in):	20	25

Crop and weed information at application:

	Date:	5/14	6/15*
Soybean	Height:	-	4-6"
	Stage:	-	V3
waterhemp	Height	-	0.5-6.5"
	Density:	-	0-160/m ²
velvetleaf	Height:	-	1-5"
	Density:	-	0-32/m ²
lambsquarters	Height:	-	0.5-4"
	Density:	-	0-32/m ²
annual grasses	Height:	-	1-4"
	Density:	-	0-24/m ²

*All weed densities and heights were recorded from plots with a PRE herbicide.

Average waterhemp density in the check was 222 plants/m² on 6/15.

Trt #	Treatment	Formulation	SOA Group	Rate	App Timing	App Code
1	Untreated Check					
2	Authority Supreme Liberty AMS	4.16 lb/gal 2.34 lb/gal	14, 15 10	8 fl oz/a 32 fl oz/a 3 lb/a	PRE POST POST	A B B
3	Authority Supreme Tricor DF Liberty AMS	4.16 lb/gal 75% w/w 2.34 lb/gal	14, 15 5 10	7 fl oz/a 5 oz/a 32 fl oz/a 3 lb/a	PRE PRE POST POST	A A B B
4	Authority Supreme Liberty Anthem Maxx AMS	4.16 lb/gal 2.34 lb/gal 4.3 lb/gal	14, 15 10 14, 15	6.5 fl oz/a 32 fl oz/a 2.5 fl oz/a 3 lb/a	PRE POST POST POST	A B B B
5	Boundary Liberty AMS	6.5 lb/gal 2.34 lb/gal	5, 15 10	29 fl oz/a 32 fl oz/a 3 lb/a	PRE POST POST	A B B
6	Zidua PRO Liberty AMS	4.09 lb/gal 2.34 lb/gal	2, 14, 15 10	6 fl oz/a 32 fl oz/a 3 lb/a	PRE POST POST	A B B
7	Kyber Liberty AMS	2.64 lb/gal 2.34 lb/gal	5, 14, 15 10	1 pt/a 32 fl oz/a 3 lb/a	PRE POST POST	A B B
8	Anthem Maxx Liberty AMS	4.3 lb/gal 2.34 lb/gal	14, 15 10	4 fl oz/a 32 fl oz/a 3 lb/a	PRE POST POST	A B B
9	Warrant Liberty AMS	3 lb/gal 2.34 lb/gal	15 10	48 fl oz/a 32 fl oz/a 3 lb/a	PRE POST POST	A B B
10	Outlook Liberty AMS	6 lb/gal 2.34 lb/gal	15 10	14 fl oz/a 32 fl oz/a 3 lb/a	PRE POST POST	A B B
11	Dual II Magnum Liberty AMS	7.64 lb/gal 2.34 lb/gal	15 10	1.3 pt/a 32 fl oz/a 3 lb/a	PRE POST POST	A B B
12	Authority Edge Liberty AMS	4.25 lb/gal 2.34 lb/gal	14, 15 10	8 fl oz/a 32 fl oz/a 3 lb/a	PRE POST POST	A B B
13	Authority Edge Tricor DF Liberty AMS	4.25 lb/gal 75% w/w 2.34 lb/gal	15, 15 5 10	7 fl oz/a 5 oz/a 32 fl oz/a 3 lb/a	PRE PRE POST POST	A A B B

Adjuvants: AMS = BlueAg spray grade ammonium sulfate

Trt #	Treatment	Formulation	SOA Group	Rate	App Timing	App Code
14	Authority Edge	4.25 lb/gal	14, 15	7 fl oz/a	PRE	A
	Liberty	2.34 lb/gal		32 fl oz/a	POST	B
	Anthem Maxx	4.3 lb/gal	15, 15	3.1 fl oz/a	POST	B
	AMS			3 lb/a	POST	B
15	Authority First DF	70% w/w	2, 15	6.4 oz/a	PRE	A
	Liberty	2.34 lb/gal		32 fl oz/a	POST	B
	AMS			3 lb/a	POST	B

Adjuvants: AMS = BlueAg spray grade ammonium sulfate

Trial Summary:

This trial evaluated the weed control and crop safety of FMC's Authority Supreme, Authority Edge, and Anthem Maxx herbicide brands vs competitor products. Authority Supreme and Authority Edge are similar products with different active ingredient loads of sulfentrazone and pyroxasulfone. Authority Edge has a higher sulfentrazone:pyroxasulfone ratio (1.8:1) compared to Authority Supreme (1:1). The trial was located in a grower's field with a heavy population of glyphosate-resistant waterhemp. There was no significant herbicide injury from the PRE and POST herbicide applications (data not shown).

Waterhemp density at the time of POST application (6/15) was impacted by PRE herbicide treatment (Table 16). Waterhemp control differed among treatments at all rating timings (Table 17). The single active ingredient group 15 treatments had lower levels of waterhemp and velvetleaf control. The POST application of Liberty was effective at controlling the emerged waterhemp in most of the treatments; however, in treatments with less effective PRE herbicides POST waterhemp control was below 90%. Many of the treatments had <90% control at soybean harvest as some waterhemp emerged after the POST application. All the herbicide programs evaluated provided good to excellent annual grass (wild-proso millet, woolly cupgrass) control throughout the growing season (Table 17).

Soybean yield differed among the herbicide treatments (Table 17). Yield of the untreated check was 21 bu acre⁻¹.

Plot photos from throughout the growing season are available at [Authority Supreme/Edge and Anthem Maxx Herbicide Programs](#) published on [wiscweeds.info](#).

Table 16. Waterhemp density at the time of POST herbicide application at Brooklyn, WI

Trt #	PRE Herbicide	Rate	Density (m ²)*	Standard Deviation	% Reduction**
1	Check		222	200	-
2	Authority Supreme	8 fl oz	6	8	97
3	Authority Supreme + Tricor DF	7 fl oz + 5 oz	8	11	96
4	Authority Supreme	7 fl oz	10	8	95
5	Boundary	29 fl oz	5	4	98
6	Zidua PRO	6 fl oz	10	7	95
7	Kyber	1 pt	12	9	95
8	Anthem Maxx	4 fl oz	28	6	87
9	Warrant	48 fl oz	95	75	57
10	Outlook	14 fl oz	42	36	81
11	Dual II Magnum	1.3 pt	23	24	90
12	Authority Edge	8 fl oz	1	2	100
13	Authority Edge + Tricor DF	7 fl oz + 5 oz	5	8	98
14	Authority Edge	7 fl oz	7	6	97
15	Authority First DF	6.4 oz	6	7	97

*density was collected from one 0.25 m² quadrant in each plot

**percent reduction in density from untreated check

Table 17. Weed control ratings and soybean yield for trial #21-BRO-SB07 at Brooklyn, WI.^a

Trt#	Herbicide (rate acre ⁻¹)	Waterhemp (%)			Velvetleaf (%)			Lambsquarters (%)			Annual Grasses ^b (%)			Yield ^c bu acre ⁻¹
		6/15	6/30	9/28	6/15	6/30	9/28	6/15	6/30	9/28	6/15	6/30	9/28	
1	Untreated Check	0	0	0	0	0	0	0	0	0	0	0	0	21 f
Two-Pass – PRE (5/14) fb POST (6/15)														
2	Authority Supreme (8 fl oz) fb Liberty (32 fl oz) + AMS (3 lb)	91	97	82	96	100	100	100	100	100	99	100	100	61 ab
3	Authority Supreme (7 fl oz) + Tricor DF (5 oz) fb Liberty (32 fl oz) + AMS (3 lb)	95	99	95	95	100	100	100	100	100	93	100	99	58 a-d
4	Authority Supreme (6.5 fl oz) fb Liberty (32 fl oz) + Anthem Maxx (2.5 fl oz) + AMS (3 lb)	88	98	89	98	100	100	100	100	100	94	100	100	58 a-d
5	Boundary (29 fl oz) fb Liberty (32 fl oz) + AMS (3 lb)	87	97	90	96	99	96	100	100	98	97	100	100	61 abc
6	Zidua PRO (6 fl oz) fb Liberty (32 fl oz) + AMS (3 lb)	89	97	84	100	100	100	100	100	100	97	100	100	60 abc
7	Kyber (1 pt) fb Liberty (32 fl oz) + AMS (3 lb)	81	95	84	90	100	94	98	100	100	85	100	100	63 a
8	Anthem Maxx (4 fl oz) fb Liberty (32 fl oz) + AMS (3 lb)	75	93	77	90	100	99	100	100	100	95	100	100	59 abc
9	Warrant (48 fl oz) fb Liberty (32 fl oz) + AMS (3 lb)	52	82	41	50	100	87	100	100	78	85	100	100	52 e
10	Outlook (14 fl oz) fb Liberty (32 fl oz) + AMS (3 lb)	69	83	49	68	99	85	99	100	75	93	100	100	53 de
11	Dual II Magnum (1.3 pt) fb Liberty (32 fl oz) + AMS (3 lb)	51	84	47	46	100	90	100	100	88	95	100	100	56 b-e
12	Authority Edge (8 fl oz) fb Liberty (32 fl oz) + AMS (3 lb)	98	98	89	98	100	100	100	100	100	96	99	99	55 cde
13	Authority Edge (7 fl oz) + Tricor DF (5 oz) fb Liberty (32 fl oz) + AMS (3 lb)	94	97	94	97	100	100	100	100	100	93	100	100	59 a-d
14	Authority Edge (7 fl oz) fb Liberty (32 fl oz) + Anthem Maxx (2.5 fl oz) + AMS (3 lb)	92	98	93	99	100	100	100	100	100	96	100	100	60 abc
15	Authority First DF (6.4 oz) fb Liberty (32 fl oz) + AMS (3 lb)	94	97	92	100	100	100	100	100	100	98	100	100	58 a-d
LSD ($\alpha=0.10$)		11	3	9	8	<1	6	ns	ns	13	ns	ns	ns	6
p value		<0.001	<0.001	<0.001	<0.001	0.075	<0.001	0.463	1.000	0.007	0.200	0.470	0.560	<0.001

^aVisual control from 70-100% is illustrated on a color scale with green representing greater weed control values.

^bAnnual grass species in the trial area consisted of wild-proso millet and woolly cupgrass. Wild-proso millet was the predominant species.

^cYield values with the same letter are not significantly different.

Trial: Evaluation of Preview 2.1SC for Residual Weed Control and Crop Safety # 21-BRO-SB08

Project Goal: Evaluate the efficacy and crop safety of Preview 2.1SC in Enlist soybeans.

Preview 2.1SC is a new herbicide premix of metribuzin and sulfentrazone in a 2:1 ratio (2.23 lb/gal metribuzin; 1.12 lb/gal sulfentrazone) from UPL. A limited supply is available for the 2022 season with full product launch coming in 2023.

Site Description:

Location:	Brooklyn, WI	Crop:	Enlist soybean
Field #:	OB-3	Variety:	P20T64E
Soil type:	Dresden loam	Planting Date:	5/13
% OM:	1.2	Emergence Date:	5/22
pH:	7.1	Population:	140,000 seeds/acre
Fertilization:	-	Depth:	1.5
Previous crop:	Seed Corn	Row spacing:	30 in
Tillage:	Conventional	Plot Size:	10 x 25 ft
Weed species:	glyphosate-resistant waterhemp (AMATA); velvetleaf (ABUTH); common lambsquarters (CHEAL); wild-proso millet (PANMI); woolly cupgrass (ERBVI)		

Herbicide Application Information:

Date:	5/14	6/22
Treatment:	PRE (A)	POST (B)
Air Temp (°F):	69	65
2" Soil Temp (°F):	70	51
Soil moisture [surface]:	dry	damp
RH %:	33	51
Cloud cover %	10	10
Wind speed (mph)/direction	1-3/NW	3-10/W
Rainfall (in) 1 wk after APP:	0.83"	3.21"
GPA:	15	15
PSI:	34	34
Nozzle:	TTI 110015	TTI 110015
Nozzle spacing (in):	20	20
Boom Height (in):	20	24-26

Crop and weed information at application:

	Date:	5/14	6/22*
Soybean	Height:	-	-
	Stage:	-	V4/V5
waterhemp	Height	-	1-8"
	Density:	-	8-21/ft ²
velvetleaf	Height:	-	1-5"
	Density:	-	0-2/ft ²
lambsquarters	Height:	-	1-5"
	Density:	-	0-3/ft ²
annual grasses	Height:	-	-
	Density:	-	-

*All weed densities and heights were recorded from the untreated check.

Trial: Evaluation of Preview 2.1SC for Residual Weed Control and Crop Safety # 21-BRO-SB08

Trt #	Treatment	Formulation	SOA Group	Rate	App Timing	App Code
1	Untreated Check					
2	Preview 2.1SC	3.35 lb/gal	5, 14	18 fl oz/a	PRE	A
	Interline	2.34 lb/gal	10	32 fl oz/a	POST	B
	Enlist One	3.8 lbae/gal	4	32 fl oz/a	POST	B
	AMS			3 lb/a	POST	B
3	Preview 2.1SC	3.35 lb/gal	5, 14	21.4 fl oz/a	PRE	A
	Interline	2.34 lb/gal	10	32 fl oz/a	POST	B
	Enlist One	3.8 lbae/gal	4	32 fl oz/a	POST	B
	AMS			3 lb/a	POST	B
4	Boundary	6.5 lb/gal	5, 15	29 fl oz/a	PRE	A
	Interline	2.34 lb/gal	10	32 fl oz/a	POST	B
	Enlist One	3.8 lbae/gal	4	32 fl oz/a	POST	B
	AMS			3 lb/a	POST	B
5	Boundary	6.5 lb/gal	5, 15	36 fl oz/a	PRE	A
	Interline	2.34 lb/gal	10	32 fl oz/a	POST	B
	Enlist One	3.8 lbae/gal	4	32 fl oz/a	POST	B
	AMS			3 lb/a	POST	B
6	Authority MTZ	45% w/w	5, 14	14 oz/a	PRE	A
	Interline	2.34 lb/gal	10	32 fl oz/a	POST	B
	Enlist One	3.8 lbae/gal	4	32 fl oz/a	POST	B
	AMS			3 lb/a	POST	B
7	Authority First DF	70% w/w	2, 14	6.45 oz/a	PRE	A
	Interline	2.34 lb/gal	10	32 fl oz/a	POST	B
	Enlist One	3.8 lbae/gal	4	32 fl oz/a	POST	B
	AMS			3 lb/a	POST	B
8	Moccasin MTZ	4.47 lb/gal	5, 15	42 fl oz/a	PRE	A
	Interline	2.34 lb/gal	10	32 fl oz/a	POST	B
	Enlist One	3.8 lbae/gal	4	32 fl oz/a	POST	B
	AMS			3 lb/a	POST	B
9	Zidua PRO	4.09 lb/gal	2, 14, 15	5 fl oz/a	PRE	A
	Interline	2.34 lb/gal	10	32 fl oz/a	POST	B
	Enlist One	3.8 lbae/gal	4	32 fl oz/a	POST	B
	AMS			3 lb/a	POST	B
10	Valor XLT	40.3% w/w	2, 14	3 oz/a	PRE	A
	Interline	2.34 lb/gal	10	32 fl oz/a	POST	B
	Enlist One	3.8 lbae/gal	4	32 fl oz/a	POST	B
	AMS			3 lb/a	POST	B
11	Tripzin ZC	4 lb/gal	3, 5	44 fl oz/a	PRE	A
	Interline	2.34 lb/gal	10	32 fl oz/a	POST	B
	Enlist One	3.8 lbae/gal	4	32 fl oz/a	POST	B
	AMS			3 lb/a	POST	B
12	Satellite HydroCap	3.8 lb/gal	3	2 pt/a	PRE	A
	Interline	2.34 lb/gal	10	32 fl oz/a	POST	B
	Enlist One	3.8 lbae/gal	4	32 fl oz/a	POST	B
	AMS			3 lb/a	POST	B

Trial Summary:

This trial evaluated the efficacy and crop safety of Preview 2.1SC in Enlist soybeans. **Preview 2.1SC** is a new herbicide premix of metribuzin and sulfentrazone in a 2:1 ratio (2.23 lb/gal metribuzin; 1.12 lb/gal sulfentrazone) from UPL. A limited supply is available for the 2022 season with full product launch coming in 2023. The trial was located in a grower's field with a heavy population of glyphosate-resistant waterhemp. There was visible injury from the PRE herbicides observed 21 days after application (Table 18). No injury symptoms were evident 38 days after application.

Preview 2.1SC provided excellent early-season residual control of waterhemp, velvetleaf, lambsquarters, and wild-proso millet (Table 18). Several of the other competitor products also provided good to excellent residual weed control. A POST application of Interline + Enlist One was made to all treatments 38 days after the PRE application. The POST application was very effective at controlling emerged weeds, with the exception of treatment 12, as indicated by visual control ratings 16 days after application (7/8). The very poor residual waterhemp control by Satellite HydroCap resulted in taller, denser waterhemp which escaped control of the POST herbicides.

Soybean yield differed among the herbicide treatments (Table 18). Yield of the untreated check was 34 bu acre⁻¹.

Plot photos from throughout the growing season are available at [Evaluation of Preview 2.1SC for Residual Weed Control and Crop Safety](#) published on [wiscweeds.info](#).

Table 18. Crop injury, weed control ratings, and soybean yield for trial #21-BRO-SB08 at Brooklyn, WI.^a

Trt # Herbicide (rate acre ⁻¹)	Injury (%)		Waterhemp (%)				Velvetleaf (%)			Lambsquarters (%)			Wild-Proso Millet			Yield ^b bu acre ⁻¹
	6/4	6/21	6/9	6/21	7/8	9/28	6/21	7/8	9/28	6/21	7/8	9/28	6/21	7/8	9/28	
1 Untreated Check	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	34 e
Two-Pass – PRE (5/14) fb POST (6/22)			POST				POST			POST			POST			
2 Preview 2.1SC (18 fl oz) fb Interline (32 fl oz) + Enlist One (32 fl oz) + AMS (3 lb)	2.8	0	97	92	100	94	97	100	100	100	100	100	96	100	100	62 abc
3 Preview 2.1SC (21.4 fl oz) fb Interline (32 fl oz) + Enlist One (32 fl oz) + AMS (3 lb)	2.5	0	97	91	98	96	98	100	100	100	100	100	96	100	99	60 bcd
4 Boundary (29 fl oz) fb Interline (32 fl oz) + Enlist One (32 fl oz) + AMS (3 lb)	6.5	0	97	90	99	92	81	100	93	100	100	100	95	100	100	61 abc
5 Boundary (36 fl oz) fb Interline (32 fl oz) + Enlist One (32 fl oz) + AMS (3 lb)	10.8	0	97	92	99	92	86	100	98	100	100	100	100	100	100	61 abc
6 Authority MTZ (14 oz) fb Interline (32 fl oz) + Enlist One (32 fl oz) + AMS (3 lb)	4.8	0	92	82	98	99	90	100	100	100	100	100	84	100	100	66 ab
7 Authority First (6.45 oz) fb Interline (32 fl oz) + Enlist One (32 fl oz) + AMS (3 lb)	4.5	0	97	86	99	98	99	100	100	100	100	100	96	100	100	63 abc
8 Moccasin MTZ (42 fl oz) fb Interline (32 fl oz) + Enlist One (32 fl oz) + AMS (3 lb)	3.5	0	97	91	100	94	81	100	98	100	100	100	96	100	100	65 ab
9 Zidua PRO (5 fl oz) fb Interline (32 fl oz) + Enlist One (32 fl oz) + AMS (3 lb)	4.8	0	93	80	100	98	100	100	100	100	100	100	99	100	100	65 ab
10 Valor XLT (3 oz) fb Interline (32 fl oz) + Enlist One (32 fl oz) + AMS (3 lb)	10.0	0	90	75	98	97	99	100	98	100	100	100	92	100	98	58 cd
11 Tripzin ZC (44 fl oz) fb Interline (32 fl oz) + Enlist One (32 fl oz) + AMS (3 lb)	4.0	0	96	89	99	94	86	100	100	100	100	100	93	100	100	66 a
12 Satellite HydroCap (2 pt) fb Interline (32 fl oz) + Enlist One (32 fl oz) + AMS (3 lb)	4.5	0	21	4	85	82	78	100	91	100	100	100	99	100	100	54 d
LSD ($\alpha=0.10$)		3.1	ns	6	5	4	5	6	ns	4	ns	ns	7	ns	ns	6
p value		<.001	1.000	<.001	<.001	<.001	<.001	<.001	0.465	<.001	1.000	1.000	0.016	0.589	0.465	<0.001

^aVisual control from 70-100% is illustrated on a color scale with green representing greater weed control values.^bYield values with the same letter are not significantly different.

Project Goal: Evaluate multiple two-pass herbicide programs with layered residuals for season-long waterhemp control in Enlist soybean.

Site Description:

Location:	Brooklyn, WI	Crop:	Enlist soybean
Field #:	OB-3	Variety:	P20T64E
Soil type:	Dresden loam	Planting Date:	5/13
% OM:	1.2	Emergence Date:	5/22
pH:	7.1	Population:	140,000 seeds/acre
Fertilization:	-	Depth:	1.5
Previous crop:	Seed Corn	Row spacing:	30 in
Tillage:	Conventional	Plot Size:	10 x 25 ft
Weed species:	glyphosate-resistant waterhemp (AMATA); velvetleaf (ABUTH); wild-proso millet (PANMI)		

Herbicide Application Information:

Date:	5/14	6/15
Treatment:	PRE (A)	POST (B)
Air Temp (°F):	72	79
2" Soil Temp (°F):	71	80
Soil moisture [surface]:	dry	very dry
RH %:	33	49
Cloud cover %	12	40
Wind speed (mph)/direction	2-10/W	2-5/NNE
Rainfall (in) 1 wk after APP:	0.83"	2.01"
GPA:	15	15
PSI:	34	34
Nozzle:	TTI 110015	AIXR110015
Nozzle spacing (in):	20	20
Boom Height (in):	20	25

Crop and weed information at application:

	Date:	5/14	6/15*
Soybean	Height:	-	4-6"
	Stage:	-	V3
waterhemp	Height	-	0.5-6"
	Density:	-	3-8/ft ²
velvetleaf	Height:	-	
	Density:	-	
annual grasses	Height:	-	
	Density:	-	

*All weed densities and heights were recorded from plots with a PRE herbicide.

Trt #	Treatment	Formulation	SOA Group	Rate	App Timing	App Code
1	Untreated Check					
2	Boundary	6.5 lb/gal	5, 15	29 fl oz/a	PRE	A
	Sequence	5.25 lb/gal	9, 15	3 pt/a	POST	B
	Enlist One	3.8 lbae/gal	4	32 fl oz/a	POST	B
	Class Act Ridion			1% v/v	POST	B
3	Prefix	5.29 lb/gal	14, 15	2 pt/a	PRE	A
	Tricor DF	75% w/w	5	6 oz/a	PRE	A
	Sequence	5.25 lb/gal	9, 15	3 pt/a	POST	B
	Enlist One	3.8 lbae/gal	4	32 fl oz/a	POST	B
	Class Act Ridion			1% v/v	POST	B
4	Tendovo*	4.03 lb/gal	2, 5, 15	4 pt/a	PRE	A
	Sequence	5.25 lb/gal	9, 15	3 pt/a	POST	B
	Enlist One	3.8 lbae/gal	4	32 fl oz/a	POST	B
	Class Act Ridion			1% v/v	POST	B
5	Broadaxe XC	7 lb/gal	14, 15	30 fl oz/a	PRE	A
	Sequence	5.25 lb/gal	9, 15	3 pt/a	POST	B
	Enlist One	3.8 lbae/gal	4	32 fl oz/a	POST	B
	Class Act Ridion			1% v/v	POST	B
6	Sonic	70% w/w	2, 14	5 oz/a	PRE	A
	Enlist One	3.8 lbae/gal	4	32 oz/a	POST	B
	Durango DMA	4 lbae/gal	9	24 oz/a	POST	B
	EverpreX	7.62 lb/gal	15	1 pt/a	POST	B
	AMS			3 lb/a	POST	B
7	Sonic	70% w/w	2, 14	5 oz/a	PRE	A
	Enlist One	3.8 lbae/gal	4	32 oz/a	POST	B
	Liberty	2.34 lb/gal	10	32 oz/a	POST	B
	EverpreX	7.62 lb/gal	15	1 pt/a	POST	B
	AMS			3 lb/a	POST	B
8	Surveil	48% w/w	2, 14	3 oz/a	PRE	A
	Enlist One	3.8 lbae/gal	4	32 oz/a	POST	B
	Durango DMA	4 lbae/gal	9	24 oz/a	POST	B
	EverpreX	7.62 lb/gal	15	1 pt/a	POST	B
	AMS			3 lb/a	POST	B
9	Kyber	2.64 lb/gal	5, 14, 15	1 pt	PRE	A
	Enlist One	3.8 lbae/gal	4	32 oz/a	POST	B
	Durango DMA	4 lbae/gal	9	24 oz/a	POST	B
	EverpreX	7.62 lb/gal	15	1 pt/a	POST	B
	AMS			3 lb/a	POST	B
10	Afforia	50.8% w/w	2, 14	2.5 oz/a	PRE	A
	Enlist One	3.8 lbae/gal	4	32 oz/a	POST	B
	Durango DMA	4 lbae/gal	9	24 oz/a	POST	B
	EverpreX	7.62 lb/gal	15	1 pt/a	POST	B
	AMS			3 lb/a	POST	B

Trt #	Treatment	Formulation	SOA Group	Rate	App Timing	App Code
11	Fierce EZ	3.05 lb/gal	14, 15	6 fl oz/a	PRE	A
	Enlist One	3.8 lbae/gal		32 fl oz/a	POST	B
	Roundup PowerMAX II	4.5 lbae/gal		32 fl oz/a	POST	B
	Perpetuo	2.3 lb/gal		6 fl oz/a	POST	B
	AMS			3 lb/a	POST	B
12	Fierce MTZ	2.64 lb/gal	5, 14, 15	1 pt/a	PRE	A
	Enlist One	3.8 lbae/gal		32 fl oz/a	POST	B
	Roundup PowerMAX II	4.5 lbae/gal		32 fl oz/a	POST	B
	Perpetuo	2.3 lb/gal		6 fl oz/a	POST	B
	AMS			3 lb/a	POST	B
13	Fierce XLT	62.4% w/w	2, 14, 15	4 oz/a	PRE	A
	Enlist One	3.8 lbae/gal		32 fl oz/a	POST	B
	Roundup PowerMAX II	4.5 lbae/gal		32 fl oz/a	POST	B
	Perpetuo	2.3 lb/gal		6 fl oz/a	POST	B
	AMS			3 lb/a	POST	B
14	Zidua PRO	4.09 lb/gal	2, 14, 15	6 fl oz/a	PRE	A
	Liberty	2.34 lb/gal		32 fl oz/a	POST	B
	Zidua SC	4.17 lb/gal		2.5 fl oz/a	POST	B
	AMS			3 lb/a	POST	B
15	Zidua PRO	4.09 lb/gal	2, 14, 15	6 fl oz/a	PRE	A
	Enlist One	3.8 lbae/gal		32 fl oz/a	POST	B
	Liberty	2.34 lb/gal		32 fl oz/a	POST	B
	Zidua SC	4.17 lb/gal		2.5 fl oz/a	POST	B
	AMS			3 lb/a	POST	B
16	Authority Supreme	4.16 lb/gal	14, 15	6.5 fl oz/a	PRE	A
	Liberty	2.34 lb/gal		32 fl oz/a	POST	B
	Anthem Maxx	4.3 lb/gal		2.5 fl oz/a	POST	B
	AMS			3 lb/a	POST	B

Adjuvants: AMS = BlueAg spray grade ammonium sulfate; Class Act Ridion = non-AMS water conditioner + NIS

*Tendovo 4.14 ZC is a new premix offering from Syngenta containing 3.33 lb/gal S-metolachlor; 0.64 lb/gal metribuzin; and 0.06 lb/gal cloransulam. Registration is expected sometime in 2022.

Trial Summary:

This trial evaluated multiple two-pass herbicide programs with layered residuals from several company portfolios for season-long waterhemp control in Enlist soybean. The trial was located in a grower's field with a heavy population of glyphosate-resistant waterhemp. There was minor injury from the PRE herbicides observed 21 days after application (Table 19). Treatments with flumioxazin tended to have greater % injury. No injury symptoms were visible 15 days after the POST application.

Several of the PRE herbicides provided good to excellent early-season residual control of waterhemp, velvetleaf, and wild-proso millet 21 days after application (Table 19). Residual control of some treatments fell below 80% by 32 days after PRE application. All but one treatment (trt 14) had at least 90% waterhemp control at soybean harvest. Velvetleaf and wild-proso millet control was 99% or greater for all herbicide programs at soybean harvest.

Yield was very similar among herbicide programs (Table 19). Yield across all herbicide treatments = 62 bu acre⁻¹, while the untreated check was 29 bu acre⁻¹.

Plot photos from throughout the growing season are available at [Evaluation of Layered Residual Herbicide Programs in Enlist Soybean](#) published on [wiscweeds.info](#).

Table 19. Crop injury, weed control ratings, and soybean yield for trial #21-BRO-SB10 at Brooklyn, WI.^a

Trt #	Herbicide (rate acre ⁻¹)	Injury (%)		Waterhemp (%)				Velvetleaf (%)				Wild-Proso Millet			Yield ^b bu acre ⁻¹	
		6/4	6/30	6/4	6/15	6/30	9/21	6/4	6/15	6/30	9/21	6/15	6/30	9/21		
1	Untreated Check	0	0	0	0	0	0	0	0	0	0	0	0	0	29 d	
Two-Pass – PRE (5/14) fb POST (6/15)		POST				POST				POST						
2	Boundary (29 fl oz) fb Sequence (3 pt) + Enlist One (32 fl oz) + Class Act Ridion 1% v/v	1.3	0	94	92	97	95	97	95	100	100	95	100	100	66 a	
3	Prefix (2 pt) + Tricor DF (6 oz) fb Sequence (3 pt) + Enlist One (32 fl oz) + Class Act Ridion 1% v/v	1.0	0	90	77	92	90	96	84	100	99	56	100	99	62 abc	
4	Tendovo (4 pt) fb Sequence (3 pt) + Enlist One (32 fl oz) + Class Act Ridion 1% v/v	2.0	0	95	93	98	95	100	100	100	99	93	100	100	60 c	
5	Broadaxe XC (30 fl oz) fb Sequence (3 pt) + Enlist One (32 fl oz) + Class Act Ridion 1% v/v	1.3	0	94	85	93	94	96	92	100	100	87	100	100	63 abc	
6	Sonic (5 oz) fb Enlist One (32 fl oz) + Durango (24 fl oz) + EverpreX (1 pt) + AMS (3 lb)	1.0	0	88	70	92	95	100	100	100	100	80	100	99	60 c	
7	Sonic (5 oz) fb Enlist One (32 fl oz) + Liberty (32 fl oz) + EverpreX (1 pt) + AMS (3 lb)	1.0	0	90	74	98	98	100	100	100	100	82	99	98	64 ab	
8	Surveil (3 oz) fb Enlist One (32 fl oz) + Durango (24 fl oz) + EverpreX (1 pt) + AMS (3 lb)	4.3	0	87	68	91	96	98	100	100	100	49	100	100	64 abc	
9	Kyber (1 pt) fb Enlist One (32 fl oz) + Durango (24 fl oz) + EverpreX (1 pt) + AMS (3 lb)	1.3	0	89	71	93	94	94	87	100	100	61	100	100	63 abc	
10	Afforia (2.5 oz) fb Enlist One (32 fl oz) + Durango (24 fl oz) + EverpreX (1 pt) + AMS (3 lb)	3.8	0	88	70	93	96	95	88	100	99	54	100	100	63 abc	
11	Fierce EZ (6 fl oz) fb Enlist One (32 oz) + Roundup PM (32 oz) + Perpetuo (6 fl oz) + AMS (3 lb)	4.5	0	94	80	98	95	95	96	100	100	82	100	100	61 bc	
12	Fierce MTZ (1 pt) fb Enlist One (32 oz) + Roundup PM (32 oz) + Perpetuo (6 fl oz) + AMS (3 lb)	1.0	0	81	66	96	95	91	78	100	100	58	100	100	60 c	
13	Fierce XLT (4 oz) fb Enlist One (32 oz) + Roundup PM (32 oz) + Perpetuo (6 fl oz) + AMS (3 lb)	3.0	0	97	89	99	96	98	100	100	100	86	100	100	60 bc	
14	Zidua PRO (6 fl oz) fb Liberty (32 fl oz) + Zidua SC (2.5 fl oz) + AMS (3 lb)	3.0	0	96	86	95	83	99	99	100	100	92	100	99	60 bc	
15	Zidua PRO (6 fl oz) fb Enlist One (32 fl oz) + Liberty (32 fl oz) + Zidua SC (2.5 fl oz) + AMS (3 lb)	1.0	0	90	82	98	97	100	100	100	100	95	99	99	60 bc	
16	Authority Supreme (6.5 fl oz) fb Liberty (32 fl oz) + Anthem Maxx (2.5 fl oz) + AMS (3 lb)	1.5	0	92	87	97	90	98	96	100	100	86	100	99	61 bc	
		LSD ($\alpha=0.10$)	1.2	ns	6	7	3	4	4	6	ns	ns	13	ns	ns	5
		p value	<.001	1.000	0.006	<.001	<.001	<.001	0.002	<.001	1.000	0.510	<.001	0.471	0.841	<0.001

^aVisual control from 70-100% is illustrated on a color scale with green representing greater weed control values.^bYield values with the same letter are not significantly different.

Project Goal: Compare the residual weed control and crop safety of Tendovo to other Syngenta and competitor preemergence soybean herbicides.

*Tendovo 4.14 ZC is a new premix offering from Syngenta containing 3.33 lb/gal S-metolachlor; 0.64 lb/gal metribuzin; and 0.06 lb/gal cloransulam. Registration is expected sometime in 2022.

Site Description:

Location:	Janesville, WI	Crop:	Enlist soybean
Field #:	7	Variety:	S20-E3
Soil type:	Plano silt loam	Planting Date:	5/3
% OM:	3.3	Emergence Date:	5/21
pH:	6.7	Population:	140,000 seeds/acre
Fertilization:	-	Depth:	1.25
Previous crop:	Corn	Row spacing:	30 in
Tillage:	Conventional	Plot Size:	10 x 30 ft
Weed species:	giant ragweed (AMBTR), velvetleaf (ABUTH), common lambsquarters (CHEAL), giant foxtail (SETFA)		

Herbicide Application Information:

	Date:	5/3	6/2	7/1
Treatment:	PRE (A)	POST (B)	LPOST (C)	
Air Temp (°F):	76	86	71	
2" Soil Temp (°F):	60	72	-	
Soil moisture [surface]:	dry	dry	dry	
RH %:	56	32	79	
Cloud cover %	98	45	-	
Wind speed (mph)/direction	1-5/NW	1-6	-	
Rainfall (in) 1 wk after APP:	1.55"	0.03"	0.22"	
GPA:	15	15	13	
PSI:	35	34	-	
Nozzle:	TTI 110015	AIXR110015	TT 11002	
Nozzle spacing (in):	20	20	20	
Boom Height (in):	20	24	34	

Crop and Weed Information at Application:

	Date:	5/3*	6/2	7/1
Soybean	Height:	-	2-3"	10-12"
	Stage:	-	VC	R1
giant ragweed	Height:	-	1-3.5"	4-14" Avg=6"
	Density:	38-85/m ²	17-28/m ²	
velvetleaf	Height:	-		
	Density:	2-18/m ²		
lambsquarters	Height:	-		
	Density:	1-25/m ²		
giant foxtail	Height:	-		
	Density:	8-55/ft ²		

*Weed density in the untreated check 21 days after the PRE application.

Trt #	Treatment	Formulation	SOA Group	Rate	App Timing	App Code
1	Untreated Check					
2	Tendovo*	4.03 lb/gal	2, 5, 15	3.5 pt/a	PRE	A
	Enlist One	3.8 lbae/gal	4	32 fl oz/a	POST	B
	Sequence	5.25 lb/gal	9, 15	3.5 pt/a	POST	B
	Class Act Ridion			1% v/v	POST	B
	Liberty	2.34 lb/gal	10	32 fl oz/a	LPOST	C
	AMS			2 lb/a	LPOST	C
3	Tendovo*	4.03 lb/gal	2, 5, 15	4.2 pt/a	PRE	A
	Enlist One	3.8 lbae/gal	4	32 fl oz/a	POST	B
	Sequence	5.25 lb/gal	9, 15	3.5 pt/a	POST	B
	Class Act Ridion			1% v/v	POST	B
	Liberty	2.34 lb/gal	10	32 fl oz/a	LPOST	C
	AMS			2 lb/a	LPOST	C
4	Boundary	6.5 lb/gal	5, 15	29 fl oz/a	PRE	A
	Enlist One	3.8 lbae/gal	4	32 fl oz/a	POST	B
	Sequence	5.25 lb/gal	9, 15	3.5 pt/a	POST	B
	Class Act Ridion			1% v/v	POST	B
	Liberty	2.34 lb/gal	10	32 fl oz/a	LPOST	C
	AMS			2 lb/a	LPOST	C
5	Broadaxe XC	7 lb/gal	14, 15	25 fl oz/a	PRE	A
	Enlist One	3.8 lbae/gal	4	32 fl oz/a	POST	B
	Sequence	5.25 lb/gal	9, 15	3.5 pt/a	POST	B
	Class Act Ridion			1% v/v	POST	B
	Liberty	2.34 lb/gal	10	32 fl oz/a	LPOST	C
	AMS			2 lb/a	LPOST	C
6	Sonic	70% w/w	2, 14	6.45 oz/a	PRE	A
	Enlist One	3.8 lbae/gal	4	32 fl oz/a	POST	B
	Sequence	5.25 lb/gal	9, 15	3.5 pt/a	POST	B
	Class Act Ridion			1% v/v	POST	B
	Liberty	2.34 lb/gal	10	32 fl oz/a	LPOST	C
	AMS			2 lb/a	LPOST	C
7	Fierce XLT	62.4% w/w	2, 14, 15	4.5 oz/a	PRE	A
	Enlist One	3.8 lbae/gal	4	32 fl oz/a	POST	B
	Sequence	5.25 lb/gal	9, 15	3.5 pt/a	POST	B
	Class Act Ridion			1% v/v	POST	B
	Liberty	2.34 lb/gal	10	32 fl oz/a	LPOST	C
	AMS			2 lb/a	LPOST	C

Adjuvants: AMS = BlueAg spray grade ammonium sulfate; Class Act Ridion = non-AMS water conditioner + NIS

*Tendovo 4.14 ZC is a new premix offering from Syngenta containing 3.33 lb/gal S-metolachlor; 0.64 lb/gal metribuzin; and 0.06 lb/gal cloransulam. Registration is expected sometime in 2022.

Trt #	Treatment	Formulation	SOA Group	Rate	App Timing	App Code
8	Zidua PRO	4.09 lb/gal	2, 14, 15 4 9, 15 10	6 fl oz/a	PRE	A
	Enlist One	3.8 lbae/gal		32 fl oz/a	POST	B
	Sequence	5.25 lb/gal		3.5 pt/a	POST	B
	Class Act Ridion			1% v/v	POST	B
	Liberty	2.34 lb/gal		32 fl oz/a	LPOST	C
	AMS			2 lb/a	LPOST	C
9	Authority Edge	4.25 lb/gal	14, 15 4 9, 15 10	9 fl oz/a	PRE	A
	Enlist One	3.8 lbae/gal		32 fl oz/a	POST	B
	Sequence	5.25 lb/gal		3.5 pt/a	POST	B
	Class Act Ridion			1% v/v	POST	B
	Liberty	2.34 lb/gal		32 fl oz/a	LPOST	C
	AMS			2 lb/a	LPOST	C

Adjuvants: AMS = BlueAg spray grade ammonium sulfate; Class Act Ridion = non-AMS water conditioner + NIS

Trial Summary:

This trial compared the efficacy and crop safety of **Tendovo** to other Syngenta and competitor preemergence soybean herbicides in Enlist soybeans. **Tendovo 4.14 ZC** is a new premix offering from Syngenta containing 3.33 lb/gal S-metolachlor; 0.64 lb/gal metribuzin; and 0.06 lb/gal cloransulam. Registration is expected sometime in 2022. There was no observable soybean injury from the PRE herbicides (data not shown). There was minor (5-7%) soybean leaf necrosis 13 days after the POST application (data not shown).

Giant ragweed was the predominant species in the trial area. Giant ragweed at this research location is a biotype with a prolonged emergence pattern as emergence typically starts in mid-to late-April and continues well into June. None of the PRE herbicides provided >80% residual control of giant ragweed 21 days after application (Table 20). Tendovo, Sonic, Fierce XLT, and Zidua PRO all provided statistically similar control 21 DAT. Velvetleaf control for these herbicides was also much greater. All these herbicides include a group 2 (ALS) herbicide. The POST application of Enlist One + Sequence was effective at controlling all weeds emerged at application (98-100%); however, several giant ragweed seedlings had emerged after the application had been made. This is evident by the poor control 28 days after application on 7/1. A rescue application of Liberty was made at this time to control weed escapes. Even three herbicide applications were not enough to achieve >90% control at soybean harvest for some of the treatments. Treatments with less effective PRE herbicides (Boundary, Broadaxe) tended to have less control at the end of the season.

Yield was very similar among herbicide programs (Table 20). Yield across all herbicide treatments = 67 bu acre⁻¹, while the untreated check was 0 bu acre⁻¹, an indication of the very high giant ragweed competition at this location.

Plot photos from throughout the growing season are available at [Evaluation of Tendovo for Residual Weed Control and Crop Safety](#) published on [wiscweeds.info](#).

Table 20. Weed control ratings and soybean yield for trial #21-ROK-SB11 at Janesville, WI.^a

Trt #	Herbicide (rate acre ⁻¹)	Giant Ragweed (%)					Velvetleaf (%)			Lambsquarters (%)			Giant Foxtail (%)				Yield ^b bu acre ⁻¹
		5/24	6/2	6/15	7/1	10/1	6/2	6/15	10/1	6/2	6/15	10/1	6/2	6/15	7/1	10/1	
1	Untreated Check	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 c
	Three-Pass – PRE (5/3) fb POST (6/2) fb LPOST (7/1)			POST		LPOST											
2	Tendovo (3.5 pt) fb Enlist One (32 fl oz) + Sequence (3.5 pt)* fb Liberty (32 fl oz) + AMS (2 lb)	68	58	93	73	93	99	100	100	99	100	100	85	99	83	94	69 a
3	Tendovo (4.2 pt) fb Enlist One (32 fl oz) + Sequence (3.5 pt)* fb Liberty (32 fl oz) + AMS (2 lb)	66	61	93	73	99	100	100	100	100	100	100	82	99	80	97	70 a
4	Boundary (29 fl oz) fb Enlist One (32 fl oz) + Sequence (3.5 pt)* fb Liberty (32 fl oz) + AMS (2 lb)	16	3	96	80	89	65	100	100	97	100	100	54	100	86	92	65 ab
5	Broadaxe XC (25 fl oz) fb Enlist One (32 fl oz) + Sequence (3.5 pt)* fb Liberty (32 fl oz) + AMS (2 lb)	13	3	96	83	79	58	100	100	99	100	100	81	100	87	90	63 b
6	Sonic (6.45 oz) fb Enlist One (32 fl oz) + Sequence (3.5 pt)* fb Liberty (32 fl oz) + AMS (2 lb)	77	66	95	76	99	98	100	100	100	100	100	88	96	76	99	68 ab
7	Fierce XLT (4.5 oz) fb Enlist One (32 fl oz) + Sequence (3.5 pt)* fb Liberty (32 fl oz) + AMS (2 lb)	67	63	91	63	92	100	100	100	100	100	100	97	99	86	99	67 ab
8	Zidua PRO (6 fl oz) fb Enlist One (32 fl oz) + Sequence (3.5 pt)* fb Liberty (32 fl oz) + AMS (2 lb)	79	77	94	75	98	100	100	100	100	100	100	99	100	97	99	65 ab
9	Authority Edge (9 fl oz) fb Enlist One (32 fl oz) + Sequence (3.5 pt)* fb Liberty (32 fl oz) + AMS (2 lb)	31	11	95	81	95	62	100	100	99	100	100	91	96	84	95	65 ab
	LSD ($\alpha=0.10$)	17	10	3	6	4	16	ns	ns	ns	ns	ns	16	ns	ns	6	6
	p value	<.001	<.001	0.039	<.001	<.001	<.001	1.000	1.000	0.304	1.000	1.000	0.004	0.450	0.132	0.098	<0.001

^aVisual control from 70-100% is illustrated on a color scale with green representing greater weed control values.^bYield values with the same letter are not significantly different.

*Class Act Ridion at 1% v/v was included in the first POST application of Enlist One + Sequence.

Project Goal: Evaluate Reviton for control of weeds in a burndown management situation.

Site Description:

Location:	Arlington, WI	Crop:	Soybean
Field #:	452	Variety:	AG15XF1
Soil type:	Plano silt loam	Planting Date:	6/1
% OM:	3.2	Emergence Date:	6/9
pH:	6.7	Population:	140,000 seeds/acre
Fertilization:	-	Depth:	1.25 in
Previous crop:	Soybean	Row spacing:	30 in
Tillage:	no-till	Plot Size:	10 x 25 ft
Weed species:	glyphosate resistant marestail (ERICA); dandelion (TAROF); common lambsquarters (CHEAL); shepherd's purse (CAPBP)		

Herbicide Application Information:

Date:	5/12
Treatment:	Burndown (A)
Air Temp (°F):	66
2" Soil Temp (°F):	65
Soil moisture [surface]:	dry
RH %:	20
Cloud cover %	40
Wind speed (mph)/direction	0-2
Rainfall (in) 1 wk after APP:	0.3"
GPA:	15
PSI:	34
Nozzle:	TT 110015
Nozzle spacing (in):	20
Boom Height (in):	23

Crop and weed information at application:

	Date:	5/12
Soybean	Height:	-
	Stage:	-
Marestail	Height:	0.5-6" Avg=3"
	Density:	1-27/ft ²
Dandelion	Diameter:	1-7"
	Density:	0-5/ft ²
Lambsquarters	Height:	1-2"
	Density:	2-5/ft ²
Shepherd's Purse	Height:	0.5-4"
	Density:	0-5/ft ²

Trt #	Treatment	Formulation	SOA Group	Rate	App Timing	App Code
1	Untreated Check					
2	Reviton Destiny HC	2.83 lb/gal	14	2 fl oz/a 0.25% v/v	Burndown Burndown	A A
3	Reviton Roundup PowerMAX II Destiny HC AMS	2.83 lb/gal 4.5 lbae/gal	14 9	1 fl oz/a 22 fl oz/a 0.25% v/v 8.5 lb/100 gal	Burndown Burndown Burndown Burndown	A A A A
4	Sharpen Roundup PowerMAX II Destiny HC AMS	2.85 lb/gal 4.5 lbae/gal	14 9	1.5 fl oz/a 22 fl oz/a 0.25% v/v 8.5 lb/100 gal	Burndown Burndown Burndown Burndown	A A A A
5	Reviton Zone Elite Roundup PowerMAX II Destiny HC AMS	2.83 lb/gal 7 lb/gal 4.5 lbae/gal	14 14, 15 9	1 fl oz/a 30 fl oz/a 22 fl oz/a 0.25% v/v 8.5 lb/100 gal	Burndown Burndown Burndown Burndown Burndown	A A A A A

Adjuvants: AMS = BlueAg spray grade ammonium sulfate; Destiny HC = high surfactant oil concentrate (HSOC)

Trial Summary:

This trial evaluated Reviton for control of weeds in a burndown management situation before planting soybean. Reviton (tafenacil; group 14) is a relatively new herbicide offering from Helm Agro which can be used as part of a pre-plant burndown before corn, soybean, and wheat. There is a 14 day preplant interval before soybean. For this trial, soybean was planted 20 days after the burndown application. There was no observable soybean injury from any of the herbicide programs (data not shown).

Glyphosate-resistant marestail was the predominant weed species in the trial area. Dandelion common lambsquarters, and shepherd's purse were also rated for burndown control. Weed control was impacted by burndown herbicide program (Table 21). Initial control was excellent for all treatments across all four weed species 5 days after treatment (DAT); however, there was regrowth of previously burndowned marestail and dandelion plants. Sharpen + Roundup outperformed all treatments containing Reviton. If horseweed is present, an appropriate tank mix partner should be included with Reviton to achieve adequate control. Reviton alone and with tank mix partners provided excellent shepherd's purse control.

Plot photos from throughout the growing season are available at [Reviton Burndown Programs in Soybean](#) published on [wiscweeds.info](#).

Table 21. Weed control ratings for trial #21-ARL-SB12 at Arlington, WI.^a

Trt #	Herbicide (rate acre ⁻¹)	Marestail ^b (%)			Dandelion (%)			Lambsquarters (%)			Shepherd's Purse (%)			
		5 DAT	14 DAT	22 DAT	5 DAT	14 DAT	22 DAT	5 DAT	14 DAT	22 DAT	5 DAT	14 DAT	22 DAT	
1	Untreated Check	0	0	0	0	0	0	0	0	0	0	0	0	
One-Pass – Pre-plant Burndown (5/12)														
2	Reviton (2 oz) + Destiny HC 0.25% v/v	96	79	68	98	70	50	97	73	61	93	100	100	
3	Reviton (1 oz) + Roundup PM (22 oz) + Destiny HC 0.25% v/v + AMS ^c	91	77	61	98	96	77	99	100	94	91	100	100	
4	Sharpen (1.5 oz) + Roundup PM (22 oz) + Destiny HC 0.25% v/v + AMS ^c	99	95	90	98	99	89	98	99	96	97	100	100	
5	Reviton (1 oz) + Zone Elite (30 oz) + Roundup PM (22 oz) + Destiny HC 0.25% v/v + AMS ^c	97	88	76	99	95	80	99	100	100	96	100	100	
		LSD ($\alpha=0.10$)	3	3	6	ns	8	15	2	5	5	ns	ns	ns
		p value	0.008	<0.001	<0.001	0.406	<0.001	0.006	0.086	<0.001	<0.001	0.142	1.000	1.000

^aVisual control from 70-100% is illustrated on a color scale with green representing greater weed control values.^bMarestail population is glyphosate resistant.^cSpray grade AMS applied at 8.5 lb/100 gal.

Project Goal: Evaluate herbicide programs to provide recommendations for XtendFlex soybean weed management in counties under restrictions from the endangered species act (ESA).

Site Description:

Location:	Brooklyn, WI	Crop:	XtendFlex soybean
Field #:	OB-1	Variety:	AG20XF1
Soil type:	Kegonsa silt loam	Planting Date:	5/25
% OM:	2	Emergence Date:	6/2
pH:	7.1	Population:	140,000 seeds/acre
Fertilization:	-	Depth:	1.25 in
Previous crop:	Seed Corn	Row spacing:	30 in
Tillage:	conventional	Plot Size:	10 x 30 ft
Weed species:	glyphosate resistant waterhemp (AMATA); velvetleaf (ABUTH); common lambsquarters; (CHEAL)		

Herbicide Application Information:

Date:	5/26	6/22
Treatment:	PRE (A)	POST (B)
Air Temp (°F):	73	65
2" Soil Temp (°F):	69	51
Soil moisture [surface]:	dry	damp
RH %:	58	51
Cloud cover %	55	10
Wind speed (mph)/direction	6-12/NW	3-10/W
Rainfall (in) 1 wk after APP:	0.61"	3.21"
GPA:	15	15
PSI:	34	34
Nozzle:	TTI 110015	TT 110015
Nozzle spacing (in):	20	20
Boom Height (in):	20	24

Crop and weed information at application:

	Date:	5/26	6/22
Soybean	Height:	-	-
	Stage:	-	V3
waterhemp	Height:	-	1-4"
	Density:	-	0-8/m ²
velvetleaf	Height:	-	1-4"
	Density:	-	0-4/m ²
lambsquarters	Height:	-	0.5-4"
	Density:	-	0-4/m ²

*Weed density recorded from plots with a previous herbicide treatment.

Density and height varied depending on the effectiveness of the PRE herbicide.

Trt #	Treatment	Formulation	SOA Group	Rate	App Timing	App Code
1	Check					
2	Fierce EZ	3.04 lb/gal	14, 15	6 fl oz/a	PRE	A
	Liberty	2.34 lb/gal	10	32 fl oz/a	POST	B
	MON 301668*	4.61 lb/gal	15	30 fl oz/a	POST	B
	AMS			2.5% v/v	POST	B
3	Fierce EZ	3.04 lb/gal	14, 15	6 fl oz/a	PRE	A
	XtendiMax	2.89 lbae/gal	4	22 fl oz/a	PRE	A
	VaporGrip Xtra			20 fl oz/a	PRE	A
	Liberty	2.34 lb/gal	10	32 fl oz/a	POST	B
	MON 301668*	4.61 lb/gal	15	30 fl oz/a	POST	B
	AMS			2.5% v/v	POST	B
4	Fierce EZ	3.04 lb/gal	14, 15	6 fl oz/a	PRE	A
	Liberty	2.34 lb/gal	10	32 fl oz/a	POST	B
	Roundup PowerMAX 3	4.8 lbae/gal	9	30 fl oz/a	POST	B
	MON 301668*	4.61 lb/gal	15	30 fl oz/a	POST	B
	AMS			2.5% v/v	POST	B
5	Fierce EZ	3.04 lb/gal	14, 15	6 fl oz/a	PRE	A
	XtendiMax	2.89 lbae/gal	4	22 fl oz/a	PRE	A
	VaporGrip Xtra			20 fl oz/a	PRE	A
	Liberty	2.34 lb/gal	10	32 fl oz/a	POST	B
	Roundup PowerMAX 3	4.8 lbae/gal	9	30 fl oz/a	POST	B
	MON 301668*	4.61 lb/gal	15	30 fl oz/a	POST	B
6	AMS			2.5% v/v	POST	B
	Fierce EZ	3.04 lb/gal	14, 15	6 fl oz/a	PRE	A
	Warrant Ultra	3.45 lb/gal	14, 15	48 fl oz/a	POST	B
	Liberty	2.34 lb/gal	10	32 fl oz/a	POST	B
	AMS			2.5% v/v	POST	B
7	Fierce EZ	3.04 lb/gal	14, 15	6 fl oz/a	PRE	A
	XtendiMax	2.89 lbae/gal	4	22 fl oz/a	PRE	A
	VaporGrip Xtra			20 fl oz/a	PRE	A
	Warrant Ultra	3.45 lb/gal	14, 15	48 fl oz/a	POST	B
	Liberty	2.34 lb/gal	10	32 fl oz/a	POST	B
	AMS			2.5% v/v	POST	B
8	Fierce EZ	3.04 lb/gal	14, 15	6 fl oz/a	PRE	A
	Warrant Ultra	3.45 lb/gal	14, 15	48 fl oz/a	POST	B
	Liberty	2.34 lb/gal	10	32 fl oz/a	POST	B
	Roundup PowerMAX 3	4.8 lbae/gal	9	30 fl oz/a	POST	B
	AMS			2.5% v/v	POST	B
9	Fierce EZ	3.04 lb/gal	14, 15	6 fl oz/a	PRE	A
	XtendiMax	2.89 lbae/gal	4	22 fl oz/a	PRE	A
	VaporGrip Xtra			20 fl oz/a	PRE	A
	Warrant Ultra	3.45 lb/gal	14, 15	48 fl oz/a	POST	B
	Liberty	2.34 lb/gal	10	32 fl oz/a	POST	B
	Roundup PowerMAX 3	4.8 lbae/gal	9	30 fl oz/a	POST	B
	AMS			2.5% v/v	POST	B

Adjuvants: AMS = Amsol (liquid AMS); VaporGrip Xtra = volatility reducing agent (VRA)

***MON301668** is an experimental formulation of encapsulated acetochlor similar to Warrant herbicide with a higher active ingredient load per gallon of formulated product.

Trial Summary:

This trial evaluated multiple 2-pass herbicide programs to provide recommendations for weed management in XtendFlex soybeans in counties under restrictions from the endangered species act (ESA). Currently 26 Wisconsin counties are listed as counties under the ESA. Since, over the top applications of XtendiMax have further in field buffer requirements these programs were designed to avoid POST applications of XtendiMax all together. There was no observable soybean injury from the PRE herbicides (data not shown). There was soybean injury 8 and 16 days after the POST application (Table 22). Injury symptoms included leaf necrosis (burn) and leaf crinkling. Tank mixes with Warrant Ultra had the greatest % injury (~22%) while tank mixes with Liberty + MON 301668 had ~12% injury.

The trial was conducted in a field with a population of glyphosate-resistant waterhemp. All treatments provided excellent season long waterhemp control (Table 22). Waterhemp control from the PRE herbicides at the time of POST application was good to excellent ~88-97%. The addition of XtendiMax to the tank at the PRE application resulted in better control of waterhemp and other broadleaf species (velvetleaf, common lambsquarters) in the trial area. Averaged across all PRE treatments, broadleaf residual control of Fierce EZ + XtendiMax was 95% vs 83% of Fierce EZ alone. All POST herbicide programs provided excellent waterhemp control.

Yield differed among herbicide programs (Table 22). Treatments with applications of Warrant Ultra + Liberty POST had slightly lower yields when compared to other POST tank mixes.

Plot photos from throughout the growing season are available at [XtendFlex Soybean Herbicide Recommendations for ESA Counties](#) published on [wiscweeds.info](#).

Table 22. Soybean injury, weed control ratings, and soybean yield for trial #21-BRO-SB13 at Brooklyn, WI.^a

Trt #	Herbicide (rate acre ⁻¹)	Injury ^c (%)		Waterhemp (%)				Overall ^d (%)				Yield ^b bu acre ⁻¹	
		6/30	7/7	6/16	6/22	7/7	9/21	6/16	6/22	7/7	9/21		
1	Untreated Check	0	0	0	0	0	0	0	0	0	0	50 d	
Two-Pass – PRE (5/26) <i>fb</i> POST (6/22)													
2	Fierce EZ (6 fl oz) <i>fb</i> Liberty (32 fl oz) + MON 301668 (30 fl oz) + AMS**	12.5	10.0	95	91	100	99	90	85	98	99	66 abc	
3	Fierce EZ (6 fl oz) + XtendiMax (22 fl oz)* <i>fb</i> Liberty (32 fl oz) + MON 301668 (30 fl oz) + AMS**	12.5	10.5	98	96	100	100	97	95	100	100	66 abc	
4	Fierce EZ (6 fl oz) <i>fb</i> Liberty (32 fl oz) + Roundup PM3 (30 fl oz) + MON 301668 (30 fl oz) + AMS**	12.0	9.3	96	92	100	99	88	81	99	99	68 ab	
5	Fierce EZ (6 fl oz) + XtendiMax (22 fl oz)* <i>fb</i> Liberty (32 fl oz) + Roundup PM3 (30 fl oz) + MON 301668 (30 fl oz) + AMS**	12.0	10.8	98	96	100	100	97	96	100	100	69 a	
6	Fierce EZ (6 fl oz) <i>fb</i> Warrant Ultra (48 fl oz) + Liberty (32 fl oz) + AMS**	21.8	16.3	94	90	99	100	87	83	98	99	63 c	
7	Fierce EZ (6 fl oz) + XtendiMax (22 fl oz)* <i>fb</i> Warrant Ultra (48 fl oz) + Liberty (32 fl oz) + AMS**	21.3	15.0	100	97	100	100	98	96	100	100	63 c	
8	Fierce EZ (6 fl oz) <i>fb</i> Warrant Ultra (48 fl oz) + Liberty (32 fl oz) + Roundup PM3 (30 fl oz) + AMS**	23.3	16.5	94	88	100	100	90	85	97	98	66 abc	
9	Fierce EZ (6 fl oz) + XtendiMax (22 fl oz)* <i>fb</i> Warrant Ultra (48 fl oz) + Liberty (32 fl oz) + Roundup PM3 (30 fl oz) + AMS**	23.5	16.3	99	97	100	100	96	95	100	100	64 bc	
		LSD ($\alpha=0.10$)	3.0	1.9	3	4	ns	0.5	3	4	ns	ns	4
		p value	<.001	<.001	0.006	0.002	0.168	0.080	<.001	<.001	0.398	0.704	<0.001

^aVisual control from 70-100% is illustrated on a color scale with green representing greater weed control values.^bYield values with the same letter are not significantly different.^cCrop injury symptoms included leaf necrosis (burn) and leaf crinkling.^dOverall weed control included all species in the trial area: waterhemp, velvetleaf, and common lambsquarters.

*All PRE applications of XtendiMax included 20 fl oz/a VaporGrip Xtra, a volatility reducing agent.

**Liquid AMS was applied at 2.5% v/v

Project Goal: Evaluate tank mixture combinations of Liberty with Enlist, Basagran, and PPO herbicides for waterhemp control and crop safety.

Site Description						
Trial #:	21-BRO-SB16		21-ARL-SB17		21-ROK-SB17	
Location:	Brooklyn, WI		Arlington, WI		Janesville, WI	
Soil Type:	Kegonsa		Plano		Plano	
Soil Texture % sand/silt/clay:	40 / 41 / 19		4 / 71 / 25		8 / 66 / 26	
% OM:	2		3.8		4.1	
pH:	7.1		6.6		6.7	
Previous Crop:	seed corn		corn		corn	
Tillage:	conventional		conventional		conventional	
Variety:	P22T86E		P22T86E		P22T86E	
Planting Date:	5/25		5/12		4/29	
Emergence Date:	6/2		5/20		5/14	
Seeding Rate:	140,000 sds/acre		140,000 sds/acre		140,000 sds/acre	
Depth:	1.25 in		1.5 in		1.5 in	
Row Spacing:	30 in		30 in		30 in	
Plot Size:	10 x 30 ft		10 x 30 ft		10 x 30 ft	

Herbicide Application Information						
Trial #:	21-BRO-SB16		21-ARL-SB17		21-ROK-SB17	
Date:	5/26	6/30	5/12	6/28	4/29	6/18
Treatment:	PRE (A)	POST(B)	PRE (A)	POST(B)	PRE (A)	POST(B)
Air Temp (°F):	73	74	70	74	85	76
2" Soil Temp (°F):	69	60	65	60	60	60
Soil moisture [surface]:	dry	moist	dry	moist	dry	wet
RH %:	58	75	24	87	24	74
Cloud cover %:	55	10	40	100	30	95
Wind speed (mph)/direction:	6-12/NW	0-4/W	3-6/ESE	3-5/S	4-13/SE	0-4/W
Rainfall (in) 1 wk after APP:	0.61"	0.36"	0.30"	0.43"	1.40"	0.27"
GPA:	15	15	13.4	15	13.4	15
PSI:	34	35	-	34	-	34
Nozzle Type:	TTI	AIXR	TTI	AIXR	TTI	AIXR
Nozzle Size:	110015	110015	11002	110015	11002	110015

Crop and Weed Information at POST Application						
	Height	Stage	Height	Stage	Height	Stage
Soybean	8-10 in	V5	9-11 in	V4/V5	6-9 in	V3/V4
	Height	Density	Height	Density	Height	Density
Waterhemp	1-11 in	4-16/m ²	-	-	-	-
Velvetleaf	2-10 in	1-16/m ²	-	-	-	-
Common Lambsquarters	2-11 in	4-12/m ²	-	-	-	-

*All weed densities and heights were recorded from plots with a PRE herbicide.

Trt #	Treatment	Formulation	SOA Group	Rate	App Timing	App Code
1	Untreated Check					
2	PRE Only*					
3	Liberty AMS	2.34 lb/gal	10	32 fl oz/a 2 lb/a	POST POST	B B
4	Cobra COC AMS	2 lb/gal	14	12.5 fl oz/a 1% v/v 2 lb/a	POST POST POST	B B B
5	Cobra Liberty AMS	2 lb/gal 2.34 lb/gal	14 10	12.5 fl oz/a 32 fl oz/a 2 lb/a	POST POST POST	B B B
7	Flexstar COC AMS	1.88 lb/gal	14	1 pt/a 1% v/v 2 lb/a	POST POST POST	B B B
8	Flexstar Liberty AMS	1.88 lb/gal 2.34 lb/gal	14 10	1 pt/a 32 fl oz/a 2 lb/a	POST POST POST	B B B
10	Resource COC AMS	0.86 lb/gal	14	8 fl oz/a 1% v/v 2 lb/a	POST POST POST	B B B
11	Resource Liberty AMS	0.86 lb/gal 2.34 lb/gal	14 10	8 fl oz/a 32 fl oz/a 2 lb/a	POST POST POST	B B B
13	Cadet COC AMS	0.91 lb/gal	14	0.9 fl oz/a 1% v/v 2 lb/a	POST POST POST	B B B
14	Cadet Liberty AMS	0.91 lb/gal 2.34 lb/gal	14 10	0.9 fl oz/a 32 fl oz/a 2 lb/a	POST POST POST	B B B
16	Basagran COC AMS	5 lb/gal	6	1.6 pt/a 1% v/v 2 lb/a	POST POST POST	B B B
17	Basagran Liberty AMS	5 lb/gal 2.34 lb/gal	6 10	1.6 pt/a 32 fl oz/a 2 lb/a	POST POST POST	B B B
19	Enlist One AMS	3.8 lbae/gal	4	32 fl oz/a 2 lb/a	POST POST	B B
20	Enlist One Liberty AMS	3.8 lbae/gal 2.34 lb/gal	4 10	32 fl oz/a 32 fl oz/a 2 lb/a	POST POST POST	B B B
21	Liberty AMS	2.34 lb/gal	10	43 fl oz/a 2 lb/a	POST POST	B B

Adjuvants: AMS = BlueAg spray grade ammonium sulfate; COC = CropOil

*A PRE application was made to all treatments. SB16: Valor at 2 oz/a; SB17: FierceEZ at 6 fl oz/a

Trial Summary:

This study was a joint effort between the [UW-Madison Nutrient and Pest Management Program](#) (NPM; Dan Smith) and the WiscWeed team. This study evaluated the impact of glufosinate tank-mixes with PPO-inhibitors (Cobra, Flexstar, Resource, and Cadet), Basagran and Enlist One. The trial was conducted at two locations with natural infestations of waterhemp in Brooklyn and Lancaster, WI. The Brooklyn waterhemp population has a greater density and is known to be glyphosate-resistant. Only waterhemp control data from the Brooklyn, WI location is included in this report. The trial was also replicated at two additional locations (Arlington, WI; Janesville, WI) to evaluate only crop response and yield in the absence of weed competition. Crop response trials were kept weed free with POST glyphosate applications as needed.

Key Take Home Points from 2021 Data:

Waterhemp Control Study (SB16):

- All tank mixes with Liberty had excellent (>90%) waterhemp control (Table 23).
- Soybean yield was similar for all treatments containing Liberty (Table 23).
- Solo applications of Cobra, Flexstar, and Basagran had lower soybean yields, likely due to increased weed competition from common lambsquarters.
- Results from 2020 indicated an improvement in waterhemp control with the addition of Cobra, Flexstar, or Enlist One to the tank with Liberty when compared to Liberty alone. Published results from the 2020 study are available in the [2020 Wisconsin Weed Science Research Report](#) published on our blog at wiscweeds.info.
 - This response was not evident in the 2021 field trials.

Crop Response Study (SB17):

- Cobra treatments had the greatest crop injury and least canopy coverage 14 days after application at both locations (Table 24).
- In general, the addition of Liberty to the tank did not increase soybean injury or reduce crop canopy closure with the exception of Flexstar (Table 24).
 - Soybean injury 14 days after the POST application averaged across both locations: Flexstar alone = 11.2%; Flexstar + Liberty = 17.6%.
- While there were notable differences in crop injury among the treatments, there was not a significant difference in soybean yield in the absence of weed competition at either location (Table 24).
- Plot photos from throughout the growing season are available at [Liberty Tank Mix Combinations: Crop Tolerance](#) published on wiscweeds.info.

Table 23. Crop injury, weed control visual ratings and soybean yield for trial #21-BRO-SB16 at Brooklyn, WI.^{a,b,c}

Trt # Herbicide (rate acre ⁻¹)	Injury ^d (%)		AMATA (%)		CHEAL (%)		ABUTH (%)		Yield ^e bu acre ⁻¹
	7/8	7/14	7/14	9/21	7/14	9/21	7/14	9/21	
1 Untreated Check	0	0	0	0	0	0	0	0	33 e
One-Pass – PRE (5/26)									
2 Valor SX (2 oz)	0	0	77	95	75	88	83	93	45 d
Two-Pass – PRE (5/26) <i>fb</i> POST (6/30)									
3 Valor SX (2 oz) <i>fb</i> Liberty (32 fl oz) + AMS (2 lb)	10.0	5.8	98	100	100	100	100	100	66 a
21 Valor SX (2 oz) <i>fb</i> Liberty (43 fl oz) + AMS (2 lb)	12.5	7.8	100	100	100	100	100	100	61 ab
4 Valor SX (2 oz) <i>fb</i> Cobra (12.5 fl oz) + COC 1% v/v + AMS (2 lb)	39.5	25.0	95	99	88	86	93	98	47 d
5 Valor SX (2 oz) <i>fb</i> Cobra (12.5 fl oz) + Liberty (32 fl oz) + AMS (2 lb)	40.3	31.8	100	100	99	99	100	100	65 ab
7 Valor SX (2 oz) <i>fb</i> Flexstar (1 pt) + COC 1% v/v + AMS (2 lb)	33.0	22.8	94	100	92	92	98	97	59 bc
8 Valor SX (2 oz) <i>fb</i> Flexstar (1 pt) + Liberty (32 fl oz) + AMS (2 lb)	30.8	22.5	99	100	99	100	100	100	67 a
10 Valor SX (2 oz) <i>fb</i> Resource (8 fl oz) + COC 1% v/v + AMS (2 lb)	29.0	20.8	84	98	86	92	100	100	63 ab
11 Valor SX (2 oz) <i>fb</i> Resource (8 fl oz) + Liberty (32 fl oz) + AMS (2 lb)	30.3	22.3	100	100	100	99	100	100	65 ab
13 Valor SX (2 oz) <i>fb</i> Cadet (0.9 fl oz) + COC 1% v/v + AMS (2 lb)	31.3	23.8	77	94	96	93	100	100	63 ab
14 Valor SX (2 oz) <i>fb</i> Cadet (0.9 fl oz) + Liberty (32 fl oz) + AMS (2 lb)	25.3	18.0	99	100	100	100	100	100	67 a
16 Valor SX (2 oz) <i>fb</i> Basagran (1.6 pt) + COC 1% v/v + AMS (2 lb)	14.3	4.3	76	91	86	85	100	98	52 cd
17 Valor SX (2 oz) <i>fb</i> Basagran (1.6 pt) + Liberty (32 fl oz) + AMS (2 lb)	19.8	8.0	100	100	98	98	100	100	61 ab
19 Valor SX (2 oz) <i>fb</i> Enlist One (32 fl oz) + AMS (2 lb)	6.5	0.5	99	100	100	100	100	100	62 ab
20 Valor SX (2 oz) <i>fb</i> Enlist One (32 fl oz) + Liberty (32 fl oz) + AMS (2 lb)	12.8	4.3	100	100	100	100	100	100	62 ab
LSD ($\alpha=0.10$)	4.9	3.9	4	2	5	4	ns	1	7
p value	<.001	<.001	<.001	<.001	<.001	<.001	0.123	<.001	<0.001

^aVisual control from 70-100% is illustrated on a color scale with green representing greater weed control values.^bAMATA, common waterhemp (glyphosate-R); CHEAL, common lambsquarters; ABUTH, velvetleaf^cCrop injury and weed control values from the untreated check and PRE only treatments were not included in the statistical analysis.^dCrop injury rated as % leaf necrosis (leaf burn)^eYield values with the same letter are not significantly different.

Table 24. Crop injury, canopy coverage and soybean yield for trials #21-ARL-SB17 at Brooklyn, WI and #21-ROK-SB17 and Janesville, WI.

Trt # Herbicide (rate acre ⁻¹)	Arlington, WI				Janesville, WI					
	Crop Injury ^a (%)		Canopy ^b (%)		Yield bu acre ⁻¹	Crop Injury ^a (%)		Canopy ^b (%)		Yield bu acre ⁻¹
	7 DAT	14 DAT	14 DAT	18 DAT		11 DAT	18 DAT	18 DAT	18 DAT	
1 Untreated Check	0	0	61 ef		60	0	0	81 abc		84
One-Pass – PRE (5/26)										
2 Valor SX (2 oz)	0	0	70 bc		60	0.8	0.5	78 abc		84
Two-Pass – PRE (5/26) <i>fb</i> POST (6/30)										
3 Valor SX (2 oz) <i>fb</i> Liberty (32 fl oz) + AMS (2 lb)	2.5	2.5	72 ab		67	3.0	1.0	76 bcd		83
21 Valor SX (2 oz) <i>fb</i> Liberty (43 fl oz) + AMS (2 lb)	4.3	5.5	70 abc		64	3.5	1.8	78 abc		86
4 Valor SX (2 oz) <i>fb</i> Cobra (12.5 fl oz) + COC 1% v/v + AMS (2 lb)	35.5	37.3	42 g		59	38.3	23.3	66 d		85
5 Valor SX (2 oz) <i>fb</i> Cobra (12.5 fl oz) + Liberty (32 fl oz) + AMS (2 lb)	32.0	33.8	46 g		58	47.0	26.0	65 d		85
7 Valor SX (2 oz) <i>fb</i> Flexstar (1 pt) + COC 1% v/v + AMS (2 lb)	6.0	13.0	67 bcd		62	17.3	9.3	78 abc		87
8 Valor SX (2 oz) <i>fb</i> Flexstar (1 pt) + Liberty (32 fl oz) + AMS (2 lb)	15.5	19.3	63 def		58	26.3	15.8	85 ab		84
10 Valor SX (2 oz) <i>fb</i> Resource (8 fl oz) + COC 1% v/v + AMS (2 lb)	14.5	20.0	60 f		59	31.0	16.5	81 abc		89
11 Valor SX (2 oz) <i>fb</i> Resource (8 fl oz) + Liberty (32 fl oz) + AMS (2 lb)	15.0	20.8	61 ef		62	28.0	15.0	77 bcd		89
13 Valor SX (2 oz) <i>fb</i> Cadet (0.9 fl oz) + COC 1% v/v + AMS (2 lb)	13.5	15.3	65 cde		64	22.0	12.3	85 ab		89
14 Valor SX (2 oz) <i>fb</i> Cadet (0.9 fl oz) + Liberty (32 fl oz) + AMS (2 lb)	10.0	10.5	71 ab		64	19.5	11.3	75 bcd		87
16 Valor SX (2 oz) <i>fb</i> Basagran (1.6 pt) + COC 1% v/v + AMS (2 lb)	0.8	1.8	69 bc		61	20.3	7.3	70 cd		87
17 Valor SX (2 oz) <i>fb</i> Basagran (1.6 pt) + Liberty (32 fl oz) + AMS (2 lb)	0.3	0.3	71 ab		64	15.3	6.5	82 ab		86
19 Valor SX (2 oz) <i>fb</i> Enlist One (32 fl oz) + AMS (2 lb)	0.0	0.0	75 a		61	1.3	0.8	89 a		86
20 Valor SX (2 oz) <i>fb</i> Enlist One (32 fl oz) + Liberty (32 fl oz) +AMS (2 lb)	2.8	3.5	69 bc		60	4.5	1.5	75 bcd		86
LSD ($\alpha=0.10$)	1.3	1.9	5		ns	6.2	3.8	11		ns
p value	<0.001	<0.001	<0.001		0.351	<0.001	<0.001	0.057		0.511

^aCrop injury rated as % leaf necrosis (leaf burn)^bSoybean canopy coverage % estimated by analyzing 3 pictures of each plot with the CANAPEO application. Values with the same letters are not significantly different.

Multi-Trial Summary: Waterhemp Control in Soybean

Multi-Trial Summary:

The following figures summarize waterhemp control from some of the soybean herbicide evaluation trials conducted in 2021 at the Obrien Hybrids Farm near Brooklyn, WI. Waterhemp at this location is known to be resistant to glyphosate and ALS herbicides. All trials were conducted on soybeans with either the Enlist E3 or XtendFlex herbicide tolerant traits.

Treatments were grouped by POST herbicide program: XtendiMax (dicamba), Enlist (2,4-D choline), Liberty (glufosinate), and Liberty + Enlist. Some of the POST herbicide programs included glyphosate as tank-mix partner. Some of the POST treatments also had a group 15 herbicide for further residual control. To see how certain herbicides or herbicide tank mixes performed see individual trial data presented in this report.

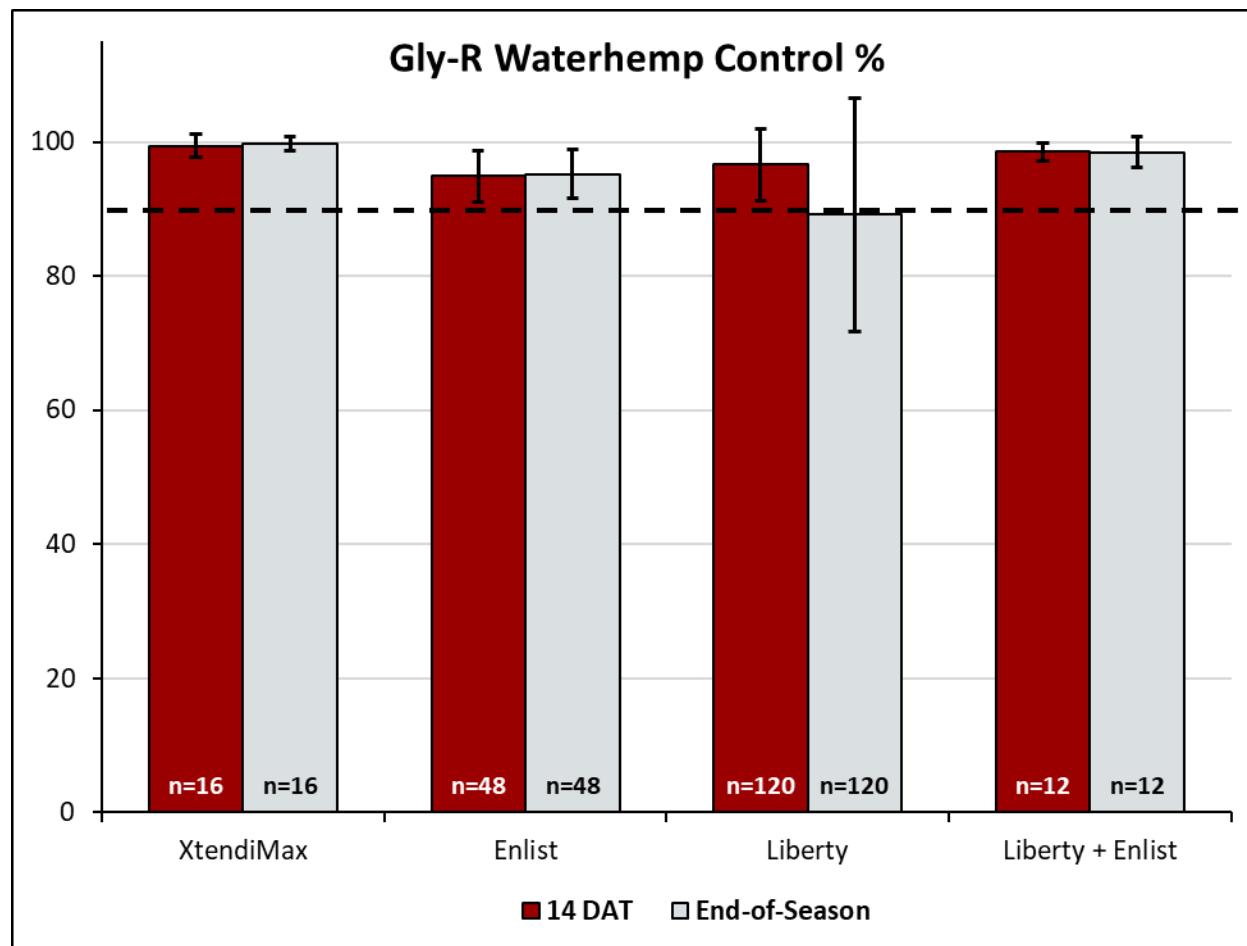


Figure 4. Glyphosate resistant waterhemp control (%) of four soybean POST herbicide systems. Bars indicate the average % control \pm the standard deviation 14 days after POST herbicide application and at the end of the growing season. n-values at the base of each bar represent the number of observations (plots) evaluated in each POST herbicide system. Some of the POST treatments included glyphosate as a tank-mix partner.

Multi-Trial Summary: Waterhemp Control in Soybean

Waterhemp control was also broken down by the relative effectiveness of the PRE herbicide used prior the POST herbicide application. PRE herbicide efficacy was evaluated at or near the time of POST application and was categorized as excellent (90-100%), good (80-89%), fair (60-79%), or poor (0-59%). See Figure 6 for a visual representation of each category. Waterhemp control averaged across all POST herbicide systems is presented in Figure 5.

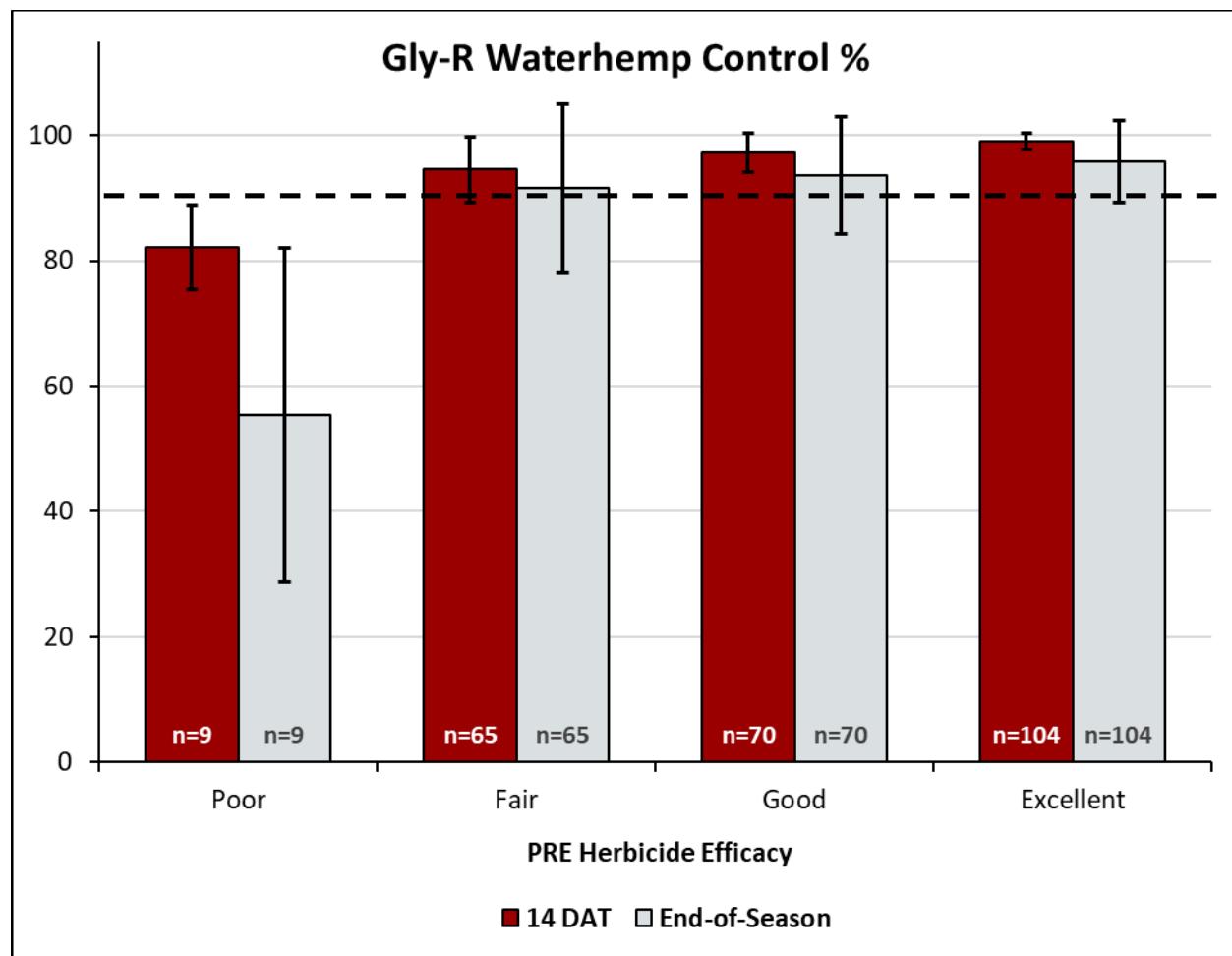


Figure 5. Glyphosate resistant waterhemp control (%) of four soybean POST herbicide systems (XtendiMax, Liberty, Enlist, Liberty plus Enlist) broken down by PRE herbicide efficacy. PRE herbicide efficacy was evaluated at or near the time of POST application. Bars indicate the average % control ± the standard deviation 14 days after POST herbicide application and at the end of the growing season. n-values at the base of each bar represent the number of observations (plots) within each PRE herbicide efficacy category.

Multi-Trial Summary: Waterhemp Control in Soybean



Figure 6. Plot photos indicating categories of PRE herbicide waterhemp efficacy.

Project Goal: Evaluate and demonstrate the effectiveness of multiple single active ingredient postemergence corn and soybean herbicides on burndown control of giant ragweed.

Site Description:

Location:	Janesville, WI	Crop:	none
Field #:	7	Variety:	-
Soil type:	Plano silt loam	Planting Date:	-
% OM:	3.3	Emergence Date:	-
pH:	6.7	Population:	-
Fertilization:	-	Depth:	-
Previous crop:	corn	Row spacing:	-
Tillage:	conventional	Plot Size:	8 x 25 ft
Weed species:	giant ragweed (AMBTR)		

Herbicide Application Information:

Date:	5/26
Treatment:	POST (A)
Air Temp (°F):	73
2" Soil Temp (°F):	68
Soil moisture [surface]:	moist
RH %:	58
Cloud cover %	0
Wind speed (mph)/direction	5-11/WNW
Rainfall (in) 1 wk after APP:	0.5"
GPA:	15
PSI:	34
Nozzle:	TT*/TTI*
Nozzle spacing (in):	20
Boom Height (in):	23

*Used TT 110015 nozzles for all treatments except XtendiMax, Enlist One, and Status.

**Used TTI 110015 nozzles for XtendiMax, Enlist One and Status treatments.

Crop and Weed Information at Application:

	Date:	5/26
giant ragweed	Height:	1-4" (Avg = 2")
	Density:	1-28/ft ²

Trt #	Treatment	Formulation	SOA Group	Rate	App Timing	App Code
1	Pursuit	3 lb/gal	2	4 fl oz/a	POST	A
	COC			1.25% v/v	POST	A
	AMS			2 lb/a	POST	A
2	Classic	25% w/w	2	0.75 oz/a	POST	A
	COC			1% v/v	POST	A
	AMS			2 lb/a	POST	A
3	FirstRate	84% w/w	2	0.3 oz/a	POST	A
	COC			1.2% v/v	POST	A
	AMS			2 lb/a	POST	A
4	Python	80% w/w	2	1 oz/a	POST	A
	COC			1% v/v	POST	A
	AMS			2 lb/a	POST	A
5	XtendiMax	2.89 lbae/gal	4	22 fl oz/a	POST	A
	Class Act Ridion			1% v/v	POST	A
6	Enlist One	3.8 lbae/gal	4	32 fl oz/a	POST	A
	AMS			2 lb/a	POST	A
7	Stinger	3 lbae/gal	4	6 fl oz/a	POST	A
8	Status	56% w/w	2, 4	5 oz/a	POST	A
	NIS			0.25% v/v	POST	A
	AMS			2 lb/a	POST	A
9	Aatrex	4 lb/gal	5	2 pt/a	POST	A
	COC			1 qt/a	POST	A
10	Buctril	2 lb/gal	6	1.5 pt/a	POST	A
11	Basagran 5L	5 lb/gal	6	1.6 pt/a	POST	A
	COC			1% v/v	POST	A
	AMS			2 lb/a	POST	A
12	Roundup PowerMAX	4.5 lbae/gal	9	32 fl oz/a	POST	A
	AMS			2 lb/a	POST	A
13	Liberty	2.34 lb/gal	10	32 fl oz/a	POST	A
	AMS			2 lb/a	POST	A
14	Cobra	2 lb/gal	14	12.5 fl oz/a	POST	A
	COC			1.5 pt/a	POST	A
	AMS			2 lb/a	POST	A
15	Flexstar	1.88 lb/gal	14	1 pt/a	POST	A
	MSO			1% v/v	POST	A
	AMS			2 lb/a	POST	A
16	Cadet	0.91 lb/gal	14	0.9 fl oz/a	POST	A
	COC			1% v/v	POST	A
	AMS			2 lb/a	POST	A

Adjuvants: AMS = BlueAg spray grade ammonium sulfate; COC = Crop Oil; MSO=Emulate; NIS = Prefer90; Non-AMS water conditioner=Class Act Ridion

Trt #	Treatment	Formulation	SOA Group	Rate	App Timing	App Code
17	Resource COC AMS	0.86 lb/gal	14	8 fl oz/a	POST	A
				1 qt/a	POST	A
				2 lb/a	POST	A
18	Callisto COC AMS	4 lb/gal	27	3 fl oz/a	POST	A
				1% v/v	POST	A
				2 lb/a	POST	A
19	Laudis MSO AMS	3.5 lb/gal	27	3 fl oz/a	POST	A
				1% v/v	POST	A
				2 lb/a	POST	A
20	Armezon MSO AMS	2.8 lb/gal	27	0.75 fl oz/a	POST	A
				1% v/v	POST	A
				2 lb/a	POST	A
21	Balance Flexx MSO AMS	2 lb/gal	27	5 fl oz/a	POST	A
				1% v/v	POST	A
				2 lb/a	POST	A

Adjuvants: AMS = BlueAg spray grade ammonium sulfate; COC = Crop Oil; MSO=Emulate; NIS = Prefer90; Class Act Ridion = non-AMS water conditioner + NIS

Trial Summary:

This trial evaluated the effectiveness of multiple single active ingredient postemergence corn and soybean herbicides on burndown control of giant ragweed. Using a single active ingredient or site of action herbicide is not recommended for POST waterhemp or giant ragweed control due to resistance concerns. Our intent was not to promote the use of a single herbicide, but rather, demonstrate the value of each herbicide active ingredient for the control of emerged weeds. Results clearly indicate the difference in effectiveness among herbicides evaluated for burndown control of giant ragweed (Table 25).

Key Take Home Points from 2021 Data:

- Several herbicides provided excellent burndown control of giant ragweed (Table 25).
- None of the ALS (group 2) herbicides had >60% control. We suspect some level of ALS resistance in this population.

Plot photos from throughout the growing season are available at [Burndown Control of Giant Ragweed](#) published on [wiscweeds.info](#)

Table 25. Giant Ragweed burndown ratings for trial #21-ROK-BG04 at Janesville, WI.^a

Trt # Herbicide (rate acre ⁻¹)	Giant Ragweed ^b (%)	
	7 DAT	15 DAT
One-Pass – POST (5/26)		
1 Pursuit (4 fl oz) + COC 1% v/v + AMS (2 lb)	36 g	50 f
2 Classic (0.75 oz) + COC 1% v/v + AMS (2 lb)	40 f	45 g
3 FirstRate (0.3 oz) + COC 1.2% v/v + AMS (2 lb)	34 g	51 f
4 Python (1 oz) + COC 1% v/v + AMS (2 lb)	34 g	51 f
5 XtendiMax (22 fl oz) + Class Act Ridion 1% v/v	73 d	96 ab
6 Enlist One (32 fl oz) + AMS (2 lb)	71 de	95 ab
7 Stinger (6 fl oz)	72 d	85 d
8 Status (5 oz) + NIS 0.25% v/v + AMS (2 lb)	74 d	95 ab
9 AAtrex (2 pt) + COC (1 qt)	91 b	84 d
10 Buctril (1.5 pt)	99 a	96 ab
11 Basagran 5L (1.6 pt) + COC 1% v/v + AMS (2 lb)	96 a	95 b
12 Roundup PowerMAX II (32 fl oz) + AMS (2 lb)	98 a	97 ab
13 Liberty (32 fl oz) + AMS (2 lb)	98 a	99 a
14 Cobra (12.5 fl oz) + COC 1.5 (1.5 pt) + AMS (2 lb)	99 a	99 ab
15 Flexstar (1 pt) + MSO 1% v/v + AMS (2 lb)	99 a	98 ab
16 Cadet (0.9 fl oz) + COC 1% v/v + AMS (2 lb)	81 c	66 e
17 Resource (8 fl oz) + COC (1 qt) + AMS (2 lb)	96 a	90 c
18 Callisto (3 fl oz) + COC 1% v/v + AMS (2 lb)	68 e	84 d
19 Laudis (3 fl oz) + MSO 1% v/v + AMS (2 lb)	72 d	97 ab
20 Armezon (0.75 fl oz) + MSO 1% v/v + AMS (2 lb)	72 d	97 ab
21 Balance Flexx (5 fl oz) + MSO 1% v/v + AMS (2 lb)	72 d	95 b
LSD ($\alpha=0.10$)	3	4
p value	<0.001	<0.001

^aVisual control from 70-100% is illustrated on a color scale with green representing greater weed control values.

^bGiant ragweed control values with the same letter are not significantly different.

Table 26. 2021 Temperature and Precipitation Summary

Location	Month	Precipitation (in)			Average Temperature (F)		
		2021	30-year norm**	2021 departure	2021	30-year norm**	2021 departure
Arlington*	May	2.61	3.69	-1.08	56.5	55.7	0.8
	June	3.79	4.68	-0.89	70.6	65.6	5.0
	July	1.49	4.16	-2.67	69.2	69.4	-0.2
	August	3.56	3.90	-0.34	69.7	67.3	2.4
	September	2.32	3.54	-1.22	61.6	59.3	2.3
	Total	13.77	19.97	-6.20	-	-	-
Brooklyn* (30-year norm from Stoughton NOAA station)	May	2.35	3.85	-1.50	58.3	57.8	0.5
	June	5.22	4.34	0.88	72.6	67.4	5.2
	July	3.01	3.85	-0.84	74.2	71.7	-0.5
	August	2.46	4.42	-1.96	71.5	69.5	2.0
	September	1.20	3.60	-2.40	64.6	61.2	3.4
	Total	14.25	20.07	-5.81	-	-	-
Janesville* (30-year norm from Beloit NOAA station)	May	2.93	3.80	-0.87	58.7	58.7	0.0
	June	2.18	4.73	-2.55	73.1	68.6	4.5
	July	2.09	3.85	-1.76	71.8	72.5	-0.7
	August	3.12	4.27	-1.15	72.7	70.8	1.9
	September	0.69	3.65	-2.96	65.6	62.9	2.7
	Total	11.01	20.30	-9.29	-	-	-
Lancaster*	May	2.86	4.13	-1.27	55.0	57.3	-2.3
	June	1.72	5.26	-3.54	68.3	66.9	1.4
	July	4.76	4.32	0.44	68.2	70.8	-2.6
	August	5.21	4.20	1.01	67.2	69.0	-1.8
	September	1.95	3.14	-1.19	58.6	60.8	-2.2
	Total	16.50	21.05	-4.55	-	-	-

*2021 data recorded from on-site weather stations. 2021 Janesville rain data was recorded from a NOAA weather station at Rock County Regional Airport.

**Source: Wisconsin State Climatology Office; 30-year normals from 1981 to 2010.

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Index of Weed Species Evaluated

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dandelion	TAROF	32, 81
foxtail, giant	SETFA	37, 42, 50, 54, 78
grasses, annual	GGGAN	20, 37, 65
lambsquarters, common	CHEAL	25, 32, 50, 54, 60, 65, 69, 78, 81, 85, 89
marestail	ERICA	32, 81
millet, wild-proso	PANMI	43, 65, 69, 74
pigweed, redroot	AMARE	20
ragweed, common	AMBEL	37, 42, 50, 54
ragweed, giant	AMBTR	4, 8, 12, 16, 20, 25, 29, 44, 46, 78, 97
shepherd's purse	CAPBP	81
velvetleaf	ABUTH	8, 12, 20, 37, 42, 43, 50, 60, 65, 69, 74, 78, 85, 89
waterhemp, common	AMATA	20, 25, 43, 60, 65, 69, 74, 85, 89, 91, 92
woolly cupgrass	ERBVI	37, 65

Index of Adjuvants

Adjuvant Brand	Adjuvant Type	Page Number(s)
Amsol	ammonium sulfate (liquid)	2, 6, 27, 56, 83
BlueAg spray grade AMS	ammonium sulfate (dry)	14, 31, 34, 39, 62, 67, 71, 76, 80, 87, 95
Class Act Ridion	water conditioner (non-AMS) + NIS	2, 34, 56, 71, 76, 95
Crop Oil	crop oil concentrate	6, 10, 34, 39, 87, 95
Destiny HC	high surfactant oil concentrate	2, 18, 31, 34, 80
Emulate	methylated seed oil	39, 95
Induce	nonionic surfatant	14
Intact	drift retardant and deposition aid	56
Prefer 90	nonionic surfactant	27, 34, 39, 95
Superb HC	high surfactant petroleum oil concentrate	27, 39
VaporGrip Xtra	volatility reducing agent	48, 52, 56, 83
Zaar	methylated seed oil + water conditioner	18

Index of Herbicides Evaluated

Herbicide	Active Ingredient(s)	Page Number(s)
Aatrex/atrazine 4L	atrazine	2, 6, 10, 14, 18, 23, 95
Accent Q	nicosulfuron + safener	39
Acuron	bicyclopyprone+mesotrione+ atrazine+S-metolachlor	14, 23, 27
Acuron GT	bicyclopyprone+mesotrione+S-metolachlor+ glyphosate	27, 34
Acuron XR*	bicyclopyprone+mesotrione+ atrazine+S-metolachlor	27
Acuron Flexi	bicyclopyprone + mesotrione + S-metolachlor	23, 34, 39
Acuron Flexi XR*	bicyclopyprone + mesotrione + S-metolachlor	27
Afforia	thifensulfuron + tribenuron + flumioxazin	71
Anthem Maxx	pyroxasulfone + fluthiacet	62, 72
Argos	mesotrione	31
Armezon	topramezone	39, 96
Armezon PRO	topramezone + dimethenamid-P	14, 18, 27, 34, 39
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Authority First DF	sulfentrazone + cloransulam	63, 67
Authority MTZ	sulfentrazone + metribuzin	48, 67
Authority Supreme	sulfentrazone + pyroxasulfone	62, 72
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Basagran 5L	bentazon	87, 95
Bicep Lite II Magnum	S-metolachlor + atrazine	6, 23, 27
Boundary	S-metolachlor + metribuzin	62, 67, 71, 76
Broadaxe XC	S-metolachlor + sulfentrazone	71, 76
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Cadet	fluthiacet	87, 95
Callisto	mesotrione	23, 35, 39, 96
Capreno	tembotriione + thiencarbazone	2, 34, 39
Classic	chlorimuron-ethyl	95
Cobra	lactofen	87, 95
Corvus	isoxaflutole + thiencarbazone	2, 23, 34
DiFlexx	dicamba (DGA salt)	2, 23
DiFlexx Duo	dicamba (DGA salt) + tembotriione	2, 34, 39
Dual II Magnum	S-metolachlor	23, 40, 52, 62
Durango DMA	glyphosate (DMA salt)	34, 71
Empyros	tolpyralate + S-metolachlor	18
Enlist One	2,4-D (choline salt)	67, 71, 76, 87, 95
EverpreX	S-metolachlor	71
Fearless	acetochlor	18, 31, 35
Fierce EZ	flumioxazin + pyroxasulfone	48, 72, 83, 87
Fierce MTZ	flumioxazin + pyroxasulfone + metribuzin	72
Fierce WDG	flumioxazin + pyroxasulfone	56

Herbicide	Active Ingredient(s)	Page Number(s)
Fierce XLT	flumioxazin + pyroxasulfone + chlorimuron	72, 76
FirstRate	cloransulam-methyl	95
Flexstar	fomesafen	87, 95
Halex GT	S-metolachlor + mesotrione + glyphosate	14
Harness	acetochlor	2, 23, 27, 34, 39
Harness MAX	acetochlor + mesotrione	2, 23, 27, 34, 39
Harness Xtra	acetochlor + atrazine	23
Harness Xtra 5.6L	acetochlor + atrazine	2
Hornet WDG	clopyralid + flumetsulam	23
Impact	topramezone	6
Impact Core	topramezone + acetochlor	18
Interline	glufosinate	67
Katagon	tolpyralate + nicosulfuron	18, 35
Kyber	flumioxazin + pyroxasulfone + metribuzin	62, 71
Laudis	tembotriione	2, 6, 27, 40, 96
Liberty	glufosinate	6, 56, 62, 71, 76, 83, 87, 95
Lumax EZ	mesotrione + atrazine + S-metolachlor	27
Mauler	metribuzin	48, 52, 56
Maverick*	mesotrione + clopyralid + pyroxasulfone	3, 14, 23, 35
Moccasin MTZ	S-metolachlor + metribuzin	67
MON 301668*	acetochlor (encapsulated)	48, 52, 56, 83
Outlook	dimethenamid-P	52, 62
Perpetuo	flumiclorac + pyroxasulfone	72
Prefix	S-metolachlor + fomesafen	71
Preview 2.1SC*	sulfentrazone + metribuzin	67
Princep 4FL	simazine	23, 35, 39
Pursuit	imazethapyr	95
Python	flumetsulam	95
Realm Q	rimsulfuron + mesotrione	34
Resicore	clopyralid + acetochlor + mesotrione	10, 14, 23, 27, 34
Resource	flumiclorac	87, 96
Restraint	tolpyralate + acetochlor	10, 35
Reviton	tiafenacil	31, 80
Revulin Q	nicosulfuron + mesotrione	39
Roundup PowerMAX II	glyphosate (potassium salt)	2, 6, 14, 27, 31, 34, 72, 80, 95
Roundup PowerMAX 3	glyphosate (potassium salt)	56, 83
Satellite HydroCap	pendimethalin	67
Select Max	clethodim	56
Sequence	S-metolachlor + glyphosate	71, 76
Sharpen	saflufenacil	31, 80

Herbicide	Active Ingredient(s)	Page Number(s)
Shieldex	tolpyralate	6, 10, 40
Sonic	sulfentrazone + cloransulam	71, 76
Status	dicamba (sodium salt) + diflufenzoxypr	35, 39, 95
Stinger	clopyralid	34, 95
Surestart II	acetochlor + clopyralid + flumetsulam	23, 27, 34, 39
Surpass NXT	acetochlor	34
Surveil	flumioxazin + cloransulam	71
Tendovo*	S-metolachlor + metribuzin + cloransulam	71, 76
Tricor DF	metribuzin	62, 71
TripleFlex II	acetochlor + clopyralid + flumetsulam	2, 34
Tripzin ZC	pendimethalin + metribuzin	67
Valor EZ/Valor SX	flumioxazin	48, 87
Valor XLT	flumioxazin + chlorimuron	67
Verdict	saflufenacil + dimethenamid-P	23, 27, 34, 39
Warrant	acetochlor	40, 52, 62
Warrant Ultra	acetochlor + fomesafen	48, 58, 83
XtendiMax	dicamba (DGA salt) with VaporGrip® Technology	48, 52, 56, 83, 95
Zidua/Zidua SC	pyroxasulfone	35, 39, 52, 72
Zidua PRO	pyroxasulfone + saflufenzcil + imazethapyr	62, 67, 72, 77
Zone Elite	sulfentrazone + metolachlor	80

*Pending approval for use in Wisconsin as of January 2022.

Index of Trial Sponsors

Company	Trial Number(s)*
ADAMA	CN05, SB06
Adjuvants Unlimited	SB30
AMVAC	CN10
BASF	CN08, CN09, SB09, SB10
Bayer Crop Science	CN01, CN02, SB01, SB02, SB03, SB04, SB05, SB13, BG01, BG02
Belchim Crop Protection	SB21
CHS Agronomy	CN12, BG03
Corteva Agriscience	CN07, SB10
FMC	SB07
Helm Agro	CN08, CN15, SB12, SB28
Stoller USA	SB29
Summit Agro	CN03, CN04
Syngenta	CN13, CN14, SB10, SB11
UPL	SB08
Valent	CN02, CN06, SB10
Wisconsin Soybean Marketing Board	SB15, SB16, SB17
Wisconsin Weed Science	CN11, SB15, CN16, CN18, SB16, SB17, BG04

*Not all trials listed are presented in this research report.