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Field Evaluation of Herbicides on Vegetables and Small Fruits 2004

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*FIELD EVALUATION
OF HERBICIDES ON
VEGETABLES AND
SMALL FRUITS*



2004

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ARKANSAS AGRICULTURAL EXPERIMENT STATION

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FIELD EVALUATION OF HERBICIDES ON VEGETABLES AND SMALL FRUITS - 2004 -

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SUMMARY

Herbicide evaluation studies on vegetables and small fruits were conducted in 2004 at the Arkansas Agricultural Experiment Station at Fayetteville, AR, in an effort to evaluate new herbicides, herbicide mixtures, and their application timings for weed control efficacy and crop tolerance. Results of these studies, in part, provide useful information to producers, fellow researchers, the Crop Protection Industry, and the IR-4 Minor Crop Pest Management Program in the development of potential new herbicide uses in vegetable, and fruit.

INTRODUCTION

The Field Evaluation of Herbicides on Vegetables, and Small Fruits 2004, contains results from herbicide research studies conducted on several minor crops. These studies were funded in part by the IR-4 project, Allen Canning Co., Agri-Technologies, Inc., and Gowan Chemical Co. This publication is available online at <http://www.uark.edu/depts/agripub/Publications/researchseries/>.

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CONTRIBUTOR

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Crop, Soil, and Environmental Sciences Department, Fayetteville

Site Description

Evaluation of New Herbicides on Snap Beans

Trial ID: FAY 0402
Study Dir.: Talbert, Thomas, Ottis

Location: Fayetteville, AR
Investigator: Weed Science

GENERAL TRIAL INFORMATION

Study Director: Talbert, Thomas, Ottis
Affiliation: University of Arkansas

Investigator: Weed Science

TRIAL LOCATION

City: Fayetteville
Trial Status: Completed

State/Prov.: AR
Postal Code: 72704

Conducted Under GLP (Y/N): N

Conducted Under GEP (Y/N): N

OBJECTIVE

To determine efficacy of promising herbicides in control of various weeds in snap bean.

CONCLUSIONS

All PRE applications except flufenacet (0.3 lb ai/A) controlled pigweeds early and late. The s-metolachlor PRE treatments and the PRE treatment of s-metolachlor plus halosulfuron provided early and late control of nutsedge. Early control of morningglory was adequate with 0.5 lb ai/A PRE of dimethenamid-P; however, this treatment injured snap bean at 43%. The successful EPOST treatment for morningglory control was cloransulam at 0.016 lb ai/A. Chloransulam also controlled copperleaf and Venice mallow; however, yields for this treatment were reduced compared to several superior treatments. For nutsedge control, both halosulfuron (0.032 lb ai/A) plus bentazon (0.5 lb ai/A) and plus fomesafen (0.2 lb ai/A) treatments were successful. EPOST application of imazamox at 0.036 lb ai/A controlled nutsedge, pigweed, and groundcherry. Superior treatments were s-metolachlor plus halosulfuron PRE, dimethenamid PRE, fomesafen plus bentazon EPOST, imazamox plus bentazon EPOST, halosulfuron plus bentazon EPOST and halosulfuron plus fomesafen EPOST.

CROP AND WEED DESCRIPTION

Weed	Code	Common Name	Scientific Name
1.	IPOSS	MORNINGGLORY, IPOMOEA SP.	IPOMOEA SP.
2.	CYPES	NUTSEGE, YELLOW	CYPERUS ESCULENTUS L.
3.	AMAPA	AMARANTH, PALMER	AMARANTHUS PALMERI S.WATS.
4.	MOLVE	CARPETWEED	MOLLUGO VERTICILLATA L.
5.	ACCOS	COPPERLEAF, HOPHORNBEAM	ACALYPHA OSTRYIFOLIA
6.	GGGAN	GRASSES, ANNUAL	
7.	HIBTR	MALLOW, VENICE	HIBISCUS TRIONUM L.
8.	PHYAN	GROUNDCHERRY, CUTLEAF	PHYSALIS ANGULATA L.

Crop 1: PHSVN BEAN, SNAP

Variety: BENTON

Planting Date: May-11-04

Planting Method: 2 ROW, 40 INCH PLANTER

Row Spacing: 40 in

Soil Moisture: Adequate

SITE AND DESIGN

Plot Width, Unit: 6.7 FT
Plot Length, Unit: 20 FT

Reps: 4
Study Design: RANDOMIZED COMPLETE BLOCK

SOIL DESCRIPTION

% Sand: 15 %	OM: 1.5	Texture: Silt Loam
% Silt: 70	pH: 6.5	Soil Name: Captina
% Clay: 15	CEC: 80	Fert. Level: Good

APPLICATION DESCRIPTION

	A	B	C
Application Date:	May-12-04	Jun-01-04	Jun-16-04
Time of Day:	9:37 am	11:00	10:00
Application Method:	BACKPACK	BACKPACK	BACKPACK
Application Timing:	PRE	E POST	L POST
Air Temp., Unit:	70 F	73 F	88 F
% Relative Humidity:	80	84	62
Wind Velocity, Unit:	10 mph	5 mph	0.5 mph
Dew Presence (Y/N):	N	N	N
Soil Temp., Unit:	66 F	82 F	79 F
Soil Moisture:	DRY	DRY	WET
% Cloud Cover:	100	0	100

CROP STAGE AT EACH APPLICATION

	A	B	C
Crop 1 Code, Stage:	PHSVN	PHSVN	PHSVN
Stage Scale:	PRE	2-3TRIFOL	4-5TRIFOL

WEED STAGE AT EACH APPLICATION

	A	B	C
Weed 1 Code, Stage:	IPOSS	IPOSS	IPOSS
Stage Scale:	PRE	2-3 LEAF	N/A
Weed 2 Code, Stage:	CYPES	CYPES	CYPES
Stage Scale:	PRE	2-3 LEAF	N/A
Weed 3 Code, Stage:	AMAPA	AMAPA	AMAPA
Stage Scale:	PRE	2-3 LEAF	N/A
Weed 4 Code, Stage:	MOLVE	MOLVE	MOLVE
Stage Scale:	PRE	2-3 LEAF	N/A
Weed 5 Code, Stage:	ACCOS	ACCOS	ACCOS
Stage Scale:	PRE	2-3 LEAF	N/A
Weed 6 Code, Stage:	GGGAN	GGGAN	GGGAN
Stage Scale:	PRE	2-3 LEAF	8-10 LEAF
Weed 7 Code, Stage:	HIBTR	HIBTR	HIBTR
Stage Scale:	PRE	2-3 LEAF	N/A
Weed 8 Code, Stage:	PHYAN	PHYAN	PHYAN
Stage Scale:	PRE	2-3 LEAF	N/A

APPLICATION EQUIPMENT

	A	B	C
Appl. Equipment:	CO2 BKPK	CO2 BKPK	CO2 BKPK
Operating Pressure:	40 PSI	40 PSI	40 PSI
Nozzle Type:	FLAT FAN	FLAT FAN	FLAT FAN
Nozzle Size:	80015	80015	80015
Nozzle Spacing, Unit:	20 in	20 in	20 in
Boom Height, Unit:	15 in	15 in	15 in
Ground Speed, Unit:	3 mph	3 mph	3 mph
Carrier:	WATER	WATER	WATER
Spray Volume, Unit:	10 GPA	10 GPA	10 GPA

Evaluation of Herbicides in Snap Bean Crop Production, Fayetteville, AR, 2004.

Treatment	Rate	Appln timing	MGLORY	NUTSEDGE	AMARANTH	PHSVN	MGLORY	NUTSEDGE
			IPOSS CONTROL	CYPES CONTROL	AMAPA CONTROL	SNAPBEAN INJURY	IPOSS CONTROL	CYPES CONTROL
	LB A/A		6/8	6/8	6/8	6/8	6/15	6/15
			%	%	%	%	%	%
Untreated			0	0	0	0	0	25
S-metolachlor	0.6	PRE	18	100	98	10	18	98
Fomesafen	0.25	PRE	63	48	85	14	51	36
S-metolachlor + halosulfuron	0.5 0.032	PRE PRE	60	98	100	19	74	100
Flufenacet	0.3	PRE	69	65	78	5	41	74
Dimethenamid-P	0.5	PRE	84	88	100	43	50	95
Fomesafen + bentazon + NIS ¹ fb	0.2 0.5	EPOST ³ EPOST					68	65
sethoxydim + COC ²	0.5	LPOST ⁴						
Imazamox + NIS	0.036	EPOST					55	91
Imazamox + bentazon + NIS	0.036 0.5	EPOST EPOST					28	70
Halosulfuron + bentazon + NIS	0.032 0.5	EPOST EPOST					68	100
Halosulfuron + fomesafen + NIS	0.032 0.2	EPOST EPOST					78	99
Imazethapyr + NIS	0.036	EPOST					50	68
Chloransulam + NIS	0.016	EPOST					90	88
LSD (P=.05)			23	31	NS	16	47	43

¹ NIS (Latron AG-98) was applied at 0.25% volume per volume of water.

² COC was applied at 1% volume per volume of water.

³ EPOST treatments applied 6/1

⁴ LPOST treatments applied 6/16

Evaluation of Herbicides in Snap Bean Crop Production, Fayetteville, AR, 2004.

Treatment	Rate	Appln timing	CARPETWE	CPPLEAF	AN GRASS	AMARANTH	MALLOW
			MOLVE CONTROL 6/15	ACCOS CONTROL 6/15	GGGAN CONTROL 6/15	AMAPA CONTROL 6/15	HIBTR CONTROL 6/15
	LB A/A		%	%	%	%	%
Untreated			25	30	23	24	25
S-metolachlor	0.6	PRE	63	25	100	90	88
Fomesafen	0.25	PRE	75	15	48	93	43
S-metolachlor + halosulfuron	0.5 0.032	PRE PRE	100	23	100	98	100
Flufenacet	0.3	PRE	88	28	100	60	35
Dimethenamid-P	0.5	PRE	68	20	100	98	45
Fomesafen + bentazon + NIS ¹ fb	0.2 0.5	EPOST ³ EPOST	54	25	0	73	69
sethoxydim + COC ²	0.5	LPOST ⁴					
Imazamox + NIS	0.036	EPOST	25	28	86	92	38
Imazamox + bentazon + NIS	0.036 0.5	EPOST EPOST	8	13	61	70	75
Halosulfuron + bentazon + NIS	0.032 0.5	EPOST EPOST	30	33	28	43	100
Halosulfuron + fomesafen + NIS	0.032 0.2	EPOST EPOST	84	48	46	76	61
Imazethapyr + NIS	0.036	EPOST	0	13	53	55	25
Chloransulam + NIS	0.016	EPOST	60	95	85	51	100
LSD (P=.05)			38	33	37	45	51

¹ NIS (Latron AG-98) was applied at 0.25% volume per volume of water.

² COC was applied at 1% volume per volume of water.

³ EPOST treatments applied 6/1

⁴ LPOST treatments applied 6/16

Evaluation of Herbicides in Snap Bean Crop Production, Fayetteville, AR, 2004.

Treatment	Rate	Appln timing	GRNDCHER PHYAN CONTROL 6/15	PHSVN SNAPBEAN INJURY 6/15	PHSVN SNAPBEAN YIELD 7/6
	LB A/A		%	%	T/A
Untreated			0	0	0.9
S-metolachlor	0.6	PRE	88	0	1.7
Fomesafen	0.25	PRE	30	0	2.0
S-metolachlor + halosulfuron	0.5 0.032	PRE PRE	45	5	4.3
Flufenacet	0.3	PRE	83	0	2.3
Dimethenamid-P	0.5	PRE	88	5	3.2
Fomesafen + bentazon + NIS ¹ fb	0.2 0.5	EPOST ³ EPOST	30	0	3.8
sethoxydim + COC ²	0.5	LPOST ⁴			
Imazamox + NIS	0.036	EPOST	100	0	2.4
Imazamox + bentazon + NIS	0.036 0.5	EPOST EPOST	58	0	3.9
Halosulfuron + bentazon + NIS	0.032 0.5	EPOST EPOST	0	0	2.8
Halosulfuron + fomesafen + NIS	0.032 0.2	EPOST EPOST	28	0	3.1
Imazethapyr + NIS	0.036	EPOST	75	0	2.4
Cloransulam + NIS	0.016	EPOST	25	18	1.3
LSD (P=.05)			47	NS	1.3

¹ NIS (Latron AG-98) was applied at 0.25% volume per volume of water.

² COC was applied at 1% volume per volume of water.

³ EPOST treatments applied 6/1

⁴ LPOST treatments applied 6/16

Site Description

Evaluation of Herbicides in Southern Pea Production

Trial ID: FAY 0409
Study Dir.: Talbert, Thomas, Ottis

Location: Fayetteville
Investigator: Weed Science

GENERAL TRIAL INFORMATION

Study Director: Talbert, Thomas, Ottis
Affiliation: University of Arkansas

Investigator: Weed Science

TRIAL LOCATION

City: Fayetteville
Trial Status: Completed

State/Prov.: AR
Postal Code: 72704

Conducted Under GLP (Y/N): N

Conducted Under GEP (Y/N): N

OBJECTIVE

Determine efficacy of promising herbicides in control of copperleaf and other weeds in southern pea.

CONCLUSIONS

Early and late control of hophornbeam copperleaf in southern pea occurred with all three rates of sulfentrazone PRE with little injury to the crop. EPOST applications of acifluorfen, acifluorfen plus bentazon, fomesafen, and fomesafen plus bentazon controlled early copperleaf but caused more injury to the crop. Lower rates of sulfentrazone should be evaluated further. Yields were extremely low because of the late planting and insufficient growing season to mature the crop. There were no significant yield differences.

CROP AND WEED DESCRIPTION

Weed	Code	Common Name	Scientific Name
1.	ACCOS	COPPERLEAF, HOPHORNBEAM	ACALYPHA OSTRYIFOLIA

Crop 1: VIGSC COWPEA
Variety: Early Scarlet
Planting Date: Jul-09-04
Planting Method: 2 row planter

Row Spacing: 40 in
Soil Moisture: Moist

SITE AND DESIGN

Plot Width, Unit: 5 FT
Plot Length, Unit: 30 FT

Reps: 4
Study Design: RANDOMIZED COMPLETE BLOCK

SOIL DESCRIPTION

% Sand: 15
% OM: 1.5
Texture: Silt Loam
% Silt: 70
pH: 6.5

Soil Name: Captina
% Clay: 15
CEC: 80
Fert. Level: Good

APPLICATION DESCRIPTION

	A	B
Application Date:	Jul-10-04	Jul-27-04
Time of Day:	7:45 am	8:45 am
Application Method:	Backpack	Backpack
Application Timing:	PRE	EPOST
Air Temp., Unit:	72 F	67 F
% Relative Humidity:	95	89
Wind Velocity, Unit:	0 mph	0 mph
Dew Presence (Y/N):	N	Y
Soil Temp., Unit:	70 F	67 F
Soil Moisture:	WET	MOIST
% Cloud Cover:	100	0

CROP STAGE AT EACH APPLICATION

	A	B
Crop 1 Code, Stage:	VIGSC	VIGSC
Stage Scale:	PRE	1-2TRIFOL

WEED STAGE AT EACH APPLICATION

	A	B
Weed 1 Code, Stage:	ACCOS	ACCOS
Stage Scale:	PRE	1-2 LEAF

APPLICATION EQUIPMENT

	A	B
Appl. Equipment:	CO2 BKPK	CO2 BKPK
Operating Pressure:	40 PSI	40 PSI
Nozzle Type:	FLATFAN	FLATFAN
Nozzle Size:	110015	110015
Nozzle Spacing, Unit:	20 in	20 in
Boom Height, Unit:	15 in	15 in
Ground Speed, Unit:	3 mph	3 mph
Carrier:	WATER	WATER
Spray Volume, Unit:	10 GPA	10 GPA

Evaluation of Herbicides in Southern Pea Production, Fayetteville, AR, 2004.

Treatment	Rate	Appln timing	COWPEA VIGSC INJURY 8/8 %	COPPERLEAF ACCOS CONTROL 8/8 %	COWPEA VIGSC INJURY 9/13 %	COPPERLEAF ACCOS CONTROL 9/13 %	COWPEA VIGSC YIELD 10/22 LB/A
Untreated Check			0	0	0	0	204
Imazethapyr	0.063	PRE	3	40	0	31	277
Imazethapyr + s-metolachlor	0.063 0.6	PRE PRE	3	83	10	70	320
S-metolachlor	0.6	PRE	13	73	8	59	366
Clomazone	0.5	PRE	0	20	8	3	240
Dimethenamid-P	0.64	PRE	5	78	3	64	218
Flufenacet	0.25	PRE	3	58	15	38	172
Flufenacet	0.5	PRE	15	81	13	44	286
Halosulfuron	0.032	PRE	3	70	15	60	234
Halosulfuron	0.048	PRE	3	74	13	61	300
Sulfentrazone	0.09	PRE	5	100	20	100	399
Sulfentrazone	0.1875	PRE	13	100	25	100	463
Sulfentrazone	0.375	PRE	35	100	40	100	318
Acifluorfen + NIS ¹	0.25	EPOST ²	65	95	30	63	228
Acifluorfen + NIS	0.5	EPOST	81	96	43	89	293
Acifluorfen + bentazon + NIS	0.125 0.25	EPOST EPOST	70	93	30	71	386
Acifluorfen + bentazon + NIS	0.25 0.5	EPOST EPOST	80	95	45	70	230
Acifluorfen + bentazon + NIS	0.5 0.5	EPOST EPOST	83	96	40	75	188
Imazamox + NIS	0.03	EPOST	10	60	0	51	272
Imazamox + bentazon + NIS	0.03 0.5	EPOST EPOST	3	35	3	28	282

Evaluation of Herbicides in Southern Pea Production, Fayetteville, AR, 2004.

Treatment	Rate	Appln timing	COWPEA	COPPERLEAF	COWPEA	COPPERLEAF	COWPEA
			VIGSC INJURY 8/8	ACCOS CONTROL 8/8	VIGSC INJURY 9/13	ACCOS CONTROL 9/13	VIGSC YIELD 10/22
			%	%	%	%	LB/A
Cloransulam + NIS	0.018	EPOST	30	71	38	90	195
Fomesafen + NIS	0.2	EPOST	79	95	35	61	276
Fomesafen + bentazon + NIS	0.2 0.5	EPOST EPOST	84	96	30	64	225
LSD (P=.05)			13	21	17	30	NS

¹ NIS (Latron AG-98) was applied at 0.25% volume per volume of water.

² EPOST treatment applied 7/27

Site Description

Herbicide Evaluation in Grapes

Trial ID: FAY 0403
Study Dir.: Talbert, Thomas, Ottis

Location: Fayetteville
Investigator: Weed Science

GENERAL TRIAL INFORMATION

Study Director: Talbert, Thomas, Ottis
Affiliation: University of Arkansas

Investigator: Weed Science

TRIAL LOCATION

City: Fayetteville
Trial Status: Completed

State/Prov.: Arkansas
Postal Code: 72704

Conducted Under GLP (Y/N): N

Conducted Under GEP (Y/N): N

OBJECTIVE

To determine efficacy of promising herbicides in control of bermudagrass and crabgrass in grapes.

CONCLUSIONS

Early control of crabgrass was successful with all treatments; however, late escapes occurred with sulfentrazone PRE at 0.5 lb /A and with the lower rates of the PRE/POST applications of sulfentrazone. Early and late control of bermudagrass was achieved with only the PRE application of simazine (2 lb /A) plus oryzalin (3 lb /A) followed by sethoxydim POST (0.5 lb /A). No injury from the herbicide treatments was observed with yields not varying between the untreated check and the treated plots.

CROP AND WEED DESCRIPTION

Weed	Code	Common Name	Scientific Name
1.	DIGSA	CRABGRASS, LARGE	DIGITARIA SANGUINALIS
2.	CYNDA	BERMUDAGRASS	CYNODON DACTYLON

Crop 1: VITVI GRAPE

SITE AND DESIGN

Plot Width, Unit: 4 FT Band centered under trellis
Plot Length, Unit: 2-3 Grape Vines

Reps: 4
Study Design: RANDOMIZED COMPLETE BLOCK

SOIL DESCRIPTION

% Sand: 15
% OM: 1.5
Texture: Silt Loam
% Silt: 70
pH: 6.5

Soil Name: Captina Silt Loam
% Clay: 15
CEC: 80
Fert. Level: Good

APPLICATION DESCRIPTION

	A	B	C
Application Date:	May-11-04	May-13-04	Jun-21-04
Time of Day:	10:00 am	9:00 am	10:30 am
Application Method:	Backpack	Backpack	Backpack
Application Timing:	Burndown	PRE	POST
Air Temp., Unit:	75 F	80 F	91 F
% Relative Humidity:	50	66	89
Wind Velocity, Unit:	10 mph	3.5 mph	2 mph
Dew Presence (Y/N):	N	N	N
Soil Temp., Unit:	62 F	62 F	72 F
Soil Moisture:	Adequate	MOIST	Moist
% Cloud Cover:	50	90	100

CROP STAGE AT EACH APPLICATION

	A	B	C
Crop 1 Code, Stage:	VITVI	VITVI	VITVI

WEED STAGE AT EACH APPLICATION

	A	B	C
Weed 1 Code, Stage:	DIGSA	DIGSA	DIGSA
Stage Scale:	BURNDOWN	PRE	8/10 LEAF
Weed 2 Code, Stage:	CYNDA	CYNDA	CYNDA
Stage Scale:	BURNDOWN	PRE	8/10 LEAF

APPLICATION EQUIPMENT

	A	B	C
Appl. Equipment:	CO2 BKPK	CO2 BKPK	CO2 BKPK
Operating Pressure:	30 PSI	22 PSI	30 PSI
Nozzle Type:	8002E	110015DG	110015DG
Nozzle Spacing, Unit:	20 in	20 in	20 in
Boom Height, Unit:	15 in	15 in	15 in
Ground Speed, Unit:	3 mph	3 mph	3 mph
Carrier:	Water	Water	Water
Spray Volume, Unit:	10 GPA	10 GPA	10 GPA

Evaluation of Herbicides in Grapes, Fayetteville, AR, 2004.

Treatment	Rate	Appln timing	BERMUDA	CRAB	BERMUDA	CRAB	GRAPES	GRAPES
			GGGPE CONTROL 6/20	DIGSA CONTROL 6/20	GGGPE CONTROL 7/30	DIGSA CONTROL 7/30	VITVI INJURY 7/30	VITVI YIELD 9/7
	LB A/A		%	%	%	%	%	kg/m
Untreated			0	0	0	0	0	5.2
Norflurazon	3	PRE	77	100	40	100	25	4.8
Flumioxazin	1	PRE	80	100	30	100	8	6.3
Flumioxazin fb flumioxazin + NIS ¹	0.5 0.5	PRE POST ³	67	100	3	90	20	4.0
Flumioxazin fb flumioxazin + NIS	0.25 0.25	PRE POST	70	100	37	90	8	4.1
Sulfentrazone	0.5	PRE	60	100	37	35	18	5.1
Sulfentrazone fb sulfentrazone + NIS	0.25 0.25	PRE POST	55	100	53	40	15	6.2
Sulfentrazone fb sulfentrazone + NIS	0.5 0.5	PRE POST	35	83	50	90	10	6.6
Simazine + oryzalin fb clethodim + COC ² (repeated)	2 3 0.25	PRE PRE POST	57	100	93	100	10	6.7
Simazine + oryzalin fb sethoxydim + COC (repeated)	2 3 0.5	PRE PRE POST	95	100	100	100	8	7.8
Thiazopyr	0.5	PRE	85	100	58	93	8	4.2
Thiazopyr	1	PRE	72	100	63	100	10	3.8
LSD (P=.05)			NS	NS	52	18	13	2.2

¹ NIS (Latron AG-98) was applied at 0.25% volume per volume of water.

² COC was applied at 1% volume per volume of water.

³ POST treatments applied 6/21

Site Description

Evaluation of Herbicides for Efficacy and Phytotoxicity in Sweet Sorghum

Trial ID: FAY 0407
Study Dir.: Talbert, Thomas, Ottis

Location: Fayetteville, AR
Investigator: Weed Science

GENERAL TRIAL INFORMATION

Study Director: Talbert, Thomas, Ottis
Affiliation: University of Arkansas

Investigator: Weed Science

TRIAL LOCATION

City: Fayetteville
Trial Status: Completed

State/Prov.: Arkansas
Postal Code: 72704

Conducted Under GLP (Y/N): N

Conducted Under GEP (Y/N): N

OBJECTIVE

To determine the efficacy of promising herbicides in control of certain weeds in sweet sorghum.

CONCLUSIONS

Low rates of atrazine were used for early control of weeds prior to the dimethenamid-P POST treatments, and low rates of S-metolachlor were used prior to the POST treatments of carfentrazone and halosulfuron. The weed population in this area, although diverse, was quite variable. Therefore control of any single weed is somewhat speculative, but 90 to 100% control does indicate evidence of good activity. Most treatments controlled Palmer amaranth at both rating times, but lower rates of S-metolachlor tended to be weaker. Morningglory control later in the season was achieved by treatments containing atrazine PRE or POST, carfentrazone, or halosulfuron. Annual grasses, a light and variable infestation of crabgrass, fall panicum and barnyardgrass, and yellow nutsedge were best controlled by higher rates of S-metolachlor or dimethenamid-P. Atrazine seemed to be the only herbicide that was consistent on Venice mallow. There was moderate to severe burning of the sweet sorghum following carfentrazone use. Halosulfuron caused serious stunting, but all the plants recovered by harvest. S-metolachlor PRE appeared to be the best single treatment for pursuing registration. There is a need for a safe over-the-top POST broadleaf herbicide.

CROP AND WEED DESCRIPTION

Weed	Code	Common Name	Scientific Name
1.	AMAPA	AMARANTH, PALMER	AMARANTHUS PALMERI S.WATS.
2.	CYPES	NUTSEGE, YELLOW	CYPERUS ESCULENTUS L.
3.	GGGAN	GRASSES, ANNUAL	
4.	HIBTR	MALLOW, VENICE	HIBISCUS TRIONUM L.
5.	IPOHE	MORNINGGLORY, IVYLEAF	IPOMOEA HEDERACEA

Crop 1: SORVU SORGHUM
Variety: Dale, treated w/safener
Planting Date: May-17-04
Planting Method: Single row Planet Jr.

Row Spacing: 40 in
Soil Moisture: Adequate

SITE AND DESIGN

Plot Width, Unit: 6 FT
Plot Length, Unit: 26 FT

Reps: 4
Study Design: RANDOMIZED COMPLETE BLOCK

SOIL DESCRIPTION

% Sand: 15
% OM: 1.5
Texture: Silt Loam
% Silt: 70
pH: 6.5

Soil Name: Captina
% Clay: 15
CEC: 80
Fert. Level: Good

APPLICATION DESCRIPTION

	A	B
Application Date:	May-17-04	Jun-20-04
Time of Day:	6:13 pm	7:45 am
Application Method:	Backpack	Backpack
Application Timing:	PRE	POST
Air Temp., Unit:	88 F	70 F
% Relative Humidity:	56	78
Wind Velocity, Unit:	3.5 mph	2.0 mph
Dew Presence (Y/N):	N	N
Soil Temp., Unit:	70 F	50 F
Soil Moisture:	Moist	Wet
% Cloud Cover:	50	75

CROP STAGE AT EACH APPLICATION

	A	B
Crop 1 Code, Stage:	SORVU	SORVU
Stage Scale:	PRE	3-4 leaf
Height, Unit:		20 in

WEED STAGE AT EACH APPLICATION

	A	B
Weed 1 Code, Stage:	AMAPA	AMAPA
Stage Scale:	PRE	1-2 leaf
Weed 2 Code, Stage:	CYPES	CYPES
Stage Scale:	PRE	1-2 leaf
Weed 3 Code, Stage:	GGGAN	GGGAN
Stage Scale:	PRE	1-2 leaf
Weed 4 Code, Stage:	HIBTR	HIBTR
Stage Scale:	PRE	1-2 leaf
Weed 5 Code, Stage:	IPOHE	IPOHE
Stage Scale:	PRE	1-2 leaf

APPLICATION EQUIPMENT

	A	B
Appl. Equipment:	CO2 BKPK	CO2 BKPK
Operating Pressure:	40 PSI	40 PSI
Nozzle Type:	FLATFAN	FLATFAN
Nozzle Size:	80.0115	80.0115
Nozzle Spacing, Unit:	20 in	20 in
Boom Height, Unit:	18 in	18 in
Ground Speed, Unit:	3 mph	3 mph
Carrier:	WATER	WATER
Spray Volume, Unit:	10 GPA	10 GPA

Evaluation of Herbicides in Sweet Sorghum, Fayetteville, AR, 2004.

Treatment	Rate	Appln timing	PIGWEEED	MGGLORY	AN GRASS	NUTSEEDGE	MALLOW	SORVU
			AMAPA CONTROL 6/14	IPOSS CONTROL 6/14	GGGAN CONTROL 6/14	CYPES CONTROL 6/14	HIBTR CONTROL 6/14	SWSORGH INJURY 6/14
	LB A/A		%	%	%	%	%	%
Untreated Check			68	48	0	0	45	20
Atrazine	1	PRE	100	73	59	15	100	23
S-metolachlor carfentrazone + NIS ¹	0.6 0.01	PRE POST ²	85	43	80	60	73	18
S-metolachlor carfentrazone + NIS	0.6 0.02	PRE POST	75	49	90	30	35	18
Dimethenamid-P	0.66	PRE	100	68	83	44	48	15
Dimethenamid-P	1.31	PRE	100	55	98	73	68	21
Atrazine fb dimethenamid-P	1 0.9	PRE POST	100	89	86	0	100	26
Atrazine fb dimethenamid-P	1 1.78	PRE POST	98	82	50	5	100	0
S-metolachlor	1.3	PRE	85	71	98	90	70	23
S-metolachlor	2.6	PRE	100	68	88	80	55	18
S-metolachlor fb halosulfuron + NIS	0.6 0.042	PRE POST	96	58	75	45	8	13
S-metolachlor fb halosulfuron + NIS	0.6 0.084	PRE POST	98	65	93	50	68	25
Carfentrazone + NIS	0.015	POST ³						
LSD (P=.05)			NS	NS	30	36	48	NS

¹ NIS (Latron AG-98) was applied at 0.25% volume per volume of water.

² POST treatments applied 6/14

³ POST treatment applied 6/20

Evaluation of Herbicides in Sweet Sorghum, Fayetteville, AR, 2004.

Treatment	Rate	Appln timing	PIGWEEED	MGGLORY	AN GRASS	NUTSEEDGE	MALLOW	SORVU	SORVU
			AMAPA CONTROL 7/14	IPOSS CONTROL 7/14	GGGAN CONTROL 7/14	CYPES CONTROL 7/14	HIBTR CONTROL 7/14	SWSORGH INJURY 7/14	SWSORGH YIELD 9/2
	LB A/A		%	%	%	%	%	%	kg/
Untreated Check			35	48	5	25	63	15	9
Atrazine	1	PRE	100	100	60	15	100	10	11
S-metolachlor carfentrazone + NIS ¹	0.6 0.01	PRE POST ²	83	98	60	50	65	25	10
S-metolachlor carfentrazone + NIS	0.6 0.02	PRE POST	73	98	70	38	70	15	8
Dimethenamid-P	0.66	PRE	100	50	88	55	75	15	7
Dimethenamid-P	1.31	PRE	75	53	95	40	55	10	11
Atrazine fb dimethenamid-P	1 0.9	PRE POST	100	100	63	40	100	10	11
Atrazine fb dimethenamid-P	1 1.78	PRE POST	98	98	53	53	100	20	10
S-metolachlor	1.3	PRE	75	35	73	68	38	5	10
S-metolachlor	2.6	PRE	100	73	98	63	30	10	14
S-metolachlor fb halosulfuron + NIS	0.6 0.042	PRE POST	93	93	68	88	90	43	10
S-metolachlor fb halosulfuron + NIS	0.6 0.084	PRE POST	83	98	68	95	75	73	7
Carfentrazone + NIS	0.015	POST ³	100	100	100	70	100	30	12
LSD (P=.05)			NS	44	44	46	43	17	NS

¹ NIS (Latron AG-98) was applied at 0.25% volume per volume of water.

² POST treatments applied 6/14

³ POST treatment applied 6/20

Site Description

Carryover of Herbicides Used in Rotation with Warm-Season Vegetables: Sweet corn, Cowpea, Snap Bean, Summer Squash, Cantaloupe, Cucumber, Tomato

Trial ID: FAY 0406
Study Dir.: Thomas, Talbert, Ottis

Location: Fayetteville, AR
Investigator: Weed Science

GENERAL TRIAL INFORMATION

Study Director: Talbert, Thomas, Ottis
Affiliation: University of Arkansas

Investigator: Weed Science

TRIAL LOCATION

City: Fayetteville
Trial Status: Completed

State/Prov.: AR
Postal Code: 72704

Conducted Under GLP (Y/N): N

Conducted Under GEP (Y/N): N

OBJECTIVE

To evaluate potential herbicide carryover to various warm-season crops.

CONCLUSIONS

Herbicide activity to all warm-season crops had dissipated by one month after treatment with S-metolachlor at both rates, and activity was very slight at both rates of flufenacet and cloransulam. After two months, activity had totally dissipated for both rates for clopyralid, flumioxazin, imazamox, and mesotrione, and very slight activity remained at both rates for halosulfuron. At three months, halosulfuron had dissipated completely. At four months, prosulfuron had dissipated; however, sulfentrazone still persisted at both rates.

Safe plant back time (months after herbicide application) for various warm season crops

Common name	Cow pea	Cucu- mber	Musk- melon	Snap Bean	Summer Squash	Sweet Corn	Tom- ato
mesotrione	2	1	2	2	2	0	2
flufenacet	0	1	2	0	0	0	0
S-metolachlor	0	1	2	0	0	0	0
cloransulam	1	1	2	0	1	1	1
imazamox	0	1	2	0	1	2	2
halosulfuron	0	1	2	0	2	2	0
flumioxazin	2	1	2	2	1	2	0
clopyralid	2	2	2	2	2	0	2
prosulfuron	3	4	4	4	4	4	4
sulfentrazone	3	>4	>4	>4	>4	>4	>4

Crop 1: ZEAMS CORN, SWEET
Variety: MERIT

Planting Method: DRILL
Row Spacing: 10 in

Crop 2: VIGSC COWPEA
Variety: EARLY SCARLET

Planting Method: DRILL
Row Spacing: 10 in

Crop 3: PHSVN BEAN, SNAP
Variety: BENTON

Planting Method: DRILL
Row Spacing: 10 in

Crop 4: CUUPE SQUASH, SUMMER
Variety: EARLY PROLIFIC

Planting Method: DRILL
Row Spacing: 10 in

Crop 5: CUMMC CANTALOUPE
Variety: HALES BEST

Planting Method: DRILL
Row Spacing: 10 in

Crop 6: CUMSA CUCUMBER
Variety: MARKETMORE

Planting Method: DRILL
Row Spacing: 10 in

Crop 7: LYPES TOMATO
Variety: 7985

Planting Method: HAND TRANSPLANT
Spacing: 1 PER PLOT

SITE AND DESIGN

Plot Width, Unit: 14 FT
Plot Length, Unit: 20 FT

Reps: 4
Study Design: SPLIT-PLOT

SOIL DESCRIPTION

% Sand: 27
% OM: 1.1
Texture: Silt Loam
% Silt: 64

pH: 6.3
Soil Name: Taloka
% Clay: 9
Fert. Level: Excellent

MOISTURE CONDITIONS

	Date	Amount	Unit	Type
1.	May-14-04	0.2	IN	RAIN
2.	May-14-04	1.0	IN	IRRIGATION
3.	May-18-04	0.5	IN	IRRIGATION
4.	May-21-04	0.5	IN	IRRIGATION
5.	May-25-05	0.5	IN	IRRIGATION
6.	May-28-05	0.5	IN	IRRIGATION
7.	Jun-03-04	0.48	IN	RAIN
8.	Jun-08-04	0.08	IN	RAIN
9.	Jun-09-04	0.11	IN	RAIN
10.	Jun-11-04	0.14	IN	RAIN
11.	Jun-14-04	0.33	IN	RAIN
12.	Jun-16-04	0.05	IN	RAIN
13.	Jun-17-04	0.19	IN	RAIN
14.	Jun-18-04	1.96	IN	RAIN
15.	Jun-21-04	0.34	IN	RAIN

MOISTURE CONDITIONS (continued)

16.	Jun-22-04	0.95	IN	RAIN
17.	Jun-23-04	0.04	IN	RAIN
18.	Jun-27-04	0.25	IN	RAIN
19.	Jun-29-04	0.15	IN	RAIN
20.	Jun-30-04	0.49	IN	RAIN
21.	Jul-01-04	0.01	IN	RAIN
22.	Jul-02-04	0.72	IN	RAIN
23.	Jul-03-04	1.3	IN	RAIN
24.	Jul-04-04	2.3	IN	RAIN
25.	Jul-05-04	0.35	IN	RAIN
26.	Jul-08-04	0.23	IN	RAIN
27.	Jul-09-04	0.26	IN	RAIN
28.	Jul-10-04	0.34	IN	RAIN
29.	Jul-19-04	0.5	IN	IRRIGATION
30.	Jul-23-04	0.03	IN	RAIN
31.	Jul-24-04	0.42	IN	RAIN
32.	Jul-25-04	1.35	IN	RAIN
33.	Jul-26-04	0.04	IN	RAIN
34.	Aug-05-04	0.5	IN	IRRIGATION
35.	Aug-09-04	0.5	IN	IRRIGATION
36.	Aug-12-04	0.21	IN	RAIN
37.	Aug-13-04	0.07	IN	RAIN
38.	Aug-19-04	0.5	IN	IRRIGATION
39.	Aug-20-04	0.25	IN	RAIN
40.	Aug-23-04	0.05	IN	RAIN
41.	Aug-26-04	0.5	IN	IRRIGATION
42.	Aug-28-04	0.24	IN	RAIN
43.	Aug-31-04	0.5	IN	IRRIGATION
44.	Sep-02-04	0.5	IN	IRRIGATION
45.	Sep-06-04	0.58	IN	RAIN
46.	Sep-13-04	0.5	IN	IRRIGATION
47.	Sep-20-04	0.5	IN	IRRIGATION
48.	Sep-27-04	0.5	IN	IRRIGATION
49.	Oct-02-04	0.46	IN	RAIN
50.	Oct-08-04	0.63	IN	RAIN
51.	Oct-10-04	0.55	IN	RAIN
52.	Oct-11-04	0.25	IN	RAIN
53.	Oct-12-04	0.09	IN	RAIN
54.	Oct-14-04	0.29	IN	RAIN
55.	Oct-15-04	0.04	IN	RAIN

APPLICATION DESCRIPTION

A
Application Date: May-17-04
Time of Day: 7:15 pm
Application Method: Backpack
Application Timing: PPI
Air Temp., Unit: 841 F
% Relative Humidity: 57
Wind Velocity, Unit: 2 mph
Dew Presence (Y/N): N
Soil Temp., Unit: 70 F
Soil Moisture: Moist
% Cloud Cover: 25

CROP STAGE AT EACH APPLICATION

A
Crop 1 Code, Stage: ZEAMS
Stage Scale: PRE
Crop 2 Code, Stage: VIGSC
Stage Scale: PRE
Crop 3 Code, Stage: PHSVN
Stage Scale: PRE
Crop 4 Code, Stage: CUUPE
Stage Scale: PRE
Crop 5 Code, Stage: CUMMC
Stage Scale: PRE
Crop 6 Code, Stage: CUMSA
Stage Scale: PRE
Crop 7 Code, Stage: LYPES
Stage Scale: PRE

APPLICATION EQUIPMENT

A
Appl. Equipment: C02 BKPK
Operating Pressure: 40 PSI
Nozzle Type: FLATFAN
Nozzle Size: 80.015
Nozzle Spacing, Unit: 20 in
Boom Height, Unit: 15 in
Ground Speed, Unit: 3 mph
Carrier: WATER
Spray Volume, Unit: 10 GPA

Evaluation of the Biological Persistence of Selected Herbicides to Recropping with Seven Summer Vegetables

Treatment ¹	Rate	Appln	CORN	COWPEA	SNAPBEAN	SUSQUASH	MUSKMELL	CUCUMBER	TOMATOE
			ZEAMS INJURY	VIGSC INJURY	PHSVN INJURY	CUUPE INJURY	CUMMC INJURY	CUMSA INJURY	LYPES INJURY
			6/20 ²	6/20	6/20	6/20	6/20	6/20	6/20
			%	%	%	%	%	%	%
Clopyralid	0.18	LB A/A timing PPI	28	85	93	64	75	79	85
Clopyralid	0.36	PPI	33	100	78	86	91	86	100
Flumioxazin	0.1	PPI	35	33	30	64	60	81	10
Flumioxazin	0.2	PPI	48	50	48	100	91	99	28
Sulfentrazone	0.375	PPI	71	48	68	88	85	95	28
Sulfentrazone	0.75	PPI	91	74	88	94	95	99	58
Imazamox	0.031	PPI	80	28	13	40	98	99	100
Imazamox	0.062	PPI	91	33	25	45	99	99	100
Mesotrione	0.19	PPI	15	94	96	98	100	99	100
Mesotrione	0.38	PPI	3	96	100	100	100	100	100
Flufenacet	0.3	PPI	30	33	10	15	30	30	8
Flufenacet	0.6	PPI	23	23	18	20	48	50	8
Prosulfuron	0.027	PPI	89	94	90	96	100	100	100
Prosulfuron	0.054	PPI	93	96	96	98	100	100	100
Cloransulam	0.016	PPI	86	33	15	68	99	99	90
Cloransulam	0.032	PPI	94	45	18	83	100	99	100
Halosulfuron	0.027	PPI	63	23	20	75	74	28	15
Halosulfuron	0.054	PPI	70	20	18	73	63	33	18
S-metolachlor	1.3	PPI	15	5	5	15	48	35	8
S-metolachlor	2.6	PPI	18	5	5	8	69	59	15
LSD (P=.05)			14	14	17	23	21	14	20

¹ Applied preplant to soil surface 5/17

² Roto-tilled and planted 5/17

Evaluation of the Biological Persistence of Selected Herbicides to Recropping with Seven Summer Vegetables

Treatment ¹	Rate	Appln	CORN	COWPEA	SNAPBEAN	SUSQUASH	MUSKMELL	CUCUMBER	TOMATO
			ZEAMS INJURY	VIGSC INJURY	PHSVN INJURY	CUUPE INJURY	CUMMC INJURY	CUMSA INJURY	LYPES INJURY
			7/14 ²	7/14	7/14	7/14	7/14	7/14	7/14
	LB A/A	timing	%	%	%	%	% ³	%	%
Clopyralid	0.18	PPI	3	41	50	28		30	30
Clopyralid	0.36	PPI	0	68	75	38		40	40
Flumioxazin	0.1	PPI	35	63	58	28		28	35
Flumioxazin	0.2	PPI	40	59	60	28		28	40
Sulfentrazone	0.375	PPI	90	73	88	90		93	63
Sulfentrazone	0.75	PPI	93	80	90	90		70	80
Imazamox	0.031	PPI	33	13	10	8		10	90
Imazamox	0.062	PPI	35	18	13	5		17	80
Mesotrione	0.19	PPI	13	48	78	20		23	3
Mesotrione	0.38	PPI	13	55	90	73		30	80
Flufenacet	0.3	PPI	8	28	13	3		13	5
Flufenacet	0.6	PPI	10	15	18	13		17	23
Prosulfuron	0.027	PPI	93	93	90	90		90	90
Prosulfuron	0.054	PPI	90	90	90	90		90	90
Cloransulam	0.016	PPI	20	17	18	13		17	5
Cloransulam	0.032	PPI	25	18	18	13		20	8
Halosulfuron	0.027	PPI	50	20	15	35		8	17
Halosulfuron	0.054	PPI	53	23	23	43		23	38
S-metolachlor	1.3	PPI	10	15	18	10		10	3
S-metolachlor	2.6	PPI	10	18	20	15		18	3
LSD (P=.05)			5	19	12	16		20	16

¹ applied to soil surface 5/16

² Roto-tilled and planted 6/15

³ Crop failure

Evaluation of the Biological Persistence of Selected Herbicides to Recropping with Seven Summer Vegetables

Treatment ¹	Rate	Appln	CORN	COWPEA	SNAPBEAN	SUSQUASH	MUSKMELL	CUCUMBER	TOMATOE
			ZEAMS INJURY	VIGSC INJURY	PHSVN INJURY	CUUPE INJURY	CUMMC INJURY	CUMSA INJURY	LYPES INJURY
			8/13 ²	8/13	8/13	8/13	8/13	8/13	8/13
	LB A/A	timing	%	%	%	%	%	%	%
Clopyralid	0.18	PPI	0	0	0	0	0	0	0
Clopyralid	0.36	PPI	0	0	0	0	0	0	0
Flumioxazin	0.1	PPI	0	0	3	0	0	0	0
Flumioxazin	0.2	PPI	0	0	3	0	0	0	0
Sulfentrazone	0.375	PPI	95	33	79	88	91	91	51
Sulfentrazone	0.75	PPI	96	44	85	93	95	95	59
Imazamox	0.031	PPI	8	0	8	8	8	8	8
Imazamox	0.062	PPI	10	3	10	10	10	10	10
Mesotrione	0.19	PPI	3	3	3	3	3	3	3
Mesotrione	0.38	PPI	3	3	3	3	3	3	3
Flufenacet	0.3	PPI	0	0	0	0	0	0	0
Flufenacet	0.6	PPI	0	0	0	0	0	0	0
Prosulfuron	0.027	PPI	70	40	63	83	93	93	64
Prosulfuron	0.054	PPI	70	40	63	83	94	94	66
Cloransulam	0.016	PPI	3	0	3	3	3	3	3
Cloransulam	0.032	PPI	3	0	3	3	3	3	3
Halosulfuron	0.027	PPI	18	23	15	20	15	15	15
Halosulfuron	0.054	PPI	18	15	15	20	15	15	15
S-metolachlor	1.3	PPI	5	3	3	3	3	3	3
S-metolachlor	2.6	PPI	5	3	3	3	3	3	3
LSD (P=.05)			2	6	2	3	2	2	5

¹ Applied preplant to soil surface 5/17

² Roto-tilled and planted 7/15

Evaluation of the Biological Persistence of Selected Herbicides to Recropping with Seven Summer Vegetables

Treatment ¹	Rate	Appln	CORN	PEA	SNAPBEAN	SQUASH	MELON	CUC	TOMATO
			ZEAMS INJURY	VIGSC INJURY	PHSVN INJURY	CUUPE INJURY	CUMMC INJURY	CUMSA INJURY	LYPES INJURY
			9/1 ²	9/9	9/9	9/9	9/9	9/9	9/9
Clopyralid	LB A/A 0.18	timing PPI	% 0	% 0	% 0	% 0	% 0	% 0	0
Clopyralid	0.36	PPI	0	0	0	0	0	0	0
Flumioxazin	0.1	PPI	0	0	0	0	0	0	0
Flumioxazin	0.2	PPI	0	0	0	0	0	0	0
Sulfentrazone	0.375	PPI	90	30	88	78	89	89	20
Sulfentrazone	0.75	PPI	92	35	94	90	94	94	38
Imazamox	0.031	PPI	0	0	0	0	0	0	0
Imazamox	0.062	PPI	0	0	0	0	0	0	0
Mesotrione	0.19	PPI	0	0	0	0	0	0	0
Mesotrione	0.38	PPI	0	0	0	0	0	0	0
Flufenacet	0.3	PPI	0	0	0	0	0	0	0
Flufenacet	0.6	PPI	0	0	0	0	0	0	0
Prosulfuron	0.027	PPI	87	10	53	68	90	90	51
Prosulfuron	0.054	PPI	88	13	59	71	94	94	68
Cloransulam	0.016	PPI	0	0	0	0	0	0	0
Cloransulam	0.032	PPI	0	0	0	0	0	0	0
Halosulfuron	0.027	PPI	0	0	0	0	0	0	0
Halosulfuron	0.054	PPI	0	0	0	0	0	0	0
S-metolachlor	1.3	PPI	0	0	0	0	0	0	0
S-metolachlor	2.6	PPI	0	0	0	0	0	0	0
LSD (P=.05)			1	5	3	4	1	1	7

¹ Applied preplant to soil surface 5/17

² Roto-tilled and planted 8/15

Evaluation of the Biological Persistence of Selected Herbicides to Recropping with Seven Summer Vegetables

Treatment ¹	Rate	Appln	CORN ZEAMS INJURY 10/19 ²	PEA VIGSC INJURY 10/19	SNAPBEAN PHSVN INJURY 10/19	SQUASH CUUPE INJURY 10/19	MELON CUMMC INJURY 10/19	CUC CUMSA INJURY 10/19	TOMATO LYPES INJURY 10/19
Clopyralid	LB A/A 0.18	timing PPI	% 0	% 0	% 0	% 0	% 0	% 0	% 0
Clopyralid	0.36	PPI	0	0	0	0	0	0	0
Flumioxazin	0.1	PPI	0	0	0	0	0	0	0
Flumioxazin	0.2	PPI	0	0	0	0	0	0	0
Sulfentrazone	0.375	PPI	91	10	53	85	86	91	61
Sulfentrazone	0.75	PPI	96	18	60	94	91	94	70
Imazamox	0.031	PPI	0	0	0	0	0	0	0
Imazamox	0.062	PPI	0	0	0	0	0	0	0
Mesotrione	0.19	PPI	0	0	0	0	0	0	0
Mesotrione	0.38	PPI	0	0	0	0	0	0	0
Flufenacet	0.3	PPI	0	0	0	0	0	0	0
Flufenacet	0.6	PPI	0	0	0	0	0	0	0
Prosulfuron	0.027	PPI	25	8	5	3	48	48	5
Prosulfuron	0.054	PPI	33	5	5	8	49	48	5
Cloransulam	0.016	PPI	0	0	0	0	0	0	0
Cloransulam	0.032	PPI	0	0	0	0	0	0	0
Halosulfuron	0.027	PPI	0	0	0	0	0	0	0
Halosulfuron	0.054	PPI	0	0	0	0	0	0	0
S-metolachlor	1.3	PPI	0	0	0	0	0	0	0
S-metolachlor	2.6	PPI	0	0	0	0	0	0	0
LSD (P=.05)			3	3	3	4	1	4	3

¹ Applied preplant to soil surface 5/17

² Roto-tilled and planted 9/15

Site Description

Carryover of Herbicides Used in Rotation with Cool-Season Vegetables: Cabbage, Collard, Kale, Mustard, Spinach, and Turnip

Trial ID: FAY 0401
Study Dir.: Talbert

Location: Fayetteville, AR
Investigator: Weed Science

GENERAL TRIAL INFORMATION

Study Director: Talbert, Thomas, Ottis
Affiliation: University of Arkansas

Investigator: Weed Science

TRIAL LOCATION

City: Fayetteville
Trial Status: COMPLETED

State/Prov.: Arkansas
Postal Code: 72704

Conducted Under GLP (Y/N): N

Conducted Under GEP (Y/N): N

OBJECTIVE

To evaluate potential herbicide carryover to various leafy-vegetable crops.

CONCLUSIONS

All herbicide activity persisted in the cool-season study at one month with the exception of clomazone. All crops tolerated clomazone when planted one month after application. Sulfentrazone was very damaging to spinach, 100% injury at 3 months after application. However, the other fall-planted crucifera greens were more tolerant than spinach to sulfentrazone carryover. At one month, cabbage injury from sulfentrazone carryover was 75%; kale was 50%; collards, turnip, and mustard were approximately 25%. Fomesafen residues were very injurious to all crops, decreasing from 100% injury at one month after application to 50% or more injury at 3 months after application. Rimsulfuron, halosulfuron, and imazethapyr were very injurious to all crops when planted one month after application. By two months, injury to all crops was moderate (below 50%) and by three months after application these herbicides had dissipated to below phytotoxic levels on all crops. Imazamox was tolerated by mustard and turnip at one month. Cabbage was injured by imazamox carryover to near 100% at one month with injury dropping to moderate (25%) at two months and dissipating by 3 months. Spinach, kale, and collards suffered moderate injury from imazamox at 1 month, with injurious levels dissipating below phytotoxic levels at two months.

Safe plant back time (months after herbicide application) for various cool season crops

Common name	Cabbage	Collard	Kale	Mustard	Turnip	Spinach
clomazone	2	1	1	2	1	3
imazamox	2	2	2	2	1	1
sulfentrazone	3	1	2	2	1	>3
rimsulfuron	2	3	2	2	3	3
imazethapyr	3	3	2	2	3	3
halosulfuron	3	3	2	3	3	3
fomesafen	>3	>3	>3	>3	>3	>3

Crop 1: BRSOL CABBAGE
Variety: BLUE DYNASTY
Planting Method: Drill

Row Spacing: 10 in
Soil Moisture: Adequate

Crop 2: BRSOA COLLARD
Variety: CHAMPION
Planting Method: Drill

Row Spacing: 10 in
Soil Moisture: Adequate

Crop 3: BRSOA KALE
Variety: DWARF SIBERIAN
Planting Method: Drill

Row Spacing: 10 in
Soil Moisture: Adequate

Crop 4: BRSJU MUSTARD (GREEN)
Variety: SAVANNAH
Planting Method: Drill

Row Spacing: 10 in
Soil Moisture: Adequate

Crop 5: SPQOL SPINACH
Variety: F380
Planting Method: Drill

Row Spacing: 10 in
Soil Moisture: Adequate

Crop 6: BRSRR TURNIP
Variety: ALAMO
Planting Method: Drill

Row Spacing: 10 in
Soil Moisture: Adequate

SITE AND DESIGN

Plot Width, Unit: 14 FT
Plot Length, Unit: 20 FT

Reps: 4
Study Design: SPLIT-PLOT

SOIL DESCRIPTION

% Sand: 27
% OM: 1.1
Texture: Silt Loam
% Silt: 64

pH: 6.3
Soil Name: Taloka
% Clay: 9

MOISTURE CONDITIONS

	Date	Amount	Unit Type	
1.	Jul-19-04	0.5	IN	IRRIGATION
2.	Jul-23-04	0.03	IN	RAIN
3.	Jul-24-04	0.42	IN	RAIN
4.	Jul-25-04	1.35	IN	RAIN
5.	Jul-26-04	0.04	IN	RAIN
6.	Jul-30-04	1.0	IN	RAIN
7.	Aug-05-04	0.5	IN	IRRIGATION
8.	Aug-09-04	0.5	IN	IRRIGATION
9.	Aug-19-04	0.5	IN	IRRIGATION
10.	Aug-20-04	0.25	IN	RAIN
11.	Aug-23-04	0.05	IN	RAIN
12.	Aug-26-04	0.5	IN	IRRIGATION
13.	Aug-28-04	0.24	IN	RAIN
14.	Aug-31-04	0.5	IN	RAIN
15.	Sep-02-04	0.5	IN	IRRIGATION
16.	Sep-06-04	0.58	IN	RAIN
17.	Sep-13-04	0.5	IN	IRRIGATION
18.	Sep-20-04	0.5	IN	IRRIGATION
19.	Sep-27-04	0.5	IN	IRRIGATION
20.	Oct-02-04	0.46	IN	RAIN
21.	Oct-01-04	0.63	IN	RAIN
22.	Oct-10-04	0.22	IN	RAIN
23.	Oct-11-04	0.25	IN	RAIN
24.	Oct-12-04	0.09	IN	RAIN
25.	Oct-14-04	0.29	IN	RAIN
26.	Oct-15-04	0.04	IN	RAIN
27.	Oct-23-04	0.31	IN	RAIN
28.	Oct-24-04	0.03	IN	RAIN
29.	Oct-26-04	0.04	IN	RAIN
30.	Oct-28-04	0.98	IN	RAIN
31.	Oct-29-04	0.09	IN	RAIN
32.	Oct-31-04	0.6	IN	RAIN
33.	Nov-01-04	2.88	IN	RAIN
34.	Nov-02-04	0.08	IN	RAIN
35.	Nov-03-04	0.21	IN	RAIN
36.	Nov-04-04	0.21	IN	RAIN
37.	Nov-11-04	1.07	IN	RAIN

APPLICATION DESCRIPTION

A
Application Date: Jul-16-04
Time of Day: 11:30 am
Application Method: CO2 BKPK
Application Timing: PRE
Air Temp., Unit: 92 F
% Relative Humidity: 62
Wind Velocity, Unit: 3 mph
Dew Presence (Y/N): N
Soil Temp., Unit: 60 F
Soil Moisture: MOIST
% Cloud Cover: 0

CROP STAGE AT EACH APPLICATION

A
Crop 1 Code, Stage: BRSOL
Stage Scale: PRE
Crop 2 Code, Stage: BRSOA
Stage Scale: PRE
Crop 3 Code, Stage: BRSOA
Stage Scale: PRE
Crop 4 Code, Stage: BRSJU
Stage Scale: PRE
Crop 5 Code, Stage: SPQOL
Stage Scale: PRE
Crop 6 Code, Stage: BRSRR
Stage Scale: PRE

APPLICATION EQUIPMENT

A
Appl. Equipment: CO2 BKPK
Operating Pressure: 40 PSI
Nozzle Type: FLATFAN
Nozzle Size: 11001
Nozzle Spacing, Unit: 20 in
Boom Height, Unit: 15 in
Ground Speed, Unit: 3 mph
Carrier: WATER
Spray Volume, Unit: 10 GPA

Evaluation of Biological Persistence of Selected Herbicides to Recropping with Six Cool-season Vegetables

Treatment ¹	Rate	Appln timing	CABBAGE	KALE	MUSTARD	COLLARD	SPINACH	TURNIP
			INJURY 9/9 ²	INJURY 9/9	INJURY 9/9	INJURY 9/9	INJURY 9/9	INJURY 9/9
	LB A/A		%	%	%	%	%	%
Imazethapyr	0.0625	PPI	90	88	83	88	89	86
Imazethapyr	0.125	PPI	94	94	90	94	95	94
Imazamox	0.03125	PPI	90	45	25	58	25	18
Imazamox	0.0625	PPI	94	54	33	61	33	28
Halosulfuron	0.047	PPI	91	74	81	86	96	85
Halosulfuron	0.094	PPI	96	95	96	95	98	95
Sulfentrazone	0.375	PPI	73	20	15	15	100	15
Sulfentrazone	0.75	PPI	95	73	65	48	100	50
Clomazone	0.75	PPI	28	5	5	5	5	5
Clomazone	1.5	PPI	40	28	15	15	10	10
Fomesafen	0.375	PPI	100	100	100	100	100	100
Fomesafen	0.75	PPI	100	100	100	100	100	100
Rimsulfuron	0.0625	PPI	93	80	91	93	94	93
Rimsulfuron	0.125	PPI	96	95	95	95	96	95
LSD (P=.05)			15	22	12	8	5	11

¹ applied to soil surface 7/16

² Planted 8/15

Evaluation of Biological Persistence of Selected Herbicides to Recropping with Six Cool-season Vegetables

Treatment ¹	Rate	Appln timing	CABBAGE	KALE	MUSTARD	COLLARD	SPINACH	TURNIP
			INJURY 10/25 ²	INJURY 10/25	INJURY 10/25	INJURY 10/25	INJURY 10/25	INJURY 10/25
LB A/A			%	%	%	%	%	%
Imazethapyr	0.0625	PPI	58	23	18	18	25	18
Imazethapyr	0.125	PPI	64	39	46	56	53	56
Imazamox	0.03125	PPI	26	10	10	10	5	5
Imazamox	0.0625	PPI	20	3	5	5	5	5
Halosulfuron	0.047	PPI	25	3	30	30	69	34
Halosulfuron	0.094	PPI	66	23	50	53	71	44
Sulfentrazone	0.375	PPI	44	5	5	5	100	10
Sulfentrazone	0.75	PPI	93	40	45	46	100	66
Clomazone	0.75	PPI	0	0	0	0	53	0
Clomazone	1.5	PPI	0	0	0	0	51	0
Fomesafen	0.375	PPI	99	64	89	88	90	86
Fomesafen	0.75	PPI	100	90	96	96	99	100
Rimsulfuron	0.0625	PPI	8	0	0	3	23	15
Rimsulfuron	0.125	PPI	51	15	63	71	43	73
LSD (P=.05)			27	24	20	17	13	20

¹ applied to soil surface 7/16

² Planted 9/15

Evaluation of Biological Persistence of Selected Herbicides to Recropping with Six Cool-season Vegetables

Treatment ¹	Rate	Appln timing	CABBAGE	KALE	MUSTARD	COLLARDS	SPINACH	TURNIP
			INJURY 11/12 ²	INJURY 11/12	INJURY 11/12	INJURY 11/12	INJURY 11/12	INJURY 11/12
	LB A/A		%	%	%	%	%	%
Imazethapyr	0.0625	PPI	5	3	0	0	0	0
Imazethapyr	0.125	PPI	8	3	0	0	0	0
Imazamox	0.03125	PPI	3	3	3	3	30	10
Imazamox	0.0625	PPI	3	0	0	0	28	3
Halosulfuron	0.047	PPI	3	0	0	0	3	0
Halosulfuron	0.094	PPI	8	0	0	0	8	5
Sulfentrazone	0.375	PPI	21	20	18	25	100	26
Sulfentrazone	0.75	PPI	21	21	19	26	100	30
Clomazone	0.75	PPI	5	18	0	3	49	8
Clomazone	1.5	PPI	28	13	3	3	29	5
Fomesafen	0.375	PPI	53	29	34	45	56	50
Fomesafen	0.75	PPI	83	55	71	71	81	84
Rimsulfuron	0.0625	PPI	3	0	3	3	3	0
Rimsulfuron	0.125	PPI	3	0	0	0	3	0
LSD (P=.05)			23	10	11	11	24	15

¹ applied to soil surface 7/16

² Planted 10/15

Appendix

Abbreviations

BKPK – Backpack sprayer

LB A/A – Pounds of active ingredient/acre

LPOST – Late postemergence

PPI – Preplant incorporated

POST – Postemergence

PRE – Preemergence

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