

Control of PPO-resistant waterhemp in a soybean/corn rotation.

Project Code: 04-PPO-SBCN Location: Serento, IL  
Investigator: Bryan Young

Investigator: Bryan Young, Associate Professor, Southern Illinois University

City State Zip Country: Belleville IL 62221 USA  
Trial Status: Final Updated: 9-2-04

Objective:

Evaluate the long-term benefits of utilizing multiple herbicide mode of action in a soybean/corn rotation for control of PPO-resistant waterhemp.

Weed Code Common Name Scientific Name  
1. AMATA waterhemp, common Amaranthus rudis Sauer

Crop 1: ZEAMX corn, field  
Planting Method: Seeded Planting Date: 5-22-03  
Rate: 28000 S/A Depth: 1.5 IN  
Row Spacing: 30 IN

Crop 2: GLXMA soybean  
Planting Method: Seeded Planting Date: 5-11-04  
Rate: 75 lb/A Depth: 1.0 IN  
Row Spacing: 30 IN

Plot Width, Unit: 10 FT Plot Length, Unit: 30 FT Reps: 3  
Tillage Type: Reduced-Till Study Design: Randomized complete block  
Previous Crop, Year: GLXMA, 2002

APPLICATION DESCRIPTION

	A	B	C	D	E
Application Date:	5-13-04	6-28-04	7-7-04		6-23-03
Time of Day:	15:00	14:00	14:00		15:00
Application Method:	Spray	Spray	Spray	Spray	Spray
Application Timing:	PRE-SB	4-6"W-SB-1	4-6"W-SB-2	PRE-CN	6-10"CN
Applic. Placement:	BROSIOI	BROFOL	BROFOL	BROSIOI	BROFOL
Air Temp., Unit:	86 F	80 F	78 F		75 F
% Relative Humidity:	98	40	72		50
Wind Velocity, Unit:	5 MPH	8 MPH	3 MPH	MPH	0 MPH
Soil Moisture:	NORMAL	BELNOR	ABONOR		NORMAL

CROP STAGE AT EACH APPLICATION

	A	B	C	D	E
Crop 1 Code, Stage:	ZEAMX NA	ZEAMX NA	ZEAMX NA	ZEAMX NA	ZEAMX V5
Height, Unit:	NA NA	NA NA	NA NA	NA NA	8 IN
Crop 2 Code, Stage:	GLXMA NA	GLXMA V4-V6	GLXMA R1	GLXMA NA	GLXMA NA
Height, Unit:	NA NA	8-12 IN	15-16 IN	NA NA	NA NA

WEED STAGE AT EACH APPLICATION

	A	B	C	D	E
Weed 1 Code:	AMATA	AMATA	AMATA	AMATA	AMATA
Stage(leaves):		2-10	5-12		
Height(inches):		1-6	4-16		
Density:		Medium	Medium		

APPLICATION EQUIPMENT

	A	B	C	D	E
Appl. Equipment:	CO2 sprayer	CO2 sprayer	CO2 sprayer	CO2 sprayer	CO2 sprayer
Operating Pressure:	40 PSI	40 PSI	40 PSI	40 PSI	40 PSI
Nozzle Type:	Flat fan	Flat fan	Flat fan	Flat fan	Flat fan
Nozzle Size:	8003	8002	8003	8002	8002
Boom Length, Unit:	7.5 FT	7.5 FT	7.5 FT	7.5 FT	7.5 FT
Spray Volume, Unit:	20 GPA	20 GPA	20 GPA	20 GPA	20 GPA

NOTES:

Corn was not harvested. Soybean was not harvested.

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Crop Code										ZEAMX	ZEAMX	ZEAMX	ZEAMX	AMATA	GLXMA	GLXMA	GLXMA
Rating Data Type										Injury	Injury	Injury	Injury	Control	Plants	Injury	Injury
Rating Unit										Percent	Percent	Percent	Percent	Percent	1.0 m2	Percent	Percent
Rating Date										6-23-03	7-7-03	7-21-03	8-11-03	6-23-03	7-7-03	7-21-03	7-12-04
Trt-Eval Interval										0 DA-E	14 DA-E	28 DA-E	49 DA-E	0 DA-E	14 DA-E	28 DA-E	6-28-04
Trt No.	Treatment Name	Form Conc	Form Type	Rate	Rate Unit	Prod Rate	Prod Unit	Grow Stg	Appl Code								
1	NONTREATED									0	0	0	0	0	0	0	0
2	FLEXSTAR	1.88	EC	0.294	LB A/A	20	OZ/A	4-6"W-SB-1	B	0	0	0	0	99	98	96	97
2	FUSION	2.56	EC	0.2	LB A/A	10	OZ/A	4-6"W-SB-1	B								8.7
2	DESTINY MSO	100	LIQ	1.0	% V/V	1	% V/V	4-6"W-SB-1	B								13
2	28% UAN	100	LIQ	2.0	% V/V	2	% V/V	4-6"W-SB-1	B								3
2	LUMAX	3.94	L	2.22	LB A/A	2.25	QT/A	PRE-CN	D								
3	FLEXSTAR	1.88	EC	0.294	LB A/A	20	OZ/A	4-6"W-SB-1	B	0	0	0	0	99	98	98	98
3	FUSION	2.56	EC	0.2	LB A/A	10	OZ/A	4-6"W-SB-1	B								5.3
3	DESTINY MSO	100	LIQ	1.0	% V/V	1	% V/V	4-6"W-SB-1	B								14
3	28% UAN	100	LIQ	2.0	% V/V	2	% V/V	4-6"W-SB-1	B								2
3	BICEP II MAGNUM	5.5	L	2.2	LB A/A	3.2	PT/A	PRE-CN	D								
3	CALLISTO	4	SC	0.094	LB A/A	3	FL OZ/A	6-10"CN	E								
3	AATREX	90	WG	0.25	LB A/A	4.44	OZ/A	6-10"CN	E								
3	PREMIUM COC	100	LIQ	1.0	% V/V	1	% V/V	6-10"CN	E								
3	28% UAN	100	LIQ	2.0	% V/V	2	% V/V	6-10"CN	E								
4	BOUNDARY	6.5	EC	1.46	LB A/A	1.8	PT/A	PRE-SB	A	0	0	0	0	99	99	98	98
4	FLEXSTAR	1.88	EC	0.294	LB A/A	20	OZ/A	4-6"W-SB-2	C								5.3
4	DESTINY MSO	100	LIQ	1.0	% V/V	1	% V/V	4-6"W-SB-2	C								0
4	28% UAN	100	LIQ	2.0	% V/V	2	% V/V	4-6"W-SB-2	C								13
4	LUMAX	3.94	L	2.22	LB A/A	2.25	QT/A	PRE-CN	D								0
5	DUAL II MAGNUM	7.64	EC	1.27	LB A/A	1.33	PT/A	PRE-SB	A	0	0	0	0	99	98	98	98
5	FLEXSTAR	1.88	EC	0.294	LB A/A	20	OZ/A	4-6"W-SB-2	C								3.3
5	DESTINY MSO	100	LIQ	1.0	% V/V	1	% V/V	4-6"W-SB-2	C								0
5	28% UAN	100	LIQ	2.0	% V/V	2	% V/V	4-6"W-SB-2	C								12
5	LUMAX	3.94	L	2.22	LB A/A	2.25	QT/A	PRE-CN	D								0
6	BOUNDARY	6.5	EC	1.46	LB A/A	1.8	PT/A	PRE-SB	A	0	0	0	0	99	99	99	99
6	FLEXSTAR	1.88	EC	0.294	LB A/A	20	OZ/A	4-6"W-SB-2	C								1.3
6	DESTINY MSO	100	LIQ	1.0	% V/V	1	% V/V	4-6"W-SB-2	C								0
6	28% UAN	100	LIQ	2.0	% V/V	2	% V/V	4-6"W-SB-2	C								13
6	BICEP II MAGNUM	5.5	L	2.2	LB A/A	3.2	PT/A	PRE-CN	D								0
6	CALLISTO	4	SC	0.094	LB A/A	3	FL OZ/A	6-10"CN	E								
6	AATREX	90	WG	0.25	LB A/A	4.44	OZ/A	6-10"CN	E								
6	PREMIUM COC	100	LIQ	1.0	% V/V	1	% V/V	6-10"CN	E								
6	28% UAN	100	LIQ	2.0	% V/V	2	% V/V	6-10"CN	E								
7	DUAL II MAGNUM	7.64	EC	1.27	LB A/A	1.33	PT/A	PRE-SB	A	0	0	0	0	99	98	98	98
7	FLEXSTAR	1.88	EC	0.294	LB A/A	20	OZ/A	4-6"W-SB-2	C								7.3
7	DESTINY MSO	100	LIQ	1.0	% V/V	1	% V/V	4-6"W-SB-2	C								0
7	28% UAN	100	LIQ	2.0	% V/V	2	% V/V	4-6"W-SB-2	C								12
7	BICEP II MAGNUM	5.5	L	2.2	LB A/A	3.2	PT/A	PRE-CN	D								0
7	CALLISTO	4	SC	0.094	LB A/A	3	FL OZ/A	6-10"CN	E								
7	AATREX	90	WG	0.25	LB A/A	4.44	OZ/A	6-10"CN	E								
7	PREMIUM COC	100	LIQ	1.0	% V/V	1	% V/V	6-10"CN	E								
7	28% UAN	100	LIQ	2.0	% V/V	2	% V/V	6-10"CN	E								

Control of PPO-resistant waterhemp in a soybean/corn rotation.

Project Code: 04-PPO-SBCN Location: Serento, IL  
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Weed Code						AMATA					AMATA										
Crop Code		ZEAMX	ZEAMX	ZEAMX	ZEAMX	AMATA	AMATA	AMATA	AMATA	AMATA	GLXMA	GLXMA	GLXMA								
Rating Data Type		Injury	Injury	Injury	Injury	Control	Control	Control	Control	Plants	Injury	Injury	Injury								
Rating Unit		Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	1.0 m2	Percent	Percent	Percent								
Rating Date		6-23-03	7-7-03	7-21-03	8-11-03	6-23-03	7-7-03	7-21-03	8-11-03	7-21-03	6-28-04	7-12-04	7-26-04								
Trt-Eval Interval		0 DA-E	14 DA-E	28 DA-E	49 DA-E	0 DA-E	14 DA-E	28 DA-E	49 DA-E	28 DA-E	0 DAT	14 DAT	28 DAT								
Trt No.	Treatment Name	Form Conc	Form Type	Rate	Rate Unit	Prod Rate	Prod Unit	Grow Stg	Appl Code												
8	BOUNDARY	6.5	EC	1.46	LB A/A	1.8	PT/A	PRE-SB	A	0	0	0	0	99	98	97	97	8.0	0	0	0
8	TOUCHDOWN TOTAL	4.17	SC	0.75	LB AE/A	23	OZ/A	4-6"W-SB-2	C												
8	AMS	100	DRY	2.5	LB A/A	2.5	LB/A	4-6"W-SB-2	C												
8	LUMAX	3.94	L	2.22	LB A/A	2.25	QT/A	PRE-CN	D												
9	DUAL II MAGNUM	7.64	EC	1.27	LB A/A	1.33	PT/A	PRE-SB	A	0	0	0	0	99	98	97	98	7.3	0	0	0
9	TOUCHDOWN TOTAL	4.17	SC	0.75	LB AE/A	23	OZ/A	4-6"W-SB-2	C												
9	AMS	100	DRY	2.5	LB A/A	2.5	LB/A	4-6"W-SB-2	C												
9	LUMAX	3.94	L	2.22	LB A/A	2.25	QT/A	PRE-CN	D												
10	BOUNDARY	6.5	EC	1.46	LB A/A	1.8	PT/A	PRE-SB	A	0	0	0	0	99	97	96	96	12.7	0	0	0
10	TOUCHDOWN TOTAL	4.17	SC	0.75	LB AE/A	23	OZ/A	4-6"W-SB-2	C												
10	AMS	100	DRY	2.5	LB A/A	2.5	LB/A	4-6"W-SB-2	C												
10	BICEP II MAGNUM	5.5	L	2.2	LB A/A	3.2	PT/A	PRE-CN	D												
10	CALLISTO	4	SC	0.094	LB A/A	3	FL OZ/A	6-10"CN	E												
10	AATREX	90	WG	0.25	LB A/A	4.44	OZ/A	6-10"CN	E												
10	PREMIUM COC	100	LIQ	1.0	% V/V	1	% V/V	6-10"CN	E												
10	28% UAN	100	LIQ	2.0	% V/V	2	% V/V	6-10"CN	E												
11	DUAL II MAGNUM	7.64	EC	1.27	LB A/A	1.33	PT/A	PRE-SB	A	0	0	0	0	99	99	98	98	2.0	0	0	0
11	TOUCHDOWN TOTAL	4.17	SC	0.75	LB AE/A	23	OZ/A	4-6"W-SB-2	C												
11	AMS	100	DRY	2.5	LB A/A	2.5	LB/A	4-6"W-SB-2	C												
11	BICEP II MAGNUM	5.5	L	2.2	LB A/A	3.2	PT/A	PRE-CN	D												
11	CALLISTO	4	SC	0.094	LB A/A	3	FL OZ/A	6-10"CN	E												
11	AATREX	90	WG	0.25	LB A/A	4.44	OZ/A	6-10"CN	E												
11	PREMIUM COC	100	LIQ	1.0	% V/V	1	% V/V	6-10"CN	E												
11	28% UAN	100	LIQ	2.0	% V/V	2	% V/V	6-10"CN	E												
LSD (P=.05)										0.0	0.0	0.0	0.0	0.0	1.1	1.8	1.8	12.81	0.0	3.3	2.0
Replicate F										0.000	0.000	0.000	0.000	0.000	0.621	0.801	1.218	1.224	0.000	2.132	1.579
Replicate Prob(F)										1.0000	1.0000	1.0000	1.0000	1.0000	0.5476	0.4628	0.3168	0.3152	1.0000	0.1448	0.2308
Treatment F										0.000	0.000	0.000	0.000	0.000	5987.614	2215.488	2441.989	22.770	0.000	37.309	2.421
Treatment Prob(F)										1.0000	1.0000	1.0000	1.0000	1.0000	0.0001	0.0001	0.0001	0.0001	1.0000	0.0001	0.0443

Control of PPO-resistant waterhemp in a soybean/corn rotation.

Project Code: 04-PPO-SBCN Location: Serento, IL  
 Investigator: Bryan Young

Weed Code	AMATA	AMATA	AMATA	AMATA	AMATA
Crop Code					
Rating Data Type	Control	Control	Control	Control	Plants
Rating Unit	Percent	Percent	Percent	Percent	1.0 m2
Rating Date	6-28-04	7-12-04	7-26-04	8-16-04	8-4-04
Trt-Eval Interval	0 DAT	14 DAT	28 DAT	49 DAT	28 DA-C

Trt No.	Treatment Name	Form Conc	Form Type	Rate	Rate Unit	Prod Rate	Prod Unit	Grow Stg	Appl Code						
1	NONTREATED										0	0	0	0	12.0
2	FLEXSTAR	1.88	EC	0.294	LB A/A	20	OZ/A	4-6"W-SB-1	B		28	27	28	14.0	
2	FUSION	2.56	EC	0.2	LB A/A	10	OZ/A	4-6"W-SB-1	B						
2	DESTINY MSO	100	LIQ	1.0	% V/V	1	% V/V	4-6"W-SB-1	B						
2	28% UAN	100	LIQ	2.0	% V/V	2	% V/V	4-6"W-SB-1	B						
2	LUMAX	3.94	L	2.22	LB A/A	2.25	QT/A	PRE-CN	D						
3	FLEXSTAR	1.88	EC	0.294	LB A/A	20	OZ/A	4-6"W-SB-1	B		27	22	27	16.7	
3	FUSION	2.56	EC	0.2	LB A/A	10	OZ/A	4-6"W-SB-1	B						
3	DESTINY MSO	100	LIQ	1.0	% V/V	1	% V/V	4-6"W-SB-1	B						
3	28% UAN	100	LIQ	2.0	% V/V	2	% V/V	4-6"W-SB-1	B						
3	BICEP II MAGNUM	5.5	L	2.2	LB A/A	3.2	PT/A	PRE-CN	D						
3	CALLISTO	4	SC	0.094	LB A/A	3	FL OZ/A	6-10"CN	E						
3	AATREX	90	WG	0.25	LB A/A	4.44	OZ/A	6-10"CN	E						
3	PREMIUM COC	100	LIQ	1.0	% V/V	1	% V/V	6-10"CN	E						
3	28% UAN	100	LIQ	2.0	% V/V	2	% V/V	6-10"CN	E						
4	BOUNDARY	6.5	EC	1.46	LB A/A	1.8	PT/A	PRE-SB	A		96	88	99	99	0.0
4	FLEXSTAR	1.88	EC	0.294	LB A/A	20	OZ/A	4-6"W-SB-2	C						
4	DESTINY MSO	100	LIQ	1.0	% V/V	1	% V/V	4-6"W-SB-2	C						
4	28% UAN	100	LIQ	2.0	% V/V	2	% V/V	4-6"W-SB-2	C						
4	LUMAX	3.94	L	2.22	LB A/A	2.25	QT/A	PRE-CN	D						
5	DUAL II MAGNUM	7.64	EC	1.27	LB A/A	1.33	PT/A	PRE-SB	A		93	80	98	99	0.7
5	FLEXSTAR	1.88	EC	0.294	LB A/A	20	OZ/A	4-6"W-SB-2	C						
5	DESTINY MSO	100	LIQ	1.0	% V/V	1	% V/V	4-6"W-SB-2	C						
5	28% UAN	100	LIQ	2.0	% V/V	2	% V/V	4-6"W-SB-2	C						
5	LUMAX	3.94	L	2.22	LB A/A	2.25	QT/A	PRE-CN	D						
6	BOUNDARY	6.5	EC	1.46	LB A/A	1.8	PT/A	PRE-SB	A		88	87	96	96	1.3
6	FLEXSTAR	1.88	EC	0.294	LB A/A	20	OZ/A	4-6"W-SB-2	C						
6	DESTINY MSO	100	LIQ	1.0	% V/V	1	% V/V	4-6"W-SB-2	C						
6	28% UAN	100	LIQ	2.0	% V/V	2	% V/V	4-6"W-SB-2	C						
6	BICEP II MAGNUM	5.5	L	2.2	LB A/A	3.2	PT/A	PRE-CN	D						
6	CALLISTO	4	SC	0.094	LB A/A	3	FL OZ/A	6-10"CN	E						
6	AATREX	90	WG	0.25	LB A/A	4.44	OZ/A	6-10"CN	E						
6	PREMIUM COC	100	LIQ	1.0	% V/V	1	% V/V	6-10"CN	E						
6	28% UAN	100	LIQ	2.0	% V/V	2	% V/V	6-10"CN	E						
7	DUAL II MAGNUM	7.64	EC	1.27	LB A/A	1.33	PT/A	PRE-SB	A		93	83	99	99	0.0
7	FLEXSTAR	1.88	EC	0.294	LB A/A	20	OZ/A	4-6"W-SB-2	C						
7	DESTINY MSO	100	LIQ	1.0	% V/V	1	% V/V	4-6"W-SB-2	C						
7	28% UAN	100	LIQ	2.0	% V/V	2	% V/V	4-6"W-SB-2	C						
7	BICEP II MAGNUM	5.5	L	2.2	LB A/A	3.2	PT/A	PRE-CN	D						
7	CALLISTO	4	SC	0.094	LB A/A	3	FL OZ/A	6-10"CN	E						
7	AATREX	90	WG	0.25	LB A/A	4.44	OZ/A	6-10"CN	E						
7	PREMIUM COC	100	LIQ	1.0	% V/V	1	% V/V	6-10"CN	E						
7	28% UAN	100	LIQ	2.0	% V/V	2	% V/V	6-10"CN	E						

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Weed Code	AMATA	AMATA	AMATA	AMATA	AMATA
Crop Code					
Rating Data Type	Control	Control	Control	Control	Plants
Rating Unit	Percent	Percent	Percent	Percent	1.0 m2
Rating Date	6-28-04	7-12-04	7-26-04	8-16-04	8-4-04
Trt-Eval Interval	0 DAT	14 DAT	28 DAT	49 DAT	28 DA-C

Trt No.	Treatment Name	Form Conc	Form Type	Rate	Form Unit	Rate Unit	Prod Rate	Prod Unit	Grow Stg	Appl Code					
8	BOUNDARY	6.5	EC	1.46	LB A/A	1.8	PT/A		PRE-SB	A	93	97	99	99	0.0
8	TOUCHDOWN TOTAL	4.17	SC	0.75	LB AE/A	23	OZ/A		4-6"W-SB-2	C					
8	AMS	100	DRY	2.5	LB A/A	2.5	LB/A		4-6"W-SB-2	C					
8	LUMAX	3.94	L	2.22	LB A/A	2.25	QT/A		PRE-CN	D					
9	DUAL II MAGNUM	7.64	EC	1.27	LB A/A	1.33	PT/A		PRE-SB	A	95	94	99	99	0.0
9	TOUCHDOWN TOTAL	4.17	SC	0.75	LB AE/A	23	OZ/A		4-6"W-SB-2	C					
9	AMS	100	DRY	2.5	LB A/A	2.5	LB/A		4-6"W-SB-2	C					
9	LUMAX	3.94	L	2.22	LB A/A	2.25	QT/A		PRE-CN	D					
10	BOUNDARY	6.5	EC	1.46	LB A/A	1.8	PT/A		PRE-SB	A	95	98	99	99	0.0
10	TOUCHDOWN TOTAL	4.17	SC	0.75	LB AE/A	23	OZ/A		4-6"W-SB-2	C					
10	AMS	100	DRY	2.5	LB A/A	2.5	LB/A		4-6"W-SB-2	C					
10	BICEP II MAGNUM	5.5	L	2.2	LB A/A	3.2	PT/A		PRE-CN	D					
10	CALLISTO	4	SC	0.094	LB A/A	3	FL OZ/A		6-10"CN	E					
10	AATREX	90	WG	0.25	LB A/A	4.44	OZ/A		6-10"CN	E					
10	PREMIUM COC	100	LIQ	1.0	% V/V	1	% V/V		6-10"CN	E					
10	28% UAN	100	LIQ	2.0	% V/V	2	% V/V		6-10"CN	E					
11	DUAL II MAGNUM	7.64	EC	1.27	LB A/A	1.33	PT/A		PRE-SB	A	95	97	99	99	0.0
11	TOUCHDOWN TOTAL	4.17	SC	0.75	LB AE/A	23	OZ/A		4-6"W-SB-2	C					
11	AMS	100	DRY	2.5	LB A/A	2.5	LB/A		4-6"W-SB-2	C					
11	BICEP II MAGNUM	5.5	L	2.2	LB A/A	3.2	PT/A		PRE-CN	D					
11	CALLISTO	4	SC	0.094	LB A/A	3	FL OZ/A		6-10"CN	E					
11	AATREX	90	WG	0.25	LB A/A	4.44	OZ/A		6-10"CN	E					
11	PREMIUM COC	100	LIQ	1.0	% V/V	1	% V/V		6-10"CN	E					
11	28% UAN	100	LIQ	2.0	% V/V	2	% V/V		6-10"CN	E					
LSD (P=.05)											7.2	10.9	9.2	7.3	8.21
Replicate F											0.513	1.743	1.165	1.977	0.162
Replicate Prob(F)											0.6080	0.2005	0.3321	0.1647	0.8517
Treatment F											168.788	89.335	157.198	239.557	5.666
Treatment Prob(F)											0.0001	0.0001	0.0001	0.0001	0.0005

Trial Comments

1. Protocol: Syngenta.
2. Ratings: CI and WC prior to POST, 14, 28 and 49 DA POST.
3. Weed counts (waterhemp) per square meter 28 DA last treatment.
4. DA-E = Days after 6-10"CN application. 1.0 m2 = 1.0 square meter. DAT = Days after postemergence application.  
 0 DAT = Prior to any postemergence applications. DA-C = Days after 4-6"W-SB-2 application.
5. No weeds present at 6-10"CN application.
6. Ratings at 14 days after 4-6"W-SB-1 and 4-6"W-SB-2 were on 7-12-04 and 7-21-04, respectively.  
 Ratings at 28 days after 4-6"W-SB-1 and 4-6"W-SB-2 were on 7-26-04 and 8-4-04, respectively.  
 Ratings at 49 days after 4-6"W-SB-1 and 4-6"W-SB-2 were on 8-16-04 and 8-25-04, respectively.