

Performance of residual herbicides in glyphosate-resistant soybean

Trial ID: SOY06-09  
Conducted: C-14

Study Dir.: Sprague, Powell  
Investigator: Christy Sprague

Date Planted: 5/18/09  
Variety: Pioneer 92M61 RR  
Population: 156,000  
Soil Type: Clay Loam  
Plot Size: 10 X 30 FT  
Row Spacing: 30 IN  
No. of Reps: 4  
% OM: 2.5  
pH: 7.0  
Design: RANDOMIZED COMPLETE BLOCK

Tillage: Fall moldboard plow, spring soil finished twice  
Fertilizer: None

Crop and Weed Description

| Weed | Code  | Common Name            | Scientific Name              |
|------|-------|------------------------|------------------------------|
| 1.   | AMBEL | RAGWEED, COMMON        | AMBROSIA ARTEMISIFOLIA L.    |
| 2.   | ANGR  | mainly foxtail species | SETARIA SP.                  |
| 3.   | ABUTH | VELVETLEAF             | ABUTILON THEOPHRASTI MEDIK.  |
| 4.   | CHEAL | LAMBSQUARTERS, COMMON  | CHENOPODIUM ALBUM L.         |
| 5.   | AMAPO | AMARANTH, POWELL       | AMARANTHUS POWELLII S. WATS. |
| Crop | Code  | Common Name            |                              |
| 1.   | GLXMA | SOYBEAN                |                              |

Application Description

|                       | A        | B        |
|-----------------------|----------|----------|
| Application Timing:   | PRE      | POST     |
| Date Treated:         | 5/18/09  | 6/24/09  |
| Time Treated:         | 6:00 pm  | 11:15 am |
| % Cloud Cover:        | 0        | 0        |
| Air Temp., Unit:      | 70 F     | 93 F     |
| % Relative Humidity:  | 20       | 56       |
| Wind Speed/Unit/Dir:  | 5 mph SW | 2 mph SW |
| Soil Temp., Unit:     | 65 F     | 75 F     |
| Soil/Leaf Surface M:  | 5 5      | 3 5      |
| Soil Moist (1=w 5=d): | 3        | 3        |

Crop Stage at Each Application

|               | A     | B     |
|---------------|-------|-------|
| Crop Name:    | GLXMA | GLXMA |
| Height (In.): | -     | 8     |
| Stage (L):    | -     | V3    |

Weed Stage at Each Application

|               | A     | B     |
|---------------|-------|-------|
| Weed 1 Name:  | AMBEL | AMBEL |
| Height (In.): | -     | 4     |
| Stage (L):    | -     | many  |
| Weed 2 Name:  | ANGR  | ANGR  |
| Height (In.): | -     | 6     |
| Stage (L):    | -     | 4     |
| Weed 3 Name:  | ABUTH | ABUTH |
| Height (In.): | -     | 3     |
| Stage (L):    | -     | 4     |
| Weed 4 Name:  | CHEAL | CHEAL |
| Height (In.): | -     | 3     |
| Stage (L):    | -     | many  |
| Weed 5 Name:  | AMAPO | AMAPO |
| Height (In.): | -     | 2     |
| Stage (L):    | -     | 8     |

Weed Density (plants/sq. ft.)

| Weed Name: | 1  | 2  | 3  | 4  | 5  |
|------------|----|----|----|----|----|
| ANGR       | 20 | 16 | <1 | <1 | <1 |
| AMBEL      |    |    |    |    |    |
| ABUTH      |    |    |    |    |    |
| CHEAL      |    |    |    |    |    |
| AMAPO      |    |    |    |    |    |

Application Equipment

| Appl | Sprayer Type | Speed MPH | Nozzle Type | Nozzle Size | Nozzle Height | Nozzle Spacing | Boom Width | GPA | Carrier | PSI |
|------|--------------|-----------|-------------|-------------|---------------|----------------|------------|-----|---------|-----|
| A    | Cub          | 3.8       | AirMix      | 11003       | 23"           | 20"            | 100"       | 19  | Water   | 28  |
| B    | Cub          | 3.8       | AirMix      | 11003       | 27"           | 20"            | 100"       | 19  | Water   | 28  |



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| Weed Code | Crop Code | Rating Data Type | Rating Unit | Rating Date | Tri-Eval Interval | GLXMA injury percent | GLXMA injury percent | ANGR control percent | AMBEL control percent | ABUTH control percent | CHEAL control percent | AMAPO control percent | GLXMA injury percent | ANGR control percent |
|-----------|-----------|------------------|-------------|-------------|-------------------|----------------------|----------------------|----------------------|-----------------------|-----------------------|-----------------------|-----------------------|----------------------|----------------------|
|           |           |                  |             |             |                   | 6/10/09              | 6/16/09              | 6/16/09              | 6/16/09               | 6/16/09               | 6/16/09               | 6/16/09               | 7/21/09              | 7/21/09              |
|           |           |                  |             |             |                   | 23 DA-A              | 29 DA-A              | 29 DA-A              | 29 DA-A               | 29 DA-A               | 29 DA-A               | 29 DA-A               | 27 DA-B              | 27 DA-B              |

| Trt No. | Treatment Name   | Form Conc | Form Type | Rate | Rate Unit  | Grow Stg | Appl Code |   |    |    |    |    |    |    |   |    |
|---------|------------------|-----------|-----------|------|------------|----------|-----------|---|----|----|----|----|----|----|---|----|
| 17      | Prefix           | 5.29      | L         | 2    | pt/a       | PRE      | A         | 6 | 18 | 95 | 81 | 58 | 92 | 99 | 0 | 97 |
| 17      | Roundup PowerMax | 4.5       | L         | 22   | fl oz/a    | POST     | B         |   |    |    |    |    |    |    |   |    |
| 17      | AMS              |           | WG        | 17   | lb/100 gal | POST     | B         |   |    |    |    |    |    |    |   |    |
| 18      | Extreme          | 2.17      | L         | 3    | pt/a       | PRE      | A         | 1 | 4  | 90 | 35 | 99 | 99 | 99 | 1 | 96 |
| 18      | Roundup PowerMax | 4.5       | L         | 22   | fl oz/a    | POST     | B         |   |    |    |    |    |    |    |   |    |
| 18      | AMS              |           | WG        | 17   | lb/100 gal | POST     | B         |   |    |    |    |    |    |    |   |    |
| 19      | Boundary         | 6.5       | EC        | 1.5  | pt/a       | PRE      | A         | 5 | 18 | 97 | 50 | 82 | 98 | 99 | 0 | 98 |
| 19      | Roundup PowerMax | 4.5       | L         | 22   | fl oz/a    | POST     | B         |   |    |    |    |    |    |    |   |    |
| 19      | AMS              |           | WG        | 17   | lb/100 gal | POST     | B         |   |    |    |    |    |    |    |   |    |
| 20      | Authority Assist | 4         | L         | 5    | fl oz/a    | PRE      | A         | 0 | 4  | 75 | 43 | 98 | 99 | 99 | 1 | 95 |
| 20      | Roundup PowerMax | 4.5       | L         | 22   | fl oz/a    | POST     | B         |   |    |    |    |    |    |    |   |    |
| 20      | AMS              |           | WG        | 17   | lb/100 gal | POST     | B         |   |    |    |    |    |    |    |   |    |
| 21      | Authority MTZ    | 45        | WG        | 10   | oz/a       | PRE      | A         | 1 | 6  | 71 | 45 | 97 | 99 | 99 | 1 | 96 |
| 21      | Roundup PowerMax | 4.5       | L         | 22   | fl oz/a    | POST     | B         |   |    |    |    |    |    |    |   |    |
| 21      | AMS              |           | WG        | 17   | lb/100 gal | POST     | B         |   |    |    |    |    |    |    |   |    |
| 22      | Sharpen          | 2.85      | L         | 1    | fl oz/a    | PRE      | A         | 3 | 3  | 11 | 45 | 91 | 98 | 99 | 0 | 96 |
| 22      | Roundup PowerMax | 4.5       | L         | 22   | fl oz/a    | POST     | B         |   |    |    |    |    |    |    |   |    |
| 22      | AMS              |           | WG        | 17   | lb/100 gal | POST     | B         |   |    |    |    |    |    |    |   |    |
| 23      | Sharpen          | 2.85      | L         | 2    | fl oz/a    | PRE      | A         | 1 | 4  | 15 | 60 | 99 | 98 | 99 | 0 | 96 |
| 23      | Roundup PowerMax | 4.5       | L         | 22   | fl oz/a    | POST     | B         |   |    |    |    |    |    |    |   |    |
| 23      | AMS              |           | WG        | 17   | lb/100 gal | POST     | B         |   |    |    |    |    |    |    |   |    |
| 24      | Roundup PowerMax | 4.5       | L         | 22   | fl oz/a    | POST     | B         | 0 | 0  | 0  | 0  | 0  | 0  | 0  | 0 | 98 |
| 24      | AMS              |           | WG        | 17   | lb/100 gal | POST     | B         |   |    |    |    |    |    |    |   |    |

|                    |      |       |       |       |       |     |      |        |      |
|--------------------|------|-------|-------|-------|-------|-----|------|--------|------|
| LSD (P=.05)        | 7.2  | 9.5   | 18.1  | 16.3  | 12.9  | 5.3 | 0.3  | 4.6    | 2.1  |
| Standard Deviation | 5.1  | 6.7   | 12.8  | 11.5  | 9.1   | 3.8 | 0.2  | 3.2    | 1.5  |
| CV                 | 47.2 | 37.71 | 19.07 | 22.16 | 11.48 | 4.2 | 0.23 | 120.43 | 1.61 |

MSU Weed Science Research Program

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| Weed Code         | AMBEL   | CHEAL   | ABUTH   | GLXMA    | GLXMA    |
|-------------------|---------|---------|---------|----------|----------|
| Crop Code         |         |         |         | moisture | yield    |
| Rating Data Type  | control | control | control | percent  | bu/acre  |
| Rating Unit       | percent | percent | percent | percent  | bu/acre  |
| Rating Date       | 7/21/09 | 7/21/09 | 7/21/09 | 10/15/09 | 10/15/09 |
| Trt-Eval Interval | 27 DA-B | 27 DA-B | 27 DA-B | 150 DA-A | at 13% M |

| Trt No. | Treatment Name        | Form Conc | Form Type | Rate | Rate Unit  | Grow Stg | Appl Code | AMBEL | CHEAL | ABUTH | GLXMA moisture percent | GLXMA yield bu/acre |
|---------|-----------------------|-----------|-----------|------|------------|----------|-----------|-------|-------|-------|------------------------|---------------------|
| 1       | Optill                | 68        | WG        | 2    | oz/a       | PRE      | A         | 99    | 99    | 99    | 13.9                   | 74.3                |
| 1       | Roundup PowerMax      | 4.5       | L         | 22   | fl oz/a    | POST     | B         |       |       |       |                        |                     |
| 1       | AMS                   |           | WG        | 17   | lb/100 gal | POST     | B         |       |       |       |                        |                     |
| 2       | Optill                | 68        | WG        | 2    | oz/a       | PRE      | A         | 99    | 99    | 99    | 14.1                   | 69.4                |
| 2       | Prowl H2O             | 3.8       | L         | 2    | pt/a       | PRE      | A         |       |       |       |                        |                     |
| 2       | Roundup PowerMax      | 4.5       | L         | 22   | fl oz/a    | POST     | B         |       |       |       |                        |                     |
| 2       | AMS                   |           | WG        | 17   | lb/100 gal | POST     | B         |       |       |       |                        |                     |
| 3       | Valor XLT             | 40.3      | WG        | 3    | oz/a       | PRE      | A         | 99    | 99    | 99    | 13.6                   | 65.1                |
| 3       | Roundup PowerMax      | 4.5       | L         | 22   | fl oz/a    | POST     | B         |       |       |       |                        |                     |
| 3       | AMS                   |           | WG        | 17   | lb/100 gal | POST     | B         |       |       |       |                        |                     |
| 4       | Sonic/Authority First | 70        | WG        | 3    | oz/a       | PRE      | A         | 98    | 99    | 98    | 13.6                   | 75.8                |
| 4       | Roundup PowerMax      | 4.5       | L         | 22   | fl oz/a    | POST     | B         |       |       |       |                        |                     |
| 4       | AMS                   |           | WG        | 17   | lb/100 gal | POST     | B         |       |       |       |                        |                     |
| 5       | Sonic                 | 70        | WG        | 4.5  | oz/a       | PRE      | A         | 99    | 99    | 99    | 13.9                   | 71.4                |
| 5       | Roundup PowerMax      | 4.5       | L         | 22   | fl oz/a    | POST     | B         |       |       |       |                        |                     |
| 5       | AMS                   |           | WG        | 17   | lb/100 gal | POST     | B         |       |       |       |                        |                     |
| 6       | Linex                 | 4         | L         | 1    | pt/a       | PRE      | A         | 99    | 99    | 99    | 14.0                   | 73.0                |
| 6       | Roundup PowerMax      | 4.5       | L         | 22   | fl oz/a    | POST     | B         |       |       |       |                        |                     |
| 6       | AMS                   |           | WG        | 17   | lb/100 gal | POST     | B         |       |       |       |                        |                     |
| 7       | FirstRate             | 84        | WG        | 0.3  | oz/a       | PRE      | A         | 98    | 99    | 99    | 13.9                   | 72.3                |
| 7       | Roundup PowerMax      | 4.5       | L         | 22   | fl oz/a    | POST     | B         |       |       |       |                        |                     |
| 7       | AMS                   |           | WG        | 17   | lb/100 gal | POST     | B         |       |       |       |                        |                     |
| 8       | Prowl H2O             | 3.8       | L         | 2    | pt/a       | PRE      | A         | 98    | 99    | 98    | 13.8                   | 67.7                |
| 8       | Roundup PowerMax      | 4.5       | L         | 22   | fl oz/a    | POST     | B         |       |       |       |                        |                     |
| 8       | AMS                   |           | WG        | 17   | lb/100 gal | POST     | B         |       |       |       |                        |                     |
| 9       | Valor                 | 51        | WG        | 2    | oz/a       | PRE      | A         | 98    | 99    | 99    | 13.9                   | 72.3                |
| 9       | Roundup PowerMax      | 4.5       | L         | 22   | fl oz/a    | POST     | B         |       |       |       |                        |                     |
| 9       | AMS                   |           | WG        | 17   | lb/100 gal | POST     | B         |       |       |       |                        |                     |
| 10      | Valor                 | 51        | WG        | 2.5  | oz/a       | PRE      | A         | 99    | 99    | 99    | 14.1                   | 71.1                |
| 10      | Roundup PowerMax      | 4.5       | L         | 22   | fl oz/a    | POST     | B         |       |       |       |                        |                     |
| 10      | AMS                   |           | WG        | 17   | lb/100 gal | POST     | B         |       |       |       |                        |                     |
| 11      | Untreated             |           |           |      |            |          |           | 0     | 0     | 0     | 17.4                   | 31.2                |
| 12      | V-10233               | 76        | WG        | 3    | oz/a       | PRE      | A         | 99    | 99    | 99    | 14.5                   | 70.7                |
| 12      | Roundup PowerMax      | 4.5       | L         | 22   | fl oz/a    | POST     | B         |       |       |       |                        |                     |
| 12      | AMS                   |           | WG        | 17   | lb/100 gal | POST     | B         |       |       |       |                        |                     |
| 13      | V-10233               | 76        | WG        | 3.75 | oz/a       | PRE      | A         | 99    | 99    | 99    | 15.6                   | 70.6                |
| 13      | Roundup PowerMax      | 4.5       | L         | 22   | fl oz/a    | POST     | B         |       |       |       |                        |                     |
| 13      | AMS                   |           | WG        | 17   | lb/100 gal | POST     | B         |       |       |       |                        |                     |
| 14      | Gangster (2.4 oz/A)   |           |           |      |            |          |           | 99    | 99    | 99    | 14.6                   | 69.6                |
| 14      | Gangster FR           | 84        | WG        | 0.4  | oz/a       | PRE      | A         |       |       |       |                        |                     |
| 14      | Gangster V            | 51        | WG        | 2    | oz/a       | PRE      | A         |       |       |       |                        |                     |
| 14      | Roundup PowerMax      | 4.5       | L         | 22   | fl oz/a    | POST     | B         |       |       |       |                        |                     |
| 14      | AMS                   |           | WG        | 17   | lb/100 gal | POST     | B         |       |       |       |                        |                     |
| 15      | Canopy                | 75        | WG        | 2.25 | oz/a       | PRE      |           | 99    | 99    | 99    | 15.0                   | 71.9                |
| 15      | Roundup PowerMax      | 4.5       | L         | 22   | fl oz/a    | POST     | B         |       |       |       |                        |                     |
| 15      | AMS                   |           | WG        | 17   | lb/100 gal | POST     | B         |       |       |       |                        |                     |
| 16      | Envive (3.0 oz/A)     |           |           |      |            |          |           | 99    | 99    | 99    | 14.2                   | 70.8                |
| 16      | Classic               | 25        | WG        | 1.1  | oz/a       | PRE      | A         |       |       |       |                        |                     |
| 16      | Harmony SG            | 50        | WG        | 0.18 | oz/a       | PRE      | A         |       |       |       |                        |                     |
| 16      | Valor                 | 51        | WG        | 1.7  | oz/a       | PRE      | A         |       |       |       |                        |                     |
| 16      | Roundup PowerMax      | 4.5       | L         | 22   | fl oz/a    | POST     | B         |       |       |       |                        |                     |
| 16      | AMS                   |           | WG        | 17   | lb/100 gal | POST     | B         |       |       |       |                        |                     |

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| Weed Code         | AMBEL   | CHEAL   | ABUTH   | GLXMA    | GLXMA    |
|-------------------|---------|---------|---------|----------|----------|
| Crop Code         |         |         |         | moisture | yield    |
| Rating Data Type  | control | control | control | percent  | bu/acre  |
| Rating Unit       | percent | percent | percent | percent  | bu/acre  |
| Rating Date       | 7/21/09 | 7/21/09 | 7/21/09 | 10/15/09 | 10/15/09 |
| Tri-Eval Interval | 27 DA-B | 27 DA-B | 27 DA-B | 150 DA-A | at 13% M |

| Tri No.            | Treatment Name   | Form Conc | Form Type | Rate | Rate Unit  | Grow Stg | Appl Code | AMBEL | CHEAL | ABUTH | GLXMA moisture | GLXMA yield |
|--------------------|------------------|-----------|-----------|------|------------|----------|-----------|-------|-------|-------|----------------|-------------|
| 17                 | Prefix           | 5.29      | L         | 2    | pt/a       | PRE      | A         | 99    | 99    | 99    | 14.2           | 73.8        |
| 17                 | Roundup PowerMax | 4.5       | L         | 22   | fl oz/a    | POST     | B         |       |       |       |                |             |
| 17                 | AMS              |           | WG        | 17   | lb/100 gal | POST     | B         |       |       |       |                |             |
| 18                 | Extreme          | 2.17      | L         | 3    | pt/a       | PRE      | A         | 99    | 99    | 99    | 13.6           | 73.5        |
| 18                 | Roundup PowerMax | 4.5       | L         | 22   | fl oz/a    | POST     | B         |       |       |       |                |             |
| 18                 | AMS              |           | WG        | 17   | lb/100 gal | POST     | B         |       |       |       |                |             |
| 19                 | Boundary         | 6.5       | EC        | 1.5  | pt/a       | PRE      | A         | 99    | 99    | 98    | 14.4           | 74.8        |
| 19                 | Roundup PowerMax | 4.5       | L         | 22   | fl oz/a    | POST     | B         |       |       |       |                |             |
| 19                 | AMS              |           | WG        | 17   | lb/100 gal | POST     | B         |       |       |       |                |             |
| 20                 | Authority Assist | 4         | L         | 5    | fl oz/a    | PRE      | A         | 99    | 99    | 99    | 13.8           | 75.1        |
| 20                 | Roundup PowerMax | 4.5       | L         | 22   | fl oz/a    | POST     | B         |       |       |       |                |             |
| 20                 | AMS              |           | WG        | 17   | lb/100 gal | POST     | B         |       |       |       |                |             |
| 21                 | Authority MTZ    | 45        | WG        | 10   | oz/a       | PRE      | A         | 99    | 99    | 99    | 13.9           | 74.6        |
| 21                 | Roundup PowerMax | 4.5       | L         | 22   | fl oz/a    | POST     | B         |       |       |       |                |             |
| 21                 | AMS              |           | WG        | 17   | lb/100 gal | POST     | B         |       |       |       |                |             |
| 22                 | Sharpen          | 2.85      | L         | 1    | fl oz/a    | PRE      | A         | 99    | 99    | 99    | 13.5           | 74.5        |
| 22                 | Roundup PowerMax | 4.5       | L         | 22   | fl oz/a    | POST     | B         |       |       |       |                |             |
| 22                 | AMS              |           | WG        | 17   | lb/100 gal | POST     | B         |       |       |       |                |             |
| 23                 | Sharpen          | 2.85      | L         | 2    | fl oz/a    | PRE      | A         | 99    | 99    | 99    | 13.8           | 73.2        |
| 23                 | Roundup PowerMax | 4.5       | L         | 22   | fl oz/a    | POST     | B         |       |       |       |                |             |
| 23                 | AMS              |           | WG        | 17   | lb/100 gal | POST     | B         |       |       |       |                |             |
| 24                 | Roundup PowerMax | 4.5       | L         | 22   | fl oz/a    | POST     | B         | 99    | 99    | 99    | 13.8           | 74.5        |
| 24                 | AMS              |           | WG        | 17   | lb/100 gal | POST     | B         |       |       |       |                |             |
| LSD (P=.05)        |                  |           |           |      |            |          |           | 1.3   | 0.4   | 1.0   | 1.59           | 4.76        |
| Standard Deviation |                  |           |           |      |            |          |           | 0.9   | 0.3   | 0.7   | 1.13           | 3.37        |
| CV                 |                  |           |           |      |            |          |           | 0.95  | 0.3   | 0.74  | 7.92           | 4.78        |