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Effect of Adjuvants on glyphosate + Flexstar on glyphosate and ALS resistant ragweed

Trial ID: 09S-THP-CTS-56 Protocol ID: 09S-THP-CTS-56
 Location: Throckmorton Study Director: Paul Marquardt/Melissa Kruger
 Project ID: Investigator: Dr. Bill Johnson
 Sponsor Contact: George Watters

General Trial Information

Study Director: Paul Marquardt/Melissa Kruger **Title:** Research Associate
Investigator: Dr. Bill Johnson **Title:** Professor

Discipline: H herbicide
Trial Status: E established
Initiation Date: 5/12/09

Trial Location

City: West Lafayette
State/Prov.: IN
Postal Code: 47907
Country: USA United States
Directions:
 TPAC Field 4A

Objectives:

Effect of adjuvants on glyphosate and Flexstar on glyphosate and ALS resistant ragweed.

Personnel

Study Director: Paul Marquardt/Melissa Kruger **Title:** Research Associate
Affiliation: Purdue University
Address: 915 W. State Street, Department of Botany & Plant Path.
Location: West Lafayette, IN
Investigator: Dr. Bill Johnson **Title:** Professor
Affiliation: Purdue University
Address: 915 W. State Street, Department of Botany & Plant Path.
Location: West Lafayette, IN
Postal Code: 47907

Cooperator/Landowner

Cooperator: Throckmorton Purdue Ag Center **Role:** Farm Manager
Organization: Purdue University
Address 1: 8343 US 231 South
City: Lafayette
State/Prov: Indiana
Postal Code: 47909 **E-mail:** jayyoung@purdue.edu
Country: USA United States
Phone No.: 765-538-3422
Fax No.: 765-538-3423

Crop Description

Crop 1: GLXMA Glycine max Soybean
Variety: AG3402
Description: roundup ready
BBCH Scale: BSOY
Planting Date: 5/12/09
Planting Method: SEEDED seeded
Rate, Unit: 160000 P/A
Depth, Unit: 1 IN
Row Spacing, Unit: 15 IN
Spacing Within Row, Unit: 2.5 IN
Seed Bed: CLOTRA cloddy/trashy
Soil Temperature, Unit: 64 F
Soil Moisture: ABONOR above normal

Pest Description

Pest 1 Type: W **Code:** SETFA *Setaria faberi*
Common Name: Giant foxtail

Pest 2 Type: W **Code:** IPOSS *Ipomoea* sp.
Common Name: Morning glory

Pest 3 Type: W **Code:** AMARE *Amaranthus retroflexus*
Common Name: Redroot pigweed

Pest 4 Type: W **Code:** AMBTR *Ambrosia trifida*
Common Name: Giant ragweed

Pest 5 Type: W **Code:** CHEAL *Chenopodium album*
Common Name: Common lambsquarters

Pest 6 Type: W **Code:** TAROF *Taraxacum officinale*
Common Name: Common dandelion

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Site and Design

Plot Width, Unit: 10 FT	Site Type: FIELD	field	
Plot Length, Unit: 30 FT	Experimental Unit: 1	PLOT	plot
Plot Area, Unit: 300 FT ²	Tillage Type: NOTILL	no-till	
Replications: 4	Study Design: RACOB	Randomized Complete Block (RCB)	

Soil Description

Description Name: Silty Loam	Texture: SIL	silt loam
% OM: 3.1	Soil Name: Tornonto-Millbrook	
pH: 6		
CEC: 11.1		

Application Description

	A	B	C
Application Date:	5/12/09	6/23/09	7/10/09
Time of Day:	4:30 PM	7:30A	7:30A
Application Method:	SPRAY	SPRAY	SPRAY
Application Timing:	PREPRE	EAPOWE	LAPOWE
Application Placement:	BANT	BROFOL	BROFOL
Applied By:	AR	AR	PM
Air Temperature, Unit:	74 F	77 F	69 F
% Relative Humidity:	34	76	86
Wind Velocity, Unit:	7 MPH	2 MPH	3 MPH
Wind Direction:	SSE	E	SE
Dew Presence (Y/N):	N no	N no	N no
Soil Temperature, Unit:	64 F	75 F	70 F
Soil Moisture:	ABONOR		
% Cloud Cover:	10	0	85
Next Rain Occurred On:	5/13/09		

Crop Stage At Each Application

	A	B	C
Crop 1 Code, BBCH Scale:	GLXMA BSOY	GLXMA BSOY	GLXMA BSOY
Stage Scale Used:	BBCH	BBCH	BBCH
Stage Majority, Percent:	00	14 90	63 90
Stage Minimum, Percent:		13 10	62 10
Stage Maximum, Percent:		14	63
Height, Unit:		8 IN	14 IN
Height Minimum, Maximum:		6 10	10 18

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Pest Stage At Each Application			
	A	B	C
Pest 1 Code, Type, Scale:	SETFA W	SETFA W	SETFA W
Stage Minimum, Percent:		10	12
Stage Maximum, Percent:		19	14
Height, Unit:		2.5 IN	17 IN
Height Minimum, Maximum:		1 4	4 30
Density, Unit:		20 YD2	15 YD2
Pest 2 Code, Type, Scale:	IPOSS W	IPOSS W	IPOSS W
Stage Minimum, Percent:		31	12
Stage Maximum, Percent:		33	
Height, Unit:		2.5 IN	5 IN
Height Minimum, Maximum:		1 4	4 6
Density, Unit:		4 YD2	1.5 YD2
Pest 3 Code, Type, Scale:	AMARE W	AMARE W	AMARE W
Stage Minimum, Percent:		10	21
Stage Maximum, Percent:		19	39
Height, Unit:		2.5 IN	13 IN
Height Minimum, Maximum:		1 4	2 24
Density, Unit:		5 YD2	2.5 YD2
Pest 4 Code, Type, Scale:	AMBTR W	AMBTR W	AMBTR W
Stage Minimum, Percent:		31	31
Stage Maximum, Percent:		35	
Height, Unit:		4.5 IN	19 IN
Height Minimum, Maximum:		3 6	2 36
Density, Unit:		3 YD2	7.5 YD2
Pest 5 Code, Type, Scale:	CHEAL W	CHEAL W	CHEAL W
Stage Minimum, Percent:		31	32
Stage Maximum, Percent:		33	39
Height, Unit:		3 IN	13 IN
Height Minimum, Maximum:		2 4	2 24
Density, Unit:		5 YD2	2.5 YD2
Pest 6 Code, Type, Scale:	TAROF W	TAROF W	TAROF W
Stage Minimum, Percent:		31	
Stage Maximum, Percent:		33	
Height, Unit:		3 IN	
Height Minimum, Maximum:		2 4	
Density, Unit:		1.5 YD2	

Application Equipment			
	A	B	C
Appl. Equipment:	CO2 BACKPACK	CO2 BACKPACK	CO2 BACKPACK
Equipment Type:	SPRBAC	SPRBAC	SPRBAC
Operating Pressure, Unit:	17 psi	17 psi	17 psi
Nozzle Type:	FLAT FAN	FLAT FAN	FLAT FAN
Nozzle Size:	XR11002	XR11002	XR11002
Nozzle Spacing, Unit:	15 IN	15 IN	15 IN
Nozzles/Row:	6	6	6
Boom Length, Unit:	7.5 FT	7.5 FT	7.5 FT
Boom Height, Unit:	18 IN	18 IN	18 IN
Ground Speed, Unit:	3 MPH	3 MPH	3 MPH
Carrier:	H2O	H2O	H2O
Water Hardness (ppm CaCO3):	150	150	150
Spray Volume, Unit:	15 gal/ac	15 gal/ac	15 gal/ac
Mix Size, Unit:	1.8 liters	1.8 liters	1.8 liters
Propellant:	CO2	CO2	CO2
Tank Mix (Y/N):	N no	N no	N no

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No.	Date	By	Deviations
1.5	12/09	PM	No-till instead of conventional tillage
Reasons: Wet conditions forced us to abandon tillage operations and plant when field was dry.			

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 Location: Throckmorton Study Director: Paul Marquardt/Melissa Kruger
 Project ID: Investigator: Dr. Bill Johnson
 Sponsor Contact: George Watters

Pest Type		W Weed SETFA	W Weed AMBTR		W Weed SETFA	W Weed AMBTR
Pest Code		Setaria faberi	Ambrosia trifi>		Setaria faberi	Ambrosia trifi>
Pest Scientific Name						
Pest Name		Giant foxtail	Giant ragweed		Giant foxtail	Giant ragweed
Crop Code	GLXMA	GLXMA	GLXMA	GLXMA	GLXMA	GLXMA
BBCH Scale	BSOY	BSOY	BSOY	BSOY	BSOY	BSOY
Crop Scientific Name	Glycine max	Glycine max	Glycine max	Glycine max	Glycine max	Glycine max
Crop Name	Soybean	Soybean	Soybean	Soybean	Soybean	Soybean
Crop Variety	AG3402	AG3402	AG3402	AG3402	AG3402	AG3402
Description						
Rating Date	5/28/09	5/28/09	5/28/09	6/15/09	6/15/09	6/15/09
Rating Type	PHYGEN	CONTRO	CONTRO	PHYGEN	CONTRO	CONTRO
Rating Unit	%	%	%	%	%	%
Number of Subsamples	1	1	1	1	1	1
Crop Stage Majority	VEVC	VEVC	VEVC	V1/V2	V1/V2	V1/V2
Pest Stage Majority		Cotyl	Cotyl		1-4"	1-4"
Pest Density, Unit		3 YD2	0.5 YD2		50 YD2	0.5 YD2
Assessed By	PM/JM	PM/JM	PM/JM	CB	CB	CB
Days After First/Last Applic.	16 16	16 16	16 16	34 34	34 34	34 34
Trt-Eval Interval	16 DA-A	16 DA-A	77 DA-A	34 DA-A	34 DA-A	34 DA-A
Plant-Eval Interval	16 DP-1	16 DP-1	16 DP-1	34 DP-1	34 DP-1	34 DP-1
Trt Treatment	Rate	Unit	Appl Code			
No. Name	Rate	Unit	Code	1	2	3
1 UNTREATED				0.0 a	0.0 b	0.0 b
2 Roundup PowerMax Flexstar	0.77 lb ae/a 0.294 lb ai/a	B B		0.0 a	69.3 a	71.3 a
3 Roundup PowerMax Flexstar N-Pak 8-0-0-9	0.77 lb ae/a 0.294 lb ai/a 2.5 % v/v	B B B		0.0 a	84.3 a	97.5 a
4 Roundup PowerMax Flexstar Alliance	0.77 lb ae/a 0.294 lb ai/a 1.25 % v/v	B B B		0.0 a	51.3 a	82.5 a
5 Roundup PowerMax Flexstar Alliance Interlock	0.77 lb ae/a 0.294 lb ai/a 1.25 % v/v 0.26 lb ai/a	B B B B		0.0 a	80.5 a	60.0 a
6 Roundup PowerMax Flexstar Alliance Preference NIS	0.77 lb ae/a 0.294 lb ai/a 1.25 % v/v 0.25 % v/v	B B B B		0.0 a	70.0 a	63.8 a
7 Roundup PowerMax Flexstar Alliance Prime Oil	0.77 lb ae/a 0.294 lb ai/a 1.25 % v/v 1 % v/v	B B B B		0.0 a	72.5 a	58.8 a
8 Roundup PowerMax Flexstar Alliance Superb HC	0.77 lb ae/a 0.294 lb ai/a 1.25 % v/v 0.5 % v/v	B B B B		0.0 a	73.8 a	85.6 a
9 Roundup PowerMax Flexstar Alliance Interlock Superb HC	0.77 lb ae/a 0.294 lb ai/a 1.25 % v/v 0.26 lb ai/a 0.5 % v/v	B B B B B		0.0 a	77.5 a	97.5 a
10 Roundup PowerMax Flexstar N-Pak Liquid AMS Superb HC	0.77 lb ae/a 0.294 lb ai/a 2.5 % v/v 0.5 % v/v	B B B B		0.0 a	87.5 a	66.3 a
11 Roundup PowerMax Flexstar Alliance Destiny HC	0.77 lb ae/a 0.294 lb ai/a 1.25 % v/v 0.5 % v/v	B B B B		0.0 a	77.5 a	77.5 a
12 Sonic Durango DMA Ammonium Sulfate	0.131 lb ai/a 0.75 lb ae/a 2 % w/w	A B B		0.0 a	91.0 a	98.8 a
						0.0 a
						58.3 a
						10.0 a

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Pest Type		W Weed	W Weed		W Weed	W Weed
Pest Code		SETFA	AMBTR		SETFA	AMBTR
Pest Scientific Name		Setaria faberi	Ambrosia trifi>		Setaria faberi	Ambrosia trifi>
Pest Name		Giant foxtail	Giant ragweed		Giant foxtail	Giant ragweed
Crop Code	GLXMA	GLXMA	GLXMA	GLXMA	GLXMA	GLXMA
BBCH Scale	BSOY	BSOY	BSOY	BSOY	BSOY	BSOY
Crop Scientific Name	Glycine max	Glycine max	Glycine max	Glycine max	Glycine max	Glycine max
Crop Name	Soybean	Soybean	Soybean	Soybean	Soybean	Soybean
Crop Variety	AG3402	AG3402	AG3402	AG3402	AG3402	AG3402
Description						
Rating Date	5/28/09	5/28/09	5/28/09	6/15/09	6/15/09	6/15/09
Rating Type	PHYGEN	CONTRO	CONTRO	PHYGEN	CONTRO	CONTRO
Rating Unit	%	%	%	%	%	%
Number of Subsamples	1	1	1	1	1	1
Crop Stage Majority	VE/VC	VE/VC	VE/VC	V1/V2	V1/V2	V1/V2
Pest Stage Majority		Cotyl	Cotyl		1-4"	1-4"
Pest Density, Unit		3 YD2	0.5 YD2		50 YD2	0.5 YD2
Assessed By	PM/JM	PM/JM	PM/JM	CB	CB	CB
Days After First/Last Applic.	16 16	16 16	16 16	34 34	34 34	34 34
Trt-Eval Interval	16 DA-A	16 DA-A	77 DA-A	34 DA-A	34 DA-A	34 DA-A
Plant-Eval Interval	16 DP-1	16 DP-1	16 DP-1	34 DP-1	34 DP-1	34 DP-1
Trt Treatment	Rate	Rate	Rate	Rate	Rate	Rate
No. Name	Unit	Unit	Unit	Unit	Unit	Unit
	Code	Code	Code	Code	Code	Code
	1	2	3	4	5	6
13 Sonic	0.197 lb ai/a A	85.0 a	87.5 a	0.0 a	61.8 a	26.3 a
Durango DMA	0.75 lb ae/a B					
Ammonium Sulfate	2 % w/w B					
14 FirstRate	0.0158 lb ai/a A	83.8 a	90.0 a	0.0 a	57.5 a	27.5 a
Durango DMA	0.75 lb ae/a B					
Ammonium Sulfate	2 % w/w B					
Durango DMA	0.75 lb ae/a C					
Ammonium Sulfate	2 % w/w C					
LSD (P=.05)	0.00	23.07	32.04	0.00	36.01	37.72
Standard Deviation	0.00	16.14	22.42	0.00	20.81	21.80
CV	0.0	22.51	30.27	0.0	46.87	136.79
Bartlett's X2	0.0	17.692	21.266	0.0	1.368	0.906
P(Bartlett's X2)	.	0.125	0.047*	.	0.505	0.636
Replicate F	0.000	0.888	0.931	0.000	0.654	1.327
Replicate Prob(F)	1.0000	0.4563	0.4354	1.0000	0.6090	0.3502
Treatment F	0.000	8.052	5.174	0.000	8.122	1.485
Treatment Prob(F)	1.0000	0.0001	0.0001	1.0000	0.0156	0.3107

Means followed by same letter do not significantly differ (P=.05, Student-Newman-Keuls)
 Mean comparisons performed only when AOV Treatment P(F) is significant at mean comparison OSL.

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Pest Type	W Weed	W Weed	W Weed	W Weed	W Weed
Pest Code	AMARE	CHEAL	AMBTR	SETFA	CHEAL
Pest Scientific Name	Amaranthus ret>	Chenopodium al>	Ambrosia trifl>	Setaria faberi	Chenopodium al>
Pest Name	Redroot pigweed	Common lambsqu>	Giant ragweed	Giant foxtail	Common lambsqu>
Crop Code	GLXMA	GLXMA	GLXMA	GLXMA	GLXMA
BBCH Scale	BSOY	BSOY	BSOY	BSOY	BSOY
Crop Scientific Name	Glycine max	Glycine max	Glycine max	Glycine max	Glycine max
Crop Name	Soybean	Soybean	Soybean	Soybean	Soybean
Crop Variety	AG3402	AG3402	AG3402	AG3402	AG3402
Description			30-36"	30-36"	30-36"
Rating Date	6/15/09	6/15/09	8/5/09	8/5/09	8/5/09
Rating Type	CONTRO	CONTRO	CONTRO	CONTRO	CONTRO
Rating Unit	%	%	%	%	%
Number of Subsamples	1	1	1	1	1
Crop Stage Majority	V1/V2	V1/V2	R4	R4	R4
Pest Stage Majority	1-2"	1-4"	24-48"	18-40"	6-36"
Pest Density, Unit	32.5YD2	15 YD2	5.5 YD2	112 YD2	2.5 YD2
Assessed By	CB	CB	CB/RT	CB/RT	CB/RT
Days After First/Last Applic.	34 34	34 34	85 26	85 26	85 26
Trt-Eval Interval	34 DA-A	34 DA-A			
Plant-Eval Interval	34 DP-1	34 DP-1	85 DP-1	85 DP-1	85 DP-1
Trt Treatment					
No. Name	7	8	9	10	11
Rate					
Unit					
Appl Code					
1 UNTREATED	0.0 b	0.0 b	0.0 c	0.0 b	0.0 c
2 Roundup PowerMax Flexstar	0.77 lb ae/a B 0.294 lb ai/a B		78.3 a	91.5 a	98.0 a
3 Roundup PowerMax Flexstar N-Pak 8-0-0-9	0.77 lb ae/a B 0.294 lb ai/a B 2.5 % v/v B		91.4 a	98.8 a	99.4 a
4 Roundup PowerMax Flexstar Alliance	0.77 lb ae/a B 0.294 lb ai/a B 1.25 % v/v B		89.8 a	99.0 a	100.0 a
5 Roundup PowerMax Flexstar Alliance Interlock	0.77 lb ae/a B 0.294 lb ai/a B 1.25 % v/v B 0.26 lb ai/a B		88.0 a	97.3 a	99.8 a
6 Roundup PowerMax Flexstar Alliance Preference NIS	0.77 lb ae/a B 0.294 lb ai/a B 1.25 % v/v B 0.25 % v/v B		19.5 bc	29.5 ab	26.3 bc
7 Roundup PowerMax Flexstar Alliance Prime Oil	0.77 lb ae/a B 0.294 lb ai/a B 1.25 % v/v B 1 % v/v B		70.3 ab	96.5 a	99.5 a
8 Roundup PowerMax Flexstar Alliance Superb HC	0.77 lb ae/a B 0.294 lb ai/a B 1.25 % v/v B 0.5 % v/v B		70.8 ab	74.8 a	75.8 ab
9 Roundup PowerMax Flexstar Alliance Interlock Superb HC	0.77 lb ae/a B 0.294 lb ai/a B 1.25 % v/v B 0.26 lb ai/a B 0.5 % v/v B		49.5 ab	55.3 a	55.0 ab
10 Roundup PowerMax Flexstar N-Pak Liquid AMS Superb HC	0.77 lb ae/a B 0.294 lb ai/a B 2.5 % v/v B 0.5 % v/v B		96.8 a	99.3 a	100.0 a
11 Roundup PowerMax Flexstar Alliance Destiny HC	0.77 lb ae/a B 0.294 lb ai/a B 1.25 % v/v B 0.5 % v/v B		88.5 a	97.3 a	97.3 a
12 Sonic Durango DMA Ammonium Sulfate	0.131 lb ai/a A 0.75 lb ae/a B 2 % w/w B	99.7 a	99.0 a	43.3 ab	55.8 a
					56.3 ab

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Pest Type	W Weed	W Weed	W Weed	W Weed	W Weed
Pest Code	AMARE	CHEAL	AMBTR	SETFA	CHEAL
Pest Scientific Name	Amaranthus ret>	Chenopodium al>	Ambrosia trifi>	Setaria faberi	Chenopodium al>
Pest Name	Redroot pigweed	Common lambsqu>	Giant ragweed	Giant foxtail	Common lambsqu>
Crop Code	GLXMA	GLXMA	GLXMA	GLXMA	GLXMA
BBCH Scale	BSOY	BSOY	BSOY	BSOY	BSOY
Crop Scientific Name	Glycine max	Glycine max	Glycine max	Glycine max	Glycine max
Crop Name	Soybean	Soybean	Soybean	Soybean	Soybean
Crop Variety	AG3402	AG3402	AG3402	AG3402	AG3402
Description			30-36"	30-36"	30-36"
Rating Date	6/15/09	6/15/09	8/5/09	8/5/09	8/5/09
Rating Type	CONTRO	CONTRO	CONTRO	CONTRO	CONTRO
Rating Unit	%	%	%	%	%
Number of Subsamples	1	1	1	1	1
Crop Stage Majority	V1/V2	V1/V2	R4	R4	R4
Pest Stage Majority	1-2"	1-4"	24-48"	18-40"	6-36"
Pest Density, Unit	32.5YD2	15 YD2	5.5 YD2	112 YD2	2.5 YD2
Assessed By	CB	CB	CB/RT	CB/RT	CB/RT
Days After First/Last Applic.	34 34	34 34	85 26	85 26	85 26
Trt-Eval Interval	34 DA-A	34 DA-A			
Plant-Eval Interval	34 DP-1	34 DP-1	85 DP-1	85 DP-1	85 DP-1
Trt Treatment	Rate	Rate	Rate	Rate	Rate
No. Name	Unit	Unit	Unit	Unit	Unit
	Code	Code	Code	Code	Code
	7	8	9	10	11
13 Sonic	0.197 lb ai/a A				
Durango DMA	0.75 lb ae/a B				
Ammonium Sulfate	2 % w/w B				
		99.0 a	84.8 a	50.6 ab	96.8 a
14 FirstRate	0.0158 lb ai/a A				
Durango DMA	0.75 lb ae/a B				
Ammonium Sulfate	2 % w/w B				
Durango DMA	0.75 lb ae/a C				
Ammonium Sulfate	2 % w/w C				
		99.5 a	70.0 a	92.1 a	98.5 a
LSD (P=.05)	1.34	41.77	34.99	40.35	41.47
Standard Deviation	0.77	24.14	24.49	27.95	28.72
CV	1.04	38.06	36.92	35.89	36.38
Bartlett's X2	1.592	13.097	48.354	102.856	76.946
P(Bartlett's X2)	0.451	0.001*	0.001*	0.001*	0.001*
Replicate F	3.401	1.387	0.307	0.407	0.437
Replicate Prob(F)	0.0943	0.3344	0.8202	0.7489	0.7282
Treatment F	16554.683	13.237	5.931	5.052	5.137
Treatment Prob(F)	0.0001	0.0047	0.0001	0.0001	0.0001

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Location: Throckmorton Study Director: Paul Marquardt/Melissa Kruger
Project ID: Investigator: Dr. Bill Johnson
Sponsor Contact: George Watters

Pest Type

W, Weed, G-BYRW7, G-WedStg = Weed or volunteer crop

Pest Code

SETFA, Setaria faberi, = US

AMBTR, Ambrosia trifida, = US

AMARE, Amaranthus retroflexus, = US

CHEAL, Chenopodium album, = US

Crop Code

GLXMA, BSOY, Glycine max, = US

Rating Type

PHYGEN = phytotoxicity - general / injury

CONTRO = control / burndown or knockdown

Rating Unit

% = percent

YD2 = per square yard

Plant-Eval Interval

16 DP-1 = 1 5/12/09

34 DP-1 = 1 5/12/09

85 DP-1 = 1 5/12/09