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GR Palmer amaranth management in Roundup Ready Flex cotton

Trial ID: C6-08

Study Dir.: Stanley Culpepper

Location: Macon County

Investigator: Stanley Culpepper

Reps: 3

Plots: 12 by 25 feet

Spray vol: 14.8 gal/ac

Mix size: 1.5 liters (min 1.1575)

Trt No.	Treatment Name	Form Conc	Form Unit	Form Type	Rate Rate	Grow Unit	Stg	Appl Code	Amt to Measure	Product	Plot No. By Rep		
											1	2	3
1	WeatherMax	4.5	L		22	OZ/A	21	DBP	A	17.42 ml/mx	101	202	310
	Valor	51		WG	2	OZ/A	21	DBP	A	1.518 g/mx			
	Gramoxone Inteon	2	L		1.5	PT/A		PRE	B	19.0 ml/mx			
	Prowl H20	3.8	L		2.1	PT/A		PRE	B	26.6 ml/mx			
	Cotoran	4	L		1	QT/A		PRE	B	25.34 ml/mx			
	WeatherMax	4.5	L		22	OZ/A	1	If	C	17.42 ml/mx			
	Parrlay	8	L		1.33	PT/A	1	If	C	16.85 ml/mx			
	WeatherMax	4.5	L		22	OZ/A		PD-8lf	D	17.42 ml/mx			
	Diuron	4	L		1.5	PT/A		PD-8lf	D	19.0 ml/mx			
2	Gramoxone Inteon	2	L		1.5	PT/A		PRE	B	19.0 ml/mx	102	207	301
	Prowl H20	3.8	L		2.1	PT/A		PRE	B	26.6 ml/mx			
	Reflex	2	L		1.5	PT/A		PRE	B	19.0 ml/mx			
	WeatherMax	4.5	L		22	OZ/A	1	If	C	17.42 ml/mx			
	Parrlay	8	L		1.33	PT/A	1	If	C	16.85 ml/mx			
	WeatherMax	4.5	L		22	OZ/A		PD-8 lf	D	17.42 ml/mx			
	Diuron	4	L		1.5	PT/A		PD-8 lf	D	19.0 ml/mx			
3	Gramoxone Inteon	2	L		1.5	PT/A		PRE	B	19.0 ml/mx	103	205	306
	Prowl H20	3.8	L		2.1	PT/A		PRE	B	26.6 ml/mx			
	Reflex	2	L		1.5	PT/A		PRE	B	19.0 ml/mx			
	WeatherMax	4.5	L		22	OZ/A	1	If	C	17.42 ml/mx			
	Parrlay	8	L		1.33	PT/A	1	If	C	16.85 ml/mx			
4	Gramoxone Inteon	2	L		1.5	PT/A		PRE	B	19.0 ml/mx	104	209	305
	Prowl H20	3.8	L		2.1	PT/A		PRE	B	26.6 ml/mx			
	Reflex	2	L		1.5	PT/A		PRE	B	19.0 ml/mx			
	WeatherMax	4.5	L		22	OZ/A	1	If	C	17.42 ml/mx			
	Parrlay	8	L		1.33	PT/A	1	If	C	16.85 ml/mx			
	WeatherMax	4.5	L		22	OZ/A		OT-8lf	E	17.42 ml/mx			
	Staple LX	3.2	L		3.8	OZ/A		OT-8lf	E	3.009 ml/mx			
5	Gramoxone Inteon	2	L		1.5	PT/A		PRE	B	19.0 ml/mx	105	204	308
	Prowl H20	3.8	L		2.1	PT/A		PRE	B	26.6 ml/mx			
	Reflex	2	L		1.5	PT/A		PRE	B	19.0 ml/mx			
	WeatherMax	4.5	L		22	OZ/A	1	If	C	17.42 ml/mx			
	Staple LX	3.2	L		3.8	OZ/A	1	If	C	3.009 ml/mx			
6	Gramoxone Inteon	2	L		1.5	PT/A		PRE	B	19.0 ml/mx	106	201	304
	Prowl H20	3.8	L		2.1	PT/A		PRE	B	26.6 ml/mx			
	Reflex	2	L		1.5	PT/A		PRE	B	19.0 ml/mx			
	WeatherMax	4.5	L		22	OZ/A	1	If	C	17.42 ml/mx			
	Staple LX	3.2	L		3.8	OZ/A	1	If	C	3.009 ml/mx			
	WeatherMax	4.5	L		22	OZ/A		OT-8lf	E	17.42 ml/mx			
	Staple LX	3.2	L		3.8	OZ/A		OT-8lf	E	3.009 ml/mx			
7	Gramoxone Inteon	2	L		1.5	PT/A		PRE	B	19.0 ml/mx	107	210	303
	Prowl H20	3.8	L		2.1	PT/A		PRE	B	26.6 ml/mx			
	Cotoran	4	L		1	QT/A		PRE	B	25.34 ml/mx			
	WeatherMax	4.5	L		22	OZ/A	1	If	C	17.42 ml/mx			
	Parrlay	8	L		1.33	PT/A	1	If	C	16.85 ml/mx			
	WeatherMax	4.5	L		22	OZ/A		PD-8lf	D	17.42 ml/mx			
	Valor	51		WG	2	OZ/A		PD-8lf	D	1.518 g/mx			

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Reps: 3 Plots: 12 by 25 feet
 Spray vol: 14.8 gal/ac Mix size: 1.5 liters (min 1.1575)

Ttr No.	Treatment Name	Form Conc	Form Unit	Form Type	Rate Rate	Grow Unit	Stg	Appl Code	Amt Product to Measure	Plot No. By Rep		
										1	2	3
8	Gramoxone Inteon	2	L		1.5	PT/A	PRE	B	19.0 ml/mx	108	206	302
	Prowl H20	3.8	L		2.1	PT/A	PRE	B	26.6 ml/mx			
	Cotoran	4	L		1	QT/A	PRE	B	25.34 ml/mx			
	WeatherMax	4.5	L		22	OZ/A	1 lf	C	17.42 ml/mx			
	Parrlay	8	L		1.33	PT/A	1 lf	C	16.85 ml/mx			
	WeatherMax	4.5	L		22	OZ/A	PD-8lf	D	17.42 ml/mx			
	Diuron	4	L		2	PT/A	PD-8lf	D	25.34 ml/mx			
9	Gramoxone Inteon	2	L		1.5	PT/A	PRE	B	19.0 ml/mx	109	208	307
	Prowl H20	3.8	L		2.1	PT/A	PRE	B	26.6 ml/mx			
	Cotoran	4	L		1	QT/A	PRE	B	25.34 ml/mx			
	WeatherMax	4.5	L		22	OZ/A	1 lf	C	17.42 ml/mx			
	Parrlay	8	L		1.33	PT/A	1 lf	C	16.85 ml/mx			
10	Nontreated								110	203	309	

Sort Order: Treatment

Product quantities required for listed treatments and applications in one trial:

Amount*	Unit	Treatment Name	Form Conc	Form Type	Lot Code
348.396	ml	WeatherMax	4.5	L	
3.795	g	Valor	51	WG	
213.765	ml	Gramoxone Inteon	2	L	
299.272	ml	Prowl H20	3.8	L	
126.676	ml	Cotoran	4	L	
147.419	ml	Parrlay	8	L	
79.172	ml	Diuron	4	L	
118.759	ml	Reflex	2	L	
15.044	ml	Staple LX	3.2	L	

* 'Per area' calculations based on spray volume= 14.8 gal/ac, mix size= 1.5 liters (mix size basis).
 * Product amount calculations increased 25 % for overage adjustment.

Trial Comments

GENERAL COMMENTS: Determine the most effective early season glyphosate-resistant Palmer amaranth weed management program.

Palmer amaranth control (Palmer was not ALS-resistant, only glyphosate-resistant):

1. Although Valor preplant provided excellent residual control, the strip tillage operation destroyed the herbicide layer in the drill and Palmer began emerging in the drill immediately.
2. At time of 1-leaf cotton applications, all Reflex programs were more effective than Cotoran programs. Rainfall occurred within 4 days of applying PRE herbicides and control was greater than normal. Valor applied preplant ahead of the Cotoran application tended to improve control in that Cotoran program.
3. Roundup plus Parrlay had no effect on emerged Palmer amaranth. Roundup + Staple LX (3.8 oz) was very effective on the smaller 2 inch Palmer amaranth when applied at the 1-leaf stage of cotton growth. However, control was only fair when treating 4 inch Palmer amaranth at the 8 leaf stage of cotton growth.
4. Directed applications of diuron provided good emerged control of the 4 inch Palmer amaranth. Plants that were larger than 4 inches or in plots where severe populations of Palmer amaranth were present, control was only fair.
5. By late season, the most effective programs included Reflex PRE and sequential POST systems with a 1-leaf and an 8 leaf application.
6. Roundup plus Diuron is more effective than Roundup plus Valor in controlling emerged pigweed at layby. However, Diuron plus MSMA is more effective than either of these options (see other studies comparing these treatments).

Cotton Injury:

1. A heavy rainfall occurred while the cotton was beginning to crack the soil surface, thus cotton injury was noted.

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2. Reflex injured cotton up to 19% while Cotoran caused up to 15% injury.
3. WeatherMax + Parrlay injured cotton no more than 10% even though injury ratings reported were often greater than 10%. This result due to the additional stunting from PRE applications.
4. WeatherMax + Staple applied to 1-leaf cotton injured cotton at least 15 to 20%.
5. Roundup plus diuron or Valor injured cotton less than 10% and was insignificant.
6. Cotton recovered from all herbicide applications by late June.

Conclusions:

1. Reflex is a better option than Cotoran PRE in fields with resistance.
2. Diuron layby mixtures are the most effective current option. Diuron plus MSMA plus Valor will likely be recommended for the 2009 crop.

GENERAL COMMENTS:

1. Rainfall occurred within 4 days of the preplant Valor application as well as PRE applications. Rainfall occurring during times of herbicide applications in crop included the following:

Apr 28	1 in
May 9	0.4 in
May 11	2.7 in
May 20	0.2 in
May 24	0.3 in
Jun 11	0.9 in
Jun 17	0.6 in
Jun 22	1 in
Jul 5	0.5 in
Jul 21	1 in

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Weed Code	AMAPA	AMAPA	AMAPA	AMAPA	AMAPA	AMAPA	GOSHI	GOSHI			
Crop Code	GOSHI	GOSHI	GOSHI	GOSHI	GOSHI	GOSHI	GOSHI	GOSHI			
Rating Data Type	control	control	control	control	control	control	injury	injury			
Rating Unit	%	%	%	%	%	%	%	%			
Rating Date	May-14-08	May-23-08	May-30-08	Jun-11-08	Jun-26-08	Jul-22-08	May-14-08	May-23-08			
Trt No.	Treatment Name	Rate	Unit	1	2	3	4	5	6	7	8
8	Gramoxone Inteon	1.5	PT/A	87 bc	83 c	70 de	94 a	85 bc	73 c	4 cd	10 c
	Prowl H20	2.1	PT/A								
	Cotoran	1	QT/A								
	WeatherMax	22	OZ/A								
	Parrlay	1.33	PT/A								
	WeatherMax	22	OZ/A								
	Diuron	2	PT/A								
9	Gramoxone Inteon	1.5	PT/A	85 c	86 c	68 e	57 c	40 f	0 e	5 cd	9 c
	Prowl H20	2.1	PT/A								
	Cotoran	1	QT/A								
	WeatherMax	22	OZ/A								
	Parrlay	1.33	PT/A								
10	Nontreated			0 d	0 d	0 f	0 d	0 g	0 e	0 d	0 d
LSD (P=.05)				5.6	4.0	12.1	11.5	11.6	13.0	8.0	5.2
Standard Deviation				3.3	2.3	7.0	6.7	6.8	7.5	4.7	3.0
CV				3.82	2.79	9.46	8.76	9.6	12.24	45.23	24.69
Bartlett's X2				8.444	6.426	1.301	11.737	11.035	8.263	4.404	5.6
P(Bartlett's X2)				0.077	0.17	0.972	0.068	0.137	0.31	0.819	0.587

Means followed by same letter do not significantly differ (P=.05, Duncan's New MRT)

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Weed Code			GOSHI	GOSHI	GOSHI
Crop Code			injury	injury	injury
Rating Data Type			%	%	%
Rating Unit					
Rating Date			May-30-08	Jun-11-08	Jun-26-08
Trt No.	Treatment Name	Rate Unit	9	10	11
1	WeatherMax	22 OZ/A	8 bc	10 a	0 a
	Valor	2 OZ/A			
	Gramoxone Inteon	1.5 PT/A			
	Prowl H20	2.1 PT/A			
	Cotoran	1 QT/A			
	WeatherMax	22 OZ/A			
	Parrlay	1.33 PT/A			
	WeatherMax	22 OZ/A			
	Diuron	1.5 PT/A			
2	Gramoxone Inteon	1.5 PT/A	5 bc	4 ab	0 a
	Prowl H20	2.1 PT/A			
	Reflex	1.5 PT/A			
	WeatherMax	22 OZ/A			
	Parrlay	1.33 PT/A			
	WeatherMax	22 OZ/A			
	Diuron	1.5 PT/A			
3	Gramoxone Inteon	1.5 PT/A	10 bc	0 b	0 a
	Prowl H20	2.1 PT/A			
	Reflex	1.5 PT/A			
	WeatherMax	22 OZ/A			
	Parrlay	1.33 PT/A			
4	Gramoxone Inteon	1.5 PT/A	12 b	4 ab	0 a
	Prowl H20	2.1 PT/A			
	Reflex	1.5 PT/A			
	WeatherMax	22 OZ/A			
	Parrlay	1.33 PT/A			
	WeatherMax	22 OZ/A			
	Staple LX	3.8 OZ/A			
5	Gramoxone Inteon	1.5 PT/A	30 a	7 ab	0 a
	Prowl H20	2.1 PT/A			
	Reflex	1.5 PT/A			
	WeatherMax	22 OZ/A			
	Staple LX	3.8 OZ/A			
6	Gramoxone Inteon	1.5 PT/A	27 a	2 b	0 a
	Prowl H20	2.1 PT/A			
	Reflex	1.5 PT/A			
	WeatherMax	22 OZ/A			
	Staple LX	3.8 OZ/A			
	WeatherMax	22 OZ/A			
	Staple LX	3.8 OZ/A			
	Staple LX	3.8 OZ/A			
7	Gramoxone Inteon	1.5 PT/A	8 bc	3 ab	0 a
	Prowl H20	2.1 PT/A			
	Cotoran	1 QT/A			
	WeatherMax	22 OZ/A			
	Parrlay	1.33 PT/A			
	WeatherMax	22 OZ/A			
	WeatherMax	22 OZ/A			
	Valor	2 OZ/A			

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Weed Code			GOSHI	GOSHI	GOSHI
Crop Code			injury	injury	injury
Rating Data Type			%	%	%
Rating Unit					
Rating Date			May-30-08	Jun-11-08	Jun-26-08
Trt No.	Treatment Name	Rate Rate Unit	9	10	11
8	Gramoxone Inteon	1.5 PT/A	7 bc	10 a	0 a
	Prowl H20	2.1 PT/A			
	Cotoran	1 QT/A			
	WeatherMax	22 OZ/A			
	Parrlay	1.33 PT/A			
	WeatherMax	22 OZ/A			
	Diuron	2 PT/A			
9	Gramoxone Inteon	1.5 PT/A	7 bc	0 b	0 a
	Prowl H20	2.1 PT/A			
	Cotoran	1 QT/A			
	WeatherMax	22 OZ/A			
	Parrlay	1.33 PT/A			
10	Nontreated		0 c	0 b	0 a
LSD (P=.05)			9.6	6.8	0.0
Standard Deviation			5.6	3.9	0.0
CV			49.58	98.74	0.0
Bartlett's X2			7.314	8.094	0.0
P(Bartlett's X2)			0.397	0.151	.

Means followed by same letter do not significantly differ (P=.05, Duncan's New MRT)

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MAINTENANCE

Field Prep./Maintenance: Wheat was used for a cover crop. Roundup was applied on March 26 to kill 15 in tall wheat. Strip tillage operation and planting occurred on April 24.

No.	Date	Maintenance Treatment Name	Form Conc	Form Unit	Form Type	Rate	Rate Unit
1.							

SOIL DESCRIPTION

% Sand: 82	% OM: 2	Texture: loamy sand
% Silt: 14	pH: 6.4	Soil Name: _____
% Clay: 4	CEC: _____	Fert. Level: _____

ADDITIONAL MEASURED ELEMENTS

Element	Quantity	Unit

MOISTURE CONDITIONS

No.	Date	Time	Amount	Unit	Type	Interval	Unit
1.							

Overall Moisture Conditions: _____

Closest Weather Station: _____ Distance: _____ Unit: _____

APPLICATION DESCRIPTION

	A	B	C	D	E
Application Date:	Apr-18-08	Apr-25-08	May-13-08	May-31-08	May-31-08
Time of Day:	8:00 am	2:30 pm	6:00 pm	8:00 am	8:00 am
Application Method:	broadcast	broadcast	broadcast	broadcast	broadcast
Application Timing:	preplant	PRE	1 leaf	PD	OT-8 lf
Applic. Placement:	overtop	on soil	overtop	directed	overtop
Air Temp., Unit:	58 F	89 F	78 F	77 F	77 F
% Relative Humidity:	53	36	45	74	74
Wind Velocity, Unit:	0 mph	5 mph	0 mph	3 mph	3 mph
Dew Presence (Y/N):	N	N	N	N	N
Water Hardness:					
Soil Temp., Unit:	56 F	82 F	82 F	77 F	77 F
Soil Moisture:	fair	moist	moist	fair	fair
% Cloud Cover:	0	30	100	0	0

CROP STAGE AT EACH APPLICATION

	A	B	C	D	E
Crop 1 Code, Stage:	GOSHI A	GOSHI B	GOSHI C	GOSHI D	GOSHI E
Stage Scale:	preplant	PRE	2 leaf	8 leaf	8 leaf
Height, Unit:	0 inch	0 inch	2 in	8 in	8 in

WEED STAGE AT EACH APPLICATION

	A	B	C	D	E
Weed 1 Code, Stage:	AMAPA A	AMAPA B	AMAPA C	AMAPA D	AMAPA E
Stage Scale:	preplant	0.5 in	2 in	4 in	4 in
Density, Unit:	0 ydsq	5 ydsq	17 ydsq	22 ydsq	22 ydq

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APPLICATION EQUIPMENT

	A	B	C	D	E
Appl. Equipment:	backpack	backpack	backpack	backpack	backpack
Operating Pressure:	24	24	24	24	24
Nozzle Type:	flat fan	flat fan	flat fan	flat fan	flat fan
Nozzle Size:	11002	11002	11002	11002	11002
Nozzle Spacing, Unit:	18 in	18 in	18 in	12 in	18 in
Nozzles/Row:	2	2	2	3	2
Band Width, Unit:					
Boom Length, Unit:	4.5 in	4.5 ft	4.5 in	24 in	4.5 ft
Boom Height, Unit:	15 in	15 in	15 in	12 in	15 in
Ground Speed, Unit:	3 mph	3 mph	3 mph	3 mph	3 mph
Incorporation Equip.:					
Hours to Incorp.:					
Incorp. Depth, Unit:					
Carrier:	water	water	water	water	water
Spray Volume, Unit:	15 GPA	15 GPA	14.5 GPA	15 GPA	15 GPA
Spray pH:					
Propellant:	CO2	CO2	CO2	CO2	CO2
Tank Mix (Y/N):	y	y	y	y	y

Trt No	Treatment Application Comment