

MSU Weed Science Research Program

The effect of preharvest herbicide treatments on three classes of dry beans

Trial ID: DB01-15  
 Conducted: SVREC

Study Dir.: Sprague and Powell  
 Investigator: Christy Sprague

**Date Planted:** Jun/04/2015                      **Row Spacing:** 30 IN  
**Variety:** see comments                      **No. of Reps:** 4  
**Population:** see comments                      **% OM:** 2.6  
**Soil Type:** Clay loam                      **pH:** 8.1  
**Plot Size:** 10 X 24 FT                      **Design:** RANDOMIZED COMPLETE BLOCK

**Tillage:** Fall-moldboard plow; spring soil finish twice  
**Fertilizer:** 280 lb/A of 17-8-15 with Mg and Zn.  
**Crop Code Common Name**  
 1. PHSSS BEAN, PHASEOLUS SP.

**Application Description**

|                              | A           | B           | C           |
|------------------------------|-------------|-------------|-------------|
| <b>Application Timing:</b>   | Zorro       | Merlin      | El Dorado   |
| <b>Date Treated:</b>         | Aug/21/2015 | Aug/25/2015 | Aug/31/2015 |
| <b>Time Treated:</b>         | 10:45 am    | 10:30 am    | 11:25 am    |
| <b>% Cloud Cover:</b>        | 5           | 100         | 100         |
| <b>Air Temp., Unit:</b>      | 76 F        | 62 F        | 70 F        |
| <b>% Relative Humidity:</b>  | 57          | 65          | 82          |
| <b>Wind Speed/Unit/Dir:</b>  | 4 mph W     | 4 mph NW    | 1 mph N     |
| <b>Soil Temp., Unit:</b>     | 70 F        | 63 F        | 68 F        |
| <b>Soil/Leaf Surface M:</b>  | 2 5         | 2 5         | 2 4         |
| <b>Soil Moist (1=w 5=d):</b> | 2           | 2           | 3           |

**Crop Stage at Each Application**

|                      | A         | B         | C         |
|----------------------|-----------|-----------|-----------|
| <b>Crop Name:</b>    | PHSSS     | PHSSS     | PHSSS     |
| <b>Height (In.):</b> | 20"       | 20"       | 19"       |
| <b>Stage (L):</b>    | 80% y.pod | 80% y.pod | 80% y.pod |

**Application Equipment**

| Appl | Sprayer Type | Speed MPH | Nozzle Type | Nozzle Size | Nozzle Height | Nozzle Spacing | Boom Width | GPA | Carrier | PSI |
|------|--------------|-----------|-------------|-------------|---------------|----------------|------------|-----|---------|-----|
| A    | Cub          | 3.8       | AIXR        | 11003       | 38"           | 20"            | 100"       | 19  | Water   | 30  |
| B    | Cub          | 3.8       | AIXR        | 11003       | 38"           | 20"            | 100"       | 19  | Water   | 30  |
| C    | Cub          | 3.8       | AIXR        | 11003       | 38"           | 20"            | 100"       | 19  | Water   | 30  |

**Comments:** 'Zorro' black beans were planted at 106,000 seeds/A. At application leaves were 70% yellow and pods were 80% yellow.  
 'Merlin' navy beans were planted at 106,000 seeds/A. At application leaves were 70% yellow and pods were 80% yellow.  
 'El Dorado' pinto beans were planted at 100,000 seeds/A. At application leaves were 10% yellow and pods were 80% yellow.  
 Eptam (1 qt/A) + Dual II Magnum (1 pt/A) was applied PPI, Raptor (3 fl oz/A) + Reflex (12 fl oz/A) + Basagran (16 fl oz/A)+ COC (1% v/v) + AMS (2.5 lb/A) was applied POST.

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Weed Code  
 Crop Code  
 Rating Data Type  
 Rating Unit  
 Rating Date  
 Trt-Eval Interval  
 # Subsamples, Dec.

PHSVX desiccation percent Aug/25/2015 4 DA-A 0  
 PHSVX desiccation percent Aug/28/2015 7 DA-A 0  
 PHSVX desiccation percent Aug/31/2015 6 DA-B 0  
 PHSVX desiccation percent Sep/03/2015 3 DA-C 0

| Trt No. | Treatment Name       | Form Conc | Form Type | Rate | Rate Unit  | Grow Stg | Appl Code | PHSVX desiccation percent Aug/25/2015 4 DA-A | PHSVX desiccation percent Aug/28/2015 7 DA-A | PHSVX desiccation percent Aug/31/2015 6 DA-B | PHSVX desiccation percent Sep/03/2015 3 DA-C |
|---------|----------------------|-----------|-----------|------|------------|----------|-----------|--|--|--|--|
| 1       | 'Zorro' - black bean |           |           |      |            |          |           | 90   | 97   | 98   | 98   |
| 1       | Sharpen              | 2.85      | L         | 1    | fl oz/a    | 80%      | A         |  |  |  |  |
| 1       | MSO                  |           | L         | 1    | % v/v      | 80%      | A         |  |  |  |  |
| 1       | AMS                  |           | WG        | 17   | lb/100 gal | 80%      | A         |  |  |  |  |
| 2       | 'Zorro' - black bean |           |           |      |            |          |           | 84   | 90   | 91   | 94   |
| 2       | Gramoxone SL         | 2         | L         | 2    | pt/a       | 80%      | A         |  |  |  |  |
| 2       | Surfactant           |           | L         | 0.25 | % v/v      | 80%      | A         |  |  |  |  |
| 3       | 'Zorro' - black bean |           |           |      |            |          |           | 85   | 94   | 96   | 97   |
| 3       | Valor                | 51        | WG        | 1.5  | oz/a       | 80%      | A         |  |  |  |  |
| 3       | MSO                  |           | L         | 1    | qt/a       | 80%      | A         |  |  |  |  |
| 4       | 'Zorro' - black bean |           |           |      |            |          |           | 66   | 85   | 95   | 98   |
| 4       | Roundup PowerMax     | 4.5       | SL        | 22   | fl oz/a    | 80%      | A         |  |  |  |  |
| 4       | AMS                  |           | WG        | 17   | lb/100 gal | 80%      | A         |  |  |  |  |
| 5       | 'Zorro' - black bean |           |           |      |            |          |           | 51   | 65   | 66   | 76   |
| 5       | Untreated            |           |           |      |            |          |           |  |  |  |  |
| 6       | 'Zorro' - black bean |           |           |      |            |          |           | 54   | 66   | 69   | 76   |
| 6       | Untreated            |           |           |      |            |          |           |  |  |  |  |
| 7       | 'Zorro' - black bean |           |           |      |            |          |           | 73   | 80   | 89   | 89   |
| 7       | Aim                  | 2         | L         | 2    | fl oz/a    | 80%      | A         |  |  |  |  |
| 7       | MSO                  |           | L         | 1    | % v/v      | 80%      | A         |  |  |  |  |
| 8       | 'Zorro' - black bean |           |           |      |            |          |           | 94   | 97   | 99   | 99   |
| 8       | Sharpen              | 2.85      | L         | 2    | fl oz/a    | 80%      | A         |  |  |  |  |
| 8       | MSO                  |           | L         | 1    | % v/v      | 80%      | A         |  |  |  |  |
| 8       | AMS                  |           | WG        | 17   | lb/100 gal | 80%      | A         |  |  |  |  |
| 9       | 'Zorro' - black bean |           |           |      |            |          |           | 88   | 98   | 99   | 99   |
| 9       | Sharpen              | 2.85      | L         | 1    | fl oz/a    | 80%      | A         |  |  |  |  |
| 9       | Roundup PowerMax     | 4.5       | SL        | 22   | fl oz/a    | 80%      | A         |  |  |  |  |
| 9       | MSO                  |           | L         | 1    | % v/v      | 80%      | A         |  |  |  |  |
| 9       | AMS                  |           | WG        | 17   | lb/100 gal | 80%      | A         |  |  |  |  |
| 10      | 'Zorro' - black bean |           |           |      |            |          |           | 97   | 99   | 99   | 99   |
| 10      | Sharpen              | 2.85      | L         | 1    | fl oz/a    | 80%      | A         |  |  |  |  |
| 10      | Gramoxone SL         | 2         | L         | 2    | pt/a       | 80%      | A         |  |  |  |  |
| 10      | MSO                  |           | L         | 1    | % v/v      | 80%      | A         |  |  |  |  |
| 10      | AMS                  |           | WG        | 17   | lb/100 gal | 80%      | A         |  |  |  |  |
| 11      | 'Merlin' - navy bean |           |           |      |            |          |           |  | 77   | 93   | 98   |
| 11      | Sharpen              | 2.85      | L         | 1    | fl oz/a    | 80%      | B         |  |  |  |  |
| 11      | MSO                  |           | L         | 1    | % v/v      | 80%      | B         |  |  |  |  |
| 11      | AMS                  |           | WG        | 17   | lb/100 gal | 80%      | B         |  |  |  |  |
| 12      | 'Merlin' - navy bean |           |           |      |            |          |           |  | 82   | 87   | 94   |
| 12      | Gramoxone SL         | 2         | L         | 2    | pt/a       | 80%      | B         |  |  |  |  |
| 12      | Surfactant           |           | L         | 0.25 | % v/v      | 80%      | B         |  |  |  |  |
| 13      | 'Merlin' - navy bean |           |           |      |            |          |           |  | 71   | 92   | 96   |
| 13      | Valor                | 51        | WG        | 1.5  | oz/a       | 80%      | B         |  |  |  |  |
| 13      | MSO                  |           | L         | 1    | qt/a       | 80%      | B         |  |  |  |  |

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 Crop Code  
 Rating Data Type  
 Rating Unit  
 Rating Date  
 Trt-Eval Interval  
 # Subsamples, Dec.

PHSVX desiccation percent  
 Aug/25/2015  
 4 DA-A  
 0

PHSVX desiccation percent  
 Aug/28/2015  
 7 DA-A  
 0

PHSVX desiccation percent  
 Aug/31/2015  
 6 DA-B  
 0

PHSVX desiccation percent  
 Sep/03/2015  
 3 DA-C  
 0

| Trt No. | Treatment Name           | Form Conc | Form Type | Rate | Rate Unit  | Grow Stg | Appl Code | PHSVX desiccation percent<br>Aug/25/2015<br>4 DA-A<br>0 | PHSVX desiccation percent<br>Aug/28/2015<br>7 DA-A<br>0 | PHSVX desiccation percent<br>Aug/31/2015<br>6 DA-B<br>0 | PHSVX desiccation percent<br>Sep/03/2015<br>3 DA-C<br>0 |
|---------|--------------------------|-----------|-----------|------|------------|----------|-----------|---|---|---|---|
| 14      | 'Merlin' - navy bean     |           |           |      |            |          |           |   | 63  | 76  | 97  |
| 14      | Roundup PowerMax         | 4.5       | SL        | 22   | fl oz/a    | 80%      | B         |   |   |   |   |
| 14      | AMS                      |           | WG        | 17   | lb/100 gal | 80%      | B         |   |   |   |   |
| 15      | 'Merlin' - navy bean     |           |           |      |            |          |           |   | 53  | 60  | 73  |
| 15      | Untreated                |           |           |      |            |          |           |   |   |   |   |
| 16      | 'Merlin' - navy bean     |           |           |      |            |          |           |   | 53  | 55  | 74  |
| 16      | Untreated                |           |           |      |            |          |           |   |   |   |   |
| 17      | 'Merlin' - navy bean     |           |           |      |            |          |           |   | 60  | 76  | 81  |
| 17      | Aim                      | 2         | L         | 2    | fl oz/a    | 80%      | B         |   |   |   |   |
| 17      | MSO                      |           | L         | 1    | % v/v      | 80%      | B         |   |   |   |   |
| 18      | 'Merlin' - navy bean     |           |           |      |            |          |           |   | 73  | 94  | 97  |
| 18      | Sharpen                  | 2.85      | L         | 2    | fl oz/a    | 80%      | B         |   |   |   |   |
| 18      | MSO                      |           | L         | 1    | % v/v      | 80%      | B         |   |   |   |   |
| 18      | AMS                      |           | WG        | 17   | lb/100 gal | 80%      | B         |   |   |   |   |
| 19      | 'Merlin' - navy bean     |           |           |      |            |          |           |   | 70  | 94  | 99  |
| 19      | Sharpen                  | 2.85      | L         | 1    | fl oz/a    | 80%      | B         |   |   |   |   |
| 19      | Roundup PowerMax         | 4.5       | SL        | 22   | fl oz/a    | 80%      | B         |   |   |   |   |
| 19      | MSO                      |           | L         | 1    | % v/v      | 80%      | B         |   |   |   |   |
| 19      | AMS                      |           | WG        | 17   | lb/100 gal | 80%      | B         |   |   |   |   |
| 20      | 'Merlin' - navy bean     |           |           |      |            |          |           |   | 86  | 93  | 98  |
| 20      | Sharpen                  | 2.85      | L         | 1    | fl oz/a    | 80%      | B         |   |   |   |   |
| 20      | Gramoxone SL             | 2         | L         | 2    | pt/a       | 80%      | B         |   |   |   |   |
| 20      | MSO                      |           | L         | 1    | % v/v      | 80%      | B         |   |   |   |   |
| 20      | AMS                      |           | WG        | 17   | lb/100 gal | 80%      | B         |   |   |   |   |
| 21      | 'El Dorado' - pinto bean |           |           |      |            |          |           |   |   |   | 78  |
| 21      | Sharpen                  | 2.85      | L         | 1    | fl oz/a    | 80%      | C         |   |   |   |   |
| 21      | MSO                      |           | L         | 1    | % v/v      | 80%      | C         |   |   |   |   |
| 21      | AMS                      |           | WG        | 17   | lb/100 gal | 80%      | C         |   |   |   |   |
| 22      | 'El Dorado' - pinto bean |           |           |      |            |          |           |   |   |   | 81  |
| 22      | Gramoxone SL             | 2         | L         | 2    | pt/a       | 80%      | C         |   |   |   |   |
| 22      | Surfactant               |           | L         | 0.25 | % v/v      | 80%      | C         |   |   |   |   |
| 23      | 'El Dorado' - pinto bean |           |           |      |            |          |           |   |   |   | 79  |
| 23      | Valor                    | 51        | WG        | 1.5  | oz/a       | 80%      | C         |   |   |   |   |
| 23      | MSO                      |           | L         | 1    | qt/a       | 80%      | C         |   |   |   |   |
| 24      | 'El Dorado' - pinto bean |           |           |      |            |          |           |   |   |   | 60  |
| 24      | Roundup PowerMax         | 4.5       | SL        | 22   | fl oz/a    | 80%      | C         |   |   |   |   |
| 24      | AMS                      |           | WG        | 17   | lb/100 gal | 80%      | C         |   |   |   |   |
| 25      | 'El Dorado' - pinto bean |           |           |      |            |          |           |   |   |   | 51  |
| 25      | Untreated                |           |           |      |            |          |           |   |   |   |   |
| 26      | 'El Dorado' - pinto bean |           |           |      |            |          |           |   |   |   | 53  |
| 26      | Untreated                |           |           |      |            |          |           |   |   |   |   |
| 27      | 'El Dorado' - pinto bean |           |           |      |            |          |           |   |   |   | 66  |
| 27      | Aim                      | 2         | L         | 2    | fl oz/a    | 80%      | C         |   |   |   |   |
| 27      | MSO                      |           | L         | 1    | % v/v      | 80%      | C         |   |   |   |   |

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Weed Code

Crop Code

Rating Data Type

Rating Unit

Rating Date

Trt-Eval Interval

# Subsamples, Dec.

| PHSVX<br>desiccation<br>percent<br>Aug/25/2015<br>4 DA-A | PHSVX<br>desiccation<br>percent<br>Aug/28/2015<br>7 DA-A | PHSVX<br>desiccation<br>percent<br>Aug/31/2015<br>6 DA-B | PHSVX<br>desiccation<br>percent<br>Sep/03/2015<br>3 DA-C |
|--|--|--|--|
| 0  | 0  | 0  | 0  |

| Trt No. | Treatment Name           | Form Conc | Form Type | Rate | Rate Unit  | Grow Stg | Appl Code |  |  |  |    |
|---------|--------------------------|-----------|-----------|------|------------|----------|-----------|--|--|--|----|
| 28      | 'El Dorado' - pinto bean |           |           |      |            |          |           |  |  |  |    |
| 28      | Sharpen                  | 2.85      | L         | 2    | fl oz/a    | 80%      | C         |  |  |  | 80 |
| 28      | MSO                      |           | L         | 1    | % v/v      | 80%      | C         |  |  |  |    |
| 28      | AMS                      |           | WG        | 17   | lb/100 gal | 80%      | C         |  |  |  |    |
| 29      | 'El Dorado' - pinto bean |           |           |      |            |          |           |  |  |  |    |
| 29      | Sharpen                  | 2.85      | L         | 1    | fl oz/a    | 80%      | C         |  |  |  | 82 |
| 29      | Roundup PowerMax         | 4.5       | SL        | 22   | fl oz/a    | 80%      | C         |  |  |  |    |
| 29      | MSO                      |           | L         | 1    | % v/v      | 80%      | C         |  |  |  |    |
| 29      | AMS                      |           | WG        | 17   | lb/100 gal | 80%      | C         |  |  |  |    |
| 30      | 'El Dorado' - pinto bean |           |           |      |            |          |           |  |  |  |    |
| 30      | Sharpen                  | 2.85      | L         | 1    | fl oz/a    | 80%      | C         |  |  |  | 89 |
| 30      | Gramoxone SL             | 2         | L         | 2    | pt/a       | 80%      | C         |  |  |  |    |
| 30      | MSO                      |           | L         | 1    | % v/v      | 80%      | C         |  |  |  |    |
| 30      | AMS                      |           | WG        | 17   | lb/100 gal | 80%      | C         |  |  |  |    |

|             |      |      |      |      |
|-------------|------|------|------|------|
| LSD (P=.05) | 3.6  | 4.0  | 4.0  | 5.2  |
| CV          | 3.14 | 3.65 | 3.32 | 4.34 |

Means followed by same letter do not significantly differ (P=.05, LSD)

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 Rating Unit  
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 Trt-Eval Interval  
 # Subsamples, Dec.

PHSVX desiccation percent  
 Sep/06/2015  
 6 DA-C  
 0

PHSVX desiccation percent  
 Sep/14/2015  
 14 DA-C  
 0

ZORRO moisture percent  
 Sep/10/2015  
 20 DA-A  
 1

ZORRO yield cwt/acre  
 Sep/10/2015  
 at 18% M  
 1

| Trt No. | Treatment Name       | Form Conc | Form Type | Rate | Rate Unit  | Grow Stg | Appl Code | PHSVX desiccation percent<br>Sep/06/2015<br>6 DA-C<br>0 | PHSVX desiccation percent<br>Sep/14/2015<br>14 DA-C<br>0 | ZORRO moisture percent<br>Sep/10/2015<br>20 DA-A<br>1 | ZORRO yield cwt/acre<br>Sep/10/2015<br>at 18% M<br>1 |
|---------|----------------------|-----------|-----------|------|------------|----------|-----------|---|--|---|--|
| 1       | 'Zorro' - black bean |           |           |      |            |          |           |   |  |   |  |
| 1       | Sharpen              | 2.85      | L         | 1    | fl oz/a    | 80%      | A         | 99  |  | 21.4  | 18.8   |
| 1       | MSO                  |           | L         | 1    | % v/v      | 80%      | A         |   |  |   |  |
| 1       | AMS                  |           | WG        | 17   | lb/100 gal | 80%      | A         |   |  |   |  |
| 2       | 'Zorro' - black bean |           |           |      |            |          |           |   |  |   |  |
| 2       | Gramoxone SL         | 2         | L         | 2    | pt/a       | 80%      | A         | 93  |  | 21.8  | 19.2   |
| 2       | Surfactant           |           | L         | 0.25 | % v/v      | 80%      | A         |   |  |   |  |
| 3       | 'Zorro' - black bean |           |           |      |            |          |           |   |  |   |  |
| 3       | Valor                | 51        | WG        | 1.5  | oz/a       | 80%      | A         | 96  |  | 21.6  | 18.0   |
| 3       | MSO                  |           | L         | 1    | qt/a       | 80%      | A         |   |  |   |  |
| 4       | 'Zorro' - black bean |           |           |      |            |          |           |   |  |   |  |
| 4       | Roundup PowerMax     | 4.5       | SL        | 22   | fl oz/a    | 80%      | A         | 99  |  | 20.5  | 20.6   |
| 4       | AMS                  |           | WG        | 17   | lb/100 gal | 80%      | A         |   |  |   |  |
| 5       | 'Zorro' - black bean |           |           |      |            |          |           |   |  |   |  |
| 5       | Untreated            |           |           |      |            |          |           | 73  |  | 21.7  | 19.5   |
| 6       | 'Zorro' - black bean |           |           |      |            |          |           |   |  |   |  |
| 6       | Untreated            |           |           |      |            |          |           | 76  |  | 21.7  | 19.7   |
| 7       | 'Zorro' - black bean |           |           |      |            |          |           |   |  |   |  |
| 7       | Aim                  | 2         | L         | 2    | fl oz/a    | 80%      | A         | 91  |  | 21.6  | 18.9   |
| 7       | MSO                  |           | L         | 1    | % v/v      | 80%      | A         |   |  |   |  |
| 8       | 'Zorro' - black bean |           |           |      |            |          |           |   |  |   |  |
| 8       | Sharpen              | 2.85      | L         | 2    | fl oz/a    | 80%      | A         | 99  |  | 21.6  | 17.2   |
| 8       | MSO                  |           | L         | 1    | % v/v      | 80%      | A         |   |  |   |  |
| 8       | AMS                  |           | WG        | 17   | lb/100 gal | 80%      | A         |   |  |   |  |
| 9       | 'Zorro' - black bean |           |           |      |            |          |           |   |  |   |  |
| 9       | Sharpen              | 2.85      | L         | 1    | fl oz/a    | 80%      | A         | 99  |  | 20.8  | 18.2   |
| 9       | Roundup PowerMax     | 4.5       | SL        | 22   | fl oz/a    | 80%      | A         |   |  |   |  |
| 9       | MSO                  |           | L         | 1    | % v/v      | 80%      | A         |   |  |   |  |
| 9       | AMS                  |           | WG        | 17   | lb/100 gal | 80%      | A         |   |  |   |  |
| 10      | 'Zorro' - black bean |           |           |      |            |          |           |   |  |   |  |
| 10      | Sharpen              | 2.85      | L         | 1    | fl oz/a    | 80%      | A         | 99  |  | 21.6  | 18.5   |
| 10      | Gramoxone SL         | 2         | L         | 2    | pt/a       | 80%      | A         |   |  |   |  |
| 10      | MSO                  |           | L         | 1    | % v/v      | 80%      | A         |   |  |   |  |
| 10      | AMS                  |           | WG        | 17   | lb/100 gal | 80%      | A         |   |  |   |  |
| 11      | 'Merlin' - navy bean |           |           |      |            |          |           |   |  |   |  |
| 11      | Sharpen              | 2.85      | L         | 1    | fl oz/a    | 80%      | B         | 98  |  |   |  |
| 11      | MSO                  |           | L         | 1    | % v/v      | 80%      | B         |   |  |   |  |
| 11      | AMS                  |           | WG        | 17   | lb/100 gal | 80%      | B         |   |  |   |  |
| 12      | 'Merlin' - navy bean |           |           |      |            |          |           |   |  |   |  |
| 12      | Gramoxone SL         | 2         | L         | 2    | pt/a       | 80%      | B         | 93  |  |   |  |
| 12      | Surfactant           |           | L         | 0.25 | % v/v      | 80%      | B         |   |  |   |  |
| 13      | 'Merlin' - navy bean |           |           |      |            |          |           |   |  |   |  |
| 13      | Valor                | 51        | WG        | 1.5  | oz/a       | 80%      | B         | 96  |  |   |  |
| 13      | MSO                  |           | L         | 1    | qt/a       | 80%      | B         |   |  |   |  |

MSU Weed Science Research Program

The effect of preharvest herbicide treatments on three classes of dry beans

Trial ID: DB01-15  
 Conducted: SVREC

Study Dir.: Sprague and Powell  
 Investigator: Christy Sprague

| Weed Code | Crop Code                | Rating Data Type | Rating Unit | Rating Date | Trt-Eval Interval | # Subsamples, Dec. | PHSVX desiccation percent | PHSVX desiccation percent | ZORRO moisture percent | ZORRO yield cwt/acre    |
|-----------|--------------------------|------------------|-------------|-------------|-------------------|--------------------|---------------------------|---------------------------|------------------------|-------------------------|
|           |                          |                  |             |             |                   |                    | Sep/06/2015<br>6 DA-C     | Sep/14/2015<br>14 DA-C    | Sep/10/2015<br>20 DA-A | Sep/10/2015<br>at 18% M |
|           |                          |                  |             |             |                   |                    | 0                         | 0                         | 1                      | 1                       |
| Trt No.   | Treatment Name           | Form Conc        | Form Type   | Rate        | Rate Unit         | Grow Stg           | Appl Code                 |                           |                        |                         |
| 14        | 'Merlin' - navy bean     |                  |             |             |                   |                    |                           |                           |                        | 99                      |
| 14        | Roundup PowerMax         | 4.5              | SL          | 22          | fl oz/a           | 80%                | B                         |                           |                        |                         |
| 14        | AMS                      |                  | WG          | 17          | lb/100 gal        | 80%                | B                         |                           |                        |                         |
| 15        | 'Merlin' - navy bean     |                  |             |             |                   |                    |                           |                           |                        | 73                      |
| 15        | Untreated                |                  |             |             |                   |                    |                           |                           |                        |                         |
| 16        | 'Merlin' - navy bean     |                  |             |             |                   |                    |                           |                           |                        | 71                      |
| 16        | Untreated                |                  |             |             |                   |                    |                           |                           |                        |                         |
| 17        | 'Merlin' - navy bean     |                  |             |             |                   |                    |                           |                           |                        | 88                      |
| 17        | Aim                      | 2                | L           | 2           | fl oz/a           | 80%                | B                         |                           |                        |                         |
| 17        | MSO                      |                  | L           | 1           | % v/v             | 80%                | B                         |                           |                        |                         |
| 18        | 'Merlin' - navy bean     |                  |             |             |                   |                    |                           |                           |                        | 98                      |
| 18        | Sharpen                  | 2.85             | L           | 2           | fl oz/a           | 80%                | B                         |                           |                        |                         |
| 18        | MSO                      |                  | L           | 1           | % v/v             | 80%                | B                         |                           |                        |                         |
| 18        | AMS                      |                  | WG          | 17          | lb/100 gal        | 80%                | B                         |                           |                        |                         |
| 19        | 'Merlin' - navy bean     |                  |             |             |                   |                    |                           |                           |                        | 99                      |
| 19        | Sharpen                  | 2.85             | L           | 1           | fl oz/a           | 80%                | B                         |                           |                        |                         |
| 19        | Roundup PowerMax         | 4.5              | SL          | 22          | fl oz/a           | 80%                | B                         |                           |                        |                         |
| 19        | MSO                      |                  | L           | 1           | % v/v             | 80%                | B                         |                           |                        |                         |
| 19        | AMS                      |                  | WG          | 17          | lb/100 gal        | 80%                | B                         |                           |                        |                         |
| 20        | 'Merlin' - navy bean     |                  |             |             |                   |                    |                           |                           |                        | 97                      |
| 20        | Sharpen                  | 2.85             | L           | 1           | fl oz/a           | 80%                | B                         |                           |                        |                         |
| 20        | Gramoxone SL             | 2                | L           | 2           | pt/a              | 80%                | B                         |                           |                        |                         |
| 20        | MSO                      |                  | L           | 1           | % v/v             | 80%                | B                         |                           |                        |                         |
| 20        | AMS                      |                  | WG          | 17          | lb/100 gal        | 80%                | B                         |                           |                        |                         |
| 21        | 'El Dorado' - pinto bean |                  |             |             |                   |                    |                           |                           |                        | 96                      |
| 21        | Sharpen                  | 2.85             | L           | 1           | fl oz/a           | 80%                | C                         |                           | 98                     |                         |
| 21        | MSO                      |                  | L           | 1           | % v/v             | 80%                | C                         |                           |                        |                         |
| 21        | AMS                      |                  | WG          | 17          | lb/100 gal        | 80%                | C                         |                           |                        |                         |
| 22        | 'El Dorado' - pinto bean |                  |             |             |                   |                    |                           |                           |                        | 80                      |
| 22        | Gramoxone SL             | 2                | L           | 2           | pt/a              | 80%                | C                         |                           | 83                     |                         |
| 22        | Surfactant               |                  | L           | 0.25        | % v/v             | 80%                | C                         |                           |                        |                         |
| 23        | 'El Dorado' - pinto bean |                  |             |             |                   |                    |                           |                           |                        | 95                      |
| 23        | Valor                    | 51               | WG          | 1.5         | oz/a              | 80%                | C                         |                           | 97                     |                         |
| 23        | MSO                      |                  | L           | 1           | qt/a              | 80%                | C                         |                           |                        |                         |
| 24        | 'El Dorado' - pinto bean |                  |             |             |                   |                    |                           |                           |                        | 75                      |
| 24        | Roundup PowerMax         | 4.5              | SL          | 22          | fl oz/a           | 80%                | C                         |                           | 94                     |                         |
| 24        | AMS                      |                  | WG          | 17          | lb/100 gal        | 80%                | C                         |                           |                        |                         |
| 25        | 'El Dorado' - pinto bean |                  |             |             |                   |                    |                           |                           |                        | 59                      |
| 25        | Untreated                |                  |             |             |                   |                    |                           |                           |                        | 60                      |
| 26        | 'El Dorado' - pinto bean |                  |             |             |                   |                    |                           |                           |                        | 59                      |
| 26        | Untreated                |                  |             |             |                   |                    |                           |                           |                        | 61                      |
| 27        | 'El Dorado' - pinto bean |                  |             |             |                   |                    |                           |                           |                        | 84                      |
| 27        | Aim                      | 2                | L           | 2           | fl oz/a           | 80%                | C                         |                           | 88                     |                         |
| 27        | MSO                      |                  | L           | 1           | % v/v             | 80%                | C                         |                           |                        |                         |

MSU Weed Science Research Program

The effect of preharvest herbicide treatments on three classes of dry beans

Trial ID: DB01-15  
 Conducted: SVREC

Study Dir.: Sprague and Powell  
 Investigator: Christy Sprague

Weed Code

Crop Code

Rating Data Type

Rating Unit

Rating Date

Trt-Eval Interval

# Subsamples, Dec.

| PHSVX<br>desiccation<br>percent<br>Sep/06/2015<br>6 DA-C<br>0 | PHSVX<br>desiccation<br>percent<br>Sep/14/2015<br>14 DA-C<br>0 | ZORRO<br>moisture<br>percent<br>Sep/10/2015<br>20 DA-A<br>1 | ZORRO<br>yield<br>cwt/acre<br>Sep/10/2015<br>at 18% M<br>1 |
|---|--|---|--|
|---|--|---|--|

| Trt No. | Treatment Name           | Form Conc | Form Type | Rate | Rate Unit  | Grow Stg | Appl Code |    |    |
|---------|--------------------------|-----------|-----------|------|------------|----------|-----------|----|----|
| 28      | 'El Dorado' - pinto bean |           |           |      |            |          |           | 97 | 99 |
| 28      | Sharpen                  | 2.85      | L         | 2    | fl oz/a    | 80%      | C         |    |    |
| 28      | MSO                      |           | L         | 1    | % v/v      | 80%      | C         |    |    |
| 28      | AMS                      |           | WG        | 17   | lb/100 gal | 80%      | C         |    |    |
| 29      | 'El Dorado' - pinto bean |           |           |      |            |          |           | 98 | 99 |
| 29      | Sharpen                  | 2.85      | L         | 1    | fl oz/a    | 80%      | C         |    |    |
| 29      | Roundup PowerMax         | 4.5       | SL        | 22   | fl oz/a    | 80%      | C         |    |    |
| 29      | MSO                      |           | L         | 1    | % v/v      | 80%      | C         |    |    |
| 29      | AMS                      |           | WG        | 17   | lb/100 gal | 80%      | C         |    |    |
| 30      | 'El Dorado' - pinto bean |           |           |      |            |          |           | 98 | 98 |
| 30      | Sharpen                  | 2.85      | L         | 1    | fl oz/a    | 80%      | C         |    |    |
| 30      | Gramoxone SL             | 2         | L         | 2    | pt/a       | 80%      | C         |    |    |
| 30      | MSO                      |           | L         | 1    | % v/v      | 80%      | C         |    |    |
| 30      | AMS                      |           | WG        | 17   | lb/100 gal | 80%      | C         |    |    |

LSD (P=.05)

CV

|      |      |      |      |
|------|------|------|------|
| 4.2  | 3.3  | 1.92 | 2.66 |
| 3.34 | 2.57 | 6.16 | 9.71 |

Means followed by same letter do not significantly differ (P=.05, LSD)

MSU Weed Science Research Program

The effect of preharvest herbicide treatments on three classes of dry beans

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 Investigator: Christy Sprague

Weed Code  
 Crop Code  
 Rating Data Type  
 Rating Unit  
 Rating Date  
 Trt-Eval Interval  
 # Subsamples, Dec.

| MERLIN<br>moisture<br>percent<br>Sep/10/2015<br>16 DA-B<br>1 | MERLIN<br>yield<br>cwt/acre<br>Sep/10/2015<br>at 18% M<br>1 | ELDORADO<br>moisture<br>percent<br>Sep/14/2015<br>14 DA-C<br>1 | ELDORADO<br>yield<br>cwt/acre<br>Sep/14/2015<br>at 18% M<br>1 |
|--|---|--|---|
|--|---|--|---|

| Trt No. | Treatment Name       | Form Conc | Form Type | Rate | Rate Unit  | Grow Stg | Appl Code |      |      |
|---------|----------------------|-----------|-----------|------|------------|----------|-----------|------|------|
| 1       | 'Zorro' - black bean |           |           |      |            |          |           |      |      |
| 1       | Sharpen              | 2.85      | L         | 1    | fl oz/a    | 80%      | A         |      |      |
| 1       | MSO                  |           | L         | 1    | % v/v      | 80%      | A         |      |      |
| 1       | AMS                  |           | WG        | 17   | lb/100 gal | 80%      | A         |      |      |
| 2       | 'Zorro' - black bean |           |           |      |            |          |           |      |      |
| 2       | Gramoxone SL         | 2         | L         | 2    | pt/a       | 80%      | A         |      |      |
| 2       | Surfactant           |           | L         | 0.25 | % v/v      | 80%      | A         |      |      |
| 3       | 'Zorro' - black bean |           |           |      |            |          |           |      |      |
| 3       | Valor                | 51        | WG        | 1.5  | oz/a       | 80%      | A         |      |      |
| 3       | MSO                  |           | L         | 1    | qt/a       | 80%      | A         |      |      |
| 4       | 'Zorro' - black bean |           |           |      |            |          |           |      |      |
| 4       | Roundup PowerMax     | 4.5       | SL        | 22   | fl oz/a    | 80%      | A         |      |      |
| 4       | AMS                  |           | WG        | 17   | lb/100 gal | 80%      | A         |      |      |
| 5       | 'Zorro' - black bean |           |           |      |            |          |           |      |      |
| 5       | Untreated            |           |           |      |            |          |           |      |      |
| 6       | 'Zorro' - black bean |           |           |      |            |          |           |      |      |
| 6       | Untreated            |           |           |      |            |          |           |      |      |
| 7       | 'Zorro' - black bean |           |           |      |            |          |           |      |      |
| 7       | Aim                  | 2         | L         | 2    | fl oz/a    | 80%      | A         |      |      |
| 7       | MSO                  |           | L         | 1    | % v/v      | 80%      | A         |      |      |
| 8       | 'Zorro' - black bean |           |           |      |            |          |           |      |      |
| 8       | Sharpen              | 2.85      | L         | 2    | fl oz/a    | 80%      | A         |      |      |
| 8       | MSO                  |           | L         | 1    | % v/v      | 80%      | A         |      |      |
| 8       | AMS                  |           | WG        | 17   | lb/100 gal | 80%      | A         |      |      |
| 9       | 'Zorro' - black bean |           |           |      |            |          |           |      |      |
| 9       | Sharpen              | 2.85      | L         | 1    | fl oz/a    | 80%      | A         |      |      |
| 9       | Roundup PowerMax     | 4.5       | SL        | 22   | fl oz/a    | 80%      | A         |      |      |
| 9       | MSO                  |           | L         | 1    | % v/v      | 80%      | A         |      |      |
| 9       | AMS                  |           | WG        | 17   | lb/100 gal | 80%      | A         |      |      |
| 10      | 'Zorro' - black bean |           |           |      |            |          |           |      |      |
| 10      | Sharpen              | 2.85      | L         | 1    | fl oz/a    | 80%      | A         |      |      |
| 10      | Gramoxone SL         | 2         | L         | 2    | pt/a       | 80%      | A         |      |      |
| 10      | MSO                  |           | L         | 1    | % v/v      | 80%      | A         |      |      |
| 10      | AMS                  |           | WG        | 17   | lb/100 gal | 80%      | A         |      |      |
| 11      | 'Merlin' - navy bean |           |           |      |            |          |           | 21.1 | 23.7 |
| 11      | Sharpen              | 2.85      | L         | 1    | fl oz/a    | 80%      | B         |      |      |
| 11      | MSO                  |           | L         | 1    | % v/v      | 80%      | B         |      |      |
| 11      | AMS                  |           | WG        | 17   | lb/100 gal | 80%      | B         |      |      |
| 12      | 'Merlin' - navy bean |           |           |      |            |          |           | 21.0 | 24.9 |
| 12      | Gramoxone SL         | 2         | L         | 2    | pt/a       | 80%      | B         |      |      |
| 12      | Surfactant           |           | L         | 0.25 | % v/v      | 80%      | B         |      |      |
| 13      | 'Merlin' - navy bean |           |           |      |            |          |           | 21.2 | 24.4 |
| 13      | Valor                | 51        | WG        | 1.5  | oz/a       | 80%      | B         |      |      |
| 13      | MSO                  |           | L         | 1    | qt/a       | 80%      | B         |      |      |



MSU Weed Science Research Program

The effect of preharvest herbicide treatments on three classes of dry beans

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Study Dir.: Sprague and Powell  
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Weed Code  
 Crop Code  
 Rating Data Type  
 Rating Unit  
 Rating Date  
 Trt-Eval Interval  
 # Subsamples, Dec.

| MERLIN<br>moisture<br>percent<br>Sep/10/2015<br>16 DA-B<br>1 | MERLIN<br>yield<br>cwt/acre<br>Sep/10/2015<br>at 18% M<br>1 | ELDORADO<br>moisture<br>percent<br>Sep/14/2015<br>14 DA-C<br>1 | ELDORADO<br>yield<br>cwt/acre<br>Sep/14/2015<br>at 18% M<br>1 |
|--|---|--|---|
|--|---|--|---|

| Trt No. | Treatment Name           | Form Conc | Form Type | Rate | Rate Unit  | Grow Stg | Appl Code |      |      |
|---------|--------------------------|-----------|-----------|------|------------|----------|-----------|------|------|
| 14      | 'Merlin' - navy bean     |           |           |      |            |          |           | 21.3 | 24.9 |
| 14      | Roundup PowerMax         | 4.5       | SL        | 22   | fl oz/a    | 80%      | B         |      |      |
| 14      | AMS                      |           | WG        | 17   | lb/100 gal | 80%      | B         |      |      |
| 15      | 'Merlin' - navy bean     |           |           |      |            |          |           | 22.8 | 23.8 |
| 15      | Untreated                |           |           |      |            |          |           |      |      |
| 16      | 'Merlin' - navy bean     |           |           |      |            |          |           | 21.9 | 24.1 |
| 16      | Untreated                |           |           |      |            |          |           |      |      |
| 17      | 'Merlin' - navy bean     |           |           |      |            |          |           | 21.9 | 25.4 |
| 17      | Aim                      | 2         | L         | 2    | fl oz/a    | 80%      | B         |      |      |
| 17      | MSO                      |           | L         | 1    | % v/v      | 80%      | B         |      |      |
| 18      | 'Merlin' - navy bean     |           |           |      |            |          |           | 21.0 | 22.7 |
| 18      | Sharpen                  | 2.85      | L         | 2    | fl oz/a    | 80%      | B         |      |      |
| 18      | MSO                      |           | L         | 1    | % v/v      | 80%      | B         |      |      |
| 18      | AMS                      |           | WG        | 17   | lb/100 gal | 80%      | B         |      |      |
| 19      | 'Merlin' - navy bean     |           |           |      |            |          |           | 20.3 | 24.4 |
| 19      | Sharpen                  | 2.85      | L         | 1    | fl oz/a    | 80%      | B         |      |      |
| 19      | Roundup PowerMax         | 4.5       | SL        | 22   | fl oz/a    | 80%      | B         |      |      |
| 19      | MSO                      |           | L         | 1    | % v/v      | 80%      | B         |      |      |
| 19      | AMS                      |           | WG        | 17   | lb/100 gal | 80%      | B         |      |      |
| 20      | 'Merlin' - navy bean     |           |           |      |            |          |           | 20.8 | 22.7 |
| 20      | Sharpen                  | 2.85      | L         | 1    | fl oz/a    | 80%      | B         |      |      |
| 20      | Gramoxone SL             | 2         | L         | 2    | pt/a       | 80%      | B         |      |      |
| 20      | MSO                      |           | L         | 1    | % v/v      | 80%      | B         |      |      |
| 20      | AMS                      |           | WG        | 17   | lb/100 gal | 80%      | B         |      |      |
| 21      | 'El Dorado' - pinto bean |           |           |      |            |          |           |      |      |
| 21      | Sharpen                  | 2.85      | L         | 1    | fl oz/a    | 80%      | C         | 19.5 | 17.6 |
| 21      | MSO                      |           | L         | 1    | % v/v      | 80%      | C         |      |      |
| 21      | AMS                      |           | WG        | 17   | lb/100 gal | 80%      | C         |      |      |
| 22      | 'El Dorado' - pinto bean |           |           |      |            |          |           | 20.3 | 19.8 |
| 22      | Gramoxone SL             | 2         | L         | 2    | pt/a       | 80%      | C         |      |      |
| 22      | Surfactant               |           | L         | 0.25 | % v/v      | 80%      | C         |      |      |
| 23      | 'El Dorado' - pinto bean |           |           |      |            |          |           | 18.8 | 20.9 |
| 23      | Valor                    | 51        | WG        | 1.5  | oz/a       | 80%      | C         |      |      |
| 23      | MSO                      |           | L         | 1    | qt/a       | 80%      | C         |      |      |
| 24      | 'El Dorado' - pinto bean |           |           |      |            |          |           | 17.8 | 20.7 |
| 24      | Roundup PowerMax         | 4.5       | SL        | 22   | fl oz/a    | 80%      | C         |      |      |
| 24      | AMS                      |           | WG        | 17   | lb/100 gal | 80%      | C         |      |      |
| 25      | 'El Dorado' - pinto bean |           |           |      |            |          |           | 23.4 | 20.6 |
| 25      | Untreated                |           |           |      |            |          |           |      |      |
| 26      | 'El Dorado' - pinto bean |           |           |      |            |          |           | 20.2 | 20.4 |
| 26      | Untreated                |           |           |      |            |          |           |      |      |
| 27      | 'El Dorado' - pinto bean |           |           |      |            |          |           | 18.0 | 21.0 |
| 27      | Aim                      | 2         | L         | 2    | fl oz/a    | 80%      | C         |      |      |
| 27      | MSO                      |           | L         | 1    | % v/v      | 80%      | C         |      |      |

MSU Weed Science Research Program

The effect of preharvest herbicide treatments on three classes of dry beans

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 Conducted: SVREC

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Weed Code

Crop Code

Rating Data Type

Rating Unit

Rating Date

Trt-Eval Interval

# Subsamples, Dec.

| MERLIN<br>moisture<br>percent<br>Sep/10/2015<br>16 DA-B<br>1 | MERLIN<br>yield<br>cwt/acre<br>Sep/10/2015<br>at 18% M<br>1 | ELDORADO<br>moisture<br>percent<br>Sep/14/2015<br>14 DA-C<br>1 | ELDORADO<br>yield<br>cwt/acre<br>Sep/14/2015<br>at 18% M<br>1 |
|--|---|--|---|
|--|---|--|---|

| Trt No.     | Treatment Name           | Form Conc | Form Type | Rate | Rate Unit  | Grow Stg | Appl Code |      |      |       |       |
|-------------|--------------------------|-----------|-----------|------|------------|----------|-----------|------|------|-------|-------|
| 28          | 'El Dorado' - pinto bean |           |           |      |            |          |           | 19.0 | 18.2 |       |       |
| 28          | Sharpen                  | 2.85      | L         | 2    | fl oz/a    | 80%      | C         |      |      |       |       |
| 28          | MSO                      |           | L         | 1    | % v/v      | 80%      | C         |      |      |       |       |
| 28          | AMS                      |           | WG        | 17   | lb/100 gal | 80%      | C         |      |      |       |       |
| 29          | 'El Dorado' - pinto bean |           |           |      |            |          |           | 19.1 | 20.2 |       |       |
| 29          | Sharpen                  | 2.85      | L         | 1    | fl oz/a    | 80%      | C         |      |      |       |       |
| 29          | Roundup PowerMax         | 4.5       | SL        | 22   | fl oz/a    | 80%      | C         |      |      |       |       |
| 29          | MSO                      |           | L         | 1    | % v/v      | 80%      | C         |      |      |       |       |
| 29          | AMS                      |           | WG        | 17   | lb/100 gal | 80%      | C         |      |      |       |       |
| 30          | 'El Dorado' - pinto bean |           |           |      |            |          |           | 20.5 | 18.2 |       |       |
| 30          | Sharpen                  | 2.85      | L         | 1    | fl oz/a    | 80%      | C         |      |      |       |       |
| 30          | Gramoxone SL             | 2         | L         | 2    | pt/a       | 80%      | C         |      |      |       |       |
| 30          | MSO                      |           | L         | 1    | % v/v      | 80%      | C         |      |      |       |       |
| 30          | AMS                      |           | WG        | 17   | lb/100 gal | 80%      | C         |      |      |       |       |
| LSD (P=.05) |                          |           |           |      |            |          |           | 2.04 | 2.67 | 3.72  | 3.69  |
| CV          |                          |           |           |      |            |          |           | 6.54 | 7.56 | 13.02 | 12.87 |

Means followed by same letter do not significantly differ (P=.05, LSD)