

Purdue Weed Science

Trial ID: 20S-TPAC-CORN-06

Location: Lafayette

Trial Year: 2020

Protocol ID: 20S-TPAC-CORN-06

Investigator (Creator): Dr. Bill Johnson

Study Director: Brent Mansfield

Project ID:

Sponsor Contact: James Whitehead - Helm Agro

General Trial Information

Study Director: Brent Mansfield Title: Research Associate

Investigator: Dr. Bill Johnson Title: Professor

Discipline: H herbicide

Trial Status: E established Trial Reliability: 1 usable data

ARM Trial Created On: 5/6/2020

Initiation Date: 5/7/2020

Trial Location

City: Lafayette Country: USA United States

State/Prov.: Indiana

Postal Code: 47909

Conducted Under GLP: No

Conducted Under GEP: No

Contacts

Role: STYDIR study director

Study Director: Brent Mansfield Title: Research Associate

Organization: Purdue University

Address 1: 915 W. State Street

Country: USA United States E-mail: brentmansfield@purdue.edu

City: West Lafayette, IN Postal Code: 47907

Role: INVEST investigator

Investigator: Dr. Bill Johnson Title: Professor

Organization: Purdue University

Address 1: 915 W. State Street

Country: USA United States E-mail: wgj@purdue.edu

City: West Lafayette, IN Postal Code: 47907

Role: SPONSR sponsor

Sponsor: James Whitehead - Helm Agro

Crop Description

Crop 1: C ZEAMX Zea mays Corn BBCH Scale: BCOR

Entry Date: 4/12/2021 Stage Scale: BBCH

Variety: DKC 62-52 RIB

Planting Date: 5/7/2020 Planting Rate: 32000 S/A

Depth: 1.75 IN

Planting Method: PLANTD planted

Row Spacing: 30 IN Planting Equipment: PP plot planter

Soil Temperature: 60 F Soil Moisture: DRY dry

Emergence Date: 5/18/2020

Pest Description

Pest 1 Type: W Code: AMBTR Ambrosia trifida Entry Date: 4/12/2021

Common Name: Giant ragweed Stage Scale: BBCH

Pest 2 Type: W Code: ECHCG Echinochloa crus-galli Entry Date: 4/12/2021

Common Name: Common barnyard grass Stage Scale: BBCH

Pest 3 Type: W Code: ABUTH Abutilon theophrasti Entry Date: 4/12/2021

Common Name: velvetleaf Stage Scale: BBCH

Pest 4 Type: W Code: CHEAL Chenopodium album Entry Date: 4/12/2021

Common Name: common lambsquarters Stage Scale: BBCH

Site and Design

Treated Plot Width: 6.67 FT

Treated Plot Length: 30 FT

Treated Plot Area: 200.1 FT2 Treatments: 9

Replications: 4

Site Type: FIELD field

Experimental Unit: 1 PLOT plot

Tillage Type: CONTIL conventional-till

Study Design: RACOB� Randomized Complete Block (RCB)

Maintenance							
No.	Date	Type	Maintenance Product Name	Cost	Cost Unit	Rate	Rate Unit
1.	4/7/2020	FERT	UAN	0.00	UAN	180	LB N/A

Soil Description

Description Name: Toronto-Millbrook complex
% Sand: 17 **% OM:** 3.1 **Texture:** SIL silt loam
% Silt: 56 **pH:** 6.2
% Clay: 27 **CEC:** 11.5

No.	Date	Moisture Total	Unit
1.	5/2/2020	0.025	CM
2.	5/3/2020	0.585	CM
3.	5/5/2020	0.481	CM
4.	5/6/2020	0.025	CM
5.	5/10/2020	0.101	CM
6.	5/14/2020	0.405	CM
7.	5/15/2020	0.279	CM
8.	5/17/2020	1.497	CM
9.	5/18/2020	0.914	CM
10.	5/19/2020	0.684	CM
11.	5/23/2020	0.178	CM
12.	5/27/2020	0.025	CM
13.	5/28/2020	0.331	CM
14.	6/4/2020	0.33	CM
15.	6/9/2020	0.787	CM
16.	6/20/2020	0.025	CM
17.	6/21/2020	0.075	CM
18.	6/22/2020	0.711	CM
19.	6/23/2020	0.203	CM
20.	6/27/2020	2.769	CM
21.	6/28/2020	0.229	CM
22.	6/29/2020	0.076	CM
23.	6/30/2020	1.829	CM
24.	7/10/2020	0.05	CM
25.	7/11/2020	0.914	CM
26.	7/12/2020	0.66	CM
27.	7/15/2020	0.127	CM
28.	7/16/2020	0.456	CM
29.	7/19/2020	0.051	CM
30.	7/21/2020	1.423	CM
31.	7/22/2020	0.329	CM
32.	7/23/2020	0.178	CM
33.	7/27/2020	1.295	CM
34.	7/30/2020	1.599	CM

Application Description		
	A	B
Application Date	5/9/2020	6/12/2020
Appl. Start Time	6:35 PM	6:40 PM
Appl. Stop Time	7:00 PM	7:03 PM
Interval to Prev. Appl.		34 DAYS
Application Method	SPRAY	SPRAY
Application Timing	PRE	4-6" WEEDS
Application Placement	BROSOI	BROFOL
Applied By	B. MANSFIELD	B. MANSFIELD
Appl. Entry Date	4/12/2021	4/12/2021
Air Temperature Start, Stop	57, 57 F	86, 86 F
% Relative Humidity Start, Stop	24, 24	21, 21
Wind Velocity+Dir. Start	4 MPH, W	2.4 MPH, N
Wind Velocity+Dir. Stop	6 MPH, W	2.4 MPH, N
Wind Velocity+Dir. Max	6 MPH, W	2.4 MPH, N
Wet Leaves (Y/N)	N, no	N, no
Soil Temperature	60 F	98 F
Soil Moisture	NORMAL	NORMAL
% Cloud Cover	45	5

Crop Stage At Each Application		
	A	B
Crop 1 Code, BBCH Scale	ZEAMX, BCOR	ZEAMX, BCOR
Days after Emergence	-9	25
Stage Majority, Percent	00, -	15, -
Stage Minimum, Percent	00, -	14, -
Stage Maximum, Percent	00, -	15, -
Height Average	0 IN	14 IN
Height Minimum, Maximum	0, 0	8, 15

Pest Stage At Each Application

	A	B
Pest 1 Code, Type, Scale	AMBTR, W, BBCH	AMBTR, W, BBCH
Stage Majority, Percent	00, -	18, -
Stage Minimum, Percent	00, -	14, -
Stage Maximum, Percent	00, -	32, -
Height Average	0 IN	8 IN
Height Minimum, Maximum	0, 0	0.5, 14
Density Average	0 FT2	3 FT2
Density Minimum, Maximum	0, 0	0.5, 5
Pest 2 Code, Type, Scale	ECHCG, W, BBCH	ECHCG, W, BBCH
Stage Majority, Percent	00, -	12, -
Stage Minimum, Percent	00, -	11, -
Stage Maximum, Percent	00, -	13, -
Height Average	0 IN	2 IN
Height Minimum, Maximum	0, 0	0.5, 3
Density Average	0 FT2	2 FT2
Density Minimum, Maximum	0, 0	1, 4
Pest 3 Code, Type, Scale	ABUTH, W, BBCH	ABUTH, W, BBCH
Stage Majority, Percent	00, -	18, -
Stage Minimum, Percent	00, -	16, -
Stage Maximum, Percent	00, -	19, -
Height Average	0 IN	5 IN
Height Minimum, Maximum	0, 0	2, 7
Density Average	0 FT2	1 FT2
Density Minimum, Maximum	0, 0	0.25, 1.5
Pest 4 Code, Type, Scale	CHEAL, W, BBCH	CHEAL, W, BBCH
Stage Majority, Percent	00, -	18, -
Stage Minimum, Percent	00, -	16, -
Stage Maximum, Percent	00, -	19, -
Height Average	0 IN	3 IN
Height Minimum, Maximum	0, 0	2, 4
Density Average	0 FT2	2 FT2
Density Minimum, Maximum	0, 0	1, 2

Application Equipment

	A	B
Appl. Equipment	CO2 BACKPACK	CO2 BACKPACK
Equipment Type	BACSPR	BACSPR
Operation Pressure	44 PSI	
Nozzle Model	TT1110015	TT110015
Nozzle Type	TEEJAI	TEEJTU
Nozzle Spacing	20.0 IN	20.0 IN
Nozzles/Row	4.0	4.0
Boom Length	6.67 FT	6.67 FT
Boom Height	17.0 IN	25.0 IN
Ground Speed	3 MPH	3 MPH
Carrier	WATER	WATER
Application Amount	15 GAL/AC	15 GAL/AC
Mix Overage		0 mL
Mix Size	1119 mL	1119 mL
Propellant	COMCO2	COMCO2

Purdue Weed Science

Helm Agro - Efficacy of Katagon in Corn						
Trial ID: 20S-TPAC-CORN-06		Location: Lafayette		Trial Year: 2020		
Protocol ID: 20S-TPAC-CORN-06		Investigator (Creator): Dr. Bill Johnson				
Project ID:		Study Director: Brent Mansfield				
		Sponsor Contact: James Whitehead - Helm Agro				
Pest Type		W, Weed	W, Weed		W, Weed	W, Weed
Pest Code		AMBTR	ECHCG		AMBTR	ECHCG
Pest Scientific Name		Ambrosia trifida	Echinochloa cru>		Ambrosia trifida	Echinochloa cru>
Pest Name		Giant ragweed	Common barnyard>		Giant ragweed	Common barnyard>
Crop Type, Code	C, ZEAMX			C, ZEAMX		
BBCH Scale	BCOR			BCOR		
Crop Scientific Name	Zea mays			Zea mays		
Crop Name	Corn			Corn		
Rating Date	6/12/2020	6/12/2020	6/12/2020	6/20/2020	6/20/2020	6/20/2020
Rating Type	PHYGEN	CONTROL	CONTROL	PHYGEN	CONTROL	CONTROL
Rating Unit/Min/Max	%, 0, 100	%, 0, 100	%, 0, 100	%, 0, 100	%, 0, 100	%, 0, 100
Number of Subsamples	1	1	1	1	1	1
Assessed By	B. MANSFIELD	B. MANSFIELD	B. MANSFIELD	B. MANSFIELD	B. MANSFIELD	B. MANSFIELD
Data Entry Date	4/12/2021	4/12/2021	4/12/2021	4/12/2021	4/12/2021	4/12/2021
Rating Timing	0 DAB	0 DAB	0 DAB	8 DAB	8 DAB	8 DAB
Days After First/Last Applic.	34, 34	34, 34	34, 34	42, 8	42, 8	42, 8
Plant-Eval Interval	36 DP-1	36 DP-1	36 DP-1	44 DP-1	44 DP-1	44 DP-1
Days After Emergence	25 DE-1	25 DE-1	25 DE-1	33 DE-1	33 DE-1	33 DE-1
Trt Treatment	Rate	Rate	Rate	Rate	Rate	Rate
No. Name	Rate	Unit	Appl Code			
1 UNTREATED	0.0	0.0	0.0	0.0	0.0	0.0
2 FEARLESS XTRA	2.25 LB AI/A A	0.0 -	81.8 a	96.5 -	0.0 -	83.8 ab
KATAGON	0.05 LB AI/A B					100.0 -
MSO ULTRA	1 % V/V B					
UAN 28%	2.5 % V/V B					
3 FEARLESS XTRA	2.25 LB AI/A A	0.0 -	80.5 a	97.0 -	0.0 -	93.8 a
KATAGON	0.05 LB AI/A B					100.0 -
AATREX	0.75 LB AI/A B					
MSO ULTRA	1 % V/V B					
UAN 28%	2.5 % V/V B					
4 HELMET	1.46 LB AI/A A	0.0 -	36.3 bc	92.3 -	0.0 -	72.5 abc
KATAGON	0.05 LB AI/A B					100.0 -
MSO ULTRA	1 % V/V B					
UAN 28%	2.5 % V/V B					
5 HELMET	1.46 LB AI/A A	0.0 -	36.3 bc	93.5 -	0.0 -	85.0 ab
KATAGON	0.05 LB AI/A B					100.0 -
AATREX	0.75 LB AI/A B					
MSO ULTRA	1 % V/V B					
UAN 28%	2.5 % V/V B					
6 FEARLESS XTRA	2.25 LB AI/A A	0.0 -	62.5 ab	93.5 -	0.0 -	62.5 bc
7 HELMET	1.46 LB AI/A A	0.0 -	21.3 c	95.3 -	0.0 -	51.3 c
8 HARNESS XTRA	2.7 LB AI/A A	0.0 -	86.3 a	97.0 -	0.0 -	87.5 a
LAUDIS	0.082 LB AI/A B					100.0 -
MSO ULTRA	1 % V/V B					
9 VERDICT	0.61 LB AI/A A	0.0 -	95.8 a	93.5 -	0.0 -	92.5 a
ARMEZON	0.0164 LB AI/A B					100.0 -
MSO ULTRA	1 % V/V B					
LSD P=.05	.	34.68	6.00	.	22.94	.
Standard Deviation	0.00	23.58	4.08	0.00	15.60	0.00
CV	0.0	37.69	4.3	0.0	19.85	0.0
Grand Mean	0.00	62.56	94.81	0.00	78.59	100.00
Levene's F^	.	0.863	0.836	.	1.915	.
Levene's Prob(F)	.	0.548	0.568	.	0.111	.
Rank X2	.	.	.	.	.	.
P(Rank X2)	.	.	.	.	.	.
Skewness^	.	0.1991	-0.8625*	.	-1.033*	.
Kurtosis^	.	-0.6589	0.5689	.	3.9345*	.
Replicate F	0.000	5.070	1.125	0.000	0.954	0.000
Replicate Prob(F)	1.0000	0.0085	0.3617	1.0000	0.4328	1.0000
Treatment F	0.000	5.594	0.836	0.000	3.790	0.000
Treatment Prob(F)	1.0000	0.0010	0.5698	1.0000	0.0082	1.0000

Means followed by same letter or symbol do not significantly differ (P=.05, LSD).

Mean comparisons performed only when AOV Treatment P(F) is significant at mean comparison OSL.

Untreated treatment(s) 1 excluded from analysis.

Could not calculate LSD (% mean diff) for columns 1,4,6,7,9,10,12,13,15 because error mean square = 0.

^Calculated from residual.

Pest Type		W, Weed	W, Weed		W, Weed	W, Weed
Pest Code		AMBTR	ECHCG		AMBTR	ECHCG
Pest Scientific Name		Ambrosia trifida	Echinochloa cru>		Ambrosia trifida	Echinochloa cru>
Pest Name		Giant ragweed	Common barnyard>		Giant ragweed	Common barnyard>
Crop Type, Code	C, ZEAMX			C, ZEAMX		
BBCH Scale	BCOR			BCOR		
Crop Scientific Name	Zea mays			Zea mays		
Crop Name	Corn			Corn		
Rating Date	6/26/2020	6/26/2020	6/26/2020	7/10/2020	7/10/2020	7/10/2020
Rating Type	PHYGEN	CONTROL	CONTROL	PHYGEN	CONTROL	CONTROL
Rating Unit/Min/Max	%, 0, 100	%, 0, 100	%, 0, 100	%, 0, 100	%, 0, 100	%, 0, 100
Number of Subsamples	1	1	1	1	1	1
Assessed By	B. MANSFIELD	B. MANSFIELD	B. MANSFIELD	B. MANSFIELD	B. MANSFIELD	B. MANSFIELD
Data Entry Date	4/12/2021	4/12/2021	4/12/2021	4/12/2021	4/12/2021	4/12/2021
Rating Timing	14 DAB	14 DAB	14 DAB	28 DAB	28 DAB	28 DAB
Days After First/Last Applic.	48, 14	48, 14	48, 14	62, 28	62, 28	62, 28
Plant-Eval Interval	50 DP-1	50 DP-1	50 DP-1	64 DP-1	64 DP-1	64 DP-1
Days After Emergence	39 DE-1	39 DE-1	39 DE-1	53 DE-1	53 DE-1	53 DE-1
Trt Treatment	7	8	9	10	11	12
No. Name Rate Unit Appl Code						
1 UNTREATED	0.0	0.0	0.0	0.0	0.0	0.0
2 FEARLESS XTRA 2.25 LB AI/A A KATAGON 0.05 LB AI/A B MSO ULTRA 1 % V/V B UAN 28% 2.5 % V/V B	0.0 -	97.5 a	100.0 -	0.0 -	98.8 a	100.0 -
3 FEARLESS XTRA 2.25 LB AI/A A KATAGON 0.05 LB AI/A B AATREX 0.75 LB AI/A B MSO ULTRA 1 % V/V B UAN 28% 2.5 % V/V B	0.0 -	100.0 a	100.0 -	0.0 -	99.5 a	100.0 -
4 HELMET 1.46 LB AI/A A KATAGON 0.05 LB AI/A B MSO ULTRA 1 % V/V B UAN 28% 2.5 % V/V B	0.0 -	90.5 a	100.0 -	0.0 -	99.5 a	100.0 -
5 HELMET 1.46 LB AI/A A KATAGON 0.05 LB AI/A B AATREX 0.75 LB AI/A B MSO ULTRA 1 % V/V B UAN 28% 2.5 % V/V B	0.0 -	98.0 a	100.0 -	0.0 -	99.5 a	100.0 -
6 FEARLESS XTRA 2.25 LB AI/A A	0.0 -	28.8 b	100.0 -	0.0 -	30.0 b	100.0 -
7 HELMET 1.46 LB AI/A A	0.0 -	23.8 b	100.0 -	0.0 -	26.3 b	100.0 -
8 HARNESS XTRA 2.7 LB AI/A A LAUDIS 0.082 LB AI/A B MSO ULTRA 1 % V/V B	0.0 -	95.0 a	100.0 -	0.0 -	97.8 a	100.0 -
9 VERDICT 0.61 LB AI/A A ARMEZON 0.0164 LB AI/A B MSO ULTRA 1 % V/V B	0.0 -	98.0 a	100.0 -	0.0 -	98.0 a	100.0 -
LSD P=.05	.	16.10	.	.	16.97	.
Standard Deviation	0.00	10.95	0.00	0.00	11.54	0.00
CV	0.0	13.87	0.0	0.0	14.22	0.0
Grand Mean	0.00	78.94	100.00	0.00	81.16	100.00
Levene's F^	.	4.904	.	.	7.685	.
Levene's Prob(F)	.	0.002*	.	.	0.00*	.
Rank X2	.	.	.	.	.	.
P(Rank X2)	.	.	.	.	.	.
Skewness^	.	0.2361	.	.	0.1633	.
Kurtosis^	.	0.9351	.	.	1.2654	.
Replicate F	0.000	2.657	0.000	0.000	2.175	0.000
Replicate Prob(F)	1.0000	0.0748	1.0000	1.0000	0.1211	1.0000
Treatment F	0.000	35.628	0.000	0.000	32.209	0.000
Treatment Prob(F)	1.0000	0.0001	1.0000	1.0000	0.0001	1.0000

Means followed by same letter or symbol do not significantly differ (P=.05, LSD).

Mean comparisons performed only when AOV Treatment P(F) is significant at mean comparison OSL.

Untreated treatment(s) 1 excluded from analysis.

Could not calculate LSD (% mean diff) for columns 1,4,6,7,9,10,12,13,15 because error mean square = 0.

^Calculated from residual.

Pest Type		W, Weed	W, Weed
Pest Code		AMBTR	ECHCG
Pest Scientific Name		Ambrosia trifida	Echinochloa cru>
Pest Name		Giant ragweed	Common barnyard>
Crop Type, Code	C, ZEAMX		
BBCH Scale	BCOR		
Crop Scientific Name	Zea mays		
Crop Name	Corn		
Rating Date	7/28/2020	7/28/2020	7/28/2020
Rating Type	PHYGEN	CONTROL	CONTROL
Rating Unit/Min/Max	%, 0, 100	%, 0, 100	%, 0, 100
Number of Subsamples	1	1	1
Assessed By	B. MANSFIELD	B. MANSFIELD	B. MANSFIELD
Data Entry Date	4/12/2021	4/12/2021	4/12/2021
Rating Timing	46 DAB	46 DAB	46 DAB
Days After First/Last Applic.	80, 46	80, 46	80, 46
Plant-Eval Interval	82 DP-1	82 DP-1	82 DP-1
Days After Emergence	71 DE-1	71 DE-1	71 DE-1
Trt Treatment			
No. Name	13	14	15
Rate			
Unit			
Appl Code			
1 UNTREATED	0.0	0.0	0.0
2 FEARLESS XTRA	2.25 LB AI/A A		
KATAGON	0.05 LB AI/A B	99.3 a	100.0 -
MSO ULTRA	1 % V/V B		
UAN 28%	2.5 % V/V B		
3 FEARLESS XTRA	2.25 LB AI/A A	98.8 a	100.0 -
KATAGON	0.05 LB AI/A B		
AATREX	0.75 LB AI/A B		
MSO ULTRA	1 % V/V B		
UAN 28%	2.5 % V/V B		
4 HELMET	1.46 LB AI/A A	99.0 a	100.0 -
KATAGON	0.05 LB AI/A B		
MSO ULTRA	1 % V/V B		
UAN 28%	2.5 % V/V B		
5 HELMET	1.46 LB AI/A A	99.3 a	100.0 -
KATAGON	0.05 LB AI/A B		
AATREX	0.75 LB AI/A B		
MSO ULTRA	1 % V/V B		
UAN 28%	2.5 % V/V B		
6 FEARLESS XTRA	2.25 LB AI/A A	47.5 b	100.0 -
7 HELMET	1.46 LB AI/A A	22.5 c	100.0 -
8 HARNESS XTRA	2.7 LB AI/A A	98.5 a	100.0 -
LAUDIS	0.082 LB AI/A B		
MSO ULTRA	1 % V/V B		
9 VERDICT	0.61 LB AI/A A	98.5 a	100.0 -
ARMEZON	0.0164 LB AI/A B		
MSO ULTRA	1 % V/V B		
LSD P=.05	.	23.93	.
Standard Deviation	0.00	16.27	0.00
CV	0.0	19.63	0.0
Grand Mean	0.00	82.91	100.00
Levene's F^	.	2.704	.
Levene's Prob(F)	.	0.032*	.
Rank X2	.	.	.
P(Rank X2)	.	.	.
Skewness^	.	1.377*	.
Kurtosis^	.	5.4202*	.
Replicate F	0.000	0.732	0.000
Replicate Prob(F)	1.0000	0.5444	1.0000
Treatment F	0.000	13.883	0.000
Treatment Prob(F)	1.0000	0.0001	1.0000

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Untreated treatment(s) 1 excluded from analysis.

Could not calculate LSD (% mean diff) for columns 1,4,6,7,9,10,12,13,15 because error mean square = 0.

^Calculated from residual.

Purdue Weed Science

Helm Agro - Efficacy of Katagon in Corn		
Trial ID: 20S-TPAC-CORN-06	Location: Lafayette	Trial Year: 2020
Protocol ID: 20S-TPAC-CORN-06	Investigator (Creator): Dr. Bill Johnson	
Project ID:	Study Director: Brent Mansfield	
	Sponsor Contact: James Whitehead - Helm Agro	

<u>Pest Type</u>
W, Weed = Weed or volunteer crop
<u>Pest Code</u>
AMBTR, Ambrosia trifida, Giant ragweed = US
ECHCG, Echinochloa crus-galli, Common barnyard grass = US
<u>Crop Type, Code</u>
C = EPPO species (Bayer) codes
ZEAMX, BCOR, Zea mays, Corn = US
<u>Rating Type</u>
PHYGEN = phytotoxicity - general / injury
<u>Rating Unit/Min/Max</u>
%, 0, 100 = percent
<u>Plant-Eval Interval</u>
36 DP-1 = 1 ZEAMX 5/7/2020
44 DP-1 = 1 ZEAMX 5/7/2020
50 DP-1 = 1 ZEAMX 5/7/2020
64 DP-1 = 1 ZEAMX 5/7/2020
82 DP-1 = 1 ZEAMX 5/7/2020