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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/>.

## **ACKNOWLEDGMENTS**

The authors would like to thank Clay Stephens of the farm crew at Fayetteville; members of the horticulture staff at Fayetteville: Dr. Teddy Morelock, Danielle Williams, and Jimmy Moore; and Dr. Justin Morris, Food Science Department, University of Arkansas. We would also like to thank William Russell of Allen Canning Co. and Daniel Stephenson of the Department of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville.

## **CONTRIBUTOR**

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# 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

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

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

| Treatment                                     | Rate         | Appln<br>timing             | MGLORY           | NUTSEDGE         | AMARANTH         | PHSVN              | MGLORY           | NUTSEDGE         |
|-----------------------------------------------|--------------|-----------------------------|------------------|------------------|------------------|--------------------|------------------|------------------|
|                                               |              |                             | IPOSS<br>CONTROL | CYPES<br>CONTROL | AMAPA<br>CONTROL | SNAPBEAN<br>INJURY | IPOSS<br>CONTROL | CYPES<br>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 +<br>halosulfuron               | 0.5<br>0.032 | PRE<br>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 +<br>bentazon + NIS <sup>1</sup> fb | 0.2<br>0.5   | EPOST <sup>3</sup><br>EPOST |                  |                  |                  |                    | 68               | 65               |
| sethoxydim + COC <sup>2</sup>                 | 0.5          | LPOST <sup>4</sup>          |                  |                  |                  |                    |                  |                  |
| Imazamox + NIS                                | 0.036        | EPOST                       |                  |                  |                  |                    | 55               | 91               |
| Imazamox +<br>bentazon + NIS                  | 0.036<br>0.5 | EPOST<br>EPOST              |                  |                  |                  |                    | 28               | 70               |
| Halosulfuron +<br>bentazon + NIS              | 0.032<br>0.5 | EPOST<br>EPOST              |                  |                  |                  |                    | 68               | 100              |
| Halosulfuron +<br>fomesafen + NIS             | 0.032<br>0.2 | EPOST<br>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               |

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

<sup>2</sup> COC was applied at 1% volume per volume of water.

<sup>3</sup> EPOST treatments applied 6/1

<sup>4</sup> LPOST treatments applied 6/16

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

| Treatment                                     | Rate<br>LB A/A | Appln<br>timing             | CARPETWE                 | CPPLEAF                  | AN GRASS                 | AMARANTH                 | MALLOW                   |
|-----------------------------------------------|----------------|-----------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
|                                               |                |                             | MOLVE<br>CONTROL<br>6/15 | ACCOS<br>CONTROL<br>6/15 | GGGAN<br>CONTROL<br>6/15 | AMAPA<br>CONTROL<br>6/15 | HIBTR<br>CONTROL<br>6/15 |
|                                               |                |                             | %                        | %                        | %                        | %                        | %                        |
| 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 +<br>halosulfuron               | 0.5<br>0.032   | PRE<br>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 +<br>bentazon + NIS <sup>1</sup> fb | 0.2<br>0.5     | EPOST <sup>3</sup><br>EPOST | 54                       | 25                       | 0                        | 73                       | 69                       |
| sethoxydim + COC <sup>2</sup>                 | 0.5            | LPOST <sup>4</sup>          |                          |                          |                          |                          |                          |
| Imazamox + NIS                                | 0.036          | EPOST                       | 25                       | 28                       | 86                       | 92                       | 38                       |
| Imazamox +<br>bentazon + NIS                  | 0.036<br>0.5   | EPOST<br>EPOST              | 8                        | 13                       | 61                       | 70                       | 75                       |
| Halosulfuron +<br>bentazon + NIS              | 0.032<br>0.5   | EPOST<br>EPOST              | 30                       | 33                       | 28                       | 43                       | 100                      |
| Halosulfuron +<br>fomesafen + NIS             | 0.032<br>0.2   | EPOST<br>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                       |

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

<sup>2</sup> COC was applied at 1% volume per volume of water.

<sup>3</sup> EPOST treatments applied 6/1

<sup>4</sup> LPOST treatments applied 6/16

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

| Treatment                                     | Rate<br>LB A/A | Appln<br>timing             | GRNDCHER                 | PHSVN                      | PHSVN                    |
|-----------------------------------------------|----------------|-----------------------------|--------------------------|----------------------------|--------------------------|
|                                               |                |                             | PHYAN<br>CONTROL<br>6/15 | SNAPBEAN<br>INJURY<br>6/15 | SNAPBEAN<br>YIELD<br>7/6 |
|                                               |                |                             | %                        | %                          | 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 +<br>halosulfuron               | 0.5<br>0.032   | PRE<br>PRE                  | 45                       | 5                          | 4.3                      |
| Flufenacet                                    | 0.3            | PRE                         | 83                       | 0                          | 2.3                      |
| Dimethenamid-P                                | 0.5            | PRE                         | 88                       | 5                          | 3.2                      |
| Fomesafen +<br>bentazon + NIS <sup>1</sup> fb | 0.2<br>0.5     | EPOST <sup>3</sup><br>EPOST | 30                       | 0                          | 3.8                      |
| sethoxydim + COC <sup>2</sup>                 | 0.5            | LPOST <sup>4</sup>          |                          |                            |                          |
| Imazamox + NIS                                | 0.036          | EPOST                       | 100                      | 0                          | 2.4                      |
| Imazamox +<br>bentazon + NIS                  | 0.036<br>0.5   | EPOST<br>EPOST              | 58                       | 0                          | 3.9                      |
| Halosulfuron +<br>bentazon + NIS              | 0.032<br>0.5   | EPOST<br>EPOST              | 0                        | 0                          | 2.8                      |
| Halosulfuron +<br>fomesafen + NIS             | 0.032<br>0.2   | EPOST<br>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                      |

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

<sup>2</sup> COC was applied at 1% volume per volume of water.

<sup>3</sup> EPOST treatments applied 6/1

<sup>4</sup> 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

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

## CROP STAGE AT EACH APPLICATION

|                            | <b>A</b> | <b>B</b>  |
|----------------------------|----------|-----------|
| <b>Crop 1 Code, Stage:</b> | VIGSC    | VIGSC     |
| <b>Stage Scale:</b>        | PRE      | 1-2TRIFOL |

## WEED STAGE AT EACH APPLICATION

|                            | <b>A</b> | <b>B</b> |
|----------------------------|----------|----------|
| <b>Weed 1 Code, Stage:</b> | ACCOS    | ACCOS    |
| <b>Stage Scale:</b>        | PRE      | 1-2 LEAF |

## APPLICATION EQUIPMENT

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

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

| Treatment                       | Rate          | Appln<br>timing    | COWPEA<br>VIGSC<br>INJURY<br>8/8 | COPPERLEAF<br>ACCOS<br>CONTROL<br>8/8 | COWPEA<br>VIGSC<br>INJURY<br>9/13 | COPPERLEAF<br>ACCOS<br>CONTROL<br>9/13 | COWPEA<br>VIGSC<br>YIELD<br>10/22 |
|---------------------------------|---------------|--------------------|----------------------------------|---------------------------------------|-----------------------------------|----------------------------------------|-----------------------------------|
|                                 | LB A/A        |                    | %                                | %                                     | %                                 | %                                      | LB/A                              |
| Untreated Check                 |               |                    | 0                                | 0                                     | 0                                 | 0                                      | 204                               |
| Imazethapyr                     | 0.063         | PRE                | 3                                | 40                                    | 0                                 | 31                                     | 277                               |
| Imazethapyr +<br>s-metolachlor  | 0.063<br>0.6  | PRE<br>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 <sup>1</sup>  | 0.25          | EPOST <sup>2</sup> | 65                               | 95                                    | 30                                | 63                                     | 228                               |
| Acifluorfen + NIS               | 0.5           | EPOST              | 81                               | 96                                    | 43                                | 89                                     | 293                               |
| Acifluorfen +<br>bentazon + NIS | 0.125<br>0.25 | EPOST<br>EPOST     | 70                               | 93                                    | 30                                | 71                                     | 386                               |
| Acifluorfen +<br>bentazon + NIS | 0.25<br>0.5   | EPOST<br>EPOST     | 80                               | 95                                    | 45                                | 70                                     | 230                               |
| Acifluorfen +<br>bentazon + NIS | 0.5<br>0.5    | EPOST<br>EPOST     | 83                               | 96                                    | 40                                | 75                                     | 188                               |
| Imazamox + NIS                  | 0.03          | EPOST              | 10                               | 60                                    | 0                                 | 51                                     | 272                               |
| Imazamox +<br>bentazon + NIS    | 0.03<br>0.5   | EPOST<br>EPOST     | 3                                | 35                                    | 3                                 | 28                                     | 282                               |

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

| Treatment                     | Rate       | Appln<br>timing | COWPEA                 | COPPERLEAF              | COWPEA                  | COPPERLEAF               | COWPEA                  |
|-------------------------------|------------|-----------------|------------------------|-------------------------|-------------------------|--------------------------|-------------------------|
|                               |            |                 | VIGSC<br>INJURY<br>8/8 | ACCOS<br>CONTROL<br>8/8 | VIGSC<br>INJURY<br>9/13 | ACCOS<br>CONTROL<br>9/13 | VIGSC<br>YIELD<br>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 +<br>bentazon + NIS | 0.2<br>0.5 | EPOST<br>EPOST  | 84                     | 96                      | 30                      | 64                       | 225                     |
| LSD (P=.05)                   |            |                 | 13                     | 21                      | 17                      | 30                       | NS                      |

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

<sup>2</sup> 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

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

## CROP STAGE AT EACH APPLICATION

|                            | <b>A</b> | <b>B</b> | <b>C</b> |
|----------------------------|----------|----------|----------|
| <b>Crop 1 Code, Stage:</b> | VITVI    | VITVI    | VITVI    |

## WEED STAGE AT EACH APPLICATION

|                            | <b>A</b> | <b>B</b> | <b>C</b>  |
|----------------------------|----------|----------|-----------|
| <b>Weed 1 Code, Stage:</b> | DIGSA    | DIGSA    | DIGSA     |
| <b>Stage Scale:</b>        | BURNDOWN | PRE      | 8/10 LEAF |
| <b>Weed 2 Code, Stage:</b> | CYNDA    | CYNDA    | CYNDA     |
| <b>Stage Scale:</b>        | BURNDOWN | PRE      | 8/10 LEAF |

## APPLICATION EQUIPMENT

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

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

| Treatment                                                            | Rate           | Appln<br>timing          | BERMUDA                  | CRAB                     | BERMUDA                  | CRAB                     | GRAPES                  | GRAPES                |
|----------------------------------------------------------------------|----------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------|-----------------------|
|                                                                      |                |                          | GGGPE<br>CONTROL<br>6/20 | DIGSA<br>CONTROL<br>6/20 | GGGPE<br>CONTROL<br>7/30 | DIGSA<br>CONTROL<br>7/30 | VITVI<br>INJURY<br>7/30 | VITVI<br>YIELD<br>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<br>flumioxazin + NIS <sup>1</sup>                     | 0.5<br>0.5     | PRE<br>POST <sup>3</sup> | 67                       | 100                      | 3                        | 90                       | 20                      | 4.0                   |
| Flumioxazin fb<br>flumioxazin + NIS                                  | 0.25<br>0.25   | PRE<br>POST              | 70                       | 100                      | 37                       | 90                       | 8                       | 4.1                   |
| Sulfentrazone                                                        | 0.5            | PRE                      | 60                       | 100                      | 37                       | 35                       | 18                      | 5.1                   |
| Sulfentrazone fb<br>sulfentrazone + NIS                              | 0.25<br>0.25   | PRE<br>POST              | 55                       | 100                      | 53                       | 40                       | 15                      | 6.2                   |
| Sulfentrazone fb<br>sulfentrazone + NIS                              | 0.5<br>0.5     | PRE<br>POST              | 35                       | 83                       | 50                       | 90                       | 10                      | 6.6                   |
| Simazine +<br>oryzalin fb<br>clethodim + COC <sup>2</sup> (repeated) | 2<br>3<br>0.25 | PRE<br>PRE<br>POST       | 57                       | 100                      | 93                       | 100                      | 10                      | 6.7                   |
| Simazine +<br>oryzalin fb<br>sethoxydim + COC (repeated)             | 2<br>3<br>0.5  | PRE<br>PRE<br>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                   |

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

<sup>2</sup> COC was applied at 1% volume per volume of water.

<sup>3</sup> 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 | NUTSEDGE, 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

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

### CROP STAGE AT EACH APPLICATION

|                            | <b>A</b> | <b>B</b> |
|----------------------------|----------|----------|
| <b>Crop 1 Code, Stage:</b> | SORVU    | SORVU    |
| <b>Stage Scale:</b>        | PRE      | 3-4 leaf |
| <b>Height, Unit:</b>       |          | 20 in    |

## WEED STAGE AT EACH APPLICATION

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

## APPLICATION EQUIPMENT

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

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

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

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

<sup>2</sup> POST treatments applied 6/14

<sup>3</sup> POST treatment applied 6/20

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

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

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

<sup>2</sup> POST treatments applied 6/14

<sup>3</sup> 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<br>pea | Cucu-<br>mber | Musk-<br>melon | Snap<br>Bean | Summer<br>Squash | Sweet<br>Corn | Tom-<br>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

|            | <b>Date</b> | <b>Amount</b> | <b>Unit</b> | <b>Type</b> |
|------------|-------------|---------------|-------------|-------------|
| <b>1.</b>  | May-14-04   | 0.2           | IN          | RAIN        |
| <b>2.</b>  | May-14-04   | 1.0           | IN          | IRRIGATION  |
| <b>3.</b>  | May-18-04   | 0.5           | IN          | IRRIGATION  |
| <b>4.</b>  | May-21-04   | 0.5           | IN          | IRRIGATION  |
| <b>5.</b>  | May-25-05   | 0.5           | IN          | IRRIGATION  |
| <b>6.</b>  | May-28-05   | 0.5           | IN          | IRRIGATION  |
| <b>7.</b>  | Jun-03-04   | 0.48          | IN          | RAIN        |
| <b>8.</b>  | Jun-08-04   | 0.08          | IN          | RAIN        |
| <b>9.</b>  | Jun-09-04   | 0.11          | IN          | RAIN        |
| <b>10.</b> | Jun-11-04   | 0.14          | IN          | RAIN        |
| <b>11.</b> | Jun-14-04   | 0.33          | IN          | RAIN        |
| <b>12.</b> | Jun-16-04   | 0.05          | IN          | RAIN        |
| <b>13.</b> | Jun-17-04   | 0.19          | IN          | RAIN        |
| <b>14.</b> | Jun-18-04   | 1.96          | IN          | RAIN        |
| <b>15.</b> | 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 <sup>1</sup> | Rate  | Appln                   | CORN              | COWPEA          | SNAPBEAN        | SUSQUASH        | MUSKMELL        | CUCUMBER        | TOMATOE         |
|------------------------|-------|-------------------------|-------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|                        |       |                         | ZEAMS<br>INJURY   | VIGSC<br>INJURY | PHSVN<br>INJURY | CUUPE<br>INJURY | CUMMC<br>INJURY | CUMSA<br>INJURY | LYPES<br>INJURY |
|                        |       |                         | 6/20 <sup>2</sup> | 6/20            | 6/20            | 6/20            | 6/20            | 6/20            | 6/20            |
|                        |       |                         | %                 | %               | %               | %               | %               | %               | %               |
| Clopyralid             | 0.18  | LB A/A<br>timing<br>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              |

<sup>1</sup> Applied preplant to soil surface 5/17

<sup>2</sup> Roto-tilled and planted 5/17

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

| Treatment <sup>1</sup> | Rate   | Appln  | CORN              | COWPEA          | SNAPBEAN        | SUSQUASH        | MUSKMELL        | CUCUMBER        | TOMATO          |
|------------------------|--------|--------|-------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|                        |        |        | ZEAMS<br>INJURY   | VIGSC<br>INJURY | PHSVN<br>INJURY | CUUPE<br>INJURY | CUMMC<br>INJURY | CUMSA<br>INJURY | LYPES<br>INJURY |
|                        |        |        | 7/14 <sup>2</sup> | 7/14            | 7/14            | 7/14            | 7/14            | 7/14            | 7/14            |
|                        | LB A/A | timing | %                 | %               | %               | %               | % <sup>3</sup>  | %               | %               |
| 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              |

<sup>1</sup> applied to soil surface 5/16

<sup>2</sup> Roto-tilled and planted 6/15

<sup>3</sup> Crop failure

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

| Treatment <sup>1</sup> | Rate   | Appln  | CORN              | COWPEA          | SNAPBEAN        | SUSQUASH        | MUSKMELL        | CUCUMBER        | TOMATOE         |
|------------------------|--------|--------|-------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|                        |        |        | ZEAMS<br>INJURY   | VIGSC<br>INJURY | PHSVN<br>INJURY | CUUPE<br>INJURY | CUMMC<br>INJURY | CUMSA<br>INJURY | LYPES<br>INJURY |
|                        |        |        | 8/13 <sup>2</sup> | 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               |

<sup>1</sup> Applied preplant to soil surface 5/17

<sup>2</sup> Roto-tilled and planted 7/15

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

| Treatment <sup>1</sup> | Rate           | Appln         | CORN                                | PEA                    | SNAPBEAN               | SQUASH                 | MELON                  | CUC                    | TOMATO                 |
|------------------------|----------------|---------------|-------------------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
|                        |                |               | ZEAMS<br>INJURY<br>9/1 <sup>2</sup> | VIGSC<br>INJURY<br>9/9 | PHSVN<br>INJURY<br>9/9 | CUUPE<br>INJURY<br>9/9 | CUMMC<br>INJURY<br>9/9 | CUMSA<br>INJURY<br>9/9 | LYPES<br>INJURY<br>9/9 |
| Clopyralid             | LB A/A<br>0.18 | timing<br>PPI | %<br>0                              | %<br>0                 | %<br>0                 | %<br>0                 | %<br>0                 | %<br>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                      |

<sup>1</sup> Applied preplant to soil surface 5/17

<sup>2</sup> Roto-tilled and planted 8/15

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

| Treatment <sup>1</sup> | Rate           | Appln         | CORN<br>ZEAMS<br>INJURY<br>10/19 <sup>2</sup> | PEA<br>VIGSC<br>INJURY<br>10/19 | SNAPBEAN<br>PHSVN<br>INJURY<br>10/19 | SQUASH<br>CUUPE<br>INJURY<br>10/19 | MELON<br>CUMMC<br>INJURY<br>10/19 | CUC<br>CUMSA<br>INJURY<br>10/19 | TOMATO<br>LYPES<br>INJURY<br>10/19 |
|------------------------|----------------|---------------|-----------------------------------------------|---------------------------------|--------------------------------------|------------------------------------|-----------------------------------|---------------------------------|------------------------------------|
| Clopyralid             | LB A/A<br>0.18 | timing<br>PPI | %<br>0                                        | %<br>0                          | %<br>0                               | %<br>0                             | %<br>0                            | %<br>0                          | %<br>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                                  |

<sup>1</sup> Applied preplant to soil surface 5/17

<sup>2</sup> 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

|     | <b>Date</b> | <b>Amount</b> | <b>Unit Type</b> |            |
|-----|-------------|---------------|------------------|------------|
| 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 <sup>1</sup> | Rate    | Appln<br>timing | CABBAGE                    | KALE          | MUSTARD       | COLLARD       | SPINACH       | TURNIP        |
|------------------------|---------|-----------------|----------------------------|---------------|---------------|---------------|---------------|---------------|
|                        |         |                 | INJURY<br>9/9 <sup>2</sup> | INJURY<br>9/9 | INJURY<br>9/9 | INJURY<br>9/9 | INJURY<br>9/9 | INJURY<br>9/9 |
|                        |         |                 | %                          | %             | %             | %             | %             | %             |
| 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            |

<sup>1</sup> applied to soil surface 7/16

<sup>2</sup> Planted 8/15

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

| Treatment <sup>1</sup> | Rate    | Appln<br>timing | CABBAGE                      | KALE            | MUSTARD         | COLLARD         | SPINACH         | TURNIP          |
|------------------------|---------|-----------------|------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|                        |         |                 | INJURY<br>10/25 <sup>2</sup> | INJURY<br>10/25 | INJURY<br>10/25 | INJURY<br>10/25 | INJURY<br>10/25 | INJURY<br>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              |

<sup>1</sup> applied to soil surface 7/16

<sup>2</sup> Planted 9/15

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

| Treatment <sup>1</sup> | Rate    | Appln<br>timing | CABBAGE                      | KALE            | MUSTARD         | COLLARDS        | SPINACH         | TURNIP          |
|------------------------|---------|-----------------|------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|                        |         |                 | INJURY<br>11/12 <sup>2</sup> | INJURY<br>11/12 | INJURY<br>11/12 | INJURY<br>11/12 | INJURY<br>11/12 | INJURY<br>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              |

<sup>1</sup> applied to soil surface 7/16

<sup>2</sup> 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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