



# 2022 Wisconsin Weed Science Research Report

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**Cropping Systems Weed Science**  
UNIVERSITY OF WISCONSIN-MADISON



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The purpose of this report is to share annual research results with crop production clientele of Wisconsin. Information herein does not constitute a recommendation or endorsement of any particular product or practice. Information herein also does not replace any information presented on pesticide labels. More complete product use guidelines are given through the University of Wisconsin-Madison Division of Extension publication:

A3646, Pest Management in Wisconsin Field Crops  
Available at <https://patstore.wisc.edu>

Despite careful proof reading, there may be some typing or compilation errors in the report. Should you find any information presented to be unreasonably questionable, please contact:

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**Project Goal:** Evaluate multiple one- and two-pass corn herbicide programs for giant ragweed control and crop safety.

#### Site Description:

|                       |                                 |                        |                   |
|-----------------------|---------------------------------|------------------------|-------------------|
| <b>Location:</b>      | Janesville, WI                  | <b>Crop:</b>           | Corn              |
| <b>Field #:</b>       | 1                               | <b>Hybrid:</b>         | DKC54-38 RIB      |
| <b>Soil type:</b>     | Plano silt loam                 | <b>Planting Date:</b>  | 5/10              |
| <b>% OM:</b>          | 3.5                             | <b>Emergence Date:</b> | 5/15              |
| <b>pH:</b>            | 6.4                             | <b>Population:</b>     | 36,000 seeds/acre |
| <b>Fertilization:</b> | 195 lbs N/acre<br>29 lbs S/acre | <b>Depth:</b>          | 2 in              |
| <b>Previous crop:</b> | Soybean                         | <b>Row spacing:</b>    | 30 in             |
| <b>Tillage:</b>       | Conventional                    | <b>Plot Size:</b>      | 10 x 30 ft        |
| <b>Weed species:</b>  | giant ragweed (AMBTR)           |                        |                   |

#### Herbicide Application Information:

|                                      |            |            |
|--------------------------------------|------------|------------|
| <b>Date:</b>                         | 5/11       | 6/1        |
| <b>Treatment:</b>                    | PRE (A)    | POST (B)   |
| <b>Air Temp (°F):</b>                | 92         | 66         |
| <b>2" Soil Temp (°F):</b>            | 80         | 70         |
| <b>Soil moisture [surface]:</b>      | dry        | dry        |
| <b>RH %:</b>                         | 65         | 58         |
| <b>Cloud cover %</b>                 | 60         | 70         |
| <b>Wind speed (mph)/direction</b>    | 1-3/W      | 1-6/NW     |
| <b>Rainfall (in) 1 wk after APP:</b> | 0.35"      | 1.51"      |
| <b>GPA:</b>                          | 15         | 15         |
| <b>PSI:</b>                          | 36         | 36         |
| <b>Nozzle:</b>                       | TTI 110015 | TTI 110015 |
| <b>Nozzle spacing (in):</b>          | 20         | 20         |
| <b>Boom Height (in):</b>             | 20         | 24         |

#### Crop and weed information at application:

|                      |                 |      |                      |
|----------------------|-----------------|------|----------------------|
|                      | <b>Date:</b>    | 5/11 | 6/1                  |
| <b>Corn</b>          | <b>Height:</b>  | -    |                      |
|                      | <b>Stage:</b>   | -    | V3                   |
| <b>Giant ragweed</b> | <b>Height:</b>  | -    | 0.5-4"               |
|                      | <b>Density:</b> | -    | 8-14 ft <sup>2</sup> |

| Trt # | Treatment            | Formulation  | SOA Group | Rate       | App Timing | App Code |
|-------|----------------------|--------------|-----------|------------|------------|----------|
| 1     | Untreated Check      |              |           |            |            |          |
| 2     | TriVolt<br>atrazine  | 4.09 lb/gal  | 2, 15, 27 | 20 fl oz/a | A          | PRE      |
|       |                      | 4 lb/gal     | 5         | 2 pt/a     | A          | PRE      |
| 3     | Acuron               | 3.44 lb/gal  | 5, 15, 27 | 3 qt/a     | A          | PRE      |
| 4     | Resicore<br>atrazine | 3.29 lb/gal  | 2, 15, 27 | 3 qt/a     | A          | PRE      |
|       |                      | 4 lb/gal     | 5         | 2 pt/a     | A          | PRE      |
| 5     | TriVolt              | 4.09 lb/gal  | 2, 15, 27 | 12 fl oz/a | A          | PRE      |
|       | atrazine             | 4 lb/gal     | 5         | 1 pt/a     | A          | PRE      |
|       | DiFlexx DUO          | 2.13 lb/gal  | 4, 27     | 24 fl oz/a | B          | POST     |
|       | atrazine             | 4 lb/gal     | 5         | 1 pt/a     | B          | POST     |
|       | Roundup PowerMAX 3   | 4.8 lbae/gal | 9         | 30 fl oz/a | B          | POST     |
|       | Class Act Ridion     |              |           | 1% v/v     | B          | POST     |
| 6     | TriVolt              | 4.09 lb/gal  | 2, 15, 27 | 12 fl oz/a | A          | PRE      |
|       | atrazine             | 4 lb/gal     | 5         | 1 pt/a     | A          | PRE      |
|       | Laudis               | 3.5 lb/gal   | 27        | 3 fl oz/a  | B          | POST     |
|       | atrazine             | 4 lb/gal     | 5         | 1 pt/a     | B          | POST     |
|       | Roundup PowerMAX 3   | 4.8 lbae/gal | 9         | 30 fl oz/a | B          | POST     |
|       | AMS (liquid)         |              |           | 2.5% v/v   | B          | POST     |
| 7     | TriVolt              | 4.09 lb/gal  | 2, 15, 27 | 12 fl oz/a | A          | PRE      |
|       | atrazine             | 4 lb/gal     | 5         | 1 pt/a     | A          | PRE      |
|       | Capreno              | 3.45 lb/gal  | 2, 27     | 3 fl oz/a  | B          | POST     |
|       | atrazine             | 4 lb/gal     | 5         | 1 pt/a     | B          | POST     |
|       | AMS (liquid)         |              |           | 2.5% v/v   | B          | POST     |
| 8     | TriVolt              | 4.09 lb/gal  | 2, 15, 27 | 12 fl oz/a | A          | PRE      |
|       | atrazine             | 4 lb/gal     | 5         | 1 pt/a     | A          | PRE      |
|       | Capreno              | 3.45 lb/gal  | 2, 27     | 3 fl oz/a  | B          | POST     |
|       | atrazine             | 4 lb/gal     | 5         | 1 pt/a     | B          | POST     |
|       | Roundup PowerMAX 3   | 4.8 lbae/gal | 9         | 30 fl oz/a | B          | POST     |
| 9     | AMS (liquid)         |              |           | 2.5% v/v   | B          | POST     |
|       | TriVolt              | 4.09 lb/gal  | 2, 15, 27 | 12 fl oz/a | A          | PRE      |
|       | atrazine             | 4 lb/gal     | 5         | 1 pt/a     | A          | PRE      |
|       | Harness Max          | 3.85 lb/gal  | 15, 27    | 40 fl oz/a | B          | POST     |
|       | atrazine             | 4 lb/gal     | 5         | 1 pt/a     | B          | POST     |
| 10    | Roundup PowerMAX 3   | 4.8 lbae/gal | 9         | 30 fl oz/a | B          | POST     |
|       | AMS (liquid)         |              |           | 2.5% v/v   | B          | POST     |
|       | Lumax EZ             | 3.67 lb/gal  | 5, 15, 27 | 1.5 qt/a   | A          | PRE      |
|       | Acuron GT            | 4.3 lb/gal   | 9, 15, 27 | 3.75 pt/a  | B          | POST     |
|       | atrazine             | 4 lb/gal     | 5         | 0.7 pt/a   | B          | POST     |
|       | NIS                  |              |           | 0.25% v/v  | B          | POST     |
|       | AMS (liquid)         |              |           | 2.5% v/v   | B          | POST     |

| Trt # | Treatment          | Formulation  | SOA Group | Rate         | App Timing | App Code |
|-------|--------------------|--------------|-----------|--------------|------------|----------|
| 11    | Acuron             | 3.44 lb/gal  | 5, 15, 27 | 1.5 qt/a     | A          | PRE      |
|       | Acuron             | 3.44 lb/gal  | 5, 15, 27 | 1.5 qt/a     | B          | POST     |
|       | Roundup PowerMAX 3 | 4.8 lbae/gal | 9         | 30 fl oz/a   | B          | POST     |
|       | AMS (liquid)       |              |           | 2.5% v/v     | B          | POST     |
| 12    | Resicore           | 3.29 lb/gal  | 2, 15, 27 | 2.5 qt/a     | A          | PRE      |
|       | Shieldex           | 3.33 lb/gal  | 27        | 1.35 fl oz/a | B          | POST     |
|       | atrazine           | 4 lb/gal     | 5         | 2 pt/a       | B          | POST     |
|       | COC                |              |           | 1% v/v       | B          | POST     |
|       | AMS (liquid)       |              |           | 2.5% v/v     | B          | POST     |
| 13    | Restraint          | 6.5 lb/gal   | 15, 27    | 36 fl oz/a   | A          | PRE      |
|       | atrazine           | 4 lb/gal     | 5         | 2 pt/a       | A          | PRE      |
|       | Shieldex           | 3.33 lb/gal  | 27        | 1.35 fl oz/a | B          | POST     |
|       | atrazine           | 4 lb/gal     | 5         | 1 pt/a       | B          | POST     |
|       | COC                |              |           | 1% v/v       | B          | POST     |
|       | AMS (liquid)       |              |           | 2.5% v/v     | B          | POST     |
| 14    | Harness            | 7 lb/gal     | 15        | 2 pt/a       | A          | PRE      |
|       | Hornet WDG         | 78.5% w/w    | 2, 4      | 3 oz/a       | A          | PRE      |
|       | Impact             | 2.8 lb/gal   | 27        | 1.25 fl oz/a | B          | POST     |
|       | atrazine           | 4 lb/gal     | 5         | 1 pt/a       | B          | POST     |
|       | MSO                |              |           | 1% v/v       | B          | POST     |
|       | AMS (dry)          |              |           | 2.5 lb/a     | B          | POST     |
| 15    | Harness            | 7 lb/gal     | 15        | 2 pt/a       | A          | PRE      |
|       | Hornet WDG         | 78.5% w/w    | 2, 4      | 3 oz/a       | A          | PRE      |
|       | Sinate             | 2.57 lb/gal  | 10, 27    | 24 fl oz/a   | B          | POST     |
|       | atrazine           | 4 lb/gal     | 5         | 1 pt/a       | B          | POST     |
|       | MSO                |              |           | 1% v/v       | B          | POST     |
|       | AMS (dry)          |              |           | 2.5 lb/a     | B          | POST     |
| 16    | Verdict            | 5.57 lb/gal  | 15, 27    | 16 fl oz/a   | A          | PRE      |
|       | Status             | 56% w/w      | 4         | 5 oz/a       | B          | POST     |
|       | Roundup PowerMAX3  | 4.8 lbae/gal | 9         | 15 fl oz/a   | B          | POST     |
|       | AMS (liquid)       |              |           | 2.5% v/v     | B          | POST     |
| 17    | Verdict            | 5.57 lb/gal  | 15, 27    | 16 fl oz/a   | A          | PRE      |
|       | Armezon PRO        | 5.35 lb/gal  | 15, 27    | 16 fl oz/a   | B          | POST     |
|       | atrazine           | 4 lb/gal     | 5         | 1 pt/a       | B          | POST     |
|       | Roundup PowerMAX 3 | 4.8 lbae/gal | 9         | 15 fl oz/a   | B          | POST     |
|       | AMS (liquid)       |              |           | 2.5% v/v     | B          | POST     |
| 18    | Verdict            | 5.57 lb/gal  | 15, 27    | 10 fl oz/a   | A          | PRE      |
|       | Callisto           | 4 lb/gal     | 27        | 3 fl oz/a    | B          | POST     |
|       | Armezon PRO        | 5.35 lb/gal  | 15, 27    | 16 fl oz/a   | B          | POST     |
|       | atrazine           | 4 lb/gal     | 5         | 1 pt/a       | B          | POST     |
|       | Roundup PowerMAX 3 | 4.8 lbae/gal | 9         | 15 fl oz/a   | B          | POST     |
|       | AMS (liquid)       |              |           | 2.5% v/v     | B          | POST     |

**Adjuvants:** AMS (liquid) = AMSOL; AMS (dry) = BlueAg spray grade ammonium sulfate; Class Act Ridion = non-AMS water conditioner + NIS; COC = Crop Oil; MSO = Emulate; NIS = Prefer 90

**Trial Summary:**

The trial was established at the Rock County Farm in Janesville, WI to evaluate the weed control and crop safety of various corn herbicide programs containing atrazine. There was no significant injury from any of the herbicide programs evaluated (data not shown).

Giant ragweed was the predominant species in the trial area. Giant ragweed at this research location is a biotype with a prolonged emergence pattern as emergence typically starts in mid- to late-April and continues well into June. The average control of giant ragweed was impacted by herbicide program at all rating timings (Table 1). Very few of the PRE herbicides evaluated provided good control (>80%) 21 days after application. Giant ragweed control was much lower than expected for most of the PRE herbicides likely due to environmental conditions following application. Warm temperatures (4 consecutive days with max temperatures >85 F) and adequate soil moisture at the time of planting led to rapid giant ragweed and corn emergence. Many giant ragweed seedlings emerged within the first week of the PRE application prior an activating rain. The first rainfall event did not occur until 7 days after application and only 0.35 inches was recorded. Furthermore, a total of only 0.77 inches was recorded within two weeks of application. Under these dry conditions herbicides containing the active ingredient clopyralid tended to perform the best relative to herbicides without. A similar trend was observed in other trials at this location with clopyralid and dicamba, both group 4 herbicides.

None of the herbicide programs evaluated provided >90% control at corn harvest. Giant ragweed control was especially poor (<40%) for all the 1-pass PRE programs. 1-pass herbicide programs are not recommended in fields with heavy population densities of giant ragweed and/or biotypes with the prolonged emergence pattern similar to this location. Several of the 2-pass programs did provide good (>80%) giant ragweed control at harvest. The better performing programs typically contained mesotrione or a higher rate of atrazine in the tank at the POST application. This provided some residual control of giant ragweed that continues to emerge well into June at this location.

Corn yield was significantly impacted by herbicide program,  $p < 0.001$  (Table 1). Averaged across all treatments, yield of the 2-pass PRE *fb* POST programs = 205 bu/acre and 1-pass PRE only = 22 bu/acre. The untreated check yield = 8 bu/acre.

Plot photos from throughout the growing season are available at [Corn Herbicide Showcase: 1 and 2-Pass Programs with Atrazine](#) published on [wiscweeds.info](http://wiscweeds.info).

**Table 1.** Giant ragweed control ratings and corn grain yield for trial #22-ROK-CN02 at Janesville, WI.<sup>a</sup>

| Trt #                                      | Herbicide (rate acre <sup>-1</sup> )                                                                                             | Giant Ragweed Control (%) |                  |                  |                  | Yield <sup>b</sup><br>bu acre <sup>-1</sup> |
|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|---------------------------|------------------|------------------|------------------|---------------------------------------------|
|                                            |                                                                                                                                  | 6/1                       | 6/16             | 6/28             | 10/26            |                                             |
| 1                                          | Check Untreated                                                                                                                  | 0                         | 0                | 0                | 0                | 8 g                                         |
| <b>One-Pass – PRE (5/11)</b>               |                                                                                                                                  |                           |                  |                  |                  |                                             |
| 2                                          | TriVolt (20 oz) + atrazine (2 pt)                                                                                                | 45                        | 26               | 14               | 0                | 13 fg                                       |
| 3                                          | Acuron (3 qt)                                                                                                                    | 53                        | 27               | 21               | 6                | 15 fg                                       |
| 4                                          | Resicore (3 qt) + atrazine (2 pt)                                                                                                | 80                        | 59               | 44               | 24               | 39 f                                        |
| <b>Two-Pass – PRE (5/11) fb POST (6/1)</b> |                                                                                                                                  |                           |                  |                  |                  |                                             |
|                                            |                                                                                                                                  | <b>POST</b>               |                  |                  |                  |                                             |
| 5                                          | Trivolt (12 oz) + atrazine (1 pt) <b>fb</b><br>DiFlexx DUO (24 oz)+atrazine (1 pt)+Roundup PM3 (30 oz)+Class Act Ridion (1% v/v) | 28                        | 95               | 84               | 81               | 230 ab                                      |
| 6                                          | Trivolt (12 oz) + atrazine (1 pt) <b>fb</b><br>Laudis (3 oz) + atrazine (1 pt) + Roundup PM3 (30 oz) + AMS (2.5% v/v)            | 20                        | 92               | 80               | 76               | 215 bc                                      |
| 7                                          | Trivolt (12 oz) + atrazine (1 pt) <b>fb</b><br>Capreno (3 oz) + atrazine (1 pt) + AMS (2.5% v/v)                                 | 30                        | 86               | 74               | 63               | 162 e                                       |
| 8                                          | Trivolt (12 oz) + atrazine (1 pt) <b>fb</b><br>Capreno (3 oz) + atrazine (1 pt) + Roundup PM3 (30 oz) + AMS (2.5% v/v)           | 32                        | 93               | 79               | 74               | 184 de                                      |
| 9                                          | Trivolt (12 oz) + atrazine (1 pt) <b>fb</b><br>Harness Max (40 oz) + atrazine (1 pt) + Roundup PM3 (30 oz) + AMS (2.5% v/v)      | 45                        | 97               | 91               | 89               | 246 a                                       |
| 10                                         | Lumax EZ (1.5 qt) <b>fb</b><br>Acuron GT (3.75 pt) + atrazine (0.7 pt) + NIS (0.25% v/v) + AMS (2.5% v/v)                        | 41                        | 93               | 86               | 86               | 243 ab                                      |
| 11                                         | Acuron (1.5 qt) <b>fb</b><br>Acuron (1.5 qt) + Roundup PM3 (30 oz) + AMS (2.5% v/v)                                              | 15                        | 94               | 86               | 88               | 226 ab                                      |
| 12                                         | Resicore (2.5 qt) <b>fb</b><br>Shieldex (1.35 oz) + atrazine (2 pt) + COC (1% v/v) + AMS (2.5% v/v)                              | 71                        | 96               | 89               | 88               | 235 ab                                      |
| 13                                         | Restraint (36 oz) <b>fb</b><br>Shieldex (1.35 oz) + atrazine (1 pt) + COC (1% v/v) + AMS (2.5% v/v)                              | 68                        | 88               | 72               | 58               | 155 e                                       |
| 14                                         | Harness (2 pt) + Hornet WDG (3 oz) <b>fb</b><br>Impact (1.25 oz) + atrazine (1 pt) + MSO (1% v/v) + AMS (2.5 lb/a)               | 68                        | 89               | 74               | 67               | 171 de                                      |
| 15                                         | Harness (2 pt) + Hornet WDG (3 oz) <b>fb</b><br>Sinate (24 oz) + atrazine (1 pt) + MSO (1% v/v) + AMS (2.5 lb/a)                 | 70                        | 88               | 75               | 71               | 181 de                                      |
| 16                                         | Verdict (16 oz) <b>fb</b><br>Status (5 oz) + Roundup PM3 (15 oz) + AMS (2.5% v/v)                                                | 33                        | 94               | 84               | 79               | 219 abc                                     |
| 17                                         | Verdict (16 oz) <b>fb</b><br>Armezon PRO (16 oz) + atrazine (1 pt) + Roundup PM3 (15 oz) + AMS (2.5% v/v)                        | 19                        | 93               | 83               | 73               | 193 cd                                      |
| 18                                         | Verdict (10 oz) + Callisto (3 oz) <b>fb</b><br>Armezon PRO (16 oz) + atrazine (1 pt) + Roundup PM3 (15 oz) + AMS (2.5% v/v)      | 25                        | 94               | 83               | 81               | 216 bc                                      |
| <b>LSD (<math>\alpha=0.10</math>)</b>      |                                                                                                                                  | <b>28</b>                 | <b>8</b>         | <b>7</b>         | <b>11</b>        | <b>29</b>                                   |
| <b>p value</b>                             |                                                                                                                                  | <b>&lt;0.001</b>          | <b>&lt;0.001</b> | <b>&lt;0.001</b> | <b>&lt;0.001</b> | <b>&lt;0.001</b>                            |

<sup>a</sup>Visual control from 70-100% is illustrated on a color scale with green representing greater weed control values.<sup>b</sup>Yield values with the same letter are not significantly different.

**Project Goal:** Evaluate one-pass POST application timings of Acuron GT.

### Site Description:

|                       |                                                                                                      |                        |                   |
|-----------------------|------------------------------------------------------------------------------------------------------|------------------------|-------------------|
| <b>Location:</b>      | Arlington, WI                                                                                        | <b>Crop:</b>           | Corn              |
| <b>Field #:</b>       | 360                                                                                                  | <b>Hybrid:</b>         | NK9653-5222-EZ1   |
| <b>Soil type:</b>     | Plano silt loam                                                                                      | <b>Planting Date:</b>  | 4/29              |
| <b>% OM:</b>          | 3.6                                                                                                  | <b>Emergence Date:</b> | 5/14              |
| <b>pH:</b>            | 6.8                                                                                                  | <b>Population:</b>     | 36,000 seeds/acre |
| <b>Fertilization:</b> | 136 lbs N/acre                                                                                       | <b>Depth:</b>          | 2.25 in           |
| <b>Previous crop:</b> | Soybean                                                                                              | <b>Row spacing:</b>    | 30 in             |
| <b>Tillage:</b>       | Conventional                                                                                         | <b>Plot Size:</b>      | 10 x 30 ft        |
| <b>Weed species:</b>  | common ragweed (AMBEL), common lambsquarters (CHEAL), giant foxtail (SETFA), woolly cupgrass (ERBVI) |                        |                   |

### Herbicide Application Information:

|                                      |           |           |           |
|--------------------------------------|-----------|-----------|-----------|
| <b>Date:</b>                         | 5/19      | 5/27      | 6/2       |
| <b>Treatment:</b>                    | EPOST (A) | MPOST (B) | LPOST (C) |
| <b>Air Temp (°F):</b>                | 67        | 66        | 73        |
| <b>2" Soil Temp (°F):</b>            | 68        | 68        | 82        |
| <b>Soil moisture [surface]:</b>      | moist     | wet       | dry       |
| <b>RH %:</b>                         | 71        | 63        | 38        |
| <b>Cloud cover %</b>                 | 0         | 100       | 10        |
| <b>Wind speed (mph)/direction</b>    | 4-5/E     | 0-1/E     | 2-9/SW    |
| <b>Rainfall (in) 1 wk after APP:</b> | 1.30"     | 0.17"     | 2.58"     |
| <b>GPA:</b>                          | 15        | 15        | 15        |
| <b>PSI:</b>                          | 36        | 37        | 35        |
| <b>Nozzle:</b>                       | TT 110015 | TT 110015 | TT 110015 |
| <b>Nozzle spacing (in):</b>          | 20        | 20        | 20        |
| <b>Boom Height (in):</b>             | 21        | 22        | 24        |

### Crop and weed information at application:

|                             |                 |                       |                        |                       |
|-----------------------------|-----------------|-----------------------|------------------------|-----------------------|
|                             | <b>Date:</b>    | 5/19                  | 5/27                   | 6/2                   |
| <b>Corn</b>                 | <b>Height:</b>  | 1-2"                  | 2.5-3.5"               | -                     |
|                             | <b>Stage:</b>   | V1                    | V2/V3                  | V4                    |
| <b>common ragweed</b>       | <b>Height:</b>  | 0.25-1"               | 0.5-1.5"               | 1-6"                  |
|                             | <b>Density:</b> | 1-3/ft <sup>2</sup>   | 3-6/ft <sup>2</sup>    | 3-8/ft <sup>2</sup>   |
| <b>common lambsquarters</b> | <b>Height:</b>  | 0.5"                  | 0.75"                  | 0.5-1.5"              |
|                             | <b>Density:</b> | 0.5-2/ft <sup>2</sup> | 2-3/ft <sup>2</sup>    | 0-2/ft <sup>2</sup>   |
| <b>giant foxtail</b>        | <b>Height:</b>  | 0.25-1"               | 0.5-2"                 | 2-5"                  |
|                             | <b>Density:</b> | 37-50/ft <sup>2</sup> | 39-100/ft <sup>2</sup> | 26-41/ft <sup>2</sup> |
| <b>woolly cupgrass</b>      | <b>Height:</b>  | 0.25-1"               | 0.5-2"                 | 2-5"                  |
|                             | <b>Density:</b> | 0-5/ft <sup>2</sup>   | 0-3/ft <sup>2</sup>    | 1-16/ft <sup>2</sup>  |

| Trt # | Treatment          | Formulation  | SOA Group | Rate       | App Timing | App Code |
|-------|--------------------|--------------|-----------|------------|------------|----------|
| 1     | Untreated Check    |              |           |            |            |          |
| 2     | Acuron GT          | 4.3 lb/gal   | 9, 15, 27 | 3.75 pt/a  | EPOST      | A        |
|       | NIS                |              |           | 0.25% v/v  | EPOST      | A        |
|       | AMS (liquid)       |              |           | 2.5% v/v   | EPOST      | A        |
| 3     | Acuron Flexi       | 3.26 lb/gal  | 15, 27    | 2 qt/a     | EPOST      | A        |
|       | Roundup PowerMAX 3 | 4.8 lbae/gal | 9         | 25 fl oz/a | EPOST      | A        |
|       | AMS (liquid)       |              |           | 2.5% v/v   | EPOST      | A        |
| 4     | Capreno            | 3.45 lb/gal  | 2, 27     | 3 fl oz/a  | EPOST      | A        |
|       | Roundup PowerMAX 3 | 4.8 lbae/gal | 9         | 25 fl oz/a | EPOST      | A        |
|       | AMS (liquid)       |              |           | 2.5% v/v   | EPOST      | A        |
| 5     | Acuron GT          | 4.3 lb/gal   | 9, 15, 27 | 3.75 pt/a  | MPOST      | B        |
|       | NIS                |              |           | 0.25% v/v  | MPOST      | B        |
|       | AMS (liquid)       |              |           | 2.5% v/v   | MPOST      | B        |
| 6     | Halex GT           | 4.39 lb/gal  | 9, 15, 27 | 3.8 pt/a   | MPOST      | B        |
|       | NIS                |              |           | 0.25% v/v  | MPOST      | B        |
|       | AMS (liquid)       |              |           | 2.5% v/v   | MPOST      | B        |
| 7     | Harness Max        | 3.85 lb/gal  | 15, 27    | 40 fl oz/a | MPOST      | B        |
|       | Roundup PowerMAX 3 | 4.8 lbae/gal | 9         | 25 fl oz/a | MPOST      | B        |
|       | AMS (liquid)       |              |           | 2.5% v/v   | MPOST      | B        |
| 8     | Resicore           | 3.29 lb/gal  | 4, 15, 27 | 1.25 qt/a  | MPOST      | B        |
|       | Roundup PowerMAX 3 | 4.8 lbae/gal | 9         | 25 fl oz/a | MPOST      | B        |
|       | AMS (liquid)       |              |           | 2.5% v/v   | MPOST      | B        |
| 9     | Acuron GT          | 4.3 lb/gal   | 9, 15, 27 | 3.75 pt/a  | LPOST      | C        |
|       | NIS                |              |           | 0.25% v/v  | LPOST      | C        |
|       | AMS (liquid)       |              |           | 2.5% v/v   | LPOST      | C        |
| 10    | Status             | 56% w/w      | 2, 4      | 5 oz/a     | LPOST      | C        |
|       | Roundup PowerMAX 3 | 4.8 lbae/gal | 9         | 25 fl oz/a | LPOST      | C        |
|       | AMS (liquid)       |              |           | 2.5% v/v   | LPOST      | C        |

**Adjuvants:** AMS = AMSOL; NIS = Prefer 90

**Trial Summary:**

The trial was established at the Arlington Ag Research Station near Arlington, WI to compare the efficacy and crop safety of one-pass POST application timings of Acuron GT and competitive standards. Acuron GT is a new premix for corn containing bicyclopyrone (27), mesotrione (27), S-metolachlor, and glyphosate (9). Acuron GT does NOT contain atrazine and will have a similar use pattern as Halex GT.

None of the POST herbicide treatments caused significant corn injury (data not shown). Most treatments caused minor (<5%) necrotic spotting (leaf burn) 7 days after application, but corn growth was not affected as there was no visible corn injury 13 days after the last POST application.

This trial was located in a field with a very heavy population density of annual grasses (giant foxtail, predominant; woolly cupgrass) as well as moderate population densities of common ragweed and common lambsquarters. All herbicides and POST application timings provided good to excellent (>90%) control of common ragweed and common lambsquarters (Table 2). Annual grass control differed amongst herbicide programs (Table 2). The predominant grass species in the trial area was giant foxtail; however, there were patches of woolly cupgrass. Grass ratings most accurately reflect giant foxtail control. Programs without a group 15 herbicide in the tank had significantly lower levels of grass control at the end of the year than those with either S-metolachlor or acetochlor.

Corn grain yield was statistically similar amongst all POST herbicide programs (Table 2). Averaged across all POST programs, corn yield was 220 bu/acre compared to only 63 bu/acre for the untreated check.

Plot photos from throughout the growing season are available at [Acruon GT Performance Demo](#) published on [wiscweeds.info](#).

**Table 2.** Weed control ratings and corn yield for trial #22-ARL-CN04 at Arlington, WI.<sup>a</sup>

| Trt #                                 | Herbicide (rate acre <sup>-1</sup> )                       | Common Ragweed (%) |              |              |              | Lambsquarters (%) |                 |                 |              | Annual Grasses <sup>c</sup> (%) |                 |                 |                 | Yield <sup>b</sup><br>bu acre <sup>-1</sup> |
|---------------------------------------|------------------------------------------------------------|--------------------|--------------|--------------|--------------|-------------------|-----------------|-----------------|--------------|---------------------------------|-----------------|-----------------|-----------------|---------------------------------------------|
|                                       |                                                            | 6/2                | 6/15         | 6/30         | 10/20        | 6/2               | 6/15            | 6/30            | 10/20        | 6/2                             | 6/15            | 6/30            | 10/20           |                                             |
| 1                                     | Untreated Check                                            | 0                  | 0            | 0            | 0            | 0                 | 0               | 0               | 0            | 0                               | 0               | 0               | 0               | 63 b                                        |
| <b>One-Pass – EPOST (5/19)</b>        |                                                            |                    |              |              |              |                   |                 |                 |              |                                 |                 |                 |                 |                                             |
| 2                                     | Acuron GT (3.75 pt) + NIS (0.25% v/v) + AMS (2.5% v/v)     | 100                | 99           | 100          | 100          | 100               | 100             | 100             | 100          | 97                              | 98              | 86              | 88              | 226 a                                       |
| 3                                     | Acuron Flexi (2 qt) + Roundup PM3 (25 oz) + AMS (2.5% v/v) | 100                | 99           | 100          | 100          | 100               | 100             | 100             | 100          | 97                              | 98              | 89              | 91              | 214 a                                       |
| 4                                     | Capreno (3 oz) + Roundup PM3 (25 oz) + AMS (2.5% v/v)      | 100                | 99           | 98           | 100          | 100               | 100             | 100             | 100          | 93                              | 88              | 69              | 76              | 210 a                                       |
| <b>One-Pass – MPOST (5/27)</b>        |                                                            |                    |              |              |              |                   |                 |                 |              |                                 |                 |                 |                 |                                             |
| 5                                     | Acuron GT (3.75 pt) + NIS (0.25% v/v) + AMS (2.5% v/v)     | 98                 | 99           | 100          | 100          | 100               | 100             | 100             | 100          | 97                              | 94              | 84              | 86              | 222 a                                       |
| 6                                     | Halex GT (3.8 pt) + NIS (0.25% v/v) + AMS (2.5% v/v)       | 98                 | 99           | 100          | 100          | 100               | 100             | 100             | 100          | 97                              | 96              | 78              | 83              | 217 a                                       |
| 7                                     | Harness Max (40 oz)+Roundup PM3 (25 oz) +AMS (2.5% v/v)    | 99                 | 100          | 100          | 100          | 100               | 100             | 100             | 100          | 98                              | 99              | 82              | 84              | 217 a                                       |
| 8                                     | Resicore (1.25 qt) + Roundup PM3 (25 oz) + AMS (2.5% v/v)  | 99                 | 100          | 100          | 100          | 100               | 100             | 100             | 100          | 97                              | 97              | 82              | 85              | 227 a                                       |
| <b>One-Pass – LPOST (6/2)</b>         |                                                            | <b>LPOST</b>       |              |              |              | <b>LPOST</b>      |                 |                 |              | <b>LPOST</b>                    |                 |                 |                 |                                             |
| 9                                     | Acuron GT (3.75 pt) + NIS (0.25% v/v) + AMS (2.5% v/v)     | 0                  | 100          | 100          | 100          | 0                 | 100             | 100             | 100          | 0                               | 98              | 84              | 92              | 228 a                                       |
| 10                                    | Status (5 oz) + Roundup PM3 (25 oz) + AMS (2.5% v/v)       | 0                  | 100          | 93           | 100          | 0                 | 99              | 91              | 99           | 0                               | 97              | 68              | 79              | 217 a                                       |
| <b>LSD (<math>\alpha=0.10</math>)</b> |                                                            | <b>1</b>           | <b>ns</b>    | <b>4</b>     | <b>ns</b>    | <b>ns</b>         | <b>0.5</b>      | <b>3</b>        | <b>0.5</b>   | <b>2</b>                        | <b>3</b>        | <b>5</b>        | <b>5</b>        | <b>31</b>                                   |
| <b>p value</b>                        |                                                            | <b>&lt;.001</b>    | <b>0.650</b> | <b>0.032</b> | <b>0.461</b> | <b>0.562</b>      | <b>&lt;.001</b> | <b>&lt;.001</b> | <b>0.018</b> | <b>0.002</b>                    | <b>&lt;.001</b> | <b>&lt;.001</b> | <b>&lt;.001</b> | <b>&lt;.001</b>                             |

<sup>a</sup>Visual control from 70-100% is illustrated on a color scale with green representing greater weed control values.<sup>b</sup>Yield values with the same letter are not significantly different.<sup>c</sup>Annual grass species in the trial consisted of giant foxtail (predominant species) and woolly cupgrass.

**Project Goal:** Evaluate multiple one- and two-pass corn herbicide programs without atrazine for weed control and crop safety.

#### Site Description:

|                       |                                                                                                      |                        |                   |
|-----------------------|------------------------------------------------------------------------------------------------------|------------------------|-------------------|
| <b>Location:</b>      | Arlington, WI                                                                                        | <b>Crop:</b>           | Corn              |
| <b>Field #:</b>       | 360                                                                                                  | <b>Hybrid:</b>         | NK9653-5222-EZ1   |
| <b>Soil type:</b>     | Plano silt loam                                                                                      | <b>Planting Date:</b>  | 4/29              |
| <b>% OM:</b>          | 3.6                                                                                                  | <b>Emergence Date:</b> | 5/14              |
| <b>pH:</b>            | 6.8                                                                                                  | <b>Population:</b>     | 36,000 seeds/acre |
| <b>Fertilization:</b> | 136 lbs N/acre                                                                                       | <b>Depth:</b>          | 2.25 in           |
| <b>Previous crop:</b> | Soybean                                                                                              | <b>Row spacing:</b>    | 30 in             |
| <b>Tillage:</b>       | Conventional                                                                                         | <b>Plot Size:</b>      | 10 x 30 ft        |
| <b>Weed species:</b>  | common ragweed (AMBEL), common lambsquarters (CHEAL), giant foxtail (SETFA), woolly cupgrass (ERBVI) |                        |                   |

#### Herbicide Application Information:

|                                      |            |           |            |
|--------------------------------------|------------|-----------|------------|
| <b>Date:</b>                         | 4/29       | 6/2       | 6/9        |
| <b>Treatment:</b>                    | PRE (A)    | EPOST (B) | POST (C)   |
| <b>Air Temp (°F):</b>                | 61         | 73        | 78         |
| <b>2" Soil Temp (°F):</b>            | 45         | 82        | 70         |
| <b>Soil moisture [surface]:</b>      | moist      | dry       | wet        |
| <b>RH %:</b>                         | 48         | 39        | 47         |
| <b>Cloud cover %</b>                 | 90         | 10        | 40         |
| <b>Wind speed (mph)/direction</b>    | 10/NW      | 2-9/SW    | 2-10/NW    |
| <b>Rainfall (in) 1 wk after APP:</b> | 1.06"      | 2.58"     | 2.85"      |
| <b>GPA:</b>                          | 15         | 15        | 15         |
| <b>PSI:</b>                          | 35         | 35        | 36         |
| <b>Nozzle:</b>                       | TTI 110015 | TT 110015 | TTI 110015 |
| <b>Nozzle spacing (in):</b>          | 20         | 20        | 20         |
| <b>Boom Height (in):</b>             | 20         | 23        | 24         |

#### Crop and weed information at application:

|                             |                 |      |                      |                      |
|-----------------------------|-----------------|------|----------------------|----------------------|
|                             | <b>Date:</b>    | 4/29 | 6/2                  | 6/9                  |
| <b>Corn</b>                 | <b>Height:</b>  | -    | -                    | 7-9"                 |
|                             | <b>Stage:</b>   | -    | V4                   | V5                   |
| <b>common ragweed</b>       | <b>Height:</b>  | -    | 1-3"                 | 1-3"                 |
|                             | <b>Density:</b> | -    | 0-1/ft <sup>2</sup>  | 0-7/ft <sup>2</sup>  |
| <b>common lambsquarters</b> | <b>Height:</b>  | -    | 0.5-3"               | 0.25-1"              |
|                             | <b>Density:</b> | -    | 0-8/ft <sup>2</sup>  | 0-1/ft <sup>2</sup>  |
| <b>giant foxtail</b>        | <b>Height:</b>  | -    | 2-4"                 | 1-5"                 |
|                             | <b>Density:</b> | -    | 4-29/ft <sup>2</sup> | 3-13/ft <sup>2</sup> |
| <b>woolly cupgrass</b>      | <b>Height:</b>  | -    | 2-4"                 | 1-4"                 |
|                             | <b>Density:</b> | -    | 0-18/ft <sup>2</sup> | 0-1/ft <sup>2</sup>  |

| Trt # | Treatment          | Formulation  | SOA Group | Rate       | App Timing | App Code |
|-------|--------------------|--------------|-----------|------------|------------|----------|
| 1     | Untreated Check    |              |           |            |            |          |
| 2     | Acuron Flexi       | 3.26 lb/gal  | 15, 27    | 2.25 qt/a  | PRE        | A        |
| 3     | Resicore           | 3.29 lb/gal  | 4, 15, 27 | 2.75 qt/a  | PRE        | A        |
| 4     | TriVolt            | 4.09 lb/gal  | 2, 15, 27 | 20 fl oz/a | PRE        | A        |
| 5     | Maverick           | 2.04 lb/gal  | 4, 15, 27 | 1 qt/a     | PRE        | A        |
| 6     | Acuron GT          | 4.3 lb/gal   | 9, 15, 27 | 3.75 pt/a  | EPOST      | B        |
|       | NIS                |              |           | 0.25% v/v  | EPOST      | B        |
|       | AMS (liquid)       |              |           | 2.5% v/v   | EPOST      | B        |
| 7     | Halex GT           | 4.39 lb/gal  | 9, 15, 27 | 3.8 pt/a   | EPOST      | B        |
|       | NIS                |              |           | 0.25% v/v  | EPOST      | B        |
|       | AMS (liquid)       |              |           | 2.5% v/v   | EPOST      | B        |
| 8     | Maverick           | 2.04 lb/gal  | 4, 15, 27 | 14 fl oz/a | EPOST      | B        |
|       | Roundup PowerMAX 3 | 4.8 lbae/gal | 9         | 25 fl oz/a | EPOST      | B        |
|       | AMS (liquid)       |              |           | 2.5% v/v   | EPOST      | B        |
| 9     | Resicore           | 3.29 lb/gal  | 4, 15, 27 | 1.25 qt/a  | EPOST      | B        |
|       | Roundup PowerMAX 3 | 4.8 lbae/gal | 9         | 25 fl oz/a | EPOST      | B        |
|       | AMS (liquid)       |              |           | 2.5% v/v   | EPOST      | B        |
| 10    | Dual II Magnum     | 7.64 lb/gal  | 15        | 1.33 pt/a  | PRE        | A        |
|       | Acuron GT          | 4.3 lb/gal   | 9, 15, 27 | 3.75 pt/a  | POST       | C        |
|       | NIS                |              |           | 0.25% v/v  | POST       | C        |
|       | AMS (liquid)       |              |           | 2.5% v/v   | POST       | C        |
| 11    | TripleFlex II      | 4.25 lb/gal  | 2, 4, 15  | 2 pt/a     | PRE        | A        |
|       | Capreno            | 3.45 lb/gal  | 2, 27     | 3 fl oz/a  | POST       | C        |
|       | Roundup PowerMAX3  | 4.8 lbae/gal | 9         | 30 fl oz/a | POST       | C        |
|       | AMS (liquid)       |              |           | 2.5% v/v   | POST       | C        |
| 12    | Restraint          | 6.5 lb/gal   | 15, 27    | 30 fl oz/a | PRE        | A        |
|       | Princep 4FL        | 4 lb/gal     | 5         | 1 qt/a     | PRE        | A        |
|       | Shieldex           | 3.33 lb/gal  | 27        | 1 fl oz/a  | POST       | C        |
|       | Status             | 56% w/w      | 4         | 2.5 oz/a   | POST       | C        |
|       | COC                |              |           | 1% v/v     | POST       | C        |
|       | AMS (liquid)       |              |           | 2.5% v/v   | POST       | C        |
| 13    | Restraint          | 6.5 lb/gal   | 15, 27    | 30 fl oz/a | PRE        | A        |
|       | Princep 4FL        | 4 lb/gal     | 5         | 1 qt/a     | PRE        | A        |
|       | Restraint          | 6.5 lb/gal   | 15, 27    | 18 fl oz/a | POST       | C        |
|       | COC                |              |           | 1% v/v     | POST       | C        |
|       | AMS (liquid)       |              |           | 2.5% v/v   | POST       | C        |

**Adjuvants:** AMS = AMSOL; COC = Crop Oil; NIS = Prefer 90

**Trial Summary:**

The trial was established at the Arlington Ag Research Station near Arlington, WI to evaluate multiple one- and two-pass corn herbicide programs from several chemical manufacturer portfolios for weed control and crop safety. Atrazine was not included in any treatment since this trial was conducted in an atrazine prohibition area at the Arlington Ag Research Station. The main goal of this study was to evaluate corn herbicide performance on weed species other than giant ragweed and waterhemp.

None of the PRE herbicides caused visible corn injury symptoms 21 days after application (data not shown). Minor leaf necrosis (6-7%) was observed 7 days after the EPOST application of Resicore (trt 9). None of the other EPOST herbicide programs caused visible corn injury.

This trial was located in a field with a very heavy population density of annual grasses (giant foxtail, predominant; woolly cupgrass) as well as moderate population densities of common ragweed and common lambsquarters. All of the corn herbicide programs provided excellent end of season control of both broadleaf species (common ragweed, common lambsquarters); however, early season residual control did differ amongst the PRE herbicides evaluated (Table 3). The predominant grass species in the trial area was giant foxtail; however, there were patches of woolly cupgrass. Grass ratings most accurately reflect giant foxtail control. All the one-pass PRE only herbicide programs failed to adequately control giant foxtail and woolly cupgrass at the end of the season. The one-pass EPOST and two-pass herbicide programs provided good to excellent end-of-season grass control. All of the one-pass EPOST treatments had excellent broadleaf control and good-excellent grass control indicating that a one-pass EPOST herbicide program can be effective for season long weed control if timed appropriately and if difficult to control weeds like giant ragweed are not present in a conventional tillage system. A burndown application may be necessary in no-till or reduced tillage systems to start with a clean seedbed.

Corn grain yield differed amongst treatments (Table 3). Corn yields of the one-pass EPOST and two-pass herbicide programs were statistically similar (average = 223 bu acre<sup>-1</sup>). The PRE only treatments had significantly lower yield (average = 189 bu acre<sup>-1</sup>). Yield of the untreated check averaged 18 bu acre<sup>-1</sup>, a 90% and 92% reduction from the average of the PRE only and the EPOST/PRE fb POST programs respectively.

Plot photos from throughout the growing season are available at [Corn Herbicide Showcase: 1 and 2-Pass Programs without Atrazine](#) published on [wiscweeds.info](http://wiscweeds.info).

Table 3. Weed control ratings and corn yield for trial #22-ARL-CN05 at Arlington, WI.<sup>a</sup>

| Trt # Herbicide (rate acre <sup>-1</sup> )                                                                    | Common Ragweed (%) |       |       |       | Lambsquarters (%) |       |      |       | Annual Grasses <sup>c</sup> (%) |       |       |       | Yield <sup>b</sup><br>bu acre <sup>-1</sup> |
|---------------------------------------------------------------------------------------------------------------|--------------------|-------|-------|-------|-------------------|-------|------|-------|---------------------------------|-------|-------|-------|---------------------------------------------|
|                                                                                                               | 5/20               | 6/9   | 6/23  | 10/20 | 5/20              | 6/9   | 6/23 | 10/20 | 5/20                            | 6/9   | 6/23  | 10/20 |                                             |
| 1 Untreated Check                                                                                             | 0                  | 0     | 0     | 0     | 0                 | 0     | 0    | 0     | 0                               | 0     | 0     | 0     | 18 e                                        |
| <b>One-Pass – PRE (4/29)</b>                                                                                  |                    |       |       |       |                   |       |      |       |                                 |       |       |       |                                             |
| 2 Acuron Flexi (2.25 qt)                                                                                      | 97                 | 96    | 100   | 99    | 100               | 100   | 100  | 100   | 88                              | 83    | 63    | 49    | 183 cd                                      |
| 3 Resicore (2.75 qt)                                                                                          | 97                 | 96    | 99    | 98    | 100               | 100   | 100  | 100   | 93                              | 87    | 74    | 65    | 197 bc                                      |
| 4 TriVolt (20 fl oz)                                                                                          | 95                 | 93    | 100   | 98    | 100               | 99    | 100  | 100   | 77                              | 83    | 72    | 68    | 196 bcd                                     |
| 5 Maverick (1 qt)                                                                                             | 99                 | 98    | 99    | 100   | 100               | 100   | 100  | 100   | 58                              | 76    | 65    | 50    | 174 d                                       |
| <b>One-Pass – EPOST (6/2)</b>                                                                                 |                    |       |       |       |                   |       |      |       |                                 |       |       |       |                                             |
| 6 Acuron GT (3.75 pt) + NIS (0.25% v/v) + AMS (2.5% v/v)                                                      | 0                  | 59    | 100   | 100   | 0                 | 71    | 100  | 100   | 0                               | 59    | 100   | 91    | 218 ab                                      |
| 7 Halex GT (3.8 pt) + NIS (0.25% v/v) + AMS (2.5% v/v)                                                        | 0                  | 57    | 100   | 99    | 0                 | 70    | 100  | 100   | 0                               | 58    | 97    | 90    | 221 a                                       |
| 8 Maverick (14 oz) + Roundup PM3 (25 oz) + AMS (2.5% v/v)                                                     | 0                  | 67    | 100   | 100   | 0                 | 83    | 100  | 100   | 0                               | 60    | 99    | 93    | 227 a                                       |
| 9 Resicore (1.25 qt) + Roundup PM3 (25 oz) + AMS (2.5% v/v)                                                   | 0                  | 63    | 100   | 100   | 0                 | 78    | 100  | 100   | 0                               | 59    | 93    | 85    | 221 a                                       |
| <b>Two-Pass – PRE (4/29) fb POST (6/9)</b>                                                                    |                    |       |       |       |                   |       |      |       |                                 |       |       |       |                                             |
| 10 Dual II Magnum (1.33 pt) fb<br>Acuron GT (3.75 pt) + NIS (0.25% v/v) + AMS (2.5% v/v)                      | 26                 | 26    | 100   | 100   | 90                | 40    | 100  | 100   | 84                              | 77    | 99    | 97    | 227 a                                       |
| 11 TripleFlex II (2 pt) fb<br>Capreno (3 oz) + Roundup PM3 (30 oz) + AMS (2.5% v/v)                           | 95                 | 79    | 100   | 100   | 100               | 99    | 100  | 100   | 87                              | 74    | 100   | 94    | 223 a                                       |
| 12 Restraint (30 oz) + Princep 4FL (1 qt) fb<br>Shieldex (1 oz) + Status (2.5 oz) + COC (1 v/v%) + AMS (2.5%) | 73                 | 70    | 100   | 100   | 100               | 96    | 100  | 100   | 90                              | 84    | 84    | 88    | 224 a                                       |
| 13 Restraint (30 oz) + Princep 4FL (1 qt) fb<br>Restraint (18 oz) + COC (1 v/v%) + AMS (2.5% v/v)             | 91                 | 66    | 100   | 100   | 100               | 98    | 100  | 100   | 89                              | 84    | 88    | 89    | 216 ab                                      |
| LSD ( $\alpha=0.10$ )                                                                                         | 9                  | 6     | ns    | ns    | 0.2               | 8     | ns   | ns    | 8                               | 6     | 8     | 7     | 22                                          |
| p value                                                                                                       | <.001              | <.001 | 0.143 | 0.563 | <.001             | <.001 | 1.00 | 0.467 | <.001                           | <.001 | <.001 | <.001 | <.001                                       |

<sup>a</sup>Visual control from 70-100% is illustrated on a color scale with green representing greater weed control values.<sup>b</sup>Yield values with the same letter are not significantly different.<sup>c</sup>Annual grass species in the trial consisted of giant foxtail (predominant species) and woolly cupgrass.

**Project Goal:** Evaluate early postemergence and sequential split applications of Maverick, a new corn herbicide premix from Valent.

\*Maverick is a suspension concentrate that contains 0.523 lb clopyralid, 0.825 lb mesotrione, and 0.690 lb of pyroxasulfone per gallon.

#### Site Description:

|                       |                                                |                        |                   |
|-----------------------|------------------------------------------------|------------------------|-------------------|
| <b>Location:</b>      | Janesville, WI                                 | <b>Crop:</b>           | Corn              |
| <b>Field #:</b>       | 9                                              | <b>Hybrid:</b>         | DKC54-38 RIB      |
| <b>Soil type:</b>     | Plano silt loam                                | <b>Planting Date:</b>  | 5/17              |
| <b>% OM:</b>          | 3.5                                            | <b>Emergence Date:</b> | 5/25              |
| <b>pH:</b>            | 6.9                                            | <b>Population:</b>     | 36,000 seeds/acre |
| <b>Fertilization:</b> | 195 lbs N/acre<br>29 lbs S/acre                | <b>Depth:</b>          | 2 in              |
| <b>Previous crop:</b> | Soybean                                        | <b>Row spacing:</b>    | 30 in             |
| <b>Tillage:</b>       | Conventional                                   | <b>Plot Size:</b>      | 10 x 25 ft        |
| <b>Weed species:</b>  | gly-R waterhemp (AMATA); giant foxtail (SETFA) |                        |                   |

#### Herbicide Application Information:

|                                      |            |            |            |
|--------------------------------------|------------|------------|------------|
| <b>Date:</b>                         | 5/17       | 6/13       | 6/24       |
| <b>Treatment:</b>                    | PRE (A)    | EPOST (B)  | POST (C)   |
| <b>Air Temp (°F):</b>                | 82         | 84         | 86         |
| <b>2" Soil Temp (°F):</b>            | 74         | 73         | 77         |
| <b>Soil moisture [surface]:</b>      | dry        | moist      | dry        |
| <b>RH %:</b>                         | 30         | 56         | 36         |
| <b>Cloud cover %</b>                 | 70         | 100        | 15         |
| <b>Wind speed (mph)/direction</b>    | 0-3/NE     | 2-4/S      | 0-3/NW     |
| <b>Rainfall (in) 1 wk after APP:</b> | 0.42"      | 0.34"      | 0.39"      |
| <b>GPA:</b>                          | 15         | 15         | 15         |
| <b>PSI:</b>                          | 35         | 35         | 35         |
| <b>Nozzle:</b>                       | TTI 110015 | TTI 110015 | TTI 110015 |
| <b>Nozzle spacing (in):</b>          | 20         | 20         | 20         |
| <b>Boom Height (in):</b>             | 20         | 23         | 26         |

#### Crop and weed information at application:

|                      |                 |      |                        |                      |
|----------------------|-----------------|------|------------------------|----------------------|
|                      | <b>Date:</b>    | 5/17 | 6/13                   | 6/24                 |
| <b>Corn</b>          | <b>Height:</b>  | -    | 5-7"                   | 16-20"               |
|                      | <b>Stage:</b>   | -    | V4                     | V6                   |
| <b>waterhemp</b>     | <b>Height:</b>  | -    | 1-3"                   | 1-8" avg=3"          |
|                      | <b>Density:</b> | -    | 3-7/ft <sup>2</sup>    | 1-5/ft <sup>2</sup>  |
| <b>giant foxtail</b> | <b>Height:</b>  | -    | 1-4"                   | 1-5"                 |
|                      | <b>Density:</b> | -    | 10-128/ft <sup>2</sup> | 5-15/ft <sup>2</sup> |

| Trt # | Treatment           | Formulation   | SOA Group | Rate       | App Timing | App Code |
|-------|---------------------|---------------|-----------|------------|------------|----------|
| 1     | Untreated Check     |               |           |            |            |          |
| 2     | Roundup PowerMAX II | 4.5 lbae/gal  | 9         | 32 fl oz/a | EPOST      | B        |
|       | Induce              |               |           | 0.25% v/v  | EPOST      | B        |
|       | AMS (dry)           |               |           | 3 lb/a     | EPOST      | B        |
| 3     | Acuron              | 3.44 lb/gal   | 5, 15, 27 | 1.5 qt/a   | EPOST      | B        |
|       | Roundup PowerMAX II | 4.5 lbae/gal  | 9         | 32 fl oz/a | EPOST      | B        |
|       | NIS                 |               |           | 0.25% v/v  | EPOST      | B        |
|       | AMS (dry)           |               |           | 3 lb/a     | EPOST      | B        |
| 4     | Halex GT            | 4.39 lb/gal   | 9, 15, 27 | 4 pt/a     | EPOST      | B        |
|       | NIS                 |               |           | 0.25% v/v  | EPOST      | B        |
|       | AMS (dry)           |               |           | 3 lb/a     | EPOST      | B        |
| 5     | Armezon PRO         | 5.35 lb/gal   | 15, 27    | 24 fl oz/a | EPOST      | B        |
|       | Roundup PowerMAX II | 4.5 lbae/gal  | 9         | 32 fl oz/a | EPOST      | B        |
|       | NIS                 |               |           | 0.25% v/v  | EPOST      | B        |
|       | AMS (dry)           |               |           | 3 lb/a     | EPOST      | B        |
| 6     | Resicore            | 3.29 lb/gal   | 4, 15, 27 | 44 fl oz/a | EPOST      | B        |
|       | Roundup PowerMAX II | 4.5 lbae/gal  | 9         | 32 fl oz/a | EPOST      | B        |
|       | NIS                 |               |           | 0.25% v/v  | EPOST      | B        |
|       | AMS (dry)           |               |           | 3 lb/a     | EPOST      | B        |
| 7     | Maverick            | 2.04 lb/gal   | 4, 15, 27 | 14 fl oz/a | EPOST      | B        |
|       | Roundup PowerMAX II | 4.5 lb ae/gal | 9         | 32 fl oz/a | EPOST      | B        |
|       | NIS                 |               |           | 0.25% v/v  | EPOST      | B        |
|       | AMS (dry)           |               |           | 3 lb/a     | EPOST      | B        |
| 8     | Maverick            | 2.04 lb/gal   | 4, 15, 27 | 14 fl oz/a | EPOST      | B        |
|       | AAtrex              | 4 lb/gal      | 5         | 1.5 pt/a   | EPOST      | B        |
|       | Roundup PowerMAX II | 4.5 lb ae/gal | 9         | 32 fl oz/a | EPOST      | B        |
|       | NIS                 |               |           | 0.25% v/v  | EPOST      | B        |
|       | AMS (dry)           |               |           | 3 lb/a     | EPOST      | B        |
| 9     | Acuron              | 3.44 lb/gal   | 5, 15, 27 | 1.5 qt/a   | PRE        | A        |
|       | Acuron              | 3.44 lb/gal   | 5, 15, 27 | 1.5 qt/a   | POST       | C        |
|       | Roundup PowerMAX II | 4.5 lb ae/gal | 9         | 32 fl oz/a | POST       | C        |
|       | NIS                 |               |           | 0.25% v/v  | POST       | C        |
|       | AMS (dry)           |               |           | 3 lb/a     | POST       | C        |
| 10    | Maverick            | 2.04 lb/gal   | 4, 15, 27 | 18 fl oz/a | PRE        | A        |
|       | Maverick            | 2.04 lb/gal   | 4, 15, 27 | 14 fl oz/a | POST       | C        |
|       | Roundup PowerMAX II | 4.5 lb ae/gal | 9         | 32 fl oz/a | POST       | C        |
|       | NIS                 |               |           | 0.25% v/v  | POST       | C        |
|       | AMS (dry)           |               |           | 3 lb/a     | POST       | C        |

**Adjuvants:** AMS = BlueAg spray grade ammonium sulfate; NIS = Induce

| Trt # | Treatment           | Formulation   | SOA Group | Rate       | App Timing | App Code |
|-------|---------------------|---------------|-----------|------------|------------|----------|
| 11    | Maverick            | 2.04 lb/gal   | 4, 15, 27 | 18 fl oz   | PRE        | A        |
|       | AAtrex              | 4 lb/gal      | 5         | 1 pt/a     | PRE        | A        |
|       | Maverick            | 2.04 lb/gal   | 4, 15, 27 | 14 fl oz/a | POST       | C        |
|       | AAtrex              | 4 lb/gal      | 5         | 1 pt/a     | POST       | C        |
|       | Roundup PowerMAX II | 4.5 lb ae/gal | 9         | 32 fl oz/a | POST       | C        |
|       | NIS                 |               |           | 0.25% v/v  | POST       | C        |
|       | AMS (dry)           |               |           | 3 lb/a     | POST       | C        |
| 12    | Perpetuo            | 2.3 lb/gal    | 14, 15    | 8 fl oz/a  | PRE        | A        |
|       | AAtrex              | 4 lb/gal      | 5         | 2 pt/a     | PRE        | A        |
|       | Maverick            | 2.04 lb/gal   | 4, 15, 27 | 14 fl oz/a | POST       | C        |
|       | Roundup PowerMAX II | 4.5 lb ae/gal | 9         | 32 fl oz/a | POST       | C        |
|       | NIS                 |               |           | 0.25% v/v  | POST       | C        |
|       | AMS (dry)           |               |           | 3 lb/a     | POST       | C        |

**Adjuvants:** AMS = BlueAg spray grade ammonium sulfate; NIS = Induce

### Trial Summary:

The trial was established at the Rock County Farm in Janesville, WI to compare the weed control and crop safety of early postemergence (EPOST) and sequential split applications of Maverick to industry standards. There was no corn injury observed from any of the herbicide treatments (data not shown).

Glyphosate-resistant waterhemp and giant foxtail were the predominant species in the trial area. Giant ragweed was also present; however, overall density was low and quite spotty. Residual waterhemp and giant foxtail control did not differ among the four PRE herbicides evaluated 27 days after application (Table 4). The two-pass herbicide programs had better late season giant foxtail control (99%) compared to the one-pass EPOST programs (86%). While initial control of giant foxtail was excellent (98-100%) for all EPOST treatments 11 days after application, more foxtail seedlings continued to emerge following application. The addition of atrazine to the tank at the EPOST and POST applications improved late season waterhemp control. Treatments with atrazine averaged 91-94% waterhemp control compared to 41-80% of those without. This is likely due to the synergistic affect of tank mixing atrazine and group 27, HPPD herbicides like mesotrione (Callisto).

Corn yield of most of the herbicide programs was very similar (Table 4). Only the Roundup alone treatment showed a decrease in yield relative to the other herbicide programs. Averaged across all treatments, yield of the 2-pass PRE *fb* POST programs = 249 bu acre<sup>-1</sup> and the one-pass EPOST = 248 bu acre<sup>-1</sup>. The untreated check yielded 49 bu acre<sup>-1</sup>.

Plot photos from throughout the growing season are available at [Postemergence and Sequential Weed Control with Maverick](#) published on [wiscweeds.info](#).

**Table 4.** Weed control ratings and corn yield for trial #22-ROK-CN07 at Janesville, WI.<sup>a</sup>

| Trt #                                             | Herbicide (rate acre <sup>-1</sup> )                                                                                                 | Waterhemp (%)             |                               |                              | Giant Foxtail (%)         |                             |                             | Yield <sup>b</sup><br>bu acre <sup>-1</sup> |
|---------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|---------------------------|-------------------------------|------------------------------|---------------------------|-----------------------------|-----------------------------|---------------------------------------------|
|                                                   |                                                                                                                                      | 6/13                      | 6/24                          | 7/14                         | 6/13                      | 6/24                        | 7/14                        |                                             |
| 1                                                 | Untreated Check                                                                                                                      | 0                         | 0                             | 0                            | 0                         | 0                           | 0                           | 49 c                                        |
| <b>One-Pass – EPOST (6/13)</b>                    |                                                                                                                                      | <b>EPOST</b>              |                               |                              | <b>EPOST</b>              |                             |                             |                                             |
| 2                                                 | Roundup PMII (32 oz) + NIS (0.25% v/v) + AMS (3 lb)                                                                                  | 0                         | 54                            | 41                           | 0                         | 100                         | 85                          | 224 b                                       |
| 3                                                 | Acuron (1.5 qt) + Roundup PMII (32 oz) + NIS (0.25% v/v) + AMS (3 lb)                                                                | 0                         | 98                            | 91                           | 0                         | 98                          | 85                          | 258 ab                                      |
| 4                                                 | Halex GT (4 pt) + NIS (0.25% v/v) + AMS (3 lb)                                                                                       | 0                         | 94                            | 80                           | 0                         | 99                          | 85                          | 247 ab                                      |
| 5                                                 | Armezon PRO (24 oz) + Roundup PMII (32 oz) + NIS (0.25% v/v) + AMS (3 lb)                                                            | 0                         | 86                            | 70                           | 0                         | 100                         | 84                          | 241 ab                                      |
| 6                                                 | Resicore (44 oz) + Roundup PMII (32 oz) + NIS (0.25% v/v) + AMS (3 lb)                                                               | 0                         | 91                            | 78                           | 0                         | 100                         | 88                          | 252 ab                                      |
| 7                                                 | Maverick (14 oz) + Roundup PMII (32 oz) + NIS (0.25% v/v) + AMS (3 lb)                                                               | 0                         | 93                            | 74                           | 0                         | 100                         | 85                          | 251 ab                                      |
| 8                                                 | Maverick (14 oz) + AAtrex (1.5 pt) + Roundup PMII (32 oz) + NIS (0.25% v/v) + AMS (3 lb)                                             | 0                         | 100                           | 93                           | 0                         | 98                          | 88                          | 261 a                                       |
| <b>Two-Pass – PRE (5/17) fb POST (6/24)</b>       |                                                                                                                                      | <b>POST</b>               |                               |                              | <b>POST</b>               |                             |                             |                                             |
| 9                                                 | Acuron (1.5 qt) <b>fb</b><br>Acuron (1.5 qt) + Roundup PMII (32 oz) + NIS (0.25% v/v) + AMS (3 lb)                                   | 97                        | 85                            | 92                           | 84                        | 70                          | 99                          | 246 ab                                      |
| 10                                                | Maverick (18 oz) <b>fb</b><br>Maverick (14 oz) + Roundup PMII (32 oz) + NIS (0.25% v/v) + AMS (3 lb)                                 | 95                        | 85                            | 73                           | 86                        | 70                          | 99                          | 252 ab                                      |
| 11                                                | Maverick (18 oz) + AAtrex (1 pt) <b>fb</b><br>Maverick (14 oz) + AAtrex (1 pt) + Roundup PMII (32 oz) + NIS (0.25% v/v) + AMS (3 lb) | 98                        | 94                            | 94                           | 84                        | 74                          | 99                          | 250 ab                                      |
| 12                                                | Perpetuo (8 oz) + AAtrex (2 pt) <b>fb</b><br>Maverick (14 oz) + Roundup PMII (32 oz) + NIS (0.25% v/v) + AMS (3 lb)                  | 96                        | 84                            | 79                           | 90                        | 77                          | 99                          | 248 ab                                      |
| <b>LSD (<math>\alpha=0.10</math>)<br/>p value</b> |                                                                                                                                      | <b>ns</b><br><b>0.171</b> | <b>7.5</b><br><b>&lt;.001</b> | <b>11</b><br><b>&lt;.001</b> | <b>ns</b><br><b>0.190</b> | <b>9</b><br><b>&lt;.001</b> | <b>5</b><br><b>&lt;.001</b> | <b>19.5</b><br><b>&lt;0.001</b>             |

<sup>a</sup>Visual control from 70-100% is illustrated on a color scale with green representing greater weed control values.<sup>b</sup>Yield values with the same letter are not significantly different.

**Project Goal:** Evaluate the residual control of troublesome weeds with single and multiple SOA herbicide products commonly used in corn production systems in Wisconsin.

#### Site Description:

|                                                | <b>Trial #:</b> | <b>22-ROK-CN11</b>              | <b>22-LAN-CN11</b>                            |
|------------------------------------------------|-----------------|---------------------------------|-----------------------------------------------|
| <b>Location:</b>                               |                 | Janesville, WI                  | Lancaster, WI                                 |
| <b>Field #:</b>                                |                 | 2                               | SIDS-NE                                       |
| <b>Soil Type:</b>                              |                 | Plano silt loam                 | Fayette silt loam                             |
| <b>Soil Texture % sand/silt/clay:</b>          |                 | 7/71/22                         | -                                             |
| <b>% OM:</b>                                   |                 | 3.5                             | 4.1                                           |
| <b>pH:</b>                                     |                 | 6.4                             | 5.3                                           |
| <b>Fertilization:</b>                          |                 | 195 lbs N/acre<br>29 lbs S/acre | 115 lbs/N acre<br>(Urea)<br>263 lbs (4-19-38) |
| <b>Previous Crop:</b>                          |                 | soybean                         | soybean                                       |
| <b>Tillage:</b>                                |                 | conventional                    | conventional                                  |
| <b>Hybrid:</b>                                 |                 | NK 9653-5222EZ                  | P9998Q-N802                                   |
| <b>Planting Date:</b>                          |                 | 5/10                            | 5/12                                          |
| <b>Emergence Date:</b>                         |                 | 5/16                            | -                                             |
| <b>Seeding Rate (seeds acre<sup>-1</sup>):</b> |                 | 36,000                          | 32,500                                        |
| <b>Depth:</b>                                  |                 | 2 in                            | 1.5 in                                        |
| <b>Row Spacing:</b>                            |                 | 30 in                           | 30 in                                         |
| <b>Plot Size:</b>                              |                 | 10 x 30 ft                      | 10 x 30 ft                                    |

#### Herbicide Application Information:

|                                       |            |            |
|---------------------------------------|------------|------------|
| <b>Date:</b>                          | 5/11       | 5/13       |
| <b>Treatment:</b>                     | PRE (A)    | PRE (A)    |
| <b>Air Temp (°F):</b>                 | 92         | 76         |
| <b>2" Soil Temp (°F):</b>             | 80         | 68         |
| <b>Soil moisture [surface]:</b>       | dry        | dry        |
| <b>RH %:</b>                          | 65         | 57         |
| <b>Cloud cover %:</b>                 | 60         | 30         |
| <b>Wind speed (mph)/direction:</b>    | 1-3/W      | 8-9/S      |
| <b>Rainfall (in) 1 wk after APP:</b>  | 0.35       | 0.23       |
| <b>Rainfall (in) 2 wks after APP:</b> | 0.77       | 1.69       |
| <b>GPA:</b>                           | 15         | 15         |
| <b>PSI:</b>                           | 35         | 35         |
| <b>Nozzle:</b>                        | TTI 110015 | TTI 110015 |

| Trt # | Treatment            | Formulation | SOA Group | Rate        | App Timing | App Code |
|-------|----------------------|-------------|-----------|-------------|------------|----------|
| 1     | Untreated Check      |             |           |             |            |          |
| 2     | Diflexx              | 4 lb ae/gal | 4         | 16 fl oz/a  | PRE        | A        |
| 3     | AAtrex               | 4 lb/gal    | 5         | 2 pt/a      | PRE        | A        |
| 4     | Princep 4FL          | 4 lb/gal    | 5         | 2 qt/a      | PRE        | A        |
| 5     | Harness              | 7 lb/gal    | 15        | 2 pt/a      | PRE        | A        |
| 6     | Dual II Magnum       | 7.64 lb/gal | 15        | 1.67 pt/a   | PRE        | A        |
| 7     | Balance Flexx        | 2 lb/gal    | 27        | 4.5 fl oz/a | PRE        | A        |
| 8     | Callisto             | 4 lb/gal    | 27        | 5 fl oz/a   | PRE        | A        |
| 9     | Harness Max          | 3.85 lb/gal | 15, 27    | 2 qt/a      | PRE        | A        |
| 10    | Corvus               | 2.63 lb/gal | 2, 27     | 5.6 fl oz/a | PRE        | A        |
| 11    | Bicep Lite II Magnum | 6 lb/gal    | 5, 15     | 1.75 qt/a   | PRE        | A        |
| 12    | Harness Xtra         | 6 lb/gal    | 5, 15     | 2 qt/a      | PRE        | A        |
| 13    | Verdict              | 5.57 lb/gal | 14, 15    | 15 fl oz/a  | PRE        | A        |
| 14    | Hornet WDG           | 78.5% w/w   | 2, 4      | 4 oz/a      | PRE        | A        |
| 15    | Acuron Flexi         | 3.26 lb/gal | 15, 27    | 2 qt/a      | PRE        | A        |
| 16    | Acuron               | 3.44 lb/gal | 5, 15, 27 | 2.5 qt/a    | PRE        | A        |
| 17    | Surestart II         | 4.25 lb/gal | 2, 4, 15  | 2.5 pt/a    | PRE        | A        |
| 18    | Resicore             | 3.29 lb/gal | 4, 15, 27 | 2.5 qt/a    | PRE        | A        |
| 19    | Maverick             | 2.04 lb/gal | 4, 15, 27 | 1 qt/a      | PRE        | A        |

#### Rate equivalents of herbicide premixes at rates used in trial.

| Herbicide Premix     | Rate        | Rate Equivalents (rate acre <sup>-1</sup> )                                           |
|----------------------|-------------|---------------------------------------------------------------------------------------|
| Harness Max          | 2 qt/a      | 2 pt Harness + 5.3 fl oz Callisto                                                     |
| Corvus               | 5.6 fl oz/a | 5.3 fl oz Balance Flexx + 0.525 oz ai thiencazone                                     |
| Bicep Lite II Magnum | 1.75 qt/a   | 1.53 pt Dual II Magnum + 2.34 pt AAtrex 4L                                            |
| Harness Xtra         | 2 qt/a      | 2.46 pt Harness + 1.7 pt AAtrex 4L                                                    |
| Verdict              | 15 fl oz/a  | 3 fl oz Sharpen + 12.5 fl oz Outlook                                                  |
| Hornet WDG           | 4 oz/a      | 0.93 oz Python + 5.3 fl oz Stinger                                                    |
| Acuron Flexi         | 2 qt/a      | 1.5 pt Dual II Magnum + 5.1 fl oz Callisto + 0.64 oz bicyclopyrone                    |
| Acuron               | 2.5 qt/a    | 1.4 pt Dual II Magnum + 4.8 fl oz Callisto + 1.25 pt AAtrex 4L + 0.6 oz bicyclopyrone |
| Surestart II         | 2.5 pt/a    | 1.34 pt Harness + 3.8 fl oz Stinger + 0.75 oz Python                                  |
| Resicore             | 2.5 qt/a    | 2 pt Harness + 6 fl oz Callisto + 5.1 fl oz Stinger                                   |
| Maverick             | 1 qt/a      | 5.3 fl oz Zidua SC + 6.6 fl oz Callisto + 5.6 fl oz Stinger                           |

**Trial Summary:**

This study was a joint effort between the [UW-Madison Nutrient and Pest Management Program](#) (NPM; Dan Smith) and the WiscWeed team. The purpose of this study was to evaluate and demonstrate the efficacy of multiple PRE-emergence corn herbicides on difficult to control weed species like giant ragweed and waterhemp. Treatments consisted of PRE-emergence corn herbicides containing one, two and three different active ingredients and/or sites of action. Since we wanted to evaluate the residual activity of the PRE-emergence herbicide treatments throughout the season, no POST-emergence herbicides were sprayed to the research plots. Our intent was not to promote one product versus another, instead, demonstrate the value of using an effective PRE-emergence herbicide program.

The trial was conducted at two locations in southern Wisconsin: Rock County Farm near Janesville, WI and Lancaster Agricultural Research Station near Lancaster, WI. Giant ragweed was the predominant species and at the Janesville location and the population consists of a biotype with a prolonged emergence pattern as emergence typically starts in mid- to late-April and continues well into June. Waterhemp and common lambsquarters were the predominant species at the Lancaster location.

The same trial was conducted at both sites in 2021. See trials 21-ROK-CN11 and 22-LAN-CN11 in last years [2021 Wisconsin Weed Science Research Report](#) for a full report.

Key Take Home Points from 2022 Data:

- None of the PRE-emergence corn herbicides evaluated provided adequate levels of giant ragweed control (>70%) 21 days after application (Table 5).
- Giant ragweed control was much lower than expected for most of the PRE herbicides likely due to environmental conditions following application. Warm temperatures (4 consecutive days with max temperatures >85 F) and adequate soil moisture at the time of planting led to rapid giant ragweed and corn emergence. Many giant ragweed seedlings emerged within the first week of the PRE application prior an activating rain. The first rainfall event did not occur until 7 days after application and only 0.35 inches was recorded. Furthermore, a total of only 0.77 inches was recorded within two weeks of application. Under these dry conditions 16 fl oz of Diflexx provided the best control.
- Several herbicides provided excellent control of common lambsquarters 21 DAT (Table 5).
- Products containing acetochlor provided the best waterhemp control (Table 5).

Plot photos from throughout the growing season are available at [Evaluation of Corn PRE-Emergence Herbicides – Janesville](#) and : [Evaluation of Corn PRE-Emergence Herbicides – Lancaster](#) published on [wiscweeds.info](#).

**Table 5.** Weed control visual ratings (%) for trials #22-ROK-CN11 at Janesville, WI and #22-LAN-CN11 at Lancaster, WI

| Trt # Herbicide (rate acre <sup>-1</sup> ) | Janesville, WI     |              | Lancaster, WI      |                  |                    |                  |
|--------------------------------------------|--------------------|--------------|--------------------|------------------|--------------------|------------------|
|                                            | AMBTR <sup>b</sup> |              | AMATA <sup>b</sup> |                  | CHEAL <sup>b</sup> |                  |
|                                            | 21 DAT             | 27 DAT       | 21 DAT             | 41 DAT           | 21 DAT             | 41 DAT           |
| 1 Untreated Check                          | 0                  | 0            | 0                  | 0                | 0                  | 0                |
| <b>One-Pass PRE</b>                        |                    |              |                    |                  |                    |                  |
| 2 Diflexx (16 fl oz)                       | 70                 | 70           | 69                 | 65               | 79                 | 81               |
| 3 AAtrex (2 pt)                            | 26                 | 24           | 68                 | 68               | 97                 | 100              |
| 4 Princep 4FL (2 qt)                       | 44                 | 30           | 69                 | 63               | 89                 | 91               |
| 5 Harness (2 pt)                           | 49                 | 45           | 90                 | 95               | 80                 | 78               |
| 6 Dual II Magnum (1.67 pt)                 | 30                 | 21           | 76                 | 81               | 70                 | 58               |
| 7 Balance Flexx (4.5 fl oz)                | 34                 | 34           | 73                 | 68               | 80                 | 75               |
| 8 Callisto (5 fl oz)                       | 28                 | 26           | 78                 | 83               | 92                 | 95               |
| 9 Harness Max (2 qt)                       | 55                 | 50           | 97                 | 97               | 98                 | 99               |
| 10 Corvus (5.6 fl oz)                      | 49                 | 41           | 78                 | 78               | 92                 | 95               |
| 11 Bicep Lite II Magnum (1.75 qt)          | 40                 | 34           | 87                 | 83               | 100                | 100              |
| 12 Harness Xtra (2 qt)                     | 68                 | 59           | 99                 | 99               | 100                | 100              |
| 13 Verdict (15 fl oz)                      | 46                 | 46           | 84                 | 81               | 83                 | 78               |
| 14 Hornet WDG (4 oz)                       | 44                 | 41           | 64                 | 56               | 78                 | 87               |
| 15 Acuron Flexi (2 qt)                     | 49                 | 54           | 83                 | 86               | 99                 | 100              |
| 16 Acuron (2.5 qt)                         | 36                 | 40           | 81                 | 83               | 100                | 98               |
| 17 Surestart II (2.5 pt)                   | 38                 | 35           | 95                 | 89               | 93                 | 94               |
| 18 Resicore (2.5 qt)                       | 55                 | 59           | 95                 | 95               | 96                 | 98               |
| 19 Maverick (1 qt)                         | 40                 | 50           | 91                 | 96               | 98                 | 98               |
| <b>LSD (<math>\alpha=0.10</math>)</b>      | <b>16</b>          | <b>17</b>    | <b>9</b>           | <b>9</b>         | <b>8</b>           | <b>10</b>        |
| <b>p value</b>                             | <b>0.001</b>       | <b>0.001</b> | <b>&lt;0.001</b>   | <b>&lt;0.001</b> | <b>&lt;0.001</b>   | <b>&lt;0.001</b> |

<sup>a</sup>Visual control from 70-100% is illustrated on a color scale with green representing greater weed control values.

<sup>b</sup>AMBTR, giant ragweed; AMATA, common waterhemp; CHEAL, common lambsquarters

**Project Goal:** Evaluate various corn herbicide programs without glyphosate for season long weed control in conventional corn.

| Site Description                              |                                |                   |                       |                                     |
|-----------------------------------------------|--------------------------------|-------------------|-----------------------|-------------------------------------|
|                                               | Trial #:                       | 22-ARL-CN12       |                       | 22-BRO-CN12                         |
|                                               | Location:                      | Arlington, WI     |                       | Brooklyn, WI                        |
|                                               | Soil Type:                     | Plano silt loam   |                       | Kegonsa loam                        |
|                                               | Soil Texture % sand/silt/clay: | 9 / 68 / 23       |                       | 50 / 37 / 14                        |
|                                               | % OM:                          | 2.8               |                       | 1.6                                 |
|                                               | pH:                            | 6.4               |                       | 6.9                                 |
|                                               | Fertilization:                 | 187 lb N/acre     |                       | 115 lb N/acre<br>150 lb potash/acre |
|                                               | Previous Crop:                 | corn              |                       | soybean                             |
|                                               | Tillage:                       | conventional      |                       | conventional                        |
|                                               | Hybrid :                       | DKC 54-36         |                       | OB 1105                             |
|                                               | Planting Date:                 | 5/6               |                       | 5/23                                |
|                                               | Emergence Date:                | 5/14              |                       | 6/5                                 |
|                                               | Seeding Rate:                  | 34,500 seeds/acre |                       | 34,500 seeds/acre                   |
|                                               | Depth:                         | 2.25 in           |                       | 2 in                                |
|                                               | Row Spacing:                   | 30 in             |                       | 30 in                               |
|                                               | Plot Size:                     | 10 x 25 ft        |                       | 10 x 25 ft                          |
| Herbicide Application Information             |                                |                   |                       |                                     |
|                                               | Trial #:                       | 22-ARL-CN12       |                       | 22-BRO-CN12                         |
|                                               | Date:                          | 5/10              | 6/2                   | 5/23      6/24                      |
|                                               | Treatment:                     | PRE (A)           | POST (B)              | PRE (A)      POST (B)               |
|                                               | Air Temp (°F):                 | 90                | 68                    | 58      71                          |
|                                               | 2” Soil Temp (°F):             | 80                | 70                    | 70      73                          |
|                                               | Soil moisture [surface]:       | moist             | dry                   | moist      dry                      |
|                                               | RH %:                          | 46                | 42                    | 37      73                          |
|                                               | Cloud cover %:                 | 30                | 0                     | 50      0                           |
|                                               | Wind speed (mph)/direction:    | 2-6/NE            | 3-9/NW                | 1-6/NNE      0-3/S                  |
|                                               | Rainfall (in) 1 wk after APP:  | 0.09 in           | 2.58 in               | 2.14 in      0.33 in                |
|                                               | Rainfall (in) 2 wks after APP: | 0.44 in           | 5.43 in               | 2.92 in      1.93 in                |
|                                               | GPA:                           | 15                | 15                    | 15      15                          |
|                                               | PSI:                           | 35                | 35                    | 35      36                          |
|                                               | Nozzle:                        | TTI 110015        | TT 110015             | TTI 110015      TT 110015           |
| Crop and Weed Information at POST Application |                                |                   |                       |                                     |
|                                               |                                | Height            | Stage                 | Height      Stage                   |
|                                               | Corn                           | -                 | V4                    | 13-16 in      V5                    |
|                                               |                                | Height            | Density               | Height      Density                 |
|                                               | waterhemp                      | -                 | -                     | -      -                            |
|                                               | woolly cupgrass                | 1-5 in            | 10-27/ft <sup>2</sup> | -      -                            |
|                                               | giant foxtail                  | 1-4 in            | 11-19/ft <sup>2</sup> | -      -                            |

| Trt # | Treatment       | Formulation | SOA Group | Rate       | App Timing | App Code |
|-------|-----------------|-------------|-----------|------------|------------|----------|
| 1     | Untreated Check |             |           |            |            |          |
| 2     | Harness MAX     | 3.85 lb/gal | 15, 27    | 2 qt/a     | PRE        | A        |
|       | Capreno         | 3.45 lb/gal | 2, 27     | 3 fl oz/a  | POST       | B        |
|       | Superb HC       |             |           | 0.5% v/v   | POST       | B        |
|       | AMS             |             |           | 2 lb/a     | POST       | B        |
| 3     | Harness MAX     | 3.85 lb/gal | 15, 27    | 2 qt/a     | PRE        | A        |
|       | Diflexx Duo     | 2.13 lb/gal | 4, 27     | 28 fl oz/a | POST       | B        |
|       | COC             |             |           | 1% v/v     | POST       | B        |
|       | AMS             |             |           | 2 lb/a     | POST       | B        |
| 4     | Acuron Flexi    | 3.26 lb/gal | 15, 27    | 1.1 qt/a   | PRE        | A        |
|       | Acuron Flexi    | 3.26 lb/gal | 15, 27    | 1.1 qt/a   | POST       | B        |
|       | NIS             |             |           | 0.25% v/v  | POST       | B        |
|       | AMS             |             |           | 2 lb/a     | POST       | B        |
| 5     | Verdict         | 5.57 lb/gal | 14, 15    | 16 fl oz/a | PRE        | A        |
|       | Armezon         | 2.8 lb/gal  | 27        | 1 fl oz/a  | POST       | B        |
|       | Status          | 56% w/w     | 4         | 5 oz/a     | POST       | B        |
|       | MSO             |             |           | 1% v/v     | POST       | B        |
|       | AMS             |             |           | 2 lb/a     | POST       | B        |
| 6     | Verdict         | 5.57 lb/gal | 14, 15    | 10 fl oz/a | PRE        | A        |
|       | Callisto        | 4 lb/gal    | 27        | 3 fl oz/a  | PRE        | A        |
|       | Armezon PRO     | 5.35 lb/gal | 15, 27    | 16 fl oz/a | POST       | B        |
|       | MSO             |             |           | 1% v/v     | POST       | B        |
|       | AMS             |             |           | 2 lb/a     | POST       | B        |
| 7     | SureStart II    | 4.25 lb/gal | 2, 4, 15  | 2 pt/a     | PRE        | A        |
|       | Accent Q        | 54.5% w/w   | 2         | 0.9 oz/a   | POST       | B        |
|       | Status          | 56% w/w     | 4         | 5 oz/a     | POST       | B        |
|       | COC             |             |           | 1% v/v     | POST       | B        |
|       | AMS             |             |           | 2 lb/a     | POST       | B        |
| 8     | Harness         | 7 lb/gal    | 15        | 2 pt/a     | PRE        | A        |
|       | Princep 4FL     | 4 lb/gal    | 5         | 1 qt/a     | PRE        | A        |
|       | Revulin Q       | 51.2% w/w   | 2, 27     | 4 oz/a     | POST       | B        |
|       | Status          | 56% w/w     | 4         | 5 oz/a     | POST       | B        |
|       | COC             |             |           | 1% v/v     | POST       | B        |
|       | AMS             |             |           | 2 lb/a     | POST       | B        |
| 9     | Harness         | 7 lb/gal    | 15        | 2 pt/a     | PRE        | A        |
|       | Princep 4FL     | 4 lb/gal    | 5         | 1 qt/a     | PRE        | A        |
|       | Revulin Q       | 51.2% w/w   | 2, 27     | 4 oz/a     | POST       | B        |
|       | Status          | 56% w/w     | 4         | 5 oz/a     | POST       | B        |
|       | Zidua SC        | 4.17 lb/gal | 15        | 3 fl oz/a  | POST       | B        |
|       | COC             |             |           | 1% v/v     | POST       | B        |
|       | AMS             |             |           | 2 lb/a     | POST       | B        |

| Trt # | Treatment      | Formulation | SOA Group | Rate       | App Timing | App Code |
|-------|----------------|-------------|-----------|------------|------------|----------|
| 10    | Harness        | 7 lb/gal    | 15        | 2 pt/a     | PRE        | A        |
|       | Princep 4FL    | 4 lb/gal    | 5         | 1 qt/a     | PRE        | A        |
|       | Shieldex       | 3.3 lb/gal  | 27        | 1 fl oz/a  | POST       | B        |
|       | Accent Q       | 54.5% w/w   | 2         | 0.9 oz/a   | POST       | B        |
|       | COC            |             |           | 1% v/v     | POST       | B        |
|       | AMS            |             |           | 2 lb/a     | POST       | B        |
| 11    | Harness        | 7 lb/gal    | 15        | 2 pt/a     | PRE        | A        |
|       | Princep 4FL    | 4 lb/gal    | 5         | 1 qt/a     | PRE        | A        |
|       | Laudis         | 3.5 lb/gal  | 27        | 3 fl oz/a  | POST       | B        |
|       | Warrant        | 3 lb/gal    | 15        | 48 fl oz/a | POST       | B        |
|       | MSO            |             |           | 1% v/v     | POST       | B        |
|       | AMS            |             |           | 2 lb/a     | POST       | B        |
| 12    | Dual II Magnum | 7.64 lb/gal | 15        | 1.67 pt/a  | PRE        | A        |
|       | Princep 4FL    | 4 lb/gal    | 5         | 1 qt/a     | PRE        | A        |
|       | Callisto       | 4 lb/gal    | 27        | 3 fl oz/a  | POST       | B        |
|       | Status         | 56% w/w     | 4         | 5 oz/a     | POST       | B        |
|       | COC            |             |           | 1% v/v     | POST       | B        |
|       | AMS            |             |           | 2 lb/a     | POST       | B        |

**Adjuvants:** AMS = BlueAg spray grade ammonium sulfate; COC = Crop Oil; MSO = Emulate; Superb HC = high surfactant oil concentrate (HSOC); NIS = Prefer 90

**Trial Summary:**

Trials were established in May 2022 at the Arlington Ag Research Station near Arlington, WI and at the O'Brien Hybrids farm located north of Brooklyn, WI. Multiple two-pass (PRE followed by POST around V4/V5 corn) herbicide programs were developed for control of waterhemp and annual grass weeds. Non-selective herbicides such as glyphosate and glufosinate were not included since treated corn did not have herbicide resistant traits. Furthermore, atrazine was not included in any treatments as both locations were in atrazine prohibition areas. There was no visible corn injury from any of the PRE or POST herbicides evaluated at either location.

***Arlington (22-ARL-CN12)***

Overall grass control was very poor throughout the entirety of the growing season (Table 6). This was due to several factors: **1) No activating rainfall following PRE herbicide application.** It was very dry for 2 weeks following the PRE application. A single rain event of 0.09 inches was the only recorded precipitation within one week of application and a total of 0.44 inches fell within two weeks. Most residual herbicides require at least 0.5 inches within 7 to 10 days of application for activation. **2) Very high density of annual grasses (woolly cupgrass, giant foxtail).** Grass density was >100 plants ft<sup>2</sup> in the untreated checks. No PRE herbicide provided >60% control of woolly cupgrass 21 days after application. The POST application of Laudis + Warrant (trt 11) performed the best at controlling emerged grasses; however end-of-season control was still <80%. Corn grain yield was very low due to high weed competition and corn rootworm injury. Average root lodging severity across the entire trial was 11%. Corn yield averaged across all herbicide treatments was only 92 bu acre<sup>-1</sup>. The untreated check yielded 3 bu acre<sup>-1</sup>.

***Brooklyn (22-BRO-CN12)***

Several of the herbicide programs evaluated provided excellent season long control of glyphosate-resistant waterhemp (Table 7). Corn grain yield did not significantly differ amongst herbicide programs (average yield = 220 bu acre<sup>-1</sup>).

**Key Take Home Points from 2022 Data:**

- Glyphosate was not required to achieve excellent season-long control of waterhemp.
- Under difficult conditions (high weed pressure/PRE herbicide activation failure) grass weed control can be challenging without the use of a non-selective herbicide like glyphosate or glufosinate.
- An effective PRE-emergence herbicide is recommended to reduce early-season crop competition and weed density.
- Lower weed density at POST application can improve the efficacy of a POST herbicide program.
- The use of a split application residual herbicide program, similar to treatment 4, is not advised in fields with heavy weed pressure or difficult to control weeds.

Plot photos are available at [Herbicide Programs for Conventional Corn – Arlington](#) and [Herbicide Programs for Conventional Corn – Brooklyn](#) published on [wiscweeds.info](http://wiscweeds.info).

**Table 6.** Weed control ratings and corn grain yield for trial #22-ARL-CN12 at the Arlington Ag Research Station near Arlington, WI.<sup>a</sup>

| Trt #                                             | Herbicide (rate acre <sup>-1</sup> )                                                                                         | Annual Grasses <sup>c</sup> |                 |                 |              | Yield <sup>b</sup><br>bu acre <sup>-1</sup> |
|---------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|-----------------------------|-----------------|-----------------|--------------|---------------------------------------------|
|                                                   |                                                                                                                              | 5/31                        | 6/15            | 6/30            | 10/4         |                                             |
| 1                                                 | Untreated Check                                                                                                              | 0                           | 0               | 0               | 0            | 3 d                                         |
| <b>Two-Pass – PRE (5/10) <i>fb</i> POST (6/2)</b> |                                                                                                                              | <b>POST</b>                 |                 |                 |              |                                             |
| 2                                                 | Harness MAX (2 qt) <i>fb</i><br>Capreno (3 oz) + Superb HC 0.5% v/v + AMS (2 lb)                                             | 39                          | 77              | 63              | 64           | 83 bc                                       |
| 3                                                 | Harness MAX (2 qt) <i>fb</i><br>Diflexx Duo (28 oz) + COC 1% v/v + AMS (2 lb)                                                | 50                          | 78              | 70              | 68           | 93 ab                                       |
| 4                                                 | Acuron Flexi (1.1 qt) <i>fb</i><br>Acuron Flexi (1.1 qt) + NIS 0.25% v/v + AMS (2 lb)                                        | 23                          | 43              | 34              | 49           | 32 cd                                       |
| 5                                                 | Verdict (16 oz) <i>fb</i><br>Armezon (1 oz) + Status (5 oz) + MSO 1% v/v + AMS (2 lb)                                        | 29                          | 89              | 83              | 71           | 120 ab                                      |
| 6                                                 | Verdict (10 oz) + Callisto (3 oz) <i>fb</i><br>Armezon PRO (16 fl oz) + MSO 1% v/v + AMS (2 lb)                              | 23                          | 73              | 66              | 67           | 62 bc                                       |
| 7                                                 | Surestart II (2 pt) <i>fb</i><br>Accent Q (0.9 oz) + Status (5 oz) + COC 1% v/v + AMS (2 lb)                                 | 34                          | 72              | 72              | 71           | 85 abc                                      |
| 8                                                 | Harness (2 pt) + Princep 4L (1 qt) <i>fb</i><br>Revulin Q (4 oz) + Status (5 oz) + COC 1% v/v + AMS (2 lb)                   | 51                          | 87              | 78              | 68           | 119 ab                                      |
| 9                                                 | Harness (2 pt) + Princep 4L (1 qt) <i>fb</i><br>Revulin Q (4 oz) + Status (5 oz) + Zidua SC (3 oz) + COC 1% v/v + AMS (2 lb) | 49                          | 82              | 77              | 71           | 115 ab                                      |
| 10                                                | Harness (2 pt) + Princep 4L (1 qt) <i>fb</i><br>Shieldex (1 oz) + Accent Q (0.9 oz) + COC 1% v/v + AMS (2 lb)                | 59                          | 82              | 79              | 70           | 117 ab                                      |
| 11                                                | Harness (2 pt) + Princep 4L (1 qt) <i>fb</i><br>Laudis (3 oz) + Warrant (48 oz) + MSO 1% v/v + AMS (2 lb)                    | 47                          | 93              | 89              | 79           | 141 a                                       |
| 12                                                | Dual II Magnum (1.67 pt) + Princep 4L (1 qt) <i>fb</i><br>Callisto (3 oz) + Status (5 oz) + COC 1% v/v + AMS (2 lb)          | 35                          | 64              | 57              | 55           | 56 bc                                       |
| <b>LSD (<math>\alpha=0.10</math>)</b>             |                                                                                                                              | <b>10</b>                   | <b>11</b>       | <b>13</b>       | <b>ns</b>    | <b>37</b>                                   |
| <b>p value</b>                                    |                                                                                                                              | <b>&lt;.001</b>             | <b>&lt;.001</b> | <b>&lt;.001</b> | <b>0.169</b> | <b>&lt;0.001</b>                            |

<sup>a</sup>Visual control from 70-100% is illustrated on a color scale with green representing greater weed control values.<sup>b</sup>Yield values with the same letter are not significantly different.<sup>c</sup>Annual grass species in the trial consisted of woolly cupgrass (predominant species) and giant foxtail. Grass ratings most accurately reflect woolly cupgrass control.

**Table 7.** Weed control ratings and corn grain yield for trial #22-BRO-CN12 at Brooklyn, WI.<sup>a</sup>

| Trt #                                              | Herbicide (rate acre <sup>-1</sup> )                                                                                         | Waterhemp       |                 |                 |                 | Yield <sup>b</sup><br>bu acre <sup>-1</sup> |
|----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|-----------------|-----------------|-----------------|-----------------|---------------------------------------------|
|                                                    |                                                                                                                              | 6/14            | 6/22            | 7/8             | 9/29            |                                             |
| 1                                                  | Untreated Check                                                                                                              | 0               | 0               | 0               | 0               | 161 b                                       |
| <b>Two-Pass – PRE (5/23) <i>fb</i> POST (6/24)</b> |                                                                                                                              | <b>POST</b>     |                 |                 |                 |                                             |
| 2                                                  | Harness MAX (2 qt) <i>fb</i><br>Capreno (3 oz) + Superb HC 0.5% v/v + AMS (2 lb)                                             | 100             | 99              | 93              | 93              | 235 a                                       |
| 3                                                  | Harness MAX (2 qt) <i>fb</i><br>Diflexx Duo (28 oz) + COC 1% v/v + AMS (2 lb)                                                | 100             | 95              | 95              | 99              | 214 a                                       |
| 4                                                  | Acuron Flexi (1.1 qt) <i>fb</i><br>Acuron Flexi (1.1 qt) + NIS 0.25% v/v + AMS (2 lb)                                        | 92              | 65              | 59              | 69              | 199 a                                       |
| 5                                                  | Verdict (16 oz) <i>fb</i><br>Armezon (1 oz) + Status (5 oz) + MSO 1% v/v + AMS (2 lb)                                        | 91              | 70              | 81              | 93              | 220 a                                       |
| 6                                                  | Verdict (10 oz) + Callisto (3 oz) <i>fb</i><br>Armezon PRO (16 fl oz) + MSO 1% v/v + AMS (2 lb)                              | 92              | 69              | 58              | 71              | 221 a                                       |
| 7                                                  | Surestart II (2 pt) <i>fb</i><br>Accent Q (0.9 oz) + Status (5 oz) + COC 1% v/v + AMS (2 lb)                                 | 97              | 87              | 85              | 99              | 234 a                                       |
| 8                                                  | Harness (2 pt) + Princep 4L (1 qt) <i>fb</i><br>Revulin Q (4 oz) + Status (5 oz) + COC 1% v/v + AMS (2 lb)                   | 100             | 98              | 98              | 100             | 217 a                                       |
| 9                                                  | Harness (2 pt) + Princep 4L (1 qt) <i>fb</i><br>Revulin Q (4 oz) + Status (5 oz) + Zidua SC (3 oz) + COC 1% v/v + AMS (2 lb) | 100             | 97              | 99              | 100             | 216 a                                       |
| 10                                                 | Harness (2 pt) + Princep 4L (1 qt) <i>fb</i><br>Shieldex (1 oz) + Accent Q (0.9 oz) + COC 1% v/v + AMS (2 lb)                | 100             | 96              | 78              | 97              | 236 a                                       |
| 11                                                 | Harness (2 pt) + Princep 4L (1 qt) <i>fb</i><br>Laudis (3 oz) + Warrant (48 oz) + MSO 1% v/v + AMS (2 lb)                    | 99              | 95              | 88              | 94              | 210 a                                       |
| 12                                                 | Dual II Magnum (1.67 pt) + Princep 4L (1 qt) <i>fb</i><br>Callisto (3 oz) + Status (5 oz) + COC 1% v/v + AMS (2 lb)          | 98              | 87              | 93              | 97              | 218 a                                       |
| <b>LSD (<math>\alpha=0.10</math>)</b>              |                                                                                                                              | <b>3</b>        | <b>9</b>        | <b>9</b>        | <b>6</b>        | <b>33</b>                                   |
| <b>p value</b>                                     |                                                                                                                              | <b>&lt;.001</b> | <b>&lt;.001</b> | <b>&lt;.001</b> | <b>&lt;.001</b> | <b>0.055</b>                                |

<sup>a</sup>Visual control from 70-100% is illustrated on a color scale with green representing greater weed control values.<sup>b</sup>Yield values with the same letter are not significantly different.

**Project Goal:** Evaluate the potential benefit of adding XtendiMax to the tank with traditional PRE herbicides.

#### Site Description:

|                       |                                                                          |                        |                    |
|-----------------------|--------------------------------------------------------------------------|------------------------|--------------------|
| <b>Location:</b>      | Arlington, WI                                                            | <b>Crop:</b>           | Soybean            |
| <b>Field #:</b>       | 361                                                                      | <b>Variety:</b>        | AG20XF1            |
| <b>Soil type:</b>     | Plano silt loam                                                          | <b>Planting Date:</b>  | 5/9                |
| <b>% OM:</b>          | 3.6                                                                      | <b>Emergence Date:</b> | 5/16               |
| <b>pH:</b>            | 5.9                                                                      | <b>Population:</b>     | 140,000 seeds/acre |
| <b>Fertilization:</b> | -                                                                        | <b>Depth:</b>          | 1.5 in             |
| <b>Previous crop:</b> | Corn Silage                                                              | <b>Row spacing:</b>    | 30 in              |
| <b>Tillage:</b>       | Conventional                                                             | <b>Plot Size:</b>      | 10 x 30 ft         |
| <b>Weed species:</b>  | common ragweed (AMBEL); velvetleaf (ABUTH); common lambsquarters (CHEAL) |                        |                    |

#### Herbicide Application Information:

|                                      |            |
|--------------------------------------|------------|
| <b>Date:</b>                         | 5/10       |
| <b>Treatment:</b>                    | PRE (A)    |
| <b>Air Temp (°F):</b>                | 93         |
| <b>2" Soil Temp (°F):</b>            | 80         |
| <b>Soil moisture [surface]:</b>      | dry        |
| <b>RH %:</b>                         | 56         |
| <b>Cloud cover %</b>                 | 60         |
| <b>Wind speed (mph)/direction</b>    | 3-9/NW     |
| <b>Rainfall (in) 1 wk after APP:</b> | 0.10"      |
| <b>GPA:</b>                          | 15         |
| <b>PSI:</b>                          | 35         |
| <b>Nozzle:</b>                       | TTI 110015 |
| <b>Nozzle spacing (in):</b>          | 20         |
| <b>Boom Height (in):</b>             | 20         |

| Trt # | Treatment       | Formulation   | SOA Group | Rate       | App Timing | App Code |
|-------|-----------------|---------------|-----------|------------|------------|----------|
| 1     | Untreated Check |               |           |            |            |          |
| 2     | Warrant         | 3 lb/gal      | 15        | 48 fl oz/a | PRE        | A        |
|       | Mauler          | 4 lb/gal      | 5         | 8 fl oz/a  | PRE        | A        |
| 3     | Warrant         | 3 lb/gal      | 15        | 48 fl oz/a | PRE        | A        |
| 4     | Warrant Ultra   | 3.45 lb/gal   | 14, 15    | 50 fl oz/a | PRE        | A        |
| 5     | Fierce EZ       | 3.04 lb/gal   | 14, 15    | 6 fl oz/a  | PRE        | A        |
| 6     | Valor EZ        | 4 lb/gal      | 14        | 2 fl oz/a  | PRE        | A        |
| 7     | Authority MTZ   | 45% w/w       | 5, 14     | 10 oz/a    | PRE        | A        |
| 8     | Warrant         | 3 lb/gal      | 15        | 48 fl oz/a | PRE        | A        |
|       | Mauler          | 4 lb/gal      | 5         | 8 fl oz/a  | PRE        | A        |
|       | XtendiMax       | 2.89 lbae/gal | 4         | 22 fl oz/a | PRE        | A        |
|       | VaporGrip Xtra  |               |           | 20 fl oz/a | PRE        | A        |
| 9     | Warrant         | 3 lb/gal      | 15        | 48 fl oz/a | PRE        | A        |
|       | XtendiMax       | 2.89 lbae/gal | 4         | 22 fl oz/a | PRE        | A        |
|       | VaporGrip Xtra  |               |           | 20 fl oz/a | PRE        | A        |
| 10    | Warrant Ultra   | 3.45 lb/gal   | 14, 15    | 50 fl oz/a | PRE        | A        |
|       | XtendiMax       | 2.89 lbae/gal | 4         | 22 fl oz/a | PRE        | A        |
|       | VaporGrip Xtra  |               |           | 20 fl oz/a | PRE        | A        |
| 11    | Fierce EZ       | 3.04 lb/gal   | 14, 15    | 6 fl oz/a  | PRE        | A        |
|       | XtendiMax       | 2.89 lbae/gal | 4         | 22 fl oz/a | PRE        | A        |
|       | VaporGrip Xtra  |               |           | 20 fl oz/a | PRE        | A        |
| 12    | Valor EZ        | 4 lb/gal      | 14        | 2 fl oz/a  | PRE        | A        |
|       | XtendiMax       | 2.89 lbae/gal | 4         | 22 fl oz/a | PRE        | A        |
|       | VaporGrip Xtra  |               |           | 20 fl oz/a | PRE        | A        |
| 13    | Authority MTZ   | 45% w/w       | 5, 14     | 10 oz/a    | PRE        | A        |
|       | XtendiMax       | 2.89 lbae/gal | 4         | 22 fl oz/a | PRE        | A        |
|       | VaporGrip Xtra  |               |           | 20 fl oz/a | PRE        | A        |
| 14    | XtendiMAX       | 2.89 lbae/gal | 4         | 22 fl oz/a | PRE        | A        |
|       | VaporGrip Xtra  |               |           | 20 fl oz/a | PRE        | A        |

**Adjuvants:** VaporGrip Xtra = volatility reducing agent.

**Trial Summary:**

The trial was established at the Arlington Ag Research Station near Arlington, WI to evaluate the potential benefit of adding XtendiMax to the tank with traditional PRE herbicides. There was visible soybean injury (stunting) from all treatments containing flumioxazin 23 days after application (data not shown). Fierce EZ and Valor EZ treatments were on average stunted 5-6% relative to the untreated check.

The addition of XtendiMax to the tank with traditional PRE herbicides greatly improved large-seeded broadleaf (common ragweed, velvetleaf) control of most treatments (Table 8). Averaged across all treatments, common ragweed control of PRE herbicides with XtendiMax was 99% vs 84% without XtendiMax 36 days after application. Similarly, velvetleaf control was 91% with vs 78% without 36 days after application. XtendiMax herbicide has been shown to provide a short period of residual control of broadleaf weeds with very little required moisture for activation. Results from this trial further supports this as only 0.10 inches of rainfall was received within one week of application. A similar trial was conducted in 2021 at the Arlington Ag Research Station with very similar results (see trial# 21-ARL-SB01 in the [2021 Wisconsin Weed Science Research Report](#)). When paired with traditional PRE herbicides, there may be some added benefit of dicamba for residual weed control in the interim between application and activating precipitation in dry springs.

Plot photos from throughout the growing season are available [XtendiMax Paired Soil Residual Herbicide Programs](#) published on [wiscweeds.info](http://wiscweeds.info).

**Table 8.** Weed control visual ratings for trial #22-ARL-SB01 at Arlington, WI.<sup>ab</sup>

| Trt # Herbicide (rate acre <sup>-1</sup> )                      | AMBEL (%)        |                  | CHEAL (%)    |                  | ABUTH (%)        |                  |
|-----------------------------------------------------------------|------------------|------------------|--------------|------------------|------------------|------------------|
|                                                                 | 23 DAT           | 36 DAT           | 23 DAT       | 36 DAT           | 23 DAT           | 36 DAT           |
| 1 Untreated Check                                               | 0                | 0                | 0            | 0                | 0                | 0                |
| <b>One-Pass – PRE (5/10)</b>                                    |                  |                  |              |                  |                  |                  |
| 2 Warrant (48 fl oz) + Mauler (8 fl oz)                         | 71               | 84               | 91           | 92               | 61               | 78               |
| 8 Warrant (48 fl oz) + Mauler (8 fl oz) + XtendiMax (22 fl oz)* | 99               | 99               | 99           | 98               | 85               | 92               |
| 3 Warrant (48 fl oz)                                            | 79               | 75               | 89           | 83               | 44               | 61               |
| 9 Warrant (48 fl oz) + XtendiMax (22 fl oz)*                    | 98               | 98               | 99           | 97               | 87               | 90               |
| 4 Warrant Ultra (50 fl oz)                                      | 71               | 81               | 96           | 85               | 49               | 63               |
| 10 Warrant Ultra (50 fl oz) + XtendiMax (22 fl oz)*             | 100              | 99               | 100          | 98               | 79               | 86               |
| 5 Fierce EZ (6 fl oz)                                           | 91               | 90               | 99           | 97               | 95               | 97               |
| 11 Fierce EZ (6 fl oz) + XtendiMax (22 fl oz)*                  | 98               | 98               | 99           | 98               | 90               | 93               |
| 6 Valor EZ (2 fl oz)                                            | 92               | 88               | 99           | 99               | 96               | 98               |
| 12 Valor EZ (2 fl oz) + XtendiMax (22 fl oz)*                   | 99               | 99               | 99           | 99               | 98               | 99               |
| 7 Authority MTZ (10 oz)                                         | 82               | 85               | 97           | 92               | 54               | 74               |
| 13 Authority MTZ (10 oz) + XtendiMax (22 fl oz)*                | 99               | 98               | 97           | 98               | 82               | 88               |
| 14 XtendiMax (22 fl oz)*                                        | 97               | 99               | 95           | 88               | 85               | 91               |
| <b>LSD (<math>\alpha=0.10</math>)</b>                           | <b>11</b>        | <b>6</b>         | <b>ns</b>    | <b>5</b>         | <b>20</b>        | <b>13</b>        |
| <b>p value</b>                                                  | <b>&lt;0.001</b> | <b>&lt;0.001</b> | <b>0.125</b> | <b>&lt;0.001</b> | <b>&lt;0.001</b> | <b>&lt;0.001</b> |

<sup>a</sup>Visual control from 70-100% is illustrated on a color scale with green representing greater weed control values.

<sup>b</sup>AMBEL, common ragweed; CHEAL, common lambsquarters; ABUTH, velvetleaf.

\*All treatments with XtendiMax included 20 fl oz/a VaporGrip Xtra, a volatility reducing agent.

**Project Goal:** Evaluate herbicide programs to provide recommendations for XtendFlex soybean weed management in areas or situations where dicamba is not used.

#### Site Description:

|                       |                                                                   |                        |                    |
|-----------------------|-------------------------------------------------------------------|------------------------|--------------------|
| <b>Location:</b>      | Brooklyn, WI                                                      | <b>Crop:</b>           | Soybean            |
| <b>Field #:</b>       | OB-5                                                              | <b>Variety:</b>        | AG20XF1            |
| <b>Soil type:</b>     | Kegonsa silt loam                                                 | <b>Planting Date:</b>  | 5/23               |
| <b>% OM:</b>          | 1.6                                                               | <b>Emergence Date:</b> | 6/6                |
| <b>pH:</b>            | 6.7                                                               | <b>Population:</b>     | 140,000 seeds/acre |
| <b>Fertilization:</b> | -                                                                 | <b>Depth:</b>          | 1.25 in            |
| <b>Previous crop:</b> | Seed corn                                                         | <b>Row spacing:</b>    | 30 in              |
| <b>Tillage:</b>       | Conventional                                                      | <b>Plot Size:</b>      | 10 x 30 ft         |
| <b>Weed species:</b>  | gly-R waterhemp (AMATA); velvetleaf (ABUTH); fall panicum (PANDI) |                        |                    |

#### Herbicide Application Information:

|                                      |            |           |
|--------------------------------------|------------|-----------|
| <b>Date:</b>                         | 5/24       | 6/29      |
| <b>Treatment:</b>                    | PRE (A)    | POST (B)  |
| <b>Air Temp (°F):</b>                | 58         | 77        |
| <b>2" Soil Temp (°F):</b>            | 60         | 75        |
| <b>Soil moisture [surface]:</b>      | moist      | dry       |
| <b>RH %:</b>                         | 62         | 63        |
| <b>Cloud cover %</b>                 | 90         | 0         |
| <b>Wind speed (mph)/direction</b>    | 2-6/SE     | 0-6/ENE   |
| <b>Rainfall (in) 1 wk after APP:</b> | 2.14"      | 1.32"     |
| <b>GPA:</b>                          | 15         | 15        |
| <b>PSI:</b>                          | 35         | 35        |
| <b>Nozzle:</b>                       | TTI 110015 | TT 110015 |
| <b>Nozzle spacing (in):</b>          | 20         | 20        |
| <b>Boom Height (in):</b>             | 20         | 25        |

#### Crop and weed information at application:

|                     |                 |      |                     |
|---------------------|-----------------|------|---------------------|
|                     | <b>Date:</b>    | 5/17 | 6/29*               |
| <b>Soybean</b>      | <b>Height:</b>  | -    | 3-6"                |
|                     | <b>Stage:</b>   | -    | V4                  |
| <b>waterhemp</b>    | <b>Height:</b>  | -    | 1-12" Avg=4"        |
|                     | <b>Density:</b> | -    | 0-6/ft <sup>2</sup> |
| <b>velvetleaf</b>   | <b>Height:</b>  | -    | 1-6"                |
|                     | <b>Density:</b> | -    | 0-1/ft <sup>2</sup> |
| <b>fall panicum</b> | <b>Height:</b>  | -    | 1-8"                |
|                     | <b>Density:</b> | -    | 1-2/ft <sup>2</sup> |

\*Weed density recorded from plots with a previous herbicide treatment.

Density and height varied depending on the effectiveness of the PRE-emergence herbicide

| Trt # | Treatment         | Formulation  | SOA Group | Rate       | App Timing | App Code |
|-------|-------------------|--------------|-----------|------------|------------|----------|
| 1     | Untreated Check   |              |           |            |            |          |
| 2     | Warrant           | 3 lb/gal     | 15        | 48 fl oz/a | PRE        | A        |
|       | Mauler            | 4 lb/gal     | 5         | 8 fl oz/a  | PRE        | A        |
|       | Roundup PowerMAX3 | 4.8 lbae/gal | 9         | 30 fl oz/a | POST       | B        |
|       | Warrant Ultra     | 3.45 lb/gal  | 14, 15    | 48 fl oz/a | POST       | B        |
|       | AMS (liquid)      |              |           | 2.5% v/v   | POST       | B        |
| 3     | Warrant           | 3 lb/gal     | 15        | 48 fl oz/a | PRE        | A        |
|       | Mauler            | 4 lb/gal     | 5         | 8 fl oz/a  | PRE        | A        |
|       | Roundup PowerMAX3 | 4.8 lbae/gal | 9         | 30 fl oz/a | POST       | B        |
|       | Liberty           | 2.34 lb/gal  | 10        | 32 fl oz/a | POST       | B        |
|       | Warrant           | 3 lb/gal     | 15        | 48 fl oz/a | POST       | B        |
|       | AMS (liquid)      |              |           | 2.5% v/v   | POST       | B        |
| 4     | Warrant           | 3 lb/gal     | 15        | 48 fl oz/a | PRE        | A        |
|       | Mauler            | 4 lb/gal     | 5         | 8 fl oz/a  | PRE        | A        |
|       | Liberty           | 2.34 lb/gal  | 10        | 32 fl oz/a | POST       | B        |
|       | Warrant           | 3 lb/gal     | 15        | 48 fl oz/a | POST       | B        |
|       | AMS (liquid)      |              |           | 2.5% v/v   | POST       | B        |
| 5     | Warrant           | 3 lb/gal     | 15        | 48 fl oz/a | PRE        | A        |
|       | Mauler            | 4 lb/gal     | 5         | 8 fl oz/a  | PRE        | A        |
|       | Liberty           | 2.34 lb/gal  | 10        | 32 fl oz/a | POST       | B        |
|       | Warrant Ultra     | 3.45 lb/gal  | 14, 15    | 48 fl oz/a | POST       | B        |
|       | AMS (liquid)      |              |           | 2.5% v/v   | POST       | B        |
| 6     | Warrant Ultra     | 3.45 lb/gal  | 14, 15    | 48 fl oz/a | PRE        | A        |
|       | Roundup PowerMAX3 | 4.8 lbae/gal | 9         | 30 fl oz/a | POST       | B        |
|       | Warrant           | 3 lb/gal     | 15        | 48 fl oz/a | POST       | B        |
|       | AMS (liquid)      |              |           | 2.5% v/v   | POST       | B        |
| 7     | Warrant Ultra     | 3.45 lb/gal  | 14, 15    | 48 fl oz/a | PRE        | A        |
|       | Roundup PowerMAX3 | 4.8 lbae/gal | 9         | 30 fl oz/a | POST       | B        |
|       | Liberty           | 2.34 lb/gal  | 10        | 32 fl oz/a | POST       | B        |
|       | Warrant           | 3 lb/gal     | 15        | 48 fl oz/a | POST       | B        |
|       | AMS (liquid)      |              |           | 2.5% v/v   | POST       | B        |
| 8     | Fierce EZ         | 3.04 lb/gal  | 14, 15    | 6 fl oz/a  | PRE        | A        |
|       | Roundup PowerMAX3 | 4.8 lbae/gal | 9         | 30 fl oz/a | POST       | B        |
|       | Liberty           | 2.34 lb/gal  | 10        | 32 fl oz/a | POST       | B        |
|       | Warrant           | 3 lb/gal     | 15        | 48 fl oz/a | POST       | B        |
|       | AMS (liquid)      |              |           | 2.5% v/v   | POST       | B        |
| 9     | Fierce EZ         | 3.04 lb/gal  | 14, 15    | 6 fl oz/a  | PRE        | A        |
|       | Roundup PowerMAX3 | 4.8 lbae/gal | 9         | 30 fl oz/a | POST       | B        |
|       | Warrant Ultra     | 3.45 lb/gal  | 14, 15    | 48 fl oz/a | POST       | B        |
|       | AMS (liquid)      |              |           | 2.5% v/v   | POST       | B        |

**Adjuvants:** AMS (liquid) = AMSOL

| Trt # | Treatment         | Formulation  | SOA Group | Rate       | App Timing | App Code |
|-------|-------------------|--------------|-----------|------------|------------|----------|
| 10    | Valor EZ          | 4 lb/gal     | 14        | 2 fl oz/a  | PRE        | A        |
|       | Mauler            | 4 lb/gal     | 5         | 8 fl oz/a  | PRE        | A        |
|       | Roundup PowerMAX3 | 4.8 lbae/gal | 9         | 30 fl oz/a | POST       | B        |
|       | Liberty           | 2.34 lb/gal  | 10        | 32 fl oz/a | POST       | B        |
|       | Warrant           | 3 lb/gal     | 15        | 48 fl oz/a | POST       | B        |
|       | AMS (liquid)      |              |           | 2.5% v/v   | POST       | B        |
| 11    | Valor EZ          | 4 lb/gal     | 14        | 2 fl oz/a  | PRE        | A        |
|       | Mauler            | 4 lb/gal     | 5         | 8 fl oz/a  | PRE        | A        |
|       | Roundup PowerMAX3 | 4.8 lbae/gal | 9         | 30 fl oz/a | POST       | B        |
|       | Warrant Ultra     | 3.45 lb/gal  | 14, 15    | 48 fl oz/a | POST       | B        |
|       | AMS (liquid)      |              |           | 2.5% v/v   | POST       | B        |

**Adjuvants:** AMS (liquid) = AMSOL

### Trial Summary:

The trial was established at the O'Brien Hybrids farm located north of Brooklyn, WI to evaluate multiple 2-pass herbicide programs for weed control recommendations in XtendFlex soybean for areas or situations where dicamba is not used. There was minor (<3%) soybean injury from the PRE herbicides. Soybean injury was observed 14 days after the POST application (Table 9). Injury symptoms included leaf necrosis (burn) and leaf crinkling. Tank mixes with Warrant Ultra had the greatest % injury (~12%) while tank mixes without had ~7% injury.

The trial was conducted in a field with a population of glyphosate-resistant waterhemp. PRE applications of Fierce EZ (trts 8, 9) and Warrant Ultra (trts 6, 7) had greater residual waterhemp 36 days after application. (Table 9). POST waterhemp control varied considerably. Treatments without Liberty (glufosinate) averaged ~71% control while those with Liberty averaged 93%. Treatments that had greater levels of PRE residual control also tended to have greater levels of POST control, a trend that has been observed in multiple waterhemp trials over the past several years of research.

Yield differed among herbicide programs (Table 9). While a clear trend wasn't immediately evident, treatments without Liberty yielded on average 65 bu acre<sup>-1</sup>, while those with Liberty averaged 68 bu acre<sup>-1</sup>.

Plot photos from throughout the growing season are available [XtendFlex Soybean Herbicide Program Recommendations without Dicamba](https://www.wiscweeds.info) published on [wiscweeds.info](https://www.wiscweeds.info).

**Table 9.** Crop injury, weed control ratings, and soybean yield for trial #22-BRO-SB06 at Brooklyn, WI.<sup>a</sup>

| Trt #                                       | Herbicide (rate acre <sup>-1</sup> )                                                                  | Injury (%) |       | Waterhemp (%) |       |       |       | Velvetleaf (%) |      |       | Fall Panicum (%) |      |       | Yield <sup>b</sup><br>bu acre <sup>-1</sup> |
|---------------------------------------------|-------------------------------------------------------------------------------------------------------|------------|-------|---------------|-------|-------|-------|----------------|------|-------|------------------|------|-------|---------------------------------------------|
|                                             |                                                                                                       | 6/29       | 7/13  | 6/29          | 7/13  | 7/26  | 9/29  | 6/29           | 7/13 | 9/29  | 6/29             | 7/13 | 9/29  |                                             |
| 1                                           | Untreated Check                                                                                       | 0          | 0     | 0             | 0     | 0     | 0     | 0              | 0    | 0     | 0                | 0    | 0     | 34 c                                        |
| <b>Two-Pass – PRE (5/24) fb POST (6/29)</b> |                                                                                                       |            |       | <b>POST</b>   |       |       |       | <b>POST</b>    |      |       | <b>POST</b>      |      |       |                                             |
| 2                                           | Warrant (48 oz) + Mauler (8 oz) <b>fb</b><br>Roundup PM3 (30 oz) + Warrant Ultra (48 oz)*             | 2.3        | 9.8   | 55            | 50    | 67    | 58    | 82             | 100  | 100   | 74               | 100  | 100   | 65 ab                                       |
| 3                                           | Warrant (48 oz) + Mauler (8 oz) <b>fb</b><br>Roundup PM3 (30 oz) + Liberty (32 oz) + Warrant (48 oz)* | 2.0        | 6.8   | 60            | 90    | 92    | 93    | 77             | 100  | 100   | 75               | 100  | 100   | 71 a                                        |
| 4                                           | Warrant (48 oz) + Mauler (8 oz) <b>fb</b><br>Liberty (32 oz) + Warrant (48 oz)*                       | 2.5        | 7.3   | 59            | 85    | 89    | 87    | 83             | 100  | 99    | 64               | 100  | 100   | 68 ab                                       |
| 5                                           | Warrant (48 oz) + Mauler (8 oz) <b>fb</b><br>Liberty (32 oz) + Warrant Ultra (48 oz)*                 | 2.3        | 14.0  | 60            | 90    | 92    | 93    | 87             | 100  | 92    | 73               | 100  | 96    | 71 a                                        |
| 6                                           | Warrant Ultra (48 oz) <b>fb</b><br>Roundup PM3 (30 oz) + Warrant (48 oz)*                             | 2.3        | 6.3   | 79            | 80    | 83    | 79    | 82             | 100  | 100   | 81               | 100  | 100   | 65 ab                                       |
| 7                                           | Warrant Ultra (48 oz) <b>fb</b><br>Roundup PM3 (30 oz) + Liberty (32 oz) + Warrant (48 oz)*           | 2.3        | 7.0   | 88            | 97    | 97    | 96    | 82             | 100  | 99    | 83               | 100  | 100   | 68 ab                                       |
| 8                                           | Fierce EZ (6 oz) <b>fb</b><br>Roundup PM3 (30 oz) + Liberty (32 oz) + Warrant (48 oz)*                | 2.8        | 6.0   | 85            | 98    | 97    | 97    | 94             | 100  | 100   | 93               | 100  | 100   | 65 ab                                       |
| 9                                           | Fierce EZ (6 oz) <b>fb</b><br>Roundup PM3 (30 oz) + Warrant Ultra (48 oz)*                            | 2.3        | 12.8  | 88            | 81    | 83    | 83    | 94             | 100  | 100   | 94               | 100  | 100   | 67 ab                                       |
| 10                                          | Valor EZ (2 oz) + Mauler (8 oz) <b>fb</b><br>Roundup PM3 (30 oz) + Liberty (32 oz) + Warrant (48 oz)* | 2.3        | 6.8   | 67            | 95    | 95    | 93    | 87             | 100  | 100   | 81               | 100  | 100   | 67 ab                                       |
| 11                                          | Valor EZ (2 oz) + Mauler (8 oz) <b>fb</b><br>Roundup PM3 (30 oz) + Warrant Ultra (48 oz)*             | 2.0        | 10.0  | 64            | 58    | 73    | 65    | 95             | 100  | 100   | 76               | 100  | 100   | 61 b                                        |
| LSD ( $\alpha=0.10$ )                       |                                                                                                       | ns         | 1.6   | 10            | 10    | 4     | 8     | 9              | ns   | 3     | 8                | ns   | 2     | 9                                           |
| p value                                     |                                                                                                       | 0.491      | <.001 | <.001         | <.001 | <.001 | <.001 | 0.014          | 1.00 | 0.018 | <.001            | 1.00 | 0.097 | <.001                                       |

<sup>a</sup>Visual control from 70-100% is illustrated on a color scale with green representing greater weed control values.<sup>b</sup>Yield values with the same letter are not significantly different.

\*All POST applications included liquid AMS at 2.5% v/v.

**Project Goal:** Evaluate herbicide programs to provide recommendations for XtendFlex soybean weed management in counties under restrictions from the endangered species act (ESA).

#### Site Description:

|                       |                                                                                  |                        |                    |
|-----------------------|----------------------------------------------------------------------------------|------------------------|--------------------|
| <b>Location:</b>      | Brooklyn, WI                                                                     | <b>Crop:</b>           | XtendFlex soybean  |
| <b>Field #:</b>       | OB-5                                                                             | <b>Variety:</b>        | AG20XF1            |
| <b>Soil type:</b>     | Kegonsa silt loam                                                                | <b>Planting Date:</b>  | 5/23               |
| <b>% OM:</b>          | 1.6                                                                              | <b>Emergence Date:</b> | 6/6                |
| <b>pH:</b>            | 6.7                                                                              | <b>Population:</b>     | 140,000 seeds/acre |
| <b>Fertilization:</b> | -                                                                                | <b>Depth:</b>          | 1.25 in            |
| <b>Previous crop:</b> | Seed Corn                                                                        | <b>Row spacing:</b>    | 30 in              |
| <b>Tillage:</b>       | conventional                                                                     | <b>Plot Size:</b>      | 10 x 30 ft         |
| <b>Weed species:</b>  | glyphosate-resistant waterhemp (AMATA); velvetleaf (ABUTH); fall panicum (PANDI) |                        |                    |

#### Herbicide Application Information:

|                                      |            |           |
|--------------------------------------|------------|-----------|
| <b>Date:</b>                         | 5/24       | 6/29      |
| <b>Treatment:</b>                    | PRE (A)    | POST (B)  |
| <b>Air Temp (°F):</b>                | 58         | 77        |
| <b>2" Soil Temp (°F):</b>            | 60         | 75        |
| <b>Soil moisture [surface]:</b>      | moist      | dry       |
| <b>RH %:</b>                         | 62         | 63        |
| <b>Cloud cover %</b>                 | 90         | 0         |
| <b>Wind speed (mph)/direction</b>    | 2-5/SE     | 0-6/ENE   |
| <b>Rainfall (in) 1 wk after APP:</b> | 2.14"      | 1.32"     |
| <b>GPA:</b>                          | 15         | 15        |
| <b>PSI:</b>                          | 35         | 35        |
| <b>Nozzle:</b>                       | TTI 110015 | TT 110015 |
| <b>Nozzle spacing (in):</b>          | 20         | 20        |
| <b>Boom Height (in):</b>             | 20         | 25        |

#### Crop and weed information at application:

|                     |                 |      |                     |
|---------------------|-----------------|------|---------------------|
|                     | <b>Date:</b>    | 5/24 | 6/29                |
| <b>Soybean</b>      | <b>Height:</b>  | -    | 3-6"                |
|                     | <b>Stage:</b>   | -    | V4                  |
| <b>waterhemp</b>    | <b>Height:</b>  | -    | 1-8" Avg=3"         |
|                     | <b>Density:</b> | -    | 0-1/ft <sup>2</sup> |
| <b>velvetleaf</b>   | <b>Height:</b>  | -    | 0.5-2"              |
|                     | <b>Density:</b> | -    | 0-1/ft <sup>2</sup> |
| <b>fall panicum</b> | <b>Height:</b>  | -    | 1-4"                |
|                     | <b>Density:</b> | -    | 0-5/ft <sup>2</sup> |

\*Weed density recorded from plots with a previous herbicide treatment.

Density and height varied depending on the effectiveness of the PRE herbicide.

| Trt # | Treatment          | Formulation   | SOA Group | Rate       | App Timing | App Code |
|-------|--------------------|---------------|-----------|------------|------------|----------|
| 1     | Check              |               |           |            |            |          |
| 2     | Fierce EZ          | 3.04 lb/gal   | 14, 15    | 6 fl oz/a  | PRE        | A        |
|       | Liberty            | 2.34 lb/gal   | 10        | 32 fl oz/a | POST       | B        |
|       | <b>MON 301668*</b> | 4.61 lb/gal   | 15        | 30 fl oz/a | POST       | B        |
|       | AMS                |               |           | 2.5% v/v   | POST       | B        |
| 3     | Fierce EZ          | 3.04 lb/gal   | 14, 15    | 6 fl oz/a  | PRE        | A        |
|       | XtendiMax          | 2.89 lbae/gal | 4         | 22 fl oz/a | PRE        | A        |
|       | VaporGrip Xtra     |               |           | 20 fl oz/a | PRE        | A        |
|       | Liberty            | 2.34 lb/gal   | 10        | 32 fl oz/a | POST       | B        |
|       | <b>MON 301668*</b> | 4.61 lb/gal   | 15        | 30 fl oz/a | POST       | B        |
|       | AMS                |               |           | 2.5% v/v   | POST       | B        |
| 4     | Fierce EZ          | 3.04 lb/gal   | 14, 15    | 6 fl oz/a  | PRE        | A        |
|       | Liberty            | 2.34 lb/gal   | 10        | 32 fl oz/a | POST       | B        |
|       | Roundup PowerMAX 3 | 4.8 lbae/gal  | 9         | 30 fl oz/a | POST       | B        |
|       | <b>MON 301668*</b> | 4.61 lb/gal   | 15        | 30 fl oz/a | POST       | B        |
|       | AMS                |               |           | 2.5% v/v   | POST       | B        |
| 5     | Fierce EZ          | 3.04 lb/gal   | 14, 15    | 6 fl oz/a  | PRE        | A        |
|       | XtendiMax          | 2.89 lbae/gal | 4         | 22 fl oz/a | PRE        | A        |
|       | VaporGrip Xtra     |               |           | 20 fl oz/a | PRE        | A        |
|       | Liberty            | 2.34 lb/gal   | 10        | 32 fl oz/a | POST       | B        |
|       | Roundup PowerMAX 3 | 4.8 lbae/gal  | 9         | 30 fl oz/a | POST       | B        |
|       | <b>MON 301668*</b> | 4.61 lb/gal   | 15        | 30 fl oz/a | POST       | B        |
|       | AMS                |               |           | 2.5% v/v   | POST       | B        |
| 6     | Fierce EZ          | 3.04 lb/gal   | 14, 15    | 6 fl oz/a  | PRE        | A        |
|       | Warrant Ultra      | 3.45 lb/gal   | 14, 15    | 48 fl oz/a | POST       | B        |
|       | Liberty            | 2.34 lb/gal   | 10        | 32 fl oz/a | POST       | B        |
|       | AMS                |               |           | 2.5% v/v   | POST       | B        |
| 7     | Fierce EZ          | 3.04 lb/gal   | 14, 15    | 6 fl oz/a  | PRE        | A        |
|       | XtendiMax          | 2.89 lbae/gal | 4         | 22 fl oz/a | PRE        | A        |
|       | VaporGrip Xtra     |               |           | 20 fl oz/a | PRE        | A        |
|       | Warrant Ultra      | 3.45 lb/gal   | 14, 15    | 48 fl oz/a | POST       | B        |
|       | Liberty            | 2.34 lb/gal   | 10        | 32 fl oz/a | POST       | B        |
|       | AMS                |               |           | 2.5% v/v   | POST       | B        |
| 8     | Fierce EZ          | 3.04 lb/gal   | 14, 15    | 6 fl oz/a  | PRE        | A        |
|       | Warrant Ultra      | 3.45 lb/gal   | 14, 15    | 48 fl oz/a | POST       | B        |
|       | Liberty            | 2.34 lb/gal   | 10        | 32 fl oz/a | POST       | B        |
|       | Roundup PowerMAX 3 | 4.8 lbae/gal  | 9         | 30 fl oz/a | POST       | B        |
|       | AMS                |               |           | 2.5% v/v   | POST       | B        |
| 9     | Fierce EZ          | 3.04 lb/gal   | 14, 15    | 6 fl oz/a  | PRE        | A        |
|       | XtendiMax          | 2.89 lbae/gal | 4         | 22 fl oz/a | PRE        | A        |
|       | VaporGrip Xtra     |               |           | 20 fl oz/a | PRE        | A        |
|       | Warrant Ultra      | 3.45 lb/gal   | 14, 15    | 48 fl oz/a | POST       | B        |
|       | Liberty            | 2.34 lb/gal   | 10        | 32 fl oz/a | POST       | B        |
|       | Roundup PowerMAX 3 | 4.8 lbae/gal  | 9         | 30 fl oz/a | POST       | B        |
|       | AMS                |               |           | 2.5% v/v   | POST       | B        |

**Adjuvants:** AMS = Amsol (liquid AMS); VaporGrip Xtra = volatility reducing agent (VRA)

\***MON301668** is an experimental formulation of encapsulated acetochlor similar to Warrant herbicide with a higher active ingredient load per gallon of formulated product.

### **Trial Summary:**

The trial was established at the O'Brien Hybrids farm located north of Brooklyn, WI. This trial evaluated multiple 2-pass herbicide programs to provide recommendations for weed management in XtendFlex soybeans in counties under restrictions from the endangered species act (ESA). Currently 26 Wisconsin counties are listed as counties under the ESA. Since, over the top applications of XtendiMax have further in field buffer requirements these programs were designed to avoid POST applications of XtendiMax all together. There was only minor (<3%) soybean injury from the PRE herbicides 36 days after application (data not shown). There was soybean injury 8 and 14 days after the POST application (Table 10). Injury symptoms included leaf necrosis (burn) and leaf crinkling. Tank mixes with Warrant Ultra had the greatest % injury (~14%) while tank mixes with Liberty + MON 301668 had ~6% injury.

The trial was conducted in a field with a population of glyphosate-resistant waterhemp. All treatments provided excellent season long waterhemp control (Table 22). Waterhemp control from the PRE herbicides at the time of POST application was good to excellent ~89-95%. The addition of XtendiMax to the tank at the PRE application did not improve control of waterhemp or velvetleaf. The same trial was conducted in 2021 and PRE applications of XtendiMax did improve control of broadleaf weeds under drier conditions. See trial 21-BRO-SB13 in last years [2021 Wisconsin Weed Science Research Report](#) for a full report. All POST herbicide programs provided excellent waterhemp control.

Soybean yield of the various herbicide programs was very similar and did not statistically differ (Table 10). Yield across all herbicide treatments = 75 bu acre<sup>-1</sup>, while the untreated check was 40 bu acre<sup>-1</sup>.

Plot photos from throughout the growing season are available [XtendFlex Soybean Herbicide Recommendations for ESA Counties](#) published on [wiscweeds.info](http://wiscweeds.info).

**Table 10.** Soybean injury, weed control ratings, and soybean yield for trial #22-BRO-SB22 at Brooklyn, WI.<sup>a</sup>

| Trt #                                       | Herbicide (rate acre <sup>-1</sup> )                                                                                                    | Injury <sup>c</sup> (%) |       | Waterhemp |       |       | Velvetleaf |       | Fall Panicum |       | Yield <sup>b</sup><br>bu acre <sup>-1</sup> |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-------|-----------|-------|-------|------------|-------|--------------|-------|---------------------------------------------|
|                                             |                                                                                                                                         | 7/7                     | 7/13  | 6/14      | 6/29  | 9/29  | 6/29       | 9/29  | 6/29         | 9/29  |                                             |
| 1                                           | Untreated Check                                                                                                                         | 0                       | 0     | 0         | 0     | 0     | 0          | 0     | 0            | 0     | 40 b                                        |
| <b>Two-Pass – PRE (5/24) fb POST (6/29)</b> |                                                                                                                                         |                         |       |           |       |       |            |       |              |       |                                             |
| 2                                           | Fierce EZ (6 fl oz) <b>fb</b><br>Liberty (32 fl oz) + MON 301668 (30 fl oz) + AMS**                                                     | 4.0                     | 4.5   | 100       | 95    | 100   | 99         | 100   | 93           | 100   | 76 a                                        |
| 3                                           | Fierce EZ (6 fl oz) + XtendiMax (22 fl oz)* <b>fb</b><br>Liberty (32 fl oz) + MON 301668 (30 fl oz) + AMS**                             | 4.8                     | 7.8   | 100       | 91    | 100   | 96         | 100   | 91           | 100   | 76 a                                        |
| 4                                           | Fierce EZ (6 fl oz) <b>fb</b><br>Liberty (32 fl oz) + Roundup PM3 (30 fl oz) + MON 301668 (30 fl oz) + AMS**                            | 4.5                     | 7.5   | 100       | 92    | 99    | 96         | 100   | 94           | 100   | 76 a                                        |
| 5                                           | Fierce EZ (6 fl oz) + XtendiMax (22 fl oz)* <b>fb</b><br>Liberty (32 fl oz) + Roundup PM3 (30 fl oz) + MON 301668 (30 fl oz) + AMS**    | 5.0                     | 5.8   | 100       | 91    | 99    | 98         | 100   | 93           | 100   | 74 a                                        |
| 6                                           | Fierce EZ (6 fl oz) <b>fb</b><br>Warrant Ultra (48 fl oz) + Liberty (32 fl oz) + AMS**                                                  | 7.8                     | 14.0  | 100       | 90    | 100   | 98         | 100   | 90           | 98    | 75 a                                        |
| 7                                           | Fierce EZ (6 fl oz) + XtendiMax (22 fl oz)* <b>fb</b><br>Warrant Ultra (48 fl oz) + Liberty (32 fl oz) + AMS**                          | 8.3                     | 13.3  | 100       | 95    | 99    | 96         | 100   | 90           | 100   | 75 a                                        |
| 8                                           | Fierce EZ (6 fl oz) <b>fb</b><br>Warrant Ultra (48 fl oz) + Liberty (32 fl oz) + Roundup PM3 (30 fl oz) + AMS**                         | 8.0                     | 14.0  | 99        | 89    | 100   | 96         | 100   | 92           | 100   | 74 a                                        |
| 9                                           | Fierce EZ (6 fl oz) + XtendiMax (22 fl oz)* <b>fb</b><br>Warrant Ultra (48 fl oz) + Liberty (32 fl oz) + Roundup PM3 (30 fl oz) + AMS** | 7.5                     | 14.8  | 100       | 92    | 99    | 97         | 100   | 90           | 100   | 75 a                                        |
| LSD ( $\alpha=0.10$ )                       |                                                                                                                                         | 1.5                     | 2.2   | ns        | ns    | ns    | ns         | ns    | ns           | 1     | 5                                           |
| p value                                     |                                                                                                                                         | <.001                   | <.001 | 0.284     | 0.623 | 0.713 | 0.576      | 0.459 | 0.824        | 0.096 | <.001                                       |

<sup>a</sup>Visual control from 70-100% is illustrated on a color scale with green representing greater weed control values.<sup>b</sup>Yield values with the same letter are not significantly different.<sup>c</sup>Crop injury symptoms included leaf necrosis (burn) and leaf crinkling.

\*All PRE applications of XtendiMax included 20 fl oz/a VaporGrip Xtra, a volatility reducing agent.

\*\*Liquid AMS was applied at 2.5% v/v

**Project Goal:** Evaluate multiple herbicide programs to provide recommendations for XtendFlex soybean weed management.

#### Site Description:

|                       |                                                                   |                        |                    |
|-----------------------|-------------------------------------------------------------------|------------------------|--------------------|
| <b>Location:</b>      | Brooklyn, WI                                                      | <b>Crop:</b>           | XtendFlex soybean  |
| <b>Field #:</b>       | OB-5                                                              | <b>Variety:</b>        | AG20XF1            |
| <b>Soil type:</b>     | Kegonsa silt loam                                                 | <b>Planting Date:</b>  | 5/23               |
| <b>% OM:</b>          | 1.6                                                               | <b>Emergence Date:</b> | 6/6                |
| <b>pH:</b>            | 6.7                                                               | <b>Population:</b>     | 140,000 seeds/acre |
| <b>Fertilization:</b> | -                                                                 | <b>Depth:</b>          | 1.25 in            |
| <b>Previous crop:</b> | Seed corn                                                         | <b>Row spacing:</b>    | 30 in              |
| <b>Tillage:</b>       | Conventional                                                      | <b>Plot Size:</b>      | 10 x 30 ft         |
| <b>Weed species:</b>  | gly-R waterhemp (AMATA); velvetleaf (ABUTH); fall panicum (PANDI) |                        |                    |

#### Herbicide Application Information:

|                                      |            |           |
|--------------------------------------|------------|-----------|
| <b>Date:</b>                         | 5/24       | 6/29      |
| <b>Treatment:</b>                    | PRE (A)    | POST (B)  |
| <b>Air Temp (°F):</b>                | 58         | 77        |
| <b>2" Soil Temp (°F):</b>            | 60         | 77        |
| <b>Soil moisture [surface]:</b>      | moist      | dry       |
| <b>RH %:</b>                         | 62         | 63        |
| <b>Cloud cover %</b>                 | 90         | 0         |
| <b>Wind speed (mph)/direction</b>    | 2-5/SE     | 0-6/ENE   |
| <b>Rainfall (in) 1 wk after APP:</b> | 2.14"      | 1.32"     |
| <b>GPA:</b>                          | 15         | 15        |
| <b>PSI:</b>                          | 35         | 35        |
| <b>Nozzle:</b>                       | TTI 110015 | TT*/TTI** |
| <b>Nozzle spacing (in):</b>          | 20         | 20        |
| <b>Boom Height (in):</b>             | 20         | 25        |

\*Used TT 110015 nozzles for all treatments without XtendiMax.

\*\*Used TTI 110015 nozzles for all treatments with XtendiMax.

#### Crop and weed information at application:

|                     |                 |      |                      |
|---------------------|-----------------|------|----------------------|
|                     | <b>Date:</b>    | 5/26 | 6/22*                |
| <b>Soybean</b>      | <b>Height:</b>  | -    | 4-6"                 |
|                     | <b>Stage:</b>   | -    | V4                   |
| <b>waterhemp</b>    | <b>Height:</b>  | -    | 0.5-11" Avg=4"       |
|                     | <b>Density:</b> | -    | 3-14/ft <sup>2</sup> |
| <b>velvetleaf</b>   | <b>Height:</b>  | -    | 1-5"                 |
|                     | <b>Density:</b> | -    | 0-1/ft <sup>2</sup>  |
| <b>fall panicum</b> | <b>Height:</b>  | -    | 1-7"                 |
|                     | <b>Density:</b> | -    | 0-7/ft <sup>2</sup>  |

\*Weed density recorded from plots with a previous herbicide treatment.

Density and height varied depending on the effectiveness of the PRE herbicide.

| Trt # | Treatment          | Formulation  | SOA Group | Rate       | App Timing | App Code |
|-------|--------------------|--------------|-----------|------------|------------|----------|
| 1     | Check              |              |           |            |            |          |
| 2     | XtendiMax          | 2.9 lbae/gal | 4         | 22 fl oz/a | PRE        | A        |
|       | Fierce EZ          | 3.04 lb/gal  | 14, 15    | 6 fl oz/a  | PRE        | A        |
|       | VaporGrip Xtra     |              |           | 20 fl oz/a | PRE        | A        |
|       | XtendiMax          | 2.9 lbae/gal | 4         | 22 fl oz/a | POST       | B        |
|       | Roundup PowerMAX 3 | 4.8 lbae/gal | 9         | 30 fl oz/a | POST       | B        |
|       | Warrant            | 3 lb/gal     | 15        | 48 fl oz/a | POST       | B        |
|       | VaporGrip Xtra     |              |           | 20 fl oz/a | POST       | B        |
|       | Intact             |              |           | 0.5% v/v   | POST       | B        |
|       | Class Act Ridion   |              |           | 1% v/v     | POST       | B        |
| 3     | XtendiMax          | 2.9 lbae/gal | 4         | 22 fl oz/a | PRE        | A        |
|       | Fierce EZ          | 3.04 lb/gal  | 14, 15    | 6 fl oz/a  | PRE        | A        |
|       | VaporGrip Xtra     |              |           | 20 fl oz/a | PRE        | A        |
|       | Liberty            | 2.34 lb/gal  | 10        | 32 fl oz/a | POST       | B        |
|       | Roundup PowerMAX 3 | 4.8 lbae/gal | 9         | 30 fl oz/a | POST       | B        |
|       | Warrant            | 3 lb/gal     | 15        | 48 fl oz/a | POST       | B        |
|       | AMS (liquid)       |              |           | 2.5% v/v   | POST       | B        |
| 4     | XtendiMax          | 2.9 lbae/gal | 4         | 22 fl oz/a | PRE        | A        |
|       | Authority MTZ      | 45% w/w      | 5, 14     | 14 oz/a    | PRE        | A        |
|       | VaporGrip Xtra     |              |           | 20 fl oz/a | PRE        | A        |
|       | XtendiMax          | 2.9 lbae/gal | 4         | 22 fl oz/a | POST       | B        |
|       | Roundup PowerMAX 3 | 4.8 lbae/gal | 9         | 30 fl oz/a | POST       | B        |
|       | Warrant            | 3 lb/gal     | 15        | 48 fl oz/a | POST       | B        |
|       | VaporGrip Xtra     |              |           | 20 fl oz/a | POST       | B        |
|       | Intact             |              |           | 0.5% v/v   | POST       | B        |
|       | Class Act Ridion   |              |           | 1% v/v     | POST       | B        |
| 5     | XtendiMax          | 2.9 lbae/gal | 4         | 22 fl oz/a | PRE        | A        |
|       | Authority MTZ      | 45% w/w      | 5, 14     | 14 oz/a    | PRE        | A        |
|       | VaporGrip Xtra     |              |           | 20 fl oz/a | PRE        | A        |
|       | Liberty            | 2.34 lb/gal  | 10        | 32 fl oz/a | POST       | B        |
|       | Roundup PowerMAX 3 | 4.8 lbae/gal | 9         | 30 fl oz/a | POST       | B        |
|       | Warrant            | 3 lb/gal     | 15        | 48 fl oz/a | POST       | B        |
|       | AMS (liquid)       |              |           | 2.5% v/v   | POST       | B        |
| 6     | XtendiMax          | 2.9 lbae/gal | 4         | 22 fl oz/a | PRE        | A        |
|       | Valor EZ           | 4 lb/gal     | 14        | 2 fl oz/a  | PRE        | A        |
|       | VaporGrip Xtra     |              |           | 20 fl oz/a | PRE        | A        |
|       | XtendiMax          | 2.9 lbae/gal | 4         | 22 fl oz/a | POST       | B        |
|       | Roundup PowerMAX 3 | 4.8 lbae/gal | 9         | 30 fl oz/a | POST       | B        |
|       | Warrant            | 3 lb/gal     | 15        | 48 fl oz/a | POST       | B        |
|       | VaporGrip Xtra     |              |           | 20 fl oz/a | POST       | B        |
|       | Intact             |              |           | 0.5% v/v   | POST       | B        |
|       | Class Act Ridion   |              |           | 1% v/v     | POST       | B        |

| Trt # | Treatment          | Formulation  | SOA Group | Rate       | App Timing | App Code |
|-------|--------------------|--------------|-----------|------------|------------|----------|
| 7     | XtendiMax          | 2.9 lbae/gal | 4         | 22 fl oz/a | PRE        | A        |
|       | Valor EZ           | 4 lb/gal     | 14        | 2 fl oz/a  | PRE        | A        |
|       | VaporGrip Xtra     |              |           | 20 fl oz/a | PRE        | A        |
|       | Liberty            | 2.34 lb/gal  | 10        | 32 fl oz/a | POST       | B        |
|       | Roundup PowerMAX 3 | 4.8 lbae/gal | 9         | 30 fl oz/a | POST       | B        |
|       | Warrant            | 3 lb/gal     | 15        | 48 fl oz/a | POST       | B        |
|       | AMS (liquid)       |              |           | 2.5% v/v   | POST       | B        |
| 8     | XtendiMax          | 2.9 lbae/gal | 4         | 22 fl oz/a | PRE        | A        |
|       | Mauler             | 4 lb/gal     | 5         | 8 fl oz/a  | PRE        | A        |
|       | Warrant            | 3 lb/gal     | 15        | 48 fl oz   | PRE        | A        |
|       | VaporGrip Xtra     |              |           | 20 fl oz/a | PRE        | A        |
|       | XtendiMax          | 2.9 lbae/gal | 4         | 22 fl oz/a | POST       | B        |
|       | Roundup PowerMAX 3 | 4.8 lbae/gal | 9         | 30 fl oz/a | POST       | B        |
|       | Warrant            | 3 lb/gal     | 15        | 48 fl oz/a | POST       | B        |
|       | VaporGrip Xtra     |              |           | 20 fl oz/a | POST       | B        |
|       | Intact             |              |           | 0.5% v/v   | POST       | B        |
|       | Class Act Ridion   |              |           | 1% v/v     | POST       | B        |
| 9     | XtendiMax          | 2.9 lbae/gal | 4         | 22 fl oz/a | PRE        | A        |
|       | Mauler             | 4 lb/gal     | 5         | 8 fl oz/a  | PRE        | A        |
|       | Warrant            | 3 lb/gal     | 15        | 48 fl oz   | PRE        | A        |
|       | VaporGrip Xtra     |              |           | 20 fl oz/a | PRE        | A        |
|       | Liberty            | 2.34 lb/gal  | 10        | 32 fl oz/a | POST       | B        |
|       | Roundup PowerMAX 3 | 4.8 lbae/gal | 9         | 30 fl oz/a | POST       | B        |
|       | Warrant            | 3 lb/gal     | 15        | 48 fl oz/a | POST       | B        |
|       | AMS (liquid)       |              |           | 2.5% v/v   | POST       | B        |
| 10    | XtendiMax          | 2.9 lbae/gal | 4         | 22 fl oz/a | PRE        | A        |
|       | Mauler             | 4 lb/gal     | 5         | 8 fl oz/a  | PRE        | A        |
|       | Warrant            | 3 lb/gal     | 15        | 48 fl oz   | PRE        | A        |
|       | VaporGrip Xtra     |              |           | 20 fl oz/a | PRE        | A        |
|       | Liberty            | 2.34 lb/gal  | 10        | 32 fl oz/a | POST       | B        |
|       | Warrant            | 3 lb/gal     | 15        | 48 fl oz/a | POST       | B        |
|       | AMS (liquid)       |              |           | 2.5% v/v   | POST       | B        |
| 11    | XtendiMax          | 2.9 lbae/gal | 4         | 22 fl oz/a | PRE        | A        |
|       | Mauler             | 4 lb/gal     | 5         | 8 fl oz/a  | PRE        | A        |
|       | Warrant            | 3 lb/gal     | 15        | 48 fl oz   | PRE        | A        |
|       | VaporGrip Xtra     |              |           | 20 fl oz/a | PRE        | A        |
|       | Roundup PowerMAX 3 | 4.8 lbae/gal | 9         | 30 fl oz/a | POST       | B        |
|       | Warrant Ultra      | 3.45 lb/gal  | 14, 15    | 48 fl oz/a | POST       | B        |
|       | AMS (liquid)       |              |           | 2.5% v/v   | POST       | B        |

| Trt # | Treatment          | Formulation  | SOA Group | Rate       | App Timing | App Code |
|-------|--------------------|--------------|-----------|------------|------------|----------|
| 12    | XtendiMax          | 2.9 lbae/gal | 4         | 22 fl oz/a | PRE        | A        |
|       | Warrant Ultra      | 3.45 lb/gal  | 14, 15    | 48 fl oz/a | PRE        | A        |
|       | VaporGrip Xtra     |              |           | 20 fl oz/a | PRE        | A        |
|       | XtendiMax          | 2.9 lbae/gal | 4         | 22 fl oz/a | POST       | B        |
|       | Roundup PowerMAX 3 | 4.8 lbae/gal | 9         | 30 fl oz/a | POST       | B        |
|       | Warrant            | 3 lb/gal     | 15        | 48 fl oz/a | POST       | B        |
|       | VaporGrip Xtra     |              |           | 20 fl oz/a | POST       | B        |
|       | Intact             |              |           | 0.5% v/v   | POST       | B        |
|       | Class Act Ridion   |              |           | 1% v/v     | POST       | B        |
| 13    | XtendiMax          | 2.9 lbae/gal | 4         | 22 fl oz/a | PRE        | A        |
|       | Warrant Ultra      | 3.45 lb/gal  | 14, 15    | 48 fl oz/a | PRE        | A        |
|       | VaporGrip Xtra     |              |           | 20 fl oz/a | PRE        | A        |
|       | Liberty            | 2.34 lb/gal  | 10        | 32 fl oz/a | POST       | B        |
|       | Roundup PowerMAX 3 | 4.8 lbae/gal | 9         | 30 fl oz/a | POST       | B        |
|       | Warrant            | 3 lb/gal     | 15        | 48 fl oz/a | POST       | B        |
|       | AMS (liquid)       |              |           | 2.5% v/v   | POST       | B        |

**Adjuvants:** AMS = Amsol (liquid AMS); Intact = DRA; Class Act Ridion = non-AMS water conditioner + NIS; VaporGrip Xtra = volatility reducing agent (VRA)

**Trial Summary:**

The trial was established at the O'Brien Hybrids farm located north of Brooklyn, WI to evaluate multiple 2-pass herbicide programs to provide recommendations for weed management in XtendFlex soybeans. There was no observable soybean injury from the PRE herbicides 36 days after application (data not shown). There was minor soybean leaf necrosis observed 14 days after the POST application in treatments with XtendiMax or Warrant Ultra (Table 11).

The trial was conducted in a field infested with a population of glyphosate-resistant waterhemp. Several treatments provided acceptable season long waterhemp control (Table 11). Waterhemp control from the PRE herbicides at the time of POST application varied. Similar to trial 22-BRO-SB06 treatments with Fierce EZ (trts 2, 3) and Warrant Ultra (trts 13, 13) had greater residual waterhemp control 36 days after application. POST waterhemp control varied considerably. Treatments with XtendiMax averaged 89% control at the end of the season while those with Liberty averaged 78%. The only treatment without either Liberty or XtendiMax had very poor waterhemp control (51%). Treatments that had greater levels of PRE residual control also tended to have greater levels of POST control; a trend that has been observed in multiple waterhemp trials over the past several years of research.

Soybean yield differed among herbicide programs (Table 11). However, there wasn't a clear trend between POST herbicide systems as yield of XtendiMax based programs yielded 67.3 bu acre<sup>-1</sup> and Liberty based programs yielded 67.4 bu acre<sup>-1</sup>. The only treatment without either Liberty or XtendiMax yielded 63 bu acre<sup>-1</sup>.

Plot photos from throughout the growing season are available [XtendFlex Soybean Herbicide Programs](#) published on [wiscweeds.info](http://wiscweeds.info).

**Table 11.** Crop injury, weed control ratings, and soybean yield for trial #22-BRO-SB07 at Brooklyn, WI.<sup>a</sup>

| Trt # Herbicide (rate acre <sup>-1</sup> )                                                                                                   | Injury (%) | Waterhemp (%) |       |       |       | Velvetleaf (%) |       |       |       | Fall Panicum (%) |       |       | Yield <sup>b</sup><br>bu acre <sup>-1</sup> |
|----------------------------------------------------------------------------------------------------------------------------------------------|------------|---------------|-------|-------|-------|----------------|-------|-------|-------|------------------|-------|-------|---------------------------------------------|
|                                                                                                                                              | 7/13       | 6/29          | 7/13  | 7/26  | 9/29  | 6/29           | 7/13  | 7/26  | 9/29  | 7/13             | 7/26  | 9/29  |                                             |
| 1 Untreated Check                                                                                                                            | 0.0        | 0             | 0     | 0     | 0     | 0              | 0     | 0     | 0     | 0                | 0     | 0     | 23.7 c                                      |
| <b>Two-Pass – PRE (5/24) fb POST (6/29)</b>                                                                                                  |            | <b>POST</b>   |       |       |       | <b>POST</b>    |       |       |       |                  |       |       |                                             |
| 2 XtendiMax (22 oz) + Fierce EZ (6 oz)* <b>fb</b><br>XtendiMax (22 oz) + Roundup PM3 (30 oz) + Warrant (48 oz)**                             | 3.3        | 88            | 94    | 89    | 92    | 92             | 100   | 100   | 100   | 100              | 98    | 95    | 64.5 b                                      |
| 3 XtendiMax (22 oz) + Fierce EZ (6 oz)* <b>fb</b><br>Liberty (32 oz) + Roundup PM3 (30 oz) + Warrant (48 oz) + AMS (2.5% v/v)                | 0.8        | 86            | 95    | 87    | 86    | 90             | 100   | 100   | 100   | 100              | 100   | 98    | 67.8 ab                                     |
| 4 XtendiMax (22 oz) + Authority MTZ (14 oz)* <b>fb</b><br>XtendiMax (22 oz) + Roundup PM3 (30 oz) + Warrant (48 oz)**                        | 1.0        | 63            | 83    | 80    | 87    | 96             | 100   | 100   | 100   | 100              | 90    | 83    | 62.7 b                                      |
| 5 XtendiMax (22 oz) + Authority MTZ (14 oz)* <b>fb</b><br>Liberty (32 oz) + Roundup PM3 (30 oz) + Warrant (48 oz) + AMS (2.5% v/v)           | 0.3        | 64            | 87    | 73    | 69    | 94             | 100   | 100   | 100   | 100              | 96    | 93    | 67.2 ab                                     |
| 6 XtendiMax (22 oz) + Valor EZ (2 oz)* <b>fb</b><br>XtendiMax (22 oz) + Roundup PM3 (30 oz) + Warrant (48 oz)**                              | 2.0        | 74            | 86    | 83    | 86    | 84             | 100   | 100   | 100   | 100              | 95    | 96    | 61.7 b                                      |
| 7 XtendiMax (22 oz) + Valor EZ (2 oz)* <b>fb</b><br>Liberty (32 oz) + Roundup PM3 (30 oz) + Warrant (48 oz) + AMS (2.5% v/v)                 | 0.0        | 78            | 94    | 86    | 88    | 84             | 100   | 100   | 100   | 100              | 99    | 98    | 68.4 ab                                     |
| 8 XtendiMax (22 oz) + Mauler (8 oz) + Warrant (48 oz)* <b>fb</b><br>XtendiMax (22 oz) + Roundup PM3 (30 oz) + Warrant (48 oz)**              | 2.5        | 53            | 81    | 80    | 86    | 49             | 100   | 100   | 100   | 100              | 92    | 92    | 70.7 ab                                     |
| 9 XtendiMax (22 oz) + Mauler (8 oz) + Warrant (48 oz)* <b>fb</b><br>Liberty (32 oz) + Roundup PM3 (30 oz) + Warrant (48 oz) + AMS (2.5% v/v) | 0.0        | 54            | 87    | 75    | 75    | 60             | 100   | 100   | 100   | 100              | 97    | 97    | 65.9 ab                                     |
| 10 XtendiMax (22 oz) + Mauler (8 oz) + Warrant (48 oz)* <b>fb</b><br>Liberty (32 oz) + Warrant (48 oz) + AMS (2.5% v/v)                      | 0.8        | 61            | 88    | 76    | 73    | 49             | 100   | 98    | 95    | 100              | 96    | 91    | 63.4 b                                      |
| 11 XtendiMax (22 oz) + Mauler (8 oz) + Warrant (48 oz)* <b>fb</b><br>Roundup PM3 (30 oz) + Warrant Ultra (48 oz) + AMS (2.5% v/v)            | 2.8        | 59            | 69    | 55    | 51    | 54             | 100   | 100   | 100   | 100              | 100   | 100   | 63.0 b                                      |
| 12 XtendiMax (22 oz) + Warrant Ultra (48 oz)* <b>fb</b><br>XtendiMax (22 oz) + Roundup PM3 (30 oz) + Warrant (48 oz)**                       | 2.8        | 83            | 90    | 88    | 94    | 57             | 100   | 100   | 100   | 100              | 99    | 99    | 76.8 a                                      |
| 13 XtendiMax (22 oz) + Warrant Ultra (48 oz)* <b>fb</b><br>Liberty (32 oz) + Roundup PM3 (30 oz) + Warrant (48 oz) + AMS (2.5% v/v)          | 0.0        | 86            | 98    | 90    | 91    | 71             | 100   | 99    | 99    | 100              | 97    | 95    | 71.7 a                                      |
| LSD ( $\alpha=0.10$ )                                                                                                                        | 0.9        | 8             | 5     | 7     | 10    | 15             | ns    | ns    | 2     | ns               | 5     | 5     | 11                                          |
| p value                                                                                                                                      | <0.001     | <.001         | <.001 | <.001 | <.001 | <.001          | 0.467 | 0.399 | 0.018 | 1.00             | 0.065 | 0.001 | <0.001                                      |

<sup>a</sup>Visual control from 70-100% is illustrated on a color scale with green representing greater weed control values.<sup>b</sup>Yield values with the same letter are not significantly different.

\*All PRE applications of XtendiMax included 20 fl oz/a VaporGrip Xtra, a volatility reducing agent.

\*\*All POST applications of XtendiMax included VaporGrip Xtra at 20 fl oz, Class Act Ridion 1% v/v, and Intact 0.5% v/v.

**Project Goal:** Compare the residual weed control and crop safety of Tendovo to other Syngenta and competitor preemergence soybean herbicides.

**\*Tendovo 4.14 ZC** is a new premix offering from Syngenta containing 3.33 lb/gal S-metolachlor; 0.64 lb/gal metribuzin; and 0.06 lb/gal cloransulam.

#### Site Description:

|                       |                                                     |                        |                    |
|-----------------------|-----------------------------------------------------|------------------------|--------------------|
| <b>Location:</b>      | Janesville, WI                                      | <b>Crop:</b>           | XtendFlex soybean  |
| <b>Field #:</b>       | 5                                                   | <b>Variety:</b>        | AG20XF1            |
| <b>Soil type:</b>     | Plano silt loam                                     | <b>Planting Date:</b>  | 5/16               |
| <b>% OM:</b>          | 3.3                                                 | <b>Emergence Date:</b> | 6/1                |
| <b>pH:</b>            | 6.4                                                 | <b>Population:</b>     | 140,000 seeds/acre |
| <b>Fertilization:</b> | -                                                   | <b>Depth:</b>          | 1.5 in             |
| <b>Previous crop:</b> | Corn                                                | <b>Row spacing:</b>    | 30 in              |
| <b>Tillage:</b>       | Conventional                                        | <b>Plot Size:</b>      | 10 x 30 ft         |
| <b>Weed species:</b>  | giant ragweed (AMBTR), common lambsquarters (CHEAL) |                        |                    |

#### Herbicide Application Information:

|                                      |            |            |              |
|--------------------------------------|------------|------------|--------------|
| <b>Date:</b>                         | 5/17       | 6/13       | 7/7          |
| <b>Treatment:</b>                    | PRE (A)    | POST (B)   | LPOST (C)    |
| <b>Air Temp (°F):</b>                | 70         | 81         | 79           |
| <b>2" Soil Temp (°F):</b>            | 64         | -          | -            |
| <b>Soil moisture [surface]:</b>      | dry        | moist      | slightly wet |
| <b>RH %:</b>                         | 42         | 71         | 79           |
| <b>Cloud cover %</b>                 | 70         | 100        | -            |
| <b>Wind speed (mph)/direction</b>    | 0-7/NE     | 5-9/SE     | 0-4/SW       |
| <b>Rainfall (in) 1 wk after APP:</b> | 1.42"      | 0.35"      | 0.14"        |
| <b>GPA:</b>                          | 15         | 15         | 15.4         |
| <b>PSI:</b>                          | 35         | 36         | 30           |
| <b>Nozzle:</b>                       | TTI 110015 | TTI 110015 | TTI 11003    |
| <b>Nozzle spacing (in):</b>          | 20         | 20         | 20           |
| <b>Boom Height (in):</b>             | 20         | 26         | 30           |

#### Crop and Weed Information at Application:

|                      |                 |      |                       |          |
|----------------------|-----------------|------|-----------------------|----------|
|                      | <b>Date:</b>    | 5/17 | 6/13*                 | 7/7      |
| <b>Soybean</b>       | <b>Height:</b>  | -    | 3-4"                  | 9-11"    |
|                      | <b>Stage:</b>   | -    | V1                    | V6       |
| <b>giant ragweed</b> | <b>Height:</b>  | -    | 1-10"                 | 1-8"     |
|                      |                 |      | Avg=4"                | Avg=4.5" |
|                      | <b>Density:</b> | -    | 40-100/m <sup>2</sup> | -        |
| <b>lambsquarters</b> | <b>Height:</b>  | -    | -                     | -        |
|                      | <b>Density:</b> | -    | -                     | -        |

\*Weed density recorded from plots with a previous herbicide treatment.

Density and height varied depending on the effectiveness of the PRE-emergence herbicide

| Trt # | Treatment          | Formulation  | SOA Group | Rate       | App Timing | App Code |
|-------|--------------------|--------------|-----------|------------|------------|----------|
| 1     | Untreated Check    |              |           |            |            |          |
| 2     | Tendovo            | 4.03 lb/gal  | 2, 5, 15  | 1.75 qt/a  | PRE        | A        |
|       | Tavium             | 3.38 lb/gal  | 4, 15     | 3.53 pt/a  | POST       | B        |
|       | Roundup PowerMAX 3 | 4.8 lbae/gal | 9         | 30 fl oz/a | POST       | B        |
|       | VaporGrip Xtra     |              |           | 20 fl oz/a | POST       | B        |
|       | Intact             |              |           | 0.5% v/v   | POST       | B        |
|       | Class Act Ridion   |              |           | 1% v/v     | POST       | B        |
|       | Liberty            | 2.34 lb/gal  | 10        | 32 fl oz/a | LPOST      | C        |
|       | AMS (dry)          |              |           | 2 lb/a     | LPOST      | C        |
| 3     | Tendovo            | 4.03 lb/gal  | 2, 5, 15  | 2.1 qt/a   | PRE        | A        |
|       | Tavium             | 3.38 lb/gal  | 4, 15     | 3.53 pt/a  | POST       | B        |
|       | Roundup PowerMAX 3 | 4.8 lbae/gal | 9         | 30 fl oz/a | POST       | B        |
|       | VaporGrip Xtra     |              |           | 20 fl oz/a | POST       | B        |
|       | Intact             |              |           | 0.5% v/v   | POST       | B        |
|       | Class Act Ridion   |              |           | 1% v/v     | POST       | B        |
|       | Liberty            | 2.34 lb/gal  | 10        | 32 fl oz/a | LPOST      | C        |
|       | AMS (dry)          |              |           | 2 lb/a     | LPOST      | C        |
| 4     | Boundary           | 6.5 lb/gal   | 5, 15     | 1.8 pt/a   | PRE        | A        |
|       | Tavium             | 3.38 lb/gal  | 4, 15     | 3.53 pt/a  | POST       | B        |
|       | Roundup PowerMAX 3 | 4.8 lbae/gal | 9         | 30 fl oz/a | POST       | B        |
|       | VaporGrip Xtra     |              |           | 20 fl oz/a | POST       | B        |
|       | Intact             |              |           | 0.5% v/v   | POST       | B        |
|       | Class Act Ridion   |              |           | 1% v/v     | POST       | B        |
|       | Liberty            | 2.34 lb/gal  | 10        | 32 fl oz/a | LPOST      | C        |
|       | AMS (dry)          |              |           | 2 lb/a     | LPOST      | C        |
| 5     | Broadaxe XC        | 7 lb/gal     | 14, 15    | 25 fl oz/a | PRE        | A        |
|       | Tavium             | 3.38 lb/gal  | 4, 15     | 3.53 pt/a  | POST       | B        |
|       | Roundup PowerMAX 3 | 4.8 lbae/gal | 9         | 30 fl oz/a | POST       | B        |
|       | VaporGrip Xtra     |              |           | 20 fl oz/a | POST       | B        |
|       | Intact             |              |           | 0.5% v/v   | POST       | B        |
|       | Class Act Ridion   |              |           | 1% v/v     | POST       | B        |
|       | Liberty            | 2.34 lb/gal  | 10        | 32 fl oz/a | LPOST      | C        |
|       | AMS (dry)          |              |           | 2 lb/a     | LPOST      | C        |
| 6     | Sonic              | 70% w/w      | 2, 14     | 6.45 oz/a  | PRE        | A        |
|       | Tavium             | 3.38 lb/gal  | 4, 15     | 3.53 pt/a  | POST       | B        |
|       | Roundup PowerMAX 3 | 4.8 lbae/gal | 9         | 30 fl oz/a | POST       | B        |
|       | VaporGrip Xtra     |              |           | 20 fl oz/a | POST       | B        |
|       | Intact             |              |           | 0.5% v/v   | POST       | B        |
|       | Class Act Ridion   |              |           | 1% v/v     | POST       | B        |
|       | Liberty            | 2.34 lb/gal  | 10        | 32 fl oz/a | LPOST      | C        |
|       | AMS (dry)          |              |           | 2 lb/a     | LPOST      | C        |

| Trt # | Treatment          | Formulation  | SOA Group | Rate       | App Timing | App Code |
|-------|--------------------|--------------|-----------|------------|------------|----------|
| 7     | Fierce XLT         | 62.41% w/w   | 2, 14, 15 | 4.5 oz/a   | PRE        | A        |
|       | Tavium             | 3.38 lb/gal  | 4, 15     | 3.53 pt/a  | POST       | B        |
|       | Roundup PowerMAX 3 | 4.8 lbae/gal | 9         | 30 fl oz/a | POST       | B        |
|       | VaporGrip Xtra     |              |           | 20 fl oz/a | POST       | B        |
|       | Intact             |              |           | 0.5% v/v   | POST       | B        |
|       | Class Act Ridion   |              |           | 1% v/v     | POST       | B        |
|       | Liberty            | 2.34 lb/gal  | 10        | 32 fl oz/a | LPOST      | C        |
|       | AMS (dry)          |              |           | 2 lb/a     | LPOST      | C        |
| 8     | Zidua PRO          | 4.09 lb/gal  | 2, 14, 15 | 6 fl oz/a  | PRE        | A        |
|       | Tavium             | 3.38 lb/gal  | 4, 15     | 3.53 pt/a  | POST       | B        |
|       | Roundup PowerMAX 3 | 4.8 lbae/gal | 9         | 30 fl oz/a | POST       | B        |
|       | VaporGrip Xtra     |              |           | 20 fl oz/a | POST       | B        |
|       | Intact             |              |           | 0.5% v/v   | POST       | B        |
|       | Class Act Ridion   |              |           | 1% v/v     | POST       | B        |
|       | Liberty            | 2.34 lb/gal  | 10        | 32 fl oz/a | LPOST      | C        |
|       | AMS (dry)          |              |           | 2 lb/a     | LPOST      | C        |
| 9     | Authority Edge     | 4.25 lb/gal  | 14, 15    | 9 fl oz/a  | PRE        | A        |
|       | Tavium             | 3.38 lb/gal  | 4, 15     | 3.53 pt/a  | POST       | B        |
|       | Roundup PowerMAX 3 | 4.8 lbae/gal | 9         | 30 fl oz/a | POST       | B        |
|       | VaporGrip Xtra     |              |           | 20 fl oz/a | POST       | B        |
|       | Intact             |              |           | 0.5% v/v   | POST       | B        |
|       | Class Act Ridion   |              |           | 1% v/v     | POST       | B        |
|       | Liberty            | 2.34 lb/gal  | 10        | 32 fl oz/a | LPOST      | C        |
|       | AMS (dry)          |              |           | 2 lb/a     | LPOST      | C        |

**Adjuvants:** AMS = BlueAg spray grade ammonium sulfate; Class Act Ridion = non-AMS water conditioner + NIS; Intact = drift reduction agent (DRA); VaporGrip Xtra = volatility reducing agent (VRA)

**Trial Summary:**

The trial was established at the Rock County Farm in Janesville, WI. This trial compared the efficacy and crop safety of **Tendovo** to other Syngenta and competitor preemergence soybean herbicides in XtendFlex soybeans. **Tendovo 4.14 ZC** is a new premix offering from Syngenta containing 3.33 lb/gal S-metolachlor; 0.64 lb/gal metribuzin; and 0.06 lb/gal cloransulam. There was no observable soybean injury from the PRE herbicides 27 days after application (data not shown). There was minor (3-5%) soybean leaf necrosis 15 days after the POST application (data not shown).

Giant ragweed was the predominant species in the trial area. Giant ragweed at this research location is a biotype with a prolonged emergence pattern as emergence typically starts in mid-to late-April and continues well into June. None of the PRE herbicides provided >75% residual control of giant ragweed 27 days after application (Table 12). The high rate of Tendovo, Sonic, and Zidua PRO all provided statistically similar control 27 DAT (~71%). All these herbicides include a group 2 (ALS) herbicide which is effective for control of ALS susceptible giant ragweed populations. The POST application of Tavium + Roundup PowerMAX 3 was effective at controlling all weeds emerged at application; however, several giant ragweed seedlings emerged after the POST application. This is evident by the poor control 24 days after application on 7/7. A rescue application of Liberty was made at this time to control weed escapes. Even three herbicide applications were not enough to achieve >90% control at soybean harvest for some of the treatments. Treatments with less effective PRE herbicides (Boundary, Broadaxe) tended to have less control at the end of the season. A similar trial was conducted in 2021 (see trial# 22-ROK-SB11 in the [2021 Wisconsin Weed Science Research Report](#)).

Yield differed among herbicide programs (Table 12). Treatments that had better giant ragweed control early in the season tended to have greater soybean yields. The untreated check was 0 bu acre<sup>-1</sup>, an indication of the very high giant ragweed competition at this location.

Plot photos from throughout the growing season are available [Evaluation of Tendovo for Residual Weed Control and Crop Safety](#) published on [wiscweeds.info](http://wiscweeds.info).

**Table 12.** Weed control ratings and soybean yield for trial #22-R0K-SB09 at Janesville, WI.<sup>a</sup>

| Trt # Herbicide (rate acre <sup>-1</sup> )                                                                                      | Giant Ragweed (%) |              |              |              | Lambsquarters (%) |              |              |             | Yield <sup>b</sup><br>bu acre <sup>-1</sup> |
|---------------------------------------------------------------------------------------------------------------------------------|-------------------|--------------|--------------|--------------|-------------------|--------------|--------------|-------------|---------------------------------------------|
|                                                                                                                                 | 6/13              | 6/28         | 7/7          | 10/11        | 6/13              | 6/28         | 7/7          | 10/11       |                                             |
| 1 Untreated Check                                                                                                               | 0                 | 0            | 0            | 0            | 0                 | 0            | 0            | 0           | 0 e                                         |
| <b>Three-Pass – PRE (5/17) <i>fb</i> POST (6/13) <i>fb</i> LPOST (7/7)</b>                                                      | <b>POST</b>       |              | <b>LPOST</b> |              | <b>POST</b>       |              | <b>LPOST</b> |             |                                             |
| 2 Tendovo (1.75 qt) <i>fb</i><br>Tavium (3.53 pt) + Roundup PM3 (30 fl oz)* <i>fb</i><br>Liberty (32 fl oz) + AMS (2 lb)        | 51                | 89           | 78           | 92           | 100               | 100          | 100          | 100         | 69.7 bcd                                    |
| 3 Tendovo (2.1 qt) <i>fb</i><br>Tavium (3.53 pt) + Roundup PM3 (30 fl oz)* <i>fb</i><br>Liberty (32 fl oz) + AMS (2 lb)         | 69                | 91           | 81           | 96           | 100               | 100          | 100          | 100         | 74.9 a                                      |
| 4 Boundary (1.8 pt) <i>fb</i><br>Tavium (3.53 pt) + Roundup PM3 (30 fl oz)* <i>fb</i><br>Liberty (32 fl oz) + AMS (2 lb)        | 0                 | 87           | 87           | 80           | 100               | 100          | 100          | 100         | 67.2 d                                      |
| 5 Broadaxe XC (25 fl oz) <i>fb</i><br>Tavium (3.53 pt) + Roundup PM3 (30 fl oz)* <i>fb</i><br>Liberty (32 fl oz) + AMS (2 lb)   | 0                 | 88           | 85           | 85           | 100               | 100          | 100          | 100         | 68.9 cd                                     |
| 6 Sonic (6.45 oz) <i>fb</i><br>Tavium (3.53 pt) + Roundup PM3 (30 fl oz)* <i>fb</i><br>Liberty (32 fl oz) + AMS (2 lb)          | 72                | 87           | 74           | 94           | 100               | 100          | 100          | 100         | 71.8 abc                                    |
| 7 Fierce XLT (4.5 oz) <i>fb</i><br>Tavium (3.53 pt) + Roundup PM3 (30 fl oz)* <i>fb</i><br>Liberty (32 fl oz) + AMS (2 lb)      | 58                | 89           | 77           | 96           | 100               | 100          | 99           | 100         | 73.4 ab                                     |
| 8 Zidua PRO (6 fl oz) <i>fb</i><br>Tavium (3.53 pt) + Roundup PM3 (30 fl oz)* <i>fb</i><br>Liberty (32 fl oz) + AMS (2 lb)      | 71                | 90           | 76           | 93           | 100               | 100          | 100          | 100         | 72.6 abc                                    |
| 9 Authority Edge (9 fl oz) <i>fb</i><br>Tavium (3.53 pt) + Roundup PM3 (30 fl oz)* <i>fb</i><br>Liberty (32 fl oz) + AMS (2 lb) | 5                 | 88           | 82           | 90           | 100               | 100          | 99           | 100         | 70.9 a-d                                    |
| <b>LSD (<math>\alpha=0.10</math>)</b>                                                                                           | <b>13</b>         | <b>ns</b>    | <b>5</b>     | <b>7</b>     | <b>ns</b>         | <b>ns</b>    | <b>ns</b>    | <b>ns</b>   | <b>4.4</b>                                  |
| <b>p value</b>                                                                                                                  | <b>&lt;.001</b>   | <b>0.261</b> | <b>0.002</b> | <b>0.004</b> | <b>1.00</b>       | <b>0.583</b> | <b>0.578</b> | <b>1.00</b> | <b>&lt;0.001</b>                            |

<sup>a</sup>Visual control from 70-100% is illustrated on a color scale with green representing greater weed control values.<sup>b</sup>Yield values with the same letter are not significantly different.

\*VaporGrip Xtra (20 fl oz/a) + Intact at 0.5% v/v + Class Act Ridion at 1% v/v was included in the first POST application of Tavium + Roundup PM3

**Project Goal:** Evaluate soybean injury and yield following PRE-emergence applications of several different metribuzin rates.

#### Site Description:

|                       |                 |                        |                        |
|-----------------------|-----------------|------------------------|------------------------|
| <b>Location:</b>      | Arlington, WI   | <b>Crop:</b>           | Enlist Soybean         |
| <b>Field #:</b>       | 565             | <b>Varieties*:</b>     | NK22-C43E3 / NK24-G7E3 |
| <b>Soil type:</b>     | Plano silt loam | <b>Planting Date:</b>  | 5/12                   |
| <b>% OM:</b>          | 3.3             | <b>Emergence Date:</b> | 5/24                   |
| <b>pH:</b>            | 7.3             | <b>Population:</b>     | 140,000 seeds/acre     |
| <b>Fertilization:</b> | -               | <b>Depth:</b>          | 1 in                   |
| <b>Previous crop:</b> | Corn silage     | <b>Row spacing:</b>    | 30 in                  |
| <b>Tillage:</b>       | Conventional    | <b>Plot Size:</b>      | 10 x 30 ft             |
| <b>Weed species:</b>  | -               |                        |                        |

\*Planted two soybean varieties to evaluate different tolerance levels to metribuzin

#### Herbicide Application Information:

|                                      |            |              |
|--------------------------------------|------------|--------------|
| <b>Date:</b>                         | 5/13       | 6/21         |
| <b>Treatment:</b>                    | PRE (A)    | POST (B)     |
| <b>Air Temp (°F):</b>                | 78         | 84           |
| <b>2" Soil Temp (°F):</b>            | 72         | -            |
| <b>Soil moisture [surface]:</b>      | moist      | slightly dry |
| <b>RH %:</b>                         | 48         | 59           |
| <b>Cloud cover %</b>                 | 0          | 0            |
| <b>Wind speed (mph)/direction</b>    | 1-7/S      | 4-12/WSW     |
| <b>Rainfall (in) 1 wk after APP:</b> | 0.44"      | 0.41"        |
| <b>GPA:</b>                          | 15         | 15.4         |
| <b>PSI:</b>                          | 35         | 30           |
| <b>Nozzle:</b>                       | TTI 110015 | TTI 11003    |
| <b>Nozzle spacing (in):</b>          | 20         | 20           |
| <b>Boom Height (in):</b>             | 20         | 26           |

#### Crop and Weed Information at Application:

|                |                |      |       |
|----------------|----------------|------|-------|
|                | <b>Date:</b>   | 5/13 | 6/21  |
| <b>Soybean</b> | <b>Height:</b> | -    | 5-6"  |
|                | <b>Stage:</b>  | -    | V3/V4 |

| Variety   | Trt # | Treatment       | Formulation | SOA Group | Rate      | App Timing | App Code |
|-----------|-------|-----------------|-------------|-----------|-----------|------------|----------|
| NK22-C4E3 | 1     | Untreated Check |             |           |           |            |          |
|           | 2     | Dual II Magnum  | 7.64 lb/gal | 15        | 1.5 pt/a  | A          | PRE      |
|           | 3     | Dual II Magnum  | 7.64 lb/gal | 15        | 1.5 pt/a  | A          | PRE      |
|           |       | Tricor DF       | 75% w/w     | 5         | 4 oz/a    | A          | PRE      |
|           | 4     | Dual II Magnum  | 7.64 lb/gal | 15        | 1.5 pt/a  | A          | PRE      |
|           |       | Tricor DF       | 75% w/w     | 5         | 4 oz/a    | A          | PRE      |
|           | 5     | Dual II Magnum  | 7.64 lb/gal | 15        | 1.5 pt/a  | A          | PRE      |
|           |       | Tricor DF       | 75% w/w     | 5         | 4 oz/a    | A          | PRE      |
|           | 6     | Dual II Magnum  | 7.64 lb/gal | 15        | 1.5 pt/a  | A          | PRE      |
|           |       | Tricor DF       | 75% w/w     | 5         | 4 oz/a    | A          | PRE      |
| NK24-G7E3 | 7     | Dual II Magnum  | 7.64 lb/gal | 15        | 1.5 pt/a  | A          | PRE      |
|           | 8     | Dual II Magnum  | 7.64 lb/gal | 15        | 1.5 pt/a  | A          | PRE      |
|           |       | Tricor DF       | 75% w/w     | 5         | 4 oz/a    | A          | PRE      |
|           | 8     | Tendovo         | 4.03 lb/gal | 2, 5, 15  | 1.5 qt/a  | A          | PRE      |
|           | 9     | Tendovo         | 4.03 lb/gal | 2, 5, 15  | 2.1 qt/a  | A          | PRE      |
|           | 10    | Zidua PRO       | 4.09 lb/gal | 2, 14, 15 | 6 fl oz/a | A          | PRE      |
|           | 11    | Untreated Check |             |           |           |            |          |
|           | 12    | Dual II Magnum  | 7.64 lb/gal | 15        | 1.5 pt/a  | A          | PRE      |
|           | 13    | Dual II Magnum  | 7.64 lb/gal | 15        | 1.5 pt/a  | A          | PRE      |
|           |       | Tricor DF       | 75% w/w     | 5         | 4 oz/a    | A          | PRE      |
| NK24-G7E3 | 14    | Dual II Magnum  | 7.64 lb/gal | 15        | 1.5 pt/a  | A          | PRE      |
|           |       | Tricor DF       | 75% w/w     | 5         | 4 oz/a    | A          | PRE      |
|           | 15    | Dual II Magnum  | 7.64 lb/gal | 15        | 1.5 pt/a  | A          | PRE      |
|           |       | Tricor DF       | 75% w/w     | 5         | 4 oz/a    | A          | PRE      |
|           | 16    | Dual II Magnum  | 7.64 lb/gal | 15        | 1.5 pt/a  | A          | PRE      |
|           |       | Tricor DF       | 75% w/w     | 5         | 4 oz/a    | A          | PRE      |
|           | 17    | Dual II Magnum  | 7.64 lb/gal | 15        | 1.5 pt/a  | A          | PRE      |
|           |       | Tricor DF       | 75% w/w     | 5         | 4 oz/a    | A          | PRE      |
|           | 18    | Tendovo         | 4.03 lb/gal | 2, 5, 15  | 1.5 qt/a  | A          | PRE      |
|           | 19    | Tendovo         | 4.03 lb/gal | 2, 5, 15  | 2.1 qt/a  | A          | PRE      |
|           | 20    | Zidua PRO       | 4.09 lb/gal | 2, 14, 15 | 6 fl oz/a | A          | PRE      |

A **POST (B)** application of Enlist One (32 fl oz/a) + Sequence (3.25 pts/a) + Class Action Ridion (1% v/v) was made to all treatments except for the untreated checks (Trts 1 and 11).

**Trial Summary:**

Metribuzin is a common component of many herbicide premixes and is often added in the tank as a solo product with other soybean PRE herbicides to improve residual weed control. However, there can be a reluctance to use higher rates of metribuzin due to concerns of potential crop injury. The objective of this trial was to evaluate soybean tolerance to various rates of metribuzin. The trial was placed on a field with a high soil pH (7.3) to increase the likelihood of soybean injury, and two soybean varieties were planted to evaluate differences in varietal tolerances to metribuzin.

There was significant soybean injury observed at 9 and 16 days after emergence (Table 13). NK24-G7E3 was more susceptible to metribuzin injury at the higher use rates (injury >10%), while NK22-C43E was more tolerant (injury <10% even at higher rates).

Soybean canopy closure was estimated at 38 days after emergence using the Canapeo application. Differences in canopy closure were observed (Table 13). Across all metribuzin rates, only Tricor applied at 12 oz acre<sup>-1</sup> to the more susceptible NK24-G7E3 had a statistically significant reduction in soybean canopy closure from the weed free checks (Dual II Magnum PRE; trts 2, 12). The Tendovo treatments also tended to have lower levels canopy closure.

There was no statistical difference in soybean yield (Table 13). The average yield of all treatments were within 5 bu acre<sup>-1</sup> of each other and ranged from 76 to 81 bu acre<sup>-1</sup>. Furthermore, yield of the treatment with the highest observed injury (trt 17; Tricor at 12 oz) was 80.6 bu acre<sup>-1</sup> which was the 3<sup>rd</sup> highest yielding treatment. This suggests that early season soybean injury may not be indicative of future soybean yield loss; however, results may vary across soybean varieties and geography.

**Table 13.** Soybean injury, canopy closure, and yield for trial #22-ARL-SB10 at Arlington, WI.

| Variety                                      | Trt # | Herbicide (rate acre <sup>-1</sup> )        | Crop Injury <sup>a</sup> (%) |           |           | Canopy <sup>b</sup> (%) | Yield<br>bu acre <sup>-1</sup> |
|----------------------------------------------|-------|---------------------------------------------|------------------------------|-----------|-----------|-------------------------|--------------------------------|
|                                              |       |                                             | 9<br>DAE                     | 16<br>DAE | 28<br>DAE | 38 DAE                  |                                |
| NK22-C4E3                                    | 1     | Untreated Check                             | 0.0                          | 0.0       | 0.0       | 45.3 a                  | 76.6                           |
| NK24-G7E3                                    | 11    | Untreated Check                             | 2.8                          | 4.0       | 0.0       | 42.8 ab                 | 77.4                           |
| <b>Two-Pass – PRE (5/13) fb POST* (6/21)</b> |       |                                             |                              |           |           |                         |                                |
| NK22-C4E3                                    | 2     | Dual II Magnum (1.5 pt)                     | 2.3                          | 5.0       | 0.0       | 41.2 a-d                | 77.4                           |
|                                              | 3     | Dual II Magnum (1.5 pt) + Tricor DF (4 oz)  | 2.0                          | 5.8       | 0.0       | 40.4 a-d                | 78.6                           |
|                                              | 4     | Dual II Magnum (1.5 pt) + Tricor DF (6 oz)  | 2.5                          | 4.8       | 0.0       | 40.9 a-d                | 77.4                           |
|                                              | 5     | Dual II Magnum (1.5 pt) + Tricor DF (8 oz)  | 2.3                          | 6.3       | 0.0       | 41.5 abc                | 79.5                           |
|                                              | 6     | Dual II Magnum (1.5 pt) + Tricor DF (10 oz) | 1.8                          | 6.8       | 0.5       | 39.6 bcd                | 78.9                           |
|                                              | 7     | Dual II Magnum (1.5 pt) + Tricor DF (12 oz) | 3.8                          | 9.8       | 0.0       | 40.7 a-d                | 78.4                           |
|                                              | 8     | Tendovo (1.5 qt)                            | 2.8                          | 3.5       | 0.3       | 35.3 def                | 81.4                           |
|                                              | 9     | Tendovo (2.1 qt)                            | 3.5                          | 5.3       | 0.0       | 30.6 g                  | 80.8                           |
|                                              | 10    | Zidua PRO (6 fl oz)                         | 2.3                          | 4.8       | 0.0       | 38.2 b-e                | 80.0                           |
| NK24-G7E3                                    | 12    | Dual II Magnum (1.5 pt)                     | 3.8                          | 4.0       | 0.0       | 40.1 a-d                | 78.5                           |
|                                              | 13    | Dual II Magnum (1.5 pt) + Tricor DF (4 oz)  | 2.3                          | 5.0       | 0.0       | 38.8 b-e                | 78.8                           |
|                                              | 14    | Dual II Magnum (1.5 pt) + Tricor DF (6 oz)  | 7.0                          | 5.0       | 0.0       | 38.5 b-d                | 76.1                           |
|                                              | 15    | Dual II Magnum (1.5 pt) + Tricor DF (8 oz)  | 4.5                          | 8.3       | 0.5       | 37.1 b-e                | 78.4                           |
|                                              | 16    | Dual II Magnum (1.5 pt) + Tricor DF (10 oz) | 10.8                         | 15.3      | 0.0       | 37.7 b-e                | 77.2                           |
|                                              | 17    | Dual II Magnum (1.5 pt) + Tricor DF (12 oz) | 17.8                         | 18.3      | 0.0       | 33.6 efg                | 80.6                           |
|                                              | 18    | Tendovo (1.5 qt)                            | 2.8                          | 4.5       | 0.0       | 33.4 efg                | 79.1                           |
|                                              | 19    | Tendovo (2.1 qt)                            | 4.8                          | 9.0       | 0.0       | 31.2 fg                 | 77.8                           |
|                                              | 20    | Zidua PRO (6 fl oz)                         | 2.5                          | 4.5       | 0.0       | 36.3 cde                | 77.3                           |
| LSD ( $\alpha=0.10$ )                        |       |                                             | 2.9                          | 3.2       | ns        | 3.1                     | ns                             |
| p value                                      |       |                                             | <.001                        | <.001     | 0.475     | <.001                   | 0.908                          |

<sup>a</sup>Visual crop injury is illustrated on a yellow-red color scale with red representing greater crop injury.

<sup>b</sup>Soybean canopy coverage % estimated by analyzing 3 pictures of each plot with the CANAPEO application. Values with the same letters are not significantly different.

\*Enlist One (32 fl oz/a) + Sequence (3.25 pts/a) + Class Action Ridion (1% v/v) was applied on 6/21 to all treatments except for the untreated checks.

**Project Goal:** Compare Syngenta soybean herbicide programs to industry standards for waterhemp management in early planted Enlist soybean.

#### Site Description:

|                       |                         |                        |                    |
|-----------------------|-------------------------|------------------------|--------------------|
| <b>Location:</b>      | Brooklyn, WI            | <b>Crop:</b>           | Enlist Soybean     |
| <b>Field #:</b>       | OB-5                    | <b>Variety:</b>        | NK24-G7E3          |
| <b>Soil type:</b>     | Kegonsa silt loam       | <b>Planting Date:</b>  | 4/27               |
| <b>% OM:</b>          | 1.6                     | <b>Emergence Date:</b> | -                  |
| <b>pH:</b>            | 6.7                     | <b>Population:</b>     | 140,000 seeds/acre |
| <b>Fertilization:</b> | -                       | <b>Depth:</b>          | 1.5 in             |
| <b>Previous crop:</b> | Seed corn               | <b>Row spacing:</b>    | 30 in              |
| <b>Tillage:</b>       | Conventional            | <b>Plot Size:</b>      | 10 x 30 ft         |
| <b>Weed species:</b>  | gly-R waterhemp (AMATA) |                        |                    |

#### Herbicide Application Information:

|                                      |            |            |
|--------------------------------------|------------|------------|
| <b>Date:</b>                         | 4/27       | 6/16       |
| <b>Treatment:</b>                    | PRE (A)    | POST (B)   |
| <b>Air Temp (°F):</b>                | 50         | 72         |
| <b>2" Soil Temp (°F):</b>            | 47         | -          |
| <b>Soil moisture [surface]:</b>      | moist      | very wet   |
| <b>RH %:</b>                         | 51         | 86         |
| <b>Cloud cover %</b>                 | 98         | 0          |
| <b>Wind speed (mph)/direction</b>    | 3-6/SW     | 0-3/W      |
| <b>Rainfall (in) 1 wk after APP:</b> | 1.31"      | 0.12       |
| <b>GPA:</b>                          | 15         | 15         |
| <b>PSI:</b>                          | 36         | 38         |
| <b>Nozzle:</b>                       | TTI 110015 | AIXR110015 |
| <b>Nozzle spacing (in):</b>          | 20         | 20         |
| <b>Boom Height (in):</b>             | 20         | 24         |

#### Crop and Weed Information at Application:

|                  |                 |      |                      |
|------------------|-----------------|------|----------------------|
|                  | <b>Date:</b>    | 4/27 | 6/16                 |
| <b>Soybean</b>   | <b>Height:</b>  | -    | 5"                   |
|                  | <b>Stage:</b>   | -    | V3/V4                |
| <b>waterhemp</b> | <b>Height:</b>  | -    | 0.5-3"               |
|                  | <b>Density:</b> | -    | 2-17/ft <sup>2</sup> |

\*Weed density recorded from plots with a previous herbicide treatment.

Density and height varied depending on the effectiveness of the PRE-emergence herbicide

| Trt # | Treatment          | Formulation  | SOA Group | Rate           | App Timing | App Code |
|-------|--------------------|--------------|-----------|----------------|------------|----------|
| 1     | Untreated Check    |              |           |                |            |          |
| 2     | Boundary           | 6.5 lb/gal   | 5, 15     | 2 pt/a         | PRE        | A        |
|       | Sequence           | 5.25 lb/gal  | 9, 15     | 3.5 pt/a       | POST       | B        |
|       | Enlist One         | 3.8 lbae/gal | 4         | 32 fl oz/a     | POST       | B        |
|       | Class Act Ridion   |              |           | 1% v/v         | POST       | B        |
| 3     | Tendovo            | 4.03 lb/gal  | 2, 5, 15  | 2.1 qt/a       | PRE        | A        |
|       | Sequence           | 5.25 lb/gal  | 9, 15     | 3.5 pt/a       | POST       | B        |
|       | Enlist One         | 3.8 lbae/gal | 4         | 32 fl oz/a     | POST       | B        |
|       | Class Act Ridion   |              |           | 1% v/v         | POST       | B        |
| 4     | Boundary           | 6.5 lb/gal   | 5, 15     | 2 pt/a         | PRE        | A        |
|       | Prefix             | 5.29 lb/gal  | 14, 15    | 2 pt/a         | POST       | B        |
|       | Roundup PowerMAX 3 | 4.8 lbae/gal | 9         | 26 fl oz/a     | POST       | B        |
|       | Enlist One         | 3.8 lbae/gal | 4         | 32 fl oz/a     | POST       | B        |
|       | AMS (dry)          |              |           | 8.5 lb/100 gal | POST       | B        |
| 5     | Tendovo            | 4.03 lb/gal  | 2, 5, 15  | 2.1 qt/a       | PRE        | A        |
|       | Prefix             | 5.29 lb/gal  | 14, 15    | 2 pt/a         | POST       | B        |
|       | Roundup PowerMAX 3 | 4.8 lbae/gal | 9         | 26 fl oz/a     | POST       | B        |
|       | Enlist One         | 3.8 lbae/gal | 4         | 32 fl oz/a     | POST       | B        |
|       | AMS (dry)          |              |           | 8.5 lb/100 gal | POST       | B        |
| 6     | Prefix             | 5.29 lb/gal  | 14, 15    | 2 pt/a         | PRE        | A        |
|       | Canopy             | 75% w/w      | 2, 5      | 2.25 oz/a      | PRE        | A        |
|       | Sequence           | 5.25 lb/gal  | 9, 15     | 3.5 pt/a       | POST       | B        |
|       | Enlist One         | 3.8 lbae/gal | 4         | 32 fl oz/a     | POST       | B        |
|       | Class Act Ridion   |              |           | 1% v/v         | POST       | B        |
| 7     | Sonic              | 70% w/w      | 2, 14     | 6 oz/a         | PRE        | A        |
|       | Sequence           | 5.25 lb/gal  | 9, 15     | 3.5 pt/a       | POST       | B        |
|       | Enlist One         | 3.8 lbae/gal | 4         | 32 fl oz/a     | POST       | B        |
|       | Class Act Ridion   |              |           | 1% v/v         | POST       | B        |
| 8     | Zidua PRO          | 4.09 lb/gal  | 2, 14, 15 | 6 fl oz/a      | PRE        | A        |
|       | Sequence           | 5.25 lb/gal  | 9, 15     | 3.5 pt/a       | POST       | B        |
|       | Enlist One         | 3.8 lbae/gal | 4         | 32 fl oz/a     | POST       | B        |
|       | Class Act Ridion   |              |           | 1% v/v         | POST       | B        |
| 9     | Fierce XLT         | 62.41% w/w   | 2, 14, 15 | 3.75 oz/a      | PRE        | A        |
|       | Roundup PowerMAX 3 | 4.8 lbae/gal | 9         | 26 fl oz/a     | POST       | B        |
|       | Enlist One         | 3.8 lbae/gal | 4         | 32 fl oz/a     | POST       | B        |
|       | Warrant            | 3 lb/gal     | 15        | 48 fl oz/a     | POST       | B        |
|       | AMS (dry)          |              |           | 8.5 lb/100 gal | POST       | B        |

**Adjuvants:** AMS = BlueAg spray grade ammonium sulfate; Class Act Ridion = non-AMS water conditioner + NIS.

**Trial Summary:**

The trial was established at the O'Brien Hybrids farm located north of Brooklyn, WI to compare Syngenta soybean herbicide programs to industry standards for waterhemp management in early planted Enlist soybean. Soybean emergence was not optimal as harvest stands averaged 90,000 to 115,000 plants acre<sup>-1</sup>. There was only minor (<5%) soybean injury from the PRE herbicides 37 days after application (Table 14). While all POST herbicide applications caused some injury, treatments with Prefix (trts 4, 5) caused the highest (15%) (Table 14).

The trial was conducted in a field infested with a population of glyphosate-resistant waterhemp. None of the treatments provided acceptable season long waterhemp control (Table 14). Residual waterhemp control in early June was very good for almost all treatments 37 days after the PRE was applied. However, control of most treatments fell below 80% by the time the POST application was made on 6/16 (50 days after application) as most soybean PRE herbicides will only provide 4-6 weeks of good residual control. All the products evaluated in this trial were really pushed to their limit due to the early soybean planting date, as the level of residual control was waning just as peak waterhemp emergence started. More research is being conducted by our program to better understand how to control waterhemp in early planted soybean systems.

Yield was very similar among herbicide programs (Table 14). Yield across all herbicide treatments = 66 bu acre<sup>-1</sup>, while the untreated check was 26 bu acre<sup>-1</sup>.

Plot photos from throughout the growing season are available [Waterhemp Management in Early Planted Enlist Soybean](#) published on [wiscweeds.info](http://wiscweeds.info).

**Table 14.** Waterhemp control ratings and soybean yield for trial #22-BRO-SB11 at Brooklyn, WI.<sup>a</sup>

| Trt #                                              | Herbicide (rate acre <sup>-1</sup> )                                                                             | Injury (%)   |                 | Waterhemp (%) |                 |                 |              |                 | Yield <sup>b</sup><br>bu acre <sup>-1</sup> |
|----------------------------------------------------|------------------------------------------------------------------------------------------------------------------|--------------|-----------------|---------------|-----------------|-----------------|--------------|-----------------|---------------------------------------------|
|                                                    |                                                                                                                  | 6/3          | 6/29            | 6/3           | 6/14            | 6/29            | 7/13         | 9/29            |                                             |
| 1                                                  | Untreated Check                                                                                                  | 0            | 0               | 0             | 0               | 0               | 0            | 0               | 26 b                                        |
| <b>Two Pass – PRE (4/27) <i>fb</i> POST (6/16)</b> |                                                                                                                  | <b>POST</b>  |                 | <b>POST</b>   |                 |                 |              |                 |                                             |
| 2                                                  | Boundary (2 pt) <i>fb</i><br>Sequence (3.5 pt) + Enlist One (32 oz) + Class Act Ridion (1% v/v)                  | 3.3          | 4.5             | 94            | 55              | 69              | 72           | 76              | 68 a                                        |
| 3                                                  | Tendovo (2.1 qt) <i>fb</i><br>Sequence (3.5 pt) + Enlist One (32 oz) + Class Act Ridion (1% v/v)                 | 4.0          | 4.3             | 92            | 64              | 71              | 70           | 75              | 64 a                                        |
| 4                                                  | Boundary (2 pt) <i>fb</i><br>Prefix (2 pt) + Roundup PM3 (26 oz) + Enlist One (32 oz) + AMS*                     | 3.8          | 15.0            | 82            | 51              | 77              | 74           | 66              | 65 a                                        |
| 5                                                  | Tendovo (2.1 qt) <i>fb</i><br>Prefix (2 pt) + Roundup PM3 (26 oz) + Enlist One (32 oz) + AMS*                    | 3.8          | 15.0            | 89            | 61              | 79              | 75           | 70              | 66 a                                        |
| 6                                                  | Prefix (2 pt) + Canopy (2.25 oz) <i>fb</i><br>Sequence (3.5 pt) + Enlist One (32 oz) + Class Act Ridion (1% v/v) | 4.5          | 4.0             | 97            | 81              | 78              | 80           | 80              | 68 a                                        |
| 7                                                  | Sonic (6 oz) <i>fb</i><br>Sequence (3.5 pt) + Enlist One (32 oz) + Class Act Ridion (1% v/v)                     | 3.3          | 4.3             | 91            | 61              | 69              | 74           | 85              | 68 a                                        |
| 8                                                  | Zidua PRO (6 oz) <i>fb</i><br>Sequence (3.5 pt) + Enlist One (32 oz) + Class Act Ridion (1% v/v)                 | 3.3          | 4.3             | 98            | 78              | 81              | 78           | 78              | 66 a                                        |
| 9                                                  | Fierce XLT (3.75 oz) <i>fb</i><br>Roundup PM3 (26 oz) + Enlist One (32 oz) + Warrant (48 oz) + AMS*              | 4.5          | 3.5             | 98            | 80              | 86              | 84           | 82              | 68 a                                        |
| <b>LSD (<math>\alpha=0.10</math>)</b>              |                                                                                                                  | <b>ns</b>    | <b>0.6</b>      | <b>7</b>      | <b>10</b>       | <b>5</b>        | <b>6</b>     | <b>5</b>        | <b>5</b>                                    |
| <b>p value</b>                                     |                                                                                                                  | <b>0.452</b> | <b>&lt;.001</b> | <b>0.013</b>  | <b>&lt;.001</b> | <b>&lt;.001</b> | <b>0.019</b> | <b>&lt;.001</b> | <b>&lt;0.001</b>                            |

<sup>a</sup>Visual control from 70-100% is illustrated on a color scale with green representing greater weed control values.<sup>b</sup>Yield values with the same letter are not significantly different.

\*Spray grade AMS applied at 8.5 lb/100 gal.

**Project Goal:** Evaluate multiple two-pass herbicide programs with layered residuals for season-long waterhemp control in Enlist soybean.

| Site Description:     |                                                                                 |                        |                    |
|-----------------------|---------------------------------------------------------------------------------|------------------------|--------------------|
| <b>Location:</b>      | Brooklyn, WI                                                                    | <b>Crop:</b>           | Enlist soybean     |
| <b>Field #:</b>       | OB-5                                                                            | <b>Variety:</b>        | H2123E             |
| <b>Soil type:</b>     | Kegonsa silt loam                                                               | <b>Planting Date:</b>  | 5/23               |
| <b>% OM:</b>          | 1.6                                                                             | <b>Emergence Date:</b> | 6/6                |
| <b>pH:</b>            | 6.7                                                                             | <b>Population:</b>     | 140,000 seeds/acre |
| <b>Fertilization:</b> | -                                                                               | <b>Depth:</b>          | 1.25               |
| <b>Previous crop:</b> | Seed corn                                                                       | <b>Row spacing:</b>    | 30 in              |
| <b>Tillage:</b>       | Conventional                                                                    | <b>Plot Size:</b>      | 10 x 30 ft         |
| <b>Weed species:</b>  | glyphosate-resistant waterhemp (AMATA); velvetleaf (ABUTH); fall panicum(PANDI) |                        |                    |

| Herbicide Application Information:   |            |            |            |
|--------------------------------------|------------|------------|------------|
| <b>Date:</b>                         | 5/24       | 6/29       | 7/14       |
| <b>Treatment:</b>                    | PRE (A)    | POST (B)   | LPOST (C)  |
| <b>Air Temp (°F):</b>                | 58         | 77         | 77         |
| <b>2" Soil Temp (°F):</b>            | 60         | 77         | -          |
| <b>Soil moisture [surface]:</b>      | moist      | dry        | dry        |
| <b>RH %:</b>                         | 62         | 63         | 48         |
| <b>Cloud cover %</b>                 | 90         | 0          | -          |
| <b>Wind speed (mph)/direction</b>    | 2-6/SE     | 0-6/ENE    | 1-8/SE     |
| <b>Rainfall (in) 1 wk after APP:</b> | 2.14"      | 1.32"      | 0.87"      |
| <b>GPA:</b>                          | 15         | 15         | 15         |
| <b>PSI:</b>                          | 36         | 36         | 36         |
| <b>Nozzle:</b>                       | TTI 110015 | AIXR110015 | AIXR110015 |
| <b>Nozzle spacing (in):</b>          | 20         | 20         | 20         |
| <b>Boom Height (in):</b>             | 20         | 25         | -          |

| Crop and weed information at application: |          |      |                      |                   |
|-------------------------------------------|----------|------|----------------------|-------------------|
|                                           | Date:    | 5/14 | 6/15*                | 7/14              |
| Soybean                                   | Height:  | -    | 3-6"                 | -                 |
|                                           | Stage:   | -    | V4                   | V7/R1             |
| waterhemp                                 | Height:  | -    | 0.5-8"<br>Avg=3"     | 1-3"              |
|                                           | Density: | -    | 0-15/ft <sup>2</sup> | sparse            |
| velvetleaf                                | Height:  | -    | 0.5-2"               | -                 |
|                                           | Density: | -    | 0-2/ft <sup>2</sup>  | 0/ft <sup>2</sup> |
| fall panicum                              | Height:  | -    | 0.5-9"<br>Avg=3"     | -                 |
|                                           | Density: | -    | 0-7/ft <sup>2</sup>  | 0/ft <sup>2</sup> |

\*All weed densities and heights were recorded from plots with a PRE herbicide.  
Density and height varied depending on the effectiveness of the PRE-emergence herbicide.

| Trt # | Treatment       | Formulation  | SOA Group | Rate       | App Timing | App Code |
|-------|-----------------|--------------|-----------|------------|------------|----------|
| 1     | Untreated Check |              |           |            |            |          |
| 2     | Kyber           | 2.64 lb/gal  | 5, 14, 15 | 1 pt/a     | PRE        | A        |
|       | Enlist One      | 3.8 lbae/gal | 4         | 32 fl oz/a | POST       | B        |
|       | Liberty         | 2.34 lb/gal  | 10        | 32 fl oz/a | POST       | B        |
|       | EverpreX        | 7.62 lb/gal  | 15        | 1 pt/a     | POST       | B        |
|       | AMS             |              |           | 3 lb/a     | POST       | B        |
| 3     | Kyber           | 2.64 lb/gal  | 5, 14, 15 | 1 pt/a     | PRE        | A        |
|       | Enlist One      | 3.8 lbae/gal | 4         | 32 fl oz/a | POST       | B        |
|       | Durango DMA     | 4 lbae/gal   | 9         | 32 fl oz/a | POST       | B        |
|       | EverpreX        | 7.62 lb/gal  | 15        | 1 pt/a     | POST       | B        |
|       | AMS             |              |           | 3 lb/a     | POST       | B        |
| 4     | Kyber           | 2.64 lb/gal  | 5, 14, 15 | 1 pt/a     | PRE        | A        |
|       | Enlist One      | 3.8 lbae/gal | 4         | 32 fl oz/a | POST       | B        |
|       | Liberty         | 2.34 lb/gal  | 10        | 32 fl oz/a | POST       | B        |
|       | EverpreX        | 7.62 lb/gal  | 15        | 1 pt/a     | POST       | B        |
|       | AMS             |              |           | 3 lb/a     | POST       | B        |
|       | Enlist One      | 3.8 lbae/gal | 4         | 32 fl oz/a | LPOST      | C        |
|       | Liberty         | 2.34 lb/gal  | 10        | 32 fl oz/a | LPOST      | C        |
|       | AMS             |              |           | 3 lb/a     | LPOST      | C        |
| 5     | Kyber           | 2.64 lb/gal  | 5, 14, 15 | 1 pt/a     | PRE        | A        |
|       | Enlist One      | 3.8 lbae/gal | 4         | 32 fl oz/a | POST       | B        |
|       | Durango DMA     | 4 lbae/gal   | 9         | 32 fl oz/a | POST       | B        |
|       | EverpreX        | 7.62 lb/gal  | 15        | 1 pt/a     | POST       | B        |
|       | AMS             |              |           | 3 lb/a     | POST       | B        |
|       | Enlist One      | 3.8 lbae/gal | 4         | 32 fl oz/a | LPOST      | C        |
|       | Liberty         | 2.34 lb/gal  | 10        | 32 fl oz/a | LPOST      | C        |
|       | AMS             |              |           | 3 lb/a     | LPOST      | C        |
| 6     | Kyber           | 2.64 lb/gal  | 5, 14, 15 | 1 pt/a     | PRE        | A        |
|       | Enlist One      | 3.8 lbae/gal | 4         | 32 fl oz/a | POST       | B        |
|       | Liberty         | 2.34 lb/gal  | 10        | 32 fl oz/a | POST       | B        |
|       | EverpreX        | 7.62 lb/gal  | 15        | 1 pt/a     | POST       | B        |
|       | AMS             |              |           | 3 lb/a     | POST       | B        |
|       | Enlist One      | 3.8 lbae/gal | 4         | 32 fl oz/a | LPOST      | C        |
|       | Durango DMA     | 4 lbae/gal   | 9         | 32 fl oz/a | LPOST      | C        |
|       | AMS             |              |           | 3 lb/a     | LPOST      | C        |
| 7     | Kyber           | 2.64 lb/gal  | 5, 14, 15 | 1 pt/a     | PRE        | A        |
|       | Durango DMA     | 4 lbae/gal   | 9         | 32 fl oz/a | POST       | B        |
|       | Liberty         | 2.34 lb/gal  | 10        | 32 fl oz/a | POST       | B        |
|       | EverpreX        | 7.62 lb/gal  | 15        | 1 pt/a     | POST       | B        |
|       | AMS             |              |           | 3 lb/a     | POST       | B        |

| Trt # | Treatment          | Formulation  | SOA Group | Rate       | App Timing | App Code |
|-------|--------------------|--------------|-----------|------------|------------|----------|
| 8     | Fierce EZ          | 3.04 lb/gal  | 14, 15    | 6 fl oz/a  | PRE        | A        |
|       | Liberty            | 2.34 lb/gal  | 10        | 32 fl oz/a | POST       | B        |
|       | Perpetuo           | 2.3 lb/gal   | 14, 15    | 6 fl oz/a  | POST       | B        |
|       | Select Max         | 1 lb/gal     | 1         | 9 fl oz/a  | POST       | B        |
|       | Induce             |              |           | 0.25% v/v  | POST       | B        |
|       | AMS                |              |           | 3 lb/a     | POST       | B        |
| 9     | Fierce EZ          | 3.04 lb/gal  | 14, 15    | 6 fl oz/a  | PRE        | A        |
|       | Enlist One         | 3.8 lbae/gal | 4         | 32 fl oz/a | POST       | B        |
|       | Perpetuo           | 2.3 lb/gal   | 14, 15    | 6 fl oz/a  | POST       | B        |
|       | Select Max         | 1 lb/gal     | 1         | 9 fl oz/a  | POST       | B        |
|       | Induce             |              |           | 0.25% v/v  | POST       | B        |
|       | AMS                |              |           | 3 lb/a     | POST       | B        |
| 10    | Fierce MTZ         | 2.64 lb/gal  | 5, 14, 15 | 1 pt/a     | PRE        | A        |
|       | Liberty            | 2.34 lb/gal  | 10        | 32 fl oz/a | POST       | B        |
|       | Perpetuo           | 2.3 lb/gal   | 14, 15    | 6 fl oz/a  | POST       | B        |
|       | Select Max         | 1 lb/gal     | 1         | 9 fl oz/a  | POST       | B        |
|       | Induce             |              |           | 0.25% v/v  | POST       | B        |
|       | AMS                |              |           | 3 lb/a     | POST       | B        |
| 11    | Fierce MTZ         | 2.64 lb/gal  | 5, 14, 15 | 1 pt/a     | PRE        | A        |
|       | Enlist One         | 3.8 lbae/gal | 4         | 32 fl oz/a | POST       | B        |
|       | Perpetuo           | 2.3 lb/gal   | 14, 15    | 6 fl oz/a  | POST       | B        |
|       | Select Max         | 1 lb/gal     | 1         | 9 fl oz/a  | POST       | B        |
|       | Induce             |              |           | 0.25% v/v  | POST       | B        |
|       | AMS                |              |           | 3 lb/a     | POST       | B        |
| 12    | Tendovo            | 4.03 lb/gal  | 2, 5, 15  | 2.1 qt/a   | PRE        | A        |
|       | Sequence           | 5.25 lb/gal  | 9, 15     | 3 pt/a     | POST       | B        |
|       | Enlist One         | 3.8 lbae/gal | 4         | 32 fl oz/a | POST       | B        |
|       | AMS                |              |           | 3 lb/a     | POST       | B        |
| 13    | Zidua PRO          | 4.09 lb/gal  | 2, 14, 15 | 6 fl oz/a  | PRE        | A        |
|       | Enlist One         | 3.8 lbae/gal | 4         | 32 fl oz/a | POST       | B        |
|       | Roundup PowerMAX 3 | 4.8 lbae/gal | 9         | 20 fl oz/a | POST       | B        |
|       | Zidua SC           | 4.17 lb/gal  | 15        | 2 fl oz/a  | POST       | B        |
|       | AMS                |              |           | 3 lb/a     | POST       | B        |
| 14    | Verdict            | 5.57 lb/gal  | 14, 15    | 5 fl oz/a  | PRE        | A        |
|       | Zidua SC           | 4.17 lb/gal  | 15        | 2 fl oz/a  | PRE        | A        |
|       | Enlist One         | 3.8 lbae/gal | 4         | 32 fl oz/a | POST       | B        |
|       | Roundup PowerMAX 3 | 4.8 lbae/gal | 9         | 20 fl oz/a | POST       | B        |
|       | Zidua SC           | 4.17 lb/gal  | 15        | 2 fl oz/a  | POST       | B        |
|       | AMS                |              |           | 3 lb/a     | POST       | B        |

**Adjuvants:** AMS = BlueAg spray grade ammonium sulfate; Induce = non-ionic surfactant (NIS)

**Trial Summary:**

The trial was established at the O'Brien Hybrids farm located north of Brooklyn, WI to evaluate multiple two- and three-pass herbicide programs with layered residuals from several company portfolios for season-long waterhemp control in Enlist soybean. The trial was located in a grower's field with a heavy population of glyphosate-resistant waterhemp. There was minor (<3%) injury from the PRE herbicides observed 21 days after application (data not shown). Minor soybean leaf necrosis was observed 14 days after the POST herbicide application (Table 15).

All of the PRE herbicides provided good to excellent early-season residual control of waterhemp, velvetleaf, and fall panicum 21 days after application (Table 15). Residual waterhemp control of some treatments fell below 80% by 36 days after PRE application. All treatments had at least 90% waterhemp control at soybean harvest. Velvetleaf and fall panicum control was 96% or greater for all herbicide programs at soybean harvest. All 3-pass herbicide programs provided excellent control although the third pass may not have been necessary due to very few weeds escaping the POST application 15 days prior. Results of this trial demonstrate that layering residual herbicides can be an effective strategy to manage glyphosate-resistant waterhemp. A similar trial was conducted in 2021 with successful results as well (see trial# 22-BRO-SB10 in the [2021 Wisconsin Weed Science Research Report](#)

Yield did differ statistically among herbicide programs (Table 15) although this was more likely due to field variation than any actual differences in herbicide treatment. Yield across all herbicide treatments = 68 bu acre<sup>-1</sup>, while the untreated check was 29 bu acre<sup>-1</sup>.

Plot photos from throughout the growing season are available [Evaluation of Layered Residual Herbicide Programs in Enlist Soybean](#) published on [wiscweeds.info](http://wiscweeds.info).

**Table 15.** Crop injury, weed control ratings, and soybean yield for trial #22-BRO-SB12 at Brooklyn, WI.<sup>a</sup>

| Trt # Herbicide (rate acre <sup>-1</sup> )                                                                                                             | Injury (%) | Waterhemp (%) |      |        |        |        | Velvetleaf (%) |      |      | Fall Panicum (%) |      |      | Yield <sup>b</sup><br>bu acre <sup>-1</sup> |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|------------|---------------|------|--------|--------|--------|----------------|------|------|------------------|------|------|---------------------------------------------|
|                                                                                                                                                        | 7/13       | 6/14          | 6/29 | 7/13   | 7/26   | 9/29   | 6/29           | 7/26 | 9/29 | 6/29             | 7/26 | 9/29 |                                             |
| 1 Untreated Check                                                                                                                                      | 0          | 0             | 0    | 0      | 0      | 0      | 0              | 0    | 0    | 0                | 0    | 0    | 29 d                                        |
| <b>Two-Pass – PRE (5/24) fb POST (6/29)</b>                                                                                                            |            | <b>POST</b>   |      |        |        |        | <b>POST</b>    |      |      | <b>POST</b>      |      |      |                                             |
| 2 Kyber (1 pt) <b>fb</b><br>Enlist One (32 oz) + Liberty (32 oz) + EverpreX (1 pt) + AMS*                                                              | 4.5        | 100           | 88   | 99     | 97     | 97     | 99             | 100  | 100  | 96               | 100  | 100  | 69 abc                                      |
| 3 Kyber (1 pt) <b>fb</b><br>Enlist One (32 oz) + Durango DMA (32 oz) + EverpreX (1 pt) + AMS*                                                          | 3.5        | 100           | 90   | 96     | 96     | 99     | 96             | 100  | 100  | 99               | 100  | 100  | 67 bc                                       |
| 7 Kyber (1 pt) <b>fb</b><br>Liberty (32 oz) + Durango DMA (32 oz) + EverpreX (1 pt) + AMS*                                                             | 5          | 100           | 86   | 100    | 98     | 99     | 99             | 100  | 100  | 91               | 100  | 100  | 66 c                                        |
| 8 Fierce EZ (6 oz) <b>fb</b><br>Liberty (32 oz)+Perpetuo (6 oz)+Select Max (9 oz)+Induce 0.25% v/v +AMS*                                               | 3.3        | 100           | 89   | 98     | 94     | 95     | 94             | 100  | 100  | 92               | 100  | 99   | 71 a                                        |
| 9 Fierce EZ (6 oz) <b>fb</b><br>Enlist One (32 oz)+Perpetuo (6 oz)+Select Max (9 oz)+Induce 0.25% v/v +AMS*                                            | 5          | 100           | 82   | 95     | 83     | 93     | 95             | 100  | 100  | 94               | 100  | 96   | 69 abc                                      |
| 10 Fierce MTZ (1 pt) <b>fb</b><br>Liberty (32 oz)+Perpetuo (6 oz)+Select Max (9 oz)+Induce 0.25% v/v +AMS*                                             | 2.8        | 100           | 87   | 99     | 96     | 99     | 97             | 100  | 100  | 95               | 100  | 100  | 69 abc                                      |
| 11 Fierce MTZ (1 pt) <b>fb</b><br>Enlist One (32 oz)+Perpetuo (6 oz)+Select Max (9 oz)+Induce 0.25% v/v +AMS*                                          | 4.3        | 99            | 83   | 92     | 81     | 90     | 97             | 100  | 100  | 93               | 100  | 100  | 67 bc                                       |
| 12 Tendovo (2.1 qt) <b>fb</b><br>Sequence (3 pt) + Enlist One (32 oz) + AMS*                                                                           | 4          | 97            | 61   | 89     | 85     | 96     | 98             | 100  | 100  | 99               | 99   | 100  | 69 abc                                      |
| 13 Zidua PRO (6 oz) <b>fb</b><br>Enlist One (32 oz) + Roundup PM3 (20 oz) + Zidua SC (2 oz) + AMS*                                                     | 1.8        | 99            | 75   | 92     | 90     | 99     | 100            | 100  | 100  | 94               | 100  | 100  | 70 ab                                       |
| 14 Verdict (5 oz) + Zidua SC (2 oz) <b>fb</b><br>Enlist One (32 oz) + Roundup PM3 (20 oz) + Zidua SC (2 oz) + AMS*                                     | 2          | 99            | 73   | 94     | 90     | 99     | 99             | 100  | 100  | 96               | 100  | 100  | 66 c                                        |
| <b>Three-Pass – PRE (5/24) fb POST (6/29) fb LPOST (7/14)</b>                                                                                          |            | <b>LPOST</b>  |      |        |        |        |                |      |      |                  |      |      |                                             |
| 4 Kyber (1 pt) <b>fb</b><br>Enlist One (32 oz) + Liberty (32 oz) + EverpreX (1 pt) + AMS* <b>fb</b><br>Enlist One (32 oz) + Liberty (32 oz) + AMS*     | 4          | 100           | 90   | 99     | 100    | 100    | 99             | 100  | 100  | 98               | 100  | 100  | 67 abc                                      |
| 5 Kyber (1 pt) <b>fb</b><br>Enlist One (32 oz) + Durango DMA (32 oz) + EverpreX (1 pt) + AMS* <b>fb</b><br>Enlist One (32 oz) + Liberty (32 oz) + AMS* | 3.3        | 100           | 90   | 98     | 100    | 100    | 99             | 100  | 100  | 95               | 100  | 100  | 67 bc                                       |
| 6 Kyber (1 pt) <b>fb</b><br>Enlist One (32 oz) + Liberty (32 oz) + EverpreX (1 pt) + AMS* <b>fb</b><br>Enlist One (32 oz) + Durango DMA (32 oz) + AMS* | 4.8        | 100           | 85   | 99     | 99     | 100    | 96             | 100  | 100  | 93               | 100  | 100  | 68 abc                                      |
| <b>LSD (<math>\alpha=0.10</math>)</b>                                                                                                                  |            | 1             | 11   | 3      | 5      | 3      | ns             | ns   | ns   | ns               | ns   | ns   | 3                                           |
| <b>p value</b>                                                                                                                                         |            | <0.001        | .003 | <0.001 | <0.001 | <0.001 | .504           | 1.00 | 1.00 | .709             | .568 | .261 | <0.001                                      |

<sup>a</sup>Visual control from 70-100% is illustrated on a color scale with green representing greater weed control values.<sup>b</sup>Yield values with the same letter are not significantly different.

\*Spray grade AMS applied at 3 lb/a.

**Project Goal:** Evaluate the efficacy and crop safety of Authority brand herbicides with and without metribuzin and similar competitor PRE herbicides in Enlist soybeans.

| Site Description                               |                    |            |                     |            |            |
|------------------------------------------------|--------------------|------------|---------------------|------------|------------|
| Trial #:                                       | 22-BRO-SB13        |            | 22-ROK-SB13         |            |            |
| Location:                                      | Brooklyn, WI       |            | Janesville , WI     |            |            |
| Soil Type:                                     | Kegonsa silt loam  |            | Plano silt loam     |            |            |
| Soil Texture % sand/silt/clay:                 | 46 / 41 / 14       |            | 7 / 71 / 22         |            |            |
| % OM:                                          | 1.6                |            | 3.3                 |            |            |
| pH:                                            | 6.7                |            | 6.4                 |            |            |
| Previous Crop:                                 | Seed Corn          |            | Corn                |            |            |
| Tillage:                                       | Conventional       |            | Conventional        |            |            |
| Variety :                                      | H2123E             |            | S20-E3              |            |            |
| Planting Date:                                 | 5/23               |            | 5/16                |            |            |
| Emergence Date:                                | 6/6                |            | 6/1                 |            |            |
| Seeding Rate:                                  | 140,000 seeds/acre |            | 140,000 seeds/acre  |            |            |
| Depth:                                         | 1.25 in            |            | 1.5 in              |            |            |
| Row Spacing:                                   | 30 in              |            | 30 in               |            |            |
| Plot Size:                                     | 10 x 30 ft         |            | 10 x 30 ft          |            |            |
| Herbicide Application Information              |                    |            |                     |            |            |
| Trial #:                                       | 22-BRO-SB13        |            | 22-ROK-SB13         |            |            |
| Date:                                          | 5/24               | 6/29       | 5/17                | 6/13       | 7/7        |
| Treatment:                                     | PRE (A)            | POST (B)   | PRE (A)             | POST (B)   | LPOST (C)  |
| Air Temp (°F):                                 | 58                 | 77         | 70                  | 81         | 79         |
| 2" Soil Temp (°F):                             | 60                 | -          | 64                  | -          | -          |
| Soil moisture [surface]:                       | moist              | dry        | dry                 | moist      | slight wet |
| RH %:                                          | 62                 | 63         | 42                  | 71         | 79         |
| Cloud cover %:                                 | 90                 | 0          | 70                  | 100        | -          |
| Wind speed (mph)/direction:                    | 2-6/SE             | 0-6/ENE    | 0-7/NE              | 5-9/SE     | 0-4/SW     |
| Rainfall (in) 1 wk after APP:                  | 2.14"              | 1.32"      | 0.42"               | 0.34"      | 0.14"      |
| GPA:                                           | 15                 | 15         | 15                  | 15         | 15.4       |
| PSI:                                           | 35                 | 36         | 35                  | 36         | 30         |
| Nozzle:                                        | TTI110015          | AIXR110015 | TTI110015           | AIXR110015 | TTI 11003  |
| Crop and Weed Information at POST Application* |                    |            |                     |            |            |
|                                                | Height             | Stage      | Height              | Stage      |            |
| Soybean                                        | 5-6 in             | V4         | 3-4 in              | V1         |            |
|                                                | Height             | Density    | Height              | Density    |            |
| Waterhemp                                      | 0.5-6 in           | 0-7/ft²    | -                   | -          |            |
| Velvetleaf                                     | 1-3 in             | 0-1/ft²    | -                   | -          |            |
| Fall Panicum                                   | 0.5-3 in           | 0-16/ft²   | -                   | -          |            |
| Giant Ragweed                                  | -                  | -          | 1-11 in<br>Avg=4-5" | 28-280/m²  |            |

\*All weed densities and heights were recorded from plots with a PRE herbicide.

| Trt # | Treatment         | Formulation | SOA Group | Rate       | App Timing | App Code |
|-------|-------------------|-------------|-----------|------------|------------|----------|
| 1     | Untreated Check   |             |           |            |            |          |
| 2     | Authority Supreme | 4.16 lb/gal | 14, 15    | 8 fl oz/a  | PRE        | A        |
| 3     | Authority Supreme | 4.16 lb/gal | 14, 15    | 8 fl oz/a  | PRE        | A        |
|       | Metricor DF       | 75% w/w     | 5         | 6 oz/a     | PRE        | A        |
| 4     | Authority Elite   | 7 lb/gal    | 14, 15    | 25 fl oz/a | PRE        | A        |
| 5     | Authority Elite   | 7 lb/gal    | 14, 15    | 25 fl oz/a | PRE        | A        |
|       | Metricor DF       | 75% w/w     | 5         | 6 oz/a     | PRE        | A        |
| 6     | Authority First   | 70% w/w     | 2, 14     | 6.4 oz/a   | PRE        | A        |
| 7     | Authority First   | 70% w/w     | 2, 14     | 6.4 oz/a   | PRE        | A        |
|       | Metricor DF       | 75% w/w     | 5         | 6 oz/a     | PRE        | A        |
| 8     | Kyber             | 2.64 lb/gal | 5, 14, 15 | 1 pt/a     | PRE        | A        |
| 9     | Zidua PRO         | 4.09 lb/gal | 2, 14, 15 | 6 fl oz/a  | PRE        | A        |
| 10    | Boundary          | 6.5 lb/gal  | 5, 15     | 29 fl oz/a | PRE        | A        |
| 11    | Anthem Maxx       | 4.3 lb/gal  | 14, 15    | 4 fl oz/a  | PRE        | A        |
| 12    | Anthem Maxx       | 4.3 lb/gal  | 14, 15    | 4 fl oz/a  | PRE        | A        |
|       | Metricor DF       | 75% w/w     | 5         | 6 oz/a     | PRE        | A        |

**POST Herbicide Program:** Applied to all treatments except the untreated check.

- **22-BRO-SB13**
  - **POST (B):** Enlist One (32 fl oz/a) + Roundup PM 3 (30 fl oz/a) + AMS (8.5 lb/100 gal)
- **22-ROK-SB13**
  - **POST (B):** Enlist One (32 fl oz/a) + Roundup PM 3 (30 fl oz/a) + AMS (8.5 lb/100 gal)
  - **LPOST (C)\*:** Liberty (32 fl oz/a) + AMS (2 lb/a)

\*A late POST application of Liberty was needed at the Janesville location (22-ROK-SB13) due to the large number of giant ragweed seedlings that emerged following the POST (B) application.

**Adjuvants:** AMS = BlueAg spray grade ammonium sulfate

**Trial Summary:**

This trial evaluated the efficacy and crop safety of Authority brand herbicides with and without metribuzin and similar competitor PRE herbicides in Enlist soybeans. The same trial was conducted at two locations to evaluate two difficult to control weed species: Brooklyn, WI (glyphosate-resistant waterhemp) and Janesville, WI (giant ragweed)

***Brooklyn (22-BRO-SB13)***

Waterhemp density at the time of POST application (6/29) was impacted by PRE herbicide treatment (Table 16). All of the PRE herbicides provided excellent early-season residual control of waterhemp and fall panicum 21 days after application (Table 17). Residual waterhemp control of some treatments fell below 90% by 36 days after PRE application. The POST application of Enlist One + Roundup PowerMAX 3 effectively controlled most of the waterhemp present at application. All of the herbicide programs evaluated had >90% waterhemp and >95% fall panicum control at soybean harvest. Adding 6 oz of Metricor DF to the tank did not appear to improve visual control of waterhemp except for Anthem Maxx. Higher rates may be needed for effective residual control which is being evaluated in a multi-state United Soybean Board funded project (see trial [#22-BRO-USB02](#) in this research report for results from the Wisconsin location) However, metribuzin does provide another effective mode of action for waterhemp control and can help delay herbicide resistance evolution.

Soybean yield of the various herbicide programs was very similar and did not statistically differ (Table 17). Yield across all herbicide treatments = 68 bu acre<sup>-1</sup>, while the untreated check was 31 bu acre<sup>-1</sup>.

***Janesville (22-ROK-SB13)***

Giant ragweed at this research location is a biotype with a prolonged emergence pattern as emergence typically starts in mid- to late-April and continues well into June. None of the PRE herbicides provided >80% residual control of giant ragweed 27 days after application (Table 18). Authority First and Zidua PRO provided the best control 27 DAT. Both herbicides include group 2 (ALS) and group 14 (PPO) active ingredients which have been shown to be effective for control of ALS susceptible giant ragweed populations in pPrevious research by our lab at this location. Adding 6 oz of Metricor DF to the tank did not appear to improve visual control of giant ragweed; however, it did improve common lambsquarters control of Anthem Maxx and velvetleaf control of Authority Supreme and Anthem Maxx. The POST application of Enlist One + Roundup PowerMAX 3 was effective at controlling all weeds emerged at application; however, several giant ragweed seedlings had emerged after the application had been made. This is evident by the poor control 24 days after application on 7/7. A rescue application of Liberty was made at this time to control weed escapes. Even three herbicide applications were not enough to achieve >90% control at soybean harvest for some of the treatments.

Yield differed among herbicide programs (Table 18). The untreated check was 0 bu acre<sup>-1</sup>, an indication of the very high giant ragweed competition at this location.

**Table 16.** Weed density at the time of POST herbicide application

| Trt # | PRE Herbicide                     | Rate<br>acre <sup>-1</sup> | 22-BRO-SB13                               |                 |                             | 22-ROK-SB13                               |                 |                             |
|-------|-----------------------------------|----------------------------|-------------------------------------------|-----------------|-----------------------------|-------------------------------------------|-----------------|-----------------------------|
|       |                                   |                            | Waterhemp                                 |                 |                             | Giant Ragweed                             |                 |                             |
|       |                                   |                            | Density<br>(m <sup>2</sup> ) <sup>a</sup> | sd <sup>b</sup> | %<br>Reduction <sup>c</sup> | Density<br>(m <sup>2</sup> ) <sup>a</sup> | sd <sup>b</sup> | %<br>Reduction <sup>c</sup> |
| 1     | Check                             |                            | 129                                       | 87              | -                           | 70                                        | 24              | -                           |
| 2     | Authority Supreme                 | 8 fl oz                    | 26                                        | 23              | 80                          | 143                                       | 96              | 0                           |
| 3     | Authority Supreme +<br>Metrior DF | 8 fl oz +<br>6 oz          | 10                                        | 10              | 93                          | 109                                       | 24              | 0                           |
| 4     | Authority Elite                   | 25 fl oz                   | 11                                        | 6               | 91                          | 111                                       | 35              | 0                           |
| 5     | Authority Elite +<br>Metrior DF   | 25 fl oz +<br>6 oz         | 24                                        | 20              | 81                          | 113                                       | 69              | 0                           |
| 6     | Authority First                   | 6.4 oz                     | 22                                        | 9               | 83                          | 69                                        | 27              | 1                           |
| 7     | Authority First +<br>Metrior DF   | 6.4 oz +<br>6 oz           | 30                                        | 39              | 76                          | 97                                        | 86              | 0                           |
| 8     | Kyber                             | 1 pt                       | 3                                         | 3               | 98                          | 52                                        | 22              | 26                          |
| 9     | Zidua PRO                         | 6 fl oz                    | 19                                        | 16              | 85                          | 83                                        | 52              | 0                           |
| 10    | Boundary                          | 29 fl oz                   | 30                                        | 26              | 77                          | 82                                        | 34              | 0                           |
| 11    | Anthem Maxx                       | 4 fl oz                    | 21                                        | 15              | 84                          | 94                                        | 46              | 0                           |
| 12    | Anthem Maxx +<br>Metrior DF       | 4 fl oz +<br>6 oz          | 16                                        | 19              | 87                          | 131                                       | 54              | 0                           |

<sup>a</sup>density was collected from one 0.25 m<sup>2</sup> quadrant in each plot<sup>b</sup>standard deviation<sup>c</sup>percent reduction in density from untreated check

Plot photos from throughout the growing season are available at [Authority Brand Soybean Herbicide Programs – Janesville](#) and [Authority Brand Soybean Herbicide Programs – Brooklyn](#) published on [wiscweeds.info](http://wiscweeds.info).

**Table 17.** Crop injury, weed control ratings, and soybean yield for trial #22-BRO-SB13.<sup>a</sup>

| Trt # Herbicide (rate acre <sup>-1</sup> )              | Injury (%)      |             | Waterhemp (%) |             |                 |             |             | Fall Panicum (%) |             |             | Yield <sup>b</sup><br>bu acre <sup>-1</sup> |
|---------------------------------------------------------|-----------------|-------------|---------------|-------------|-----------------|-------------|-------------|------------------|-------------|-------------|---------------------------------------------|
|                                                         | 6/14            | 6/29        | 6/14          | 6/29        | 7/13            | 7/26        | 9/29        | 6/29             | 7/26        | 9/29        |                                             |
| 1 Untreated Check                                       | 0               | 0           | 0             | 0           | 0               | 0           | 0           | 0                | 0           | 0           | 31 b                                        |
| <b>Two-Pass – PRE (5/24) fb POST<sup>c</sup> (6/29)</b> |                 |             | <b>POST</b>   |             |                 |             |             | <b>POST</b>      |             |             |                                             |
| 2 Authority Supreme (8 fl oz)                           | 0.3             | 3.5         | 100           | 88          | 96              | 90          | 97          | 97               | 95          | 99          | 70 a                                        |
| 3 Authority Supreme (8 fl oz) + Metricor DF (6 oz)      | 0.0             | 2.5         | 100           | 91          | 95              | 91          | 97          | 95               | 97          | 100         | 70 a                                        |
| 4 Authority Elite (25 fl oz)                            | 0.0             | 2.3         | 99            | 83          | 92              | 89          | 92          | 95               | 91          | 97          | 67 a                                        |
| 5 Authority Elite (25 fl oz) + Metricor DF (6 oz)       | 0.0             | 2.5         | 99            | 82          | 93              | 91          | 98          | 96               | 96          | 99          | 70 a                                        |
| 6 Authority First (6.4 oz)                              | 0.0             | 2.8         | 97            | 83          | 92              | 95          | 98          | 100              | 98          | 100         | 67 a                                        |
| 7 Authority First (6.4 oz) + Metricor DF (6 oz)         | 0.0             | 2.5         | 98            | 80          | 93              | 92          | 97          | 93               | 95          | 98          | 67 a                                        |
| 8 Kyber (1 pt)                                          | 2.5             | 3.0         | 100           | 93          | 99              | 98          | 100         | 96               | 99          | 100         | 66 a                                        |
| 9 Zidua PRO (6 fl oz)                                   | 0.0             | 4.0         | 100           | 84          | 94              | 90          | 98          | 97               | 96          | 98          | 69 a                                        |
| 10 Boundary (29 fl oz)                                  | 0.0             | 2.8         | 99            | 69          | 88              | 88          | 96          | 90               | 98          | 100         | 68 a                                        |
| 11 Anthem Maxx (4 fl oz)                                | 0.0             | 3.3         | 99            | 83          | 93              | 91          | 96          | 92               | 98          | 99          | 65 a                                        |
| 12 Anthem Maxx (4 fl oz) + Metricor DF (6 oz)           | 0.0             | 3.0         | 100           | 90          | 96              | 92          | 96          | 90               | 98          | 99          | 68 a                                        |
| <b>LSD (<math>\alpha=0.10</math>)</b>                   | <b>0.3</b>      | <b>ns</b>   | <b>ns</b>     | <b>8</b>    | <b>3</b>        | <b>ns</b>   | <b>ns</b>   | <b>ns</b>        | <b>ns</b>   | <b>ns</b>   | <b>5</b>                                    |
| <b>p value</b>                                          | <b>&lt;.001</b> | <b>.282</b> | <b>.165</b>   | <b>.001</b> | <b>&lt;.001</b> | <b>.112</b> | <b>.430</b> | <b>.748</b>      | <b>.611</b> | <b>.580</b> | <b>&lt;0.001</b>                            |

<sup>a</sup>Visual control from 70-100% is illustrated on a color scale with green representing greater weed control values.<sup>b</sup>Yield values with the same letter are not significantly different.<sup>c</sup>POST application - Enlist One (32 fl oz) + Roundup PowerMAX3 (32 fl oz) + AMS (8.5 lb/100 gal) applied to all treatments except the untreated check.

**Table 18.** Crop injury, weed control ratings, and soybean yield for trial #22-ROK-SB13.<sup>a</sup>

| Trt # Herbicide (rate acre <sup>-1</sup> )                                         | Injury (%)  |            | Giant Ragweed (%) |              |              |              | Lambsquarters (%) |              |            | Velvetleaf (%)  |              |            | Yield <sup>b</sup><br>bu acre <sup>-1</sup> |
|------------------------------------------------------------------------------------|-------------|------------|-------------------|--------------|--------------|--------------|-------------------|--------------|------------|-----------------|--------------|------------|---------------------------------------------|
|                                                                                    | 6/7         | 6/13       | 6/13              | 6/28         | 7/7          | 10/11        | 6/13              | 6/28         | 10/11      | 6/13            | 6/28         | 10/11      |                                             |
| 1 Untreated Check                                                                  | 0.0         | 0          | 0                 | 0            | 0            | 0            | 0                 | 0            | 0          | 0               | 0            | 0          | 0 c                                         |
| <b>Two-Pass – PRE (5/17) fb POST<sup>c</sup> (6/13) fb LPOST<sup>d</sup> (7/7)</b> |             |            | <b>POST</b>       |              | <b>LPOST</b> |              | <b>POST</b>       |              |            | <b>POST</b>     |              |            |                                             |
| 2 Authority Supreme (8 fl oz)                                                      | 0.0         | 0          | 10                | 83           | 72           | 95           | 99                | 100          | 100        | 86              | 100          | 100        | 71.6 ab                                     |
| 3 Authority Supreme (8 fl oz) + Metricor DF (6 oz)                                 | 0.0         | 0          | 8                 | 82           | 72           | 93           | 100               | 100          | 100        | 98              | 100          | 100        | 70.9 ab                                     |
| 4 Authority Elite (25 fl oz)                                                       | 0.0         | 0          | 11                | 82           | 72           | 91           | 95                | 100          | 100        | 75              | 100          | 100        | 73.5 ab                                     |
| 5 Authority Elite (25 fl oz) + Metricor DF (6 oz)                                  | 1.0         | 0          | 26                | 83           | 72           | 89           | 100               | 100          | 100        | 80              | 100          | 100        | 71.4 ab                                     |
| 6 Authority First (6.4 oz)                                                         | 0.8         | 0          | 78                | 83           | 71           | 100          | 100               | 100          | 100        | 96              | 99           | 100        | 72.8 ab                                     |
| 7 Authority First (6.4 oz) + Metricor DF (6 oz)                                    | 1.5         | 0          | 71                | 81           | 70           | 100          | 100               | 100          | 100        | 94              | 100          | 100        | 75.3 a                                      |
| 8 Kyber (1 pt)                                                                     | 4.8         | 0          | 59                | 80           | 67           | 97           | 100               | 100          | 100        | 98              | 100          | 100        | 74.5 ab                                     |
| 9 Zidua PRO (6 fl oz)                                                              | 1.5         | 0          | 73                | 83           | 71           | 98           | 100               | 100          | 100        | 100             | 100          | 100        | 73.8 ab                                     |
| 10 Boundary (29 fl oz)                                                             | 1.5         | 0          | 11                | 83           | 72           | 96           | 95                | 100          | 100        | 86              | 99           | 100        | 69.5 b                                      |
| 11 Anthem Maxx (4 fl oz)                                                           | 1.3         | 0          | 3                 | 83           | 74           | 95           | 60                | 99           | 100        | 63              | 98           | 100        | 70.9 ab                                     |
| 12 Anthem Maxx (4 fl oz) + Metricor DF (6 oz)                                      | 0.5         | 0          | 13                | 83           | 72           | 92           | 100               | 100          | 100        | 98              | 100          | 100        | 71.2 ab                                     |
| <b>LSD (<math>\alpha=0.10</math>)</b>                                              | <b>1.8</b>  | <b>ns</b>  | <b>18</b>         | <b>ns</b>    | <b>ns</b>    | <b>ns</b>    | <b>8</b>          | <b>&lt;1</b> | <b>ns</b>  | <b>12</b>       | <b>ns</b>    | <b>ns</b>  | <b>5.6</b>                                  |
| <b>p value</b>                                                                     | <b>.006</b> | <b>1.0</b> | <b>&lt;.001</b>   | <b>0.942</b> | <b>0.791</b> | <b>0.480</b> | <b>&lt;.001</b>   | <b>0.003</b> | <b>1.0</b> | <b>&lt;.001</b> | <b>0.575</b> | <b>1.0</b> | <b>&lt;0.001</b>                            |

<sup>a</sup>Visual control from 70-100% is illustrated on a color scale with green representing greater weed control values.<sup>b</sup>Yield values with the same letter are not significantly different.<sup>c</sup>POST application - Enlist One (32 fl oz) + Roundup PowerMAX3 (32 fl oz) + AMS (8.5 lb/100 gal) applied to all treatments except the untreated check.<sup>d</sup>LPOST application - Liberty (32 fl oz) + AMS (2 lb/a) applied to all treatments except the untreated check.

**Project Goal:** Evaluate the efficacy and crop safety of Preview 2.1SC as a component of a competitive weed control program in Enlist soybeans.

#### Site Description:

|                       |                                                                                  |                        |                    |
|-----------------------|----------------------------------------------------------------------------------|------------------------|--------------------|
| <b>Location:</b>      | Brooklyn, WI                                                                     | <b>Crop:</b>           | Enlist soybean     |
| <b>Field #:</b>       | OB-5                                                                             | <b>Variety:</b>        | H2123E             |
| <b>Soil type:</b>     | Kegonsa                                                                          | <b>Planting Date:</b>  | 5/23               |
| <b>% OM:</b>          | 1.6                                                                              | <b>Emergence Date:</b> | 6/6                |
| <b>pH:</b>            | 6.7                                                                              | <b>Population:</b>     | 140,000 seeds/acre |
| <b>Fertilization:</b> | -                                                                                | <b>Depth:</b>          | 1.25               |
| <b>Previous crop:</b> | Seed Corn                                                                        | <b>Row spacing:</b>    | 30 in              |
| <b>Tillage:</b>       | Conventional                                                                     | <b>Plot Size:</b>      | 10 x 30 ft         |
| <b>Weed species:</b>  | glyphosate-resistant waterhemp (AMATA); velvetleaf (ABUTH); fall panicum (PANDI) |                        |                    |

#### Herbicide Application Information:

|                                      |            |              |
|--------------------------------------|------------|--------------|
| <b>Date:</b>                         | 5/23       | 6/29         |
| <b>Treatment:</b>                    | PRE (A)    | POST (B)     |
| <b>Air Temp (°F):</b>                | 70         | 77           |
| <b>2" Soil Temp (°F):</b>            | 70         | 75           |
| <b>Soil moisture [surface]:</b>      | moist      | slightly dry |
| <b>RH %:</b>                         | 30         | 63           |
| <b>Cloud cover %</b>                 | 80         | 0            |
| <b>Wind speed (mph)/direction</b>    | 2-6/NNE    | 0-6/ENE      |
| <b>Rainfall (in) 1 wk after APP:</b> | 2.14"      | 1.32"        |
| <b>GPA:</b>                          | 15         | 15           |
| <b>PSI:</b>                          | 35         | 36           |
| <b>Nozzle:</b>                       | TTI 110015 | TT 110015    |
| <b>Nozzle spacing (in):</b>          | 20         | 20           |
| <b>Boom Height (in):</b>             | 20         | 25           |

#### Crop and weed information at application:

|                    |                 |      |                     |
|--------------------|-----------------|------|---------------------|
|                    | <b>Date:</b>    | 5/23 | 6/29*               |
| <b>Soybean</b>     | <b>Height:</b>  | -    | 3-6"                |
|                    | <b>Stage:</b>   | -    | V4                  |
| <b>waterhemp</b>   | <b>Height</b>   | -    | 1-8" Avg=3"         |
|                    | <b>Density:</b> | -    | 2-3/ft <sup>2</sup> |
| <b>velvetleaf</b>  | <b>Height:</b>  | -    | 1-3"                |
|                    | <b>Density:</b> | -    | 0-1/ft <sup>2</sup> |
| <b>fall panium</b> | <b>Height:</b>  | -    | 1-4"                |
|                    | <b>Density:</b> | -    | 0-4/ft <sup>2</sup> |

\*All weed densities and heights were recorded from the untreated check.

| Trt # | Treatment       | Formulation  | SOA Group | Rate       | App Timing | App Code |
|-------|-----------------|--------------|-----------|------------|------------|----------|
| 1     | Untreated Check |              |           |            |            |          |
| 2     | Preview 2.1SC   | 3.35 lb/gal  | 5, 14     | 21 fl oz/a | PRE        | A        |
|       | Interline       | 2.34 lb/gal  | 10        | 32 fl oz/a | POST       | B        |
|       | AMS (liquid)    |              |           | 5% v/v     | POST       | B        |
| 3     | Preview 2.1SC   | 3.35 lb/gal  | 5, 14     | 21 fl oz/a | PRE        | A        |
|       | Moccasin        | 8 lb/gal     | 15        | 1.25 pt/a  | PRE        | A        |
|       | Interline       | 2.34 lb/gal  | 10        | 32 fl oz/a | POST       | B        |
|       | AMS (liquid)    |              |           | 5% v/v     | POST       | B        |
| 4     | Preview 2.1SC   | 3.35 lb/gal  | 5, 14     | 21 fl oz/a | PRE        | A        |
|       | InterMoc        | 3.54 lb/gal  | 10, 15    | 2 qt/a     | POST       | B        |
|       | AMS (liquid)    |              |           | 5% v/v     | POST       | B        |
| 5     | Preview 2.1SC   | 3.35 lb/gal  | 5, 14     | 21 fl oz/a | PRE        | A        |
|       | Moccasin        | 8 lb/gal     | 15        | 1.25 pt/a  | PRE        | A        |
|       | InterMoc        | 3.54 lb/gal  | 10, 15    | 2 qt/a     | POST       | B        |
|       | AMS (liquid)    |              |           | 5% v/v     | POST       | B        |
| 6     | Preview 2.1SC   | 3.35 lb/gal  | 5, 14     | 21 fl oz/a | PRE        | A        |
|       | FirstRate       | 84% w/w      | 2         | 0.6 oz/a   | PRE        | A        |
|       | InterMoc        | 3.54 lb/gal  | 10, 15    | 2 qt/a     | POST       | B        |
|       | AMS (liquid)    |              |           | 5% v/v     | POST       | B        |
| 7     | Tripzin ZC      | 4 lb/gal     | 3, 5      | 43 fl oz/a | PRE        | A        |
|       | InterMoc        | 3.54 lb/gal  | 10, 15    | 2 qt/a     | POST       | B        |
|       | AMS (liquid)    |              |           | 5% v/v     | POST       | B        |
| 8     | Moccasin MTZ    | 4.466 lb/gal | 5, 15     | 42 fl oz/a | PRE        | A        |
|       | InterMoc        | 3.54 lb/gal  | 10, 15    | 2 qt/a     | POST       | B        |
|       | AMS (liquid)    |              |           | 5% v/v     | POST       | B        |
| 9     | Zidua PRO       | 4.09 lb/gal  | 2, 14, 15 | 6 fl oz/a  | PRE        | A        |
|       | Liberty         | 2.34 lb/gal  | 10        | 32 fl oz/a | POST       | B        |
|       | Dual Magnum     | 7.62 lb/gal  | 15        | 1.33 pt/a  | POST       | B        |
|       | AMS (liquid)    |              |           | 5% v/v     | POST       | B        |
| 10    | Boundary        | 6.5 lb/gal   | 5, 15     | 29 fl oz/a | PRE        | A        |
|       | Liberty         | 2.34 lb/gal  | 10        | 32 fl oz/a | POST       | B        |
|       | Dual Magnum     | 7.62 lb/gal  | 15        | 1.33 pt/a  | POST       | B        |
|       | AMS (liquid)    |              |           | 5% v/v     | POST       | B        |

**Adjuvants:** AMS (liquid) = Amsol

**Trial Summary:**

The trial was established at the O'Brien Hybrids farm located north of Brooklyn, WI to evaluate the efficacy and crop safety of Preview 2.1SC in Enlist soybeans. **Preview 2.1SC** is a new herbicide premix of metribuzin and sulfentrazone in a 2:1 ratio (2.23 lb/gal metribuzin; 1.12 lb/gal sulfentrazone) from UPL. A limited supply was available for the 2022 season with full product launch coming in 2023. The trial was located in a grower's field with a heavy population of glyphosate-resistant waterhemp. There was minor injury from the PRE herbicides observed 22 days after application (Table 19). No injury symptoms were evident 30 days after application.

Preview 2.1SC provided excellent early-season residual control of waterhemp and fall panicum (Table 19). Adding Moccasin (metolachlor) to the tank with Preview improved waterhemp and fall panicum control. Several of the other competitor products also provided good to excellent residual weed control. All POST applications included glufosinate and were mostly effective at controlling emerged waterhemp. Treatments that had greater levels of PRE residual control also tended to have greater control at soybean harvest; a trend that has been observed in multiple waterhemp trials over the past several years of research.

Soybean yield of the various herbicide programs was very similar and did not statistically differ (Table 19). Yield across all herbicide treatments = 63 bu acre<sup>-1</sup>, while the untreated check was 29 bu acre<sup>-1</sup>.

Plot photos from throughout the growing season are available at [Preview 2.1SC Herbicide Programs in Enlist Soybean](#) published on [wiscweeds.info](http://wiscweeds.info).

**Table 19.** Crop injury, weed control ratings, and soybean yield for trial #22-BRO-SB17 at Brooklyn, WI.<sup>a</sup>

| Trt #                                              | Herbicide (rate acre <sup>-1</sup> )                                                     | Injury (%)   |             | Waterhemp (%) |              |              |              | Fall Panicum (%) |              |             |              | Yield <sup>b</sup><br>bu acre <sup>-1</sup> |
|----------------------------------------------------|------------------------------------------------------------------------------------------|--------------|-------------|---------------|--------------|--------------|--------------|------------------|--------------|-------------|--------------|---------------------------------------------|
|                                                    |                                                                                          | 6/14         | 6/22        | 6/7           | 6/22         | 7/13         | 9/29         | 6/7              | 6/22         | 7/13        | 9/29         |                                             |
| 1                                                  | Untreated Check                                                                          | 0.5          | 0           | 0             | 0            | 0            | 0            | 0                | 0            | 0           | 0            | 29 b                                        |
| <b>Two-Pass – PRE (5/23) <i>fb</i> POST (6/29)</b> |                                                                                          |              |             | <b>POST</b>   |              |              |              | <b>POST</b>      |              |             |              |                                             |
| 2                                                  | Preview 2.1SC (21 oz) <i>fb</i><br>Interline (32 oz) + AMS (5% v/v)                      | 1.3          | 0           | 100           | 90           | 96           | 93           | 100              | 91           | 100         | 100          | 65 a                                        |
| 3                                                  | Preview 2.1SC (21 oz) + Moccasin (1.25 pt) <i>fb</i><br>Interline (32 oz) + AMS (5% v/v) | 3.0          | 0           | 100           | 96           | 90           | 87           | 100              | 95           | 100         | 100          | 66 a                                        |
| 4                                                  | Preview 2.1SC (21 oz) <i>fb</i><br>InterMoc (2 qt) + AMS (5% v/v)                        | 2.3          | 0           | 100           | 93           | 87           | 86           | 100              | 92           | 100         | 97           | 64 a                                        |
| 5                                                  | Preview 2.1SC (21 oz) + Moccasin (1.25 pt) <i>fb</i><br>InterMoc (2 qt) + AMS (5% v/v)   | 1.8          | 0           | 100           | 97           | 94           | 92           | 100              | 96           | 100         | 100          | 66 a                                        |
| 6                                                  | Preview 2.1SC (21 oz) + FirstRate (0.6 oz) <i>fb</i><br>InterMoc (2 qt) + AMS (5% v/v)   | 2.0          | 0           | 100           | 97           | 96           | 94           | 100              | 96           | 100         | 100          | 63 a                                        |
| 7                                                  | Tripzin ZC (43 oz) <i>fb</i><br>InterMoc (2 qt) + AMS (5% v/v)                           | 1.3          | 0           | 100           | 89           | 85           | 79           | 100              | 90           | 100         | 98           | 62 a                                        |
| 8                                                  | Moccasin MTZ (42 oz) <i>fb</i><br>InterMoc (2 qt) + AMS (5% v/v)                         | 1.8          | 0           | 100           | 95           | 92           | 88           | 100              | 98           | 100         | 100          | 62 a                                        |
| 9                                                  | Zidua PRO (6 oz) <i>fb</i><br>Liberty (32 oz) + Dual Magnum (1.33 pt) + AMS (5% v/v)     | 3.3          | 0           | 100           | 100          | 99           | 98           | 100              | 98           | 100         | 100          | 62 a                                        |
| 10                                                 | Boundary (29 fl oz) <i>fb</i><br>Liberty (32 oz) + Dual Magnum (1.33 pt) + AMS (5% v/v)  | 2.5          | 0           | 100           | 94           | 95           | 94           | 100              | 99           | 100         | 100          | 62 a                                        |
| <b>LSD (<math>\alpha=0.10</math>)</b>              |                                                                                          | <b>ns</b>    | <b>ns</b>   | <b>ns</b>     | <b>6</b>     | <b>6</b>     | <b>6</b>     | <b>ns</b>        | <b>ns</b>    | <b>ns</b>   | <b>ns</b>    | <b>5</b>                                    |
| <b>p value</b>                                     |                                                                                          | <b>0.613</b> | <b>1.00</b> | <b>1.00</b>   | <b>0.048</b> | <b>0.017</b> | <b>0.001</b> | <b>1.00</b>      | <b>0.210</b> | <b>1.00</b> | <b>0.620</b> | <b>&lt;0.001</b>                            |

<sup>a</sup>Visual control from 70-100% is illustrated on a color scale with green representing greater weed control values.<sup>b</sup>Yield values with the same letter are not significantly different.

**Project Goal:** Evaluate Reviton for control of weeds in a burndown management situation.

#### Site Description:

|                       |                                                                      |                        |                    |
|-----------------------|----------------------------------------------------------------------|------------------------|--------------------|
| <b>Location:</b>      | Arlington, WI                                                        | <b>Crop:</b>           | Soybean            |
| <b>Field #:</b>       | 452                                                                  | <b>Variety:</b>        | AG15XF1            |
| <b>Soil type:</b>     | Plano silt loam                                                      | <b>Planting Date:</b>  | 6/20               |
| <b>% OM:</b>          | 3.2                                                                  | <b>Emergence Date:</b> | -                  |
| <b>pH:</b>            | 6.7                                                                  | <b>Population:</b>     | 140,000 seeds/acre |
| <b>Fertilization:</b> | -                                                                    | <b>Depth:</b>          | 1.25 in            |
| <b>Previous crop:</b> | Soybean                                                              | <b>Row spacing:</b>    | 30 in              |
| <b>Tillage:</b>       | no-till                                                              | <b>Plot Size:</b>      | 10 x 25 ft         |
| <b>Weed species:</b>  | glyphosate-resistant marestail (ERICA); common lambsquarters (CHEAL) |                        |                    |

#### Herbicide Application Information:

|                                      |              |
|--------------------------------------|--------------|
| <b>Date:</b>                         | 6/2          |
| <b>Treatment:</b>                    | Burndown (A) |
| <b>Air Temp (°F):</b>                | 76           |
| <b>2" Soil Temp (°F):</b>            | -            |
| <b>Soil moisture [surface]:</b>      | dry          |
| <b>RH %:</b>                         | 34           |
| <b>Cloud cover %</b>                 | 0            |
| <b>Wind speed (mph)/direction</b>    | 1-7/SE       |
| <b>Rainfall (in) 1 wk after APP:</b> | 2.58"        |
| <b>GPA:</b>                          | 15           |
| <b>PSI:</b>                          | 36           |
| <b>Nozzle:</b>                       | TT 110015    |
| <b>Nozzle spacing (in):</b>          | 20           |
| <b>Boom Height (in):</b>             | 24           |

#### Crop and weed information at application:

|                      |                 |                         |
|----------------------|-----------------|-------------------------|
|                      | <b>Date:</b>    | 6/2                     |
| <b>Soybean</b>       | <b>Height:</b>  | -                       |
|                      | <b>Stage:</b>   | -                       |
| <b>Marestail</b>     | <b>Height:</b>  | 0.5-3" Avg=1"           |
|                      | <b>Density:</b> | 137-400/ft <sup>2</sup> |
| <b>Lambsquarters</b> | <b>Height:</b>  | 0.5-5" Avg=3"           |
|                      | <b>Density:</b> | 10-35/ft <sup>2</sup>   |

| Trt # | Treatment            | Formulation  | SOA Group | Rate           | App Timing | App Code |
|-------|----------------------|--------------|-----------|----------------|------------|----------|
| 1     | Untreated Check      |              |           |                |            |          |
| 2     | Reviton              | 2.83 lb/gal  | 14        | 2 fl oz/a      | Burndown   | A        |
|       | Destiny HC           |              |           | 1% v/v         | Burndown   | A        |
| 3     | Reviton              | 2.83 lb/gal  | 14        | 1 fl oz/a      | Burndown   | A        |
|       | Roundup PowerMAX II  | 4.5 lbae/gal | 9         | 22 fl oz/a     | Burndown   | A        |
|       | Destiny HC           |              |           | 1% v/v         | Burndown   | A        |
|       | AMS                  |              |           | 8.5 lb/100 gal | Burndown   | A        |
| 4     | Reviton              | 2.83 lb/gal  | 14        | 1 fl oz/a      | Burndown   | A        |
|       | Liberty              | 2.34 lb/gal  | 10        | 32 fl oz/a     | Burndown   | A        |
|       | Destiny HC           |              |           | 1% v/v         | Burndown   | A        |
|       | AMS                  |              |           | 8.5 lb/100 gal | Burndown   | A        |
| 5     | Reviton              | 2.83 lb/gal  | 14        | 1 fl oz/a      | Burndown   | A        |
|       | Roundup PowerMAX II  | 4.5 lbae/gal | 9         | 22 fl oz/a     | Burndown   | A        |
|       | Rancor 4F            | 4 lb/gal     | 5         | 1 pt/a         | Burndown   | A        |
|       | Destiny HC           |              |           | 1% v/v         | Burndown   | A        |
|       | AMS                  |              |           | 8.5 lb/100 gal | Burndown   | A        |
| 6     | Reviton              | 2.83 lb/gal  | 14        | 1 fl oz/a      | Burndown   | A        |
|       | Arrow 2EC            | 2 lb/gal     | 1         | 6 fl oz/a      | Burndown   | A        |
|       | Destiny HC           |              |           | 1% v/v         | Burndown   | A        |
|       | AMS                  |              |           | 8.5 lb/100 gal | Burndown   | A        |
| 7     | Reviton              | 2.83 lb/gal  | 14        | 1 fl oz/a      | Burndown   | A        |
|       | LO-VOL 4 2,4-D ester | 3.8 lb/gal   | 4         | 1 pt           | Burndown   | A        |
|       | Destiny HC           |              |           | 1% v/v         | Burndown   | A        |
|       | AMS                  |              |           | 8.5 lb/100 gal | Burndown   | A        |
| 8     | Reviton              | 2.83 lb/gal  | 14        | 1 fl oz/a      | Burndown   | A        |
|       | Roundup PowerMAX II  | 4.5 lbae/gal | 9         | 22 fl oz/a     | Burndown   | A        |
|       | LO-VOL 4 2,4-D ester | 3.8 lb/gal   | 4         | 1 pt/a         | Burndown   | A        |
|       | Destiny HC           |              |           | 1% v/v         | Burndown   | A        |
|       | AMS                  |              |           | 8.5 lb/100 gal | Burndown   | A        |
| 9     | Reviton              | 2.83 lb/gal  | 14        | 1 fl oz/a      | Burndown   | A        |
|       | Roundup PowerMAX II  | 4.5 lbae/gal | 9         | 22 fl oz/a     | Burndown   | A        |
|       | Helmet MTZ           | 6.5 lb/gal   | 5, 15     | 2.1 pt/a       | Burndown   | A        |
|       | Destiny HC           |              |           | 1% v/v         | Burndown   | A        |
|       | AMS                  |              |           | 8.5 lb/100 gal | Burndown   | A        |

**Adjuvants:** AMS = BlueAg spray grade ammonium sulfate; Destiny HC = high surfactant oil concentrate (HSOC)

**Trial Summary:**

The trial was established at the Arlington Ag Research Station near Arlington, WI to evaluate Reviton for control of weeds in a burndown management situation before planting soybean. Reviton (tiafenacil; group 14) is a herbicide offering from Helm Agro which can be used as part of a pre-plant burndown before corn, soybean, and wheat. There is a 14 day preplant interval before soybean. For this trial, soybean was planted 18 days after the burndown application. There was no observable soybean injury from any of the herbicide programs (data not shown).

Glyphosate-resistant marestalk and common lambsquarters were the predominant weed species in the trial area. Weed control was impacted by burndown herbicide program (Table 20). The addition of Liberty (glufosinate) or products containing metribuzin (Rancor 4F, Helmet MTZ) to 1 fl oz acre<sup>-1</sup> of Reviton greatly improved control of marestalk and lambsquarters relative to Reviton applied alone at 2 fl oz acre<sup>-1</sup>. Reviton tank mixes with glyphosate and 2,4-D provided satisfactory control of lambsquarters, but generally did not provide adequate control of marestalk. If horseweed or lambsquarters are present, an appropriate tank mix partner should be included with Reviton to achieve adequate control.

Plot photos from throughout the growing season are available [Reviton Burndown Programs in Soybean](#) published on [wiscweeds.info](http://wiscweeds.info).

**Table 20.** Weed control ratings for trial #22-ARL-SB31 at Arlington, WI.<sup>a</sup>

| Trt #                                      | Herbicide (rate acre <sup>-1</sup> )                                                         | Marestail <sup>b</sup> (%) |                  |                  | Lambsquarters (%) |                  |              |
|--------------------------------------------|----------------------------------------------------------------------------------------------|----------------------------|------------------|------------------|-------------------|------------------|--------------|
|                                            |                                                                                              | 4 DAT                      | 15 DAT           | 21 DAT           | 4 DAT             | 15 DAT           | 21 DAT       |
| 1                                          | Untreated Check                                                                              | 0                          | 0                | 0                | 0                 | 0                | 0            |
| <b>One-Pass – Pre-plant Burndown (6/2)</b> |                                                                                              |                            |                  |                  |                   |                  |              |
| 2                                          | Reviton (2 oz) + Destiny HC 1% v/v                                                           | 61                         | 63               | 67               | 44                | 66               | 76           |
| 3                                          | Reviton (1 oz) + Roundup PM (22 oz) + Destiny HC 1% v/v + AMS*                               | 74                         | 88               | 91               | 57                | 97               | 94           |
| 4                                          | Reviton (1 oz) + Liberty (32 oz) + Destiny HC 1% v/v + AMS*                                  | 91                         | 95               | 96               | 92                | 91               | 92           |
| 5                                          | Reviton (1 oz) + Roundup PM (22 oz) + Rancor 4F (1 pt) + Destiny HC 1% v/v + AMS*            | 70                         | 96               | 98               | 53                | 99               | 99           |
| 6                                          | Reviton (1 oz) + Arrow 2EC (6 oz) + Destiny HC 1% v/v + AMS*                                 | 61                         | 64               | 72               | 56                | 69               | 70           |
| 7                                          | Reviton (1 oz) + LO-VOL 4 2,4-D ester (1 pt) + Destiny HC 1% v/v + AMS*                      | 62                         | 76               | 75               | 81                | 95               | 97           |
| 8                                          | Reviton (1 oz) + Roundup PM (22 oz) + LO-VOL 4 2,4-D ester (1 pt) + Destiny HC 1% v/v + AMS* | 73                         | 84               | 89               | 78                | 97               | 99           |
| 9                                          | Reviton (1 oz) + Roundup PM (22 oz) + Helmet MTZ (2.1 pt) + Destiny HC 1% v/v + AMS*         | 71                         | 99               | 99               | 57                | 100              | 99           |
| <b>LSD (<math>\alpha=0.10</math>)</b>      |                                                                                              | <b>11</b>                  | <b>7</b>         | <b>6</b>         | <b>8</b>          | <b>4</b>         | <b>8</b>     |
| <b>p value</b>                             |                                                                                              | <b>0.009</b>               | <b>&lt;0.001</b> | <b>&lt;0.001</b> | <b>&lt;0.001</b>  | <b>&lt;0.001</b> | <b>0.006</b> |

<sup>a</sup>Visual control from 70-100% is illustrated on a color scale with green representing greater weed control values.<sup>b</sup>Marestail population is glyphosate-resistant.

\*Spray grade AMS applied at 8.5 lb/100 gal.

**Project Goal:** Evaluate various rates of metribuzin applied PRE-emergence for residual waterhemp control.

#### Site Description:

|                       |                                |                        |                    |
|-----------------------|--------------------------------|------------------------|--------------------|
| <b>Location:</b>      | Brooklyn, WI                   | <b>Crop:</b>           | Soybean            |
| <b>Field #:</b>       | OB-4                           | <b>Variety:</b>        | NK22-C43E3         |
| <b>Soil type:</b>     | Kegonsa                        | <b>Planting Date:</b>  | 5/23               |
| <b>% OM:</b>          | 1.6                            | <b>Emergence Date:</b> | 6/6                |
| <b>pH:</b>            | 6.9                            | <b>Population:</b>     | 140,000 seeds/acre |
| <b>Fertilization:</b> | -                              | <b>Depth:</b>          | 1.25 in            |
| <b>Previous crop:</b> | Corn Silage                    | <b>Row spacing:</b>    | 30 in              |
| <b>Tillage:</b>       | Conventional                   | <b>Plot Size:</b>      | 10 x 30 ft         |
| <b>Weed species:</b>  | glyphosate-resistant waterhemp |                        |                    |

#### Herbicide Application Information:

|                                      |            |
|--------------------------------------|------------|
| <b>Date:</b>                         | 5/23       |
| <b>Treatment:</b>                    | PRE (A)    |
| <b>Air Temp (°F):</b>                | 70         |
| <b>2" Soil Temp (°F):</b>            | 70         |
| <b>Soil moisture [surface]:</b>      | moist      |
| <b>RH %:</b>                         | 30         |
| <b>Cloud cover %</b>                 | 80         |
| <b>Wind speed (mph)/direction</b>    | 3-6/NNE    |
| <b>Rainfall (in) 1 wk after APP:</b> | 2.14"      |
| <b>GPA:</b>                          | 15         |
| <b>PSI:</b>                          | 35         |
| <b>Nozzle:</b>                       | TTI 110015 |
| <b>Nozzle spacing (in):</b>          | 20         |
| <b>Boom Height (in):</b>             | 20         |

| Trt # | Treatment                   | Formulation | SOA Group | Rate      | App Timing | App Code |
|-------|-----------------------------|-------------|-----------|-----------|------------|----------|
| 1     | Untreated Check             |             |           |           |            |          |
| 2     | Weed Free Check<br>Zidua SC | 4.17 lb/gal | 15        | 5 fl oz/a | PRE        | A        |
| 3     | Metricor DF                 | 75% w/w     | 5         | 4 oz/a    | PRE        | A        |
| 4     | Metricor DF                 | 75% w/w     | 5         | 5 oz/a    | PRE        | A        |
| 5     | Metricor DF                 | 75% w/w     | 5         | 6 oz/a    | PRE        | A        |
| 6     | Metricor DF                 | 75% w/w     | 5         | 7 oz/a    | PRE        | A        |
| 7     | Metricor DF                 | 75% w/w     | 5         | 8 oz/a    | PRE        | A        |
| 8     | Metricor DF                 | 75% w/w     | 5         | 9 oz/a    | PRE        | A        |
| 9     | Metricor DF                 | 75% w/w     | 5         | 10 oz/a   | PRE        | A        |
| 10    | Metricor DF                 | 75% w/w     | 5         | 11 oz/a   | PRE        | A        |
| 11    | Metricor DF                 | 75% w/w     | 5         | 12 oz/a   | PRE        | A        |
| 12    | Metricor DF                 | 75% w/w     | 5         | 13 oz/a   | PRE        | A        |
| 13    | Metricor DF                 | 75% w/w     | 5         | 14 oz/a   | PRE        | A        |
| 14    | Metricor DF                 | 75% w/w     | 5         | 15 oz/a   | PRE        | A        |
| 15    | Metricor DF                 | 75% w/w     | 5         | 16 oz/a   | PRE        | A        |
| 16    | Spartan                     | 4 lb/gal    | 14        | 8 fl oz/a | PRE        | A        |
| 17    | Dual II Magnum              | 7.64 lb/gal | 15        | 1.5 pt/a  | PRE        | A        |

### Trial Summary:

This study was part of multi-state effort funded by the United Soybean Board investigating the benefits of metribuzin as part of a waterhemp management strategy. The trial was established at the O'Brien Hybrids farm located north of Brooklyn, WI to evaluate various rates of metribuzin applied PRE-emergence for residual waterhemp control. There was no significant soybean injury observed 15 and 31 days after application (Table 21).

Metricor DF (metribuzin) provided 51 to 74% residual waterhemp control 31 days after the PRE application, with rates greater than 8 oz needed to achieve at least 60% control. (Table 21). The highest rates of Metricor DF were comparable to 8 fl oz Spartan and 1.5 pt Dual II Magnum 31 DAT. None of the metribuzin rates provided any waterhemp control 46 days after application. These results indicate that metribuzin can be a beneficial component of a PRE tank mix, particularly at rates of at least 8 oz acre<sup>-1</sup>, but should not be relied on as a solo application.

**Table 21.** Soybean injury and waterhemp control for trial #22-BRO-USB02 at Brooklyn, WI.<sup>a</sup>

| Trt #                                 | Herbicide (rate acre <sup>-1</sup> ) | Soybean Injury (%) |              | Waterhemp Control (%) |                  |                  | Biomass Red. <sup>b</sup> (%) |
|---------------------------------------|--------------------------------------|--------------------|--------------|-----------------------|------------------|------------------|-------------------------------|
|                                       |                                      | 15 DAT             | 31 DAT       | 15 DAT                | 31 DAT           | 46 DAT           | 31 DAT                        |
| 1                                     | Untreated Check                      | 0                  | 0            | 0                     | 0                | 0                | 0                             |
| <b>One-Pass – PRE (5/23)</b>          |                                      |                    |              |                       |                  |                  |                               |
| 2                                     | Zidua SC (5 fl oz)                   | 0                  | 0            | 100                   | 94               | 81               | 98                            |
| 3                                     | Metlicor DF (4 oz)                   | 0                  | 0            | 85                    | 51               | 0                | 16                            |
| 4                                     | Metlicor DF (5 oz)                   | 0                  | 0            | 84                    | 52               | 1                | 29                            |
| 5                                     | Metlicor DF (6 oz)                   | 0                  | 0            | 90                    | 50               | 0                | 21                            |
| 6                                     | Metlicor DF (7 oz)                   | 0                  | 0            | 91                    | 51               | 1                | 22                            |
| 7                                     | Metlicor DF (8 oz)                   | 0                  | 0            | 95                    | 56               | 1                | 37                            |
| 8                                     | Metlicor DF (9 oz)                   | 0                  | 0            | 93                    | 62               | 1                | 12                            |
| 9                                     | Metlicor DF (10 oz)                  | 0                  | 0            | 94                    | 63               | 3                | 25                            |
| 10                                    | Metlicor DF (11 oz)                  | 0                  | 0            | 97                    | 64               | 3                | 35                            |
| 11                                    | Metlicor DF (12 oz)                  | 0                  | 0            | 98                    | 68               | 6                | 37                            |
| 12                                    | Metlicor DF (13 oz)                  | 0                  | 0            | 94                    | 66               | 3                | 43                            |
| 13                                    | Metlicor DF (14 oz)                  | 0                  | 0            | 98                    | 67               | 5                | 44                            |
| 14                                    | Metlicor DF (15 oz)                  | 0                  | 0.5          | 98                    | 71               | 7                | 47                            |
| 15                                    | Metlicor DF (16 oz)                  | 0                  | 0            | 100                   | 74               | 5                | 63                            |
| 16                                    | Spartan (8 fl oz)                    | 0                  | 0.5          | 94                    | 77               | 33               | 58                            |
| 17                                    | Dual II Magnum (1.5 pt)              | 0                  | 1.3          | 96                    | 84               | 21               | 68                            |
| <b>LSD (<math>\alpha=0.10</math>)</b> |                                      | <b>ns</b>          | <b>0.6</b>   | <b>5</b>              | <b>11</b>        | <b>12</b>        | <b>25</b>                     |
| <b>p value</b>                        |                                      | <b>ns</b>          | <b>0.042</b> | <b>&lt;0.001</b>      | <b>&lt;0.001</b> | <b>&lt;0.001</b> | <b>&lt;0.001</b>              |

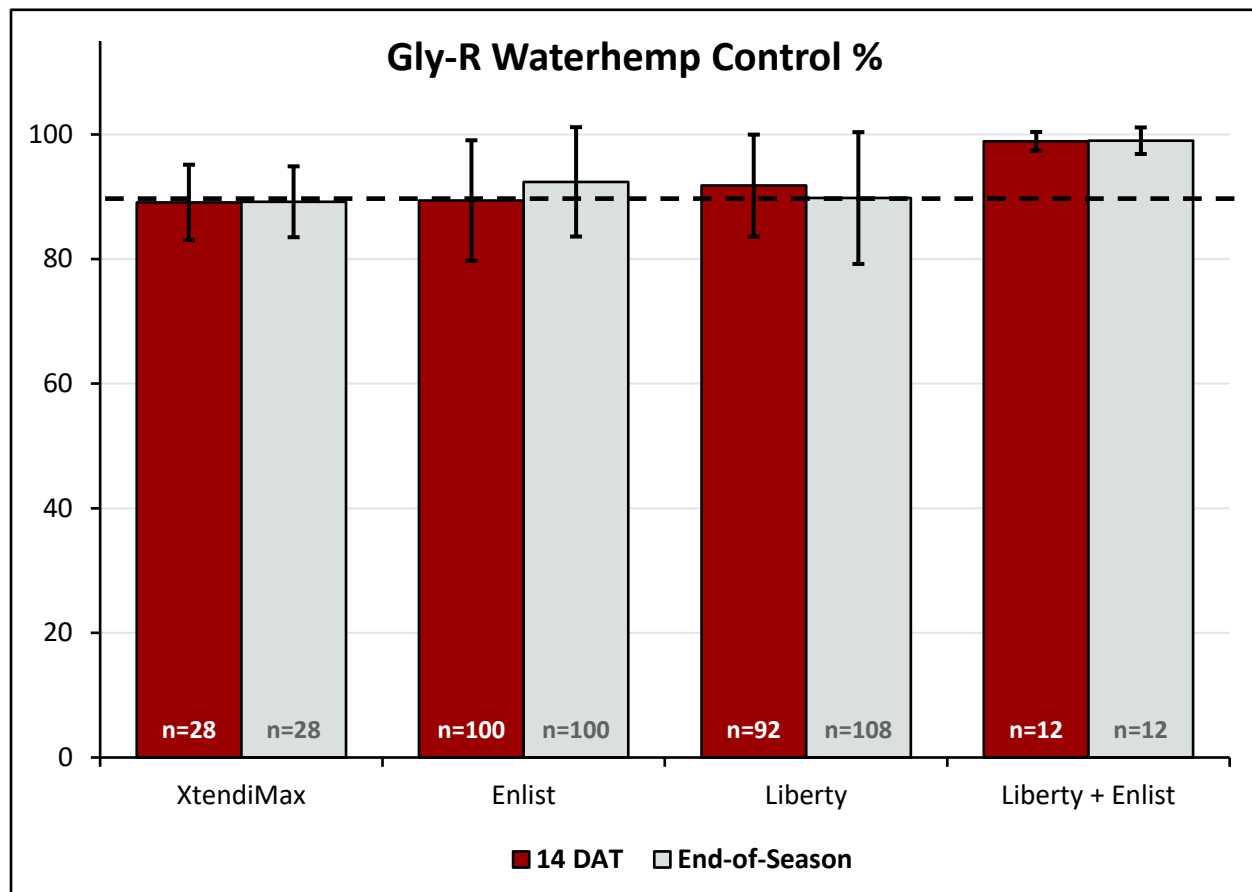
<sup>a</sup> Visual control from 70-100% is illustrated on a color scale with green representing greater weed control values.

<sup>b</sup> Biomass reduction (%) relative to the untreated check. Biomass was sampled from two 0.25 m<sup>2</sup> quadrats plot<sup>-1</sup>.

### Multi-Trial Summary:

The following figures summarize waterhemp control from some of the soybean herbicide evaluation trials conducted in 2022 at the Obrien Hybrids Farm near Brooklyn, WI. Waterhemp at this location is known to be resistant to glyphosate and ALS herbicides. All trials were conducted on soybeans with either the Enlist E3 or XtendFlex herbicide tolerant traits.

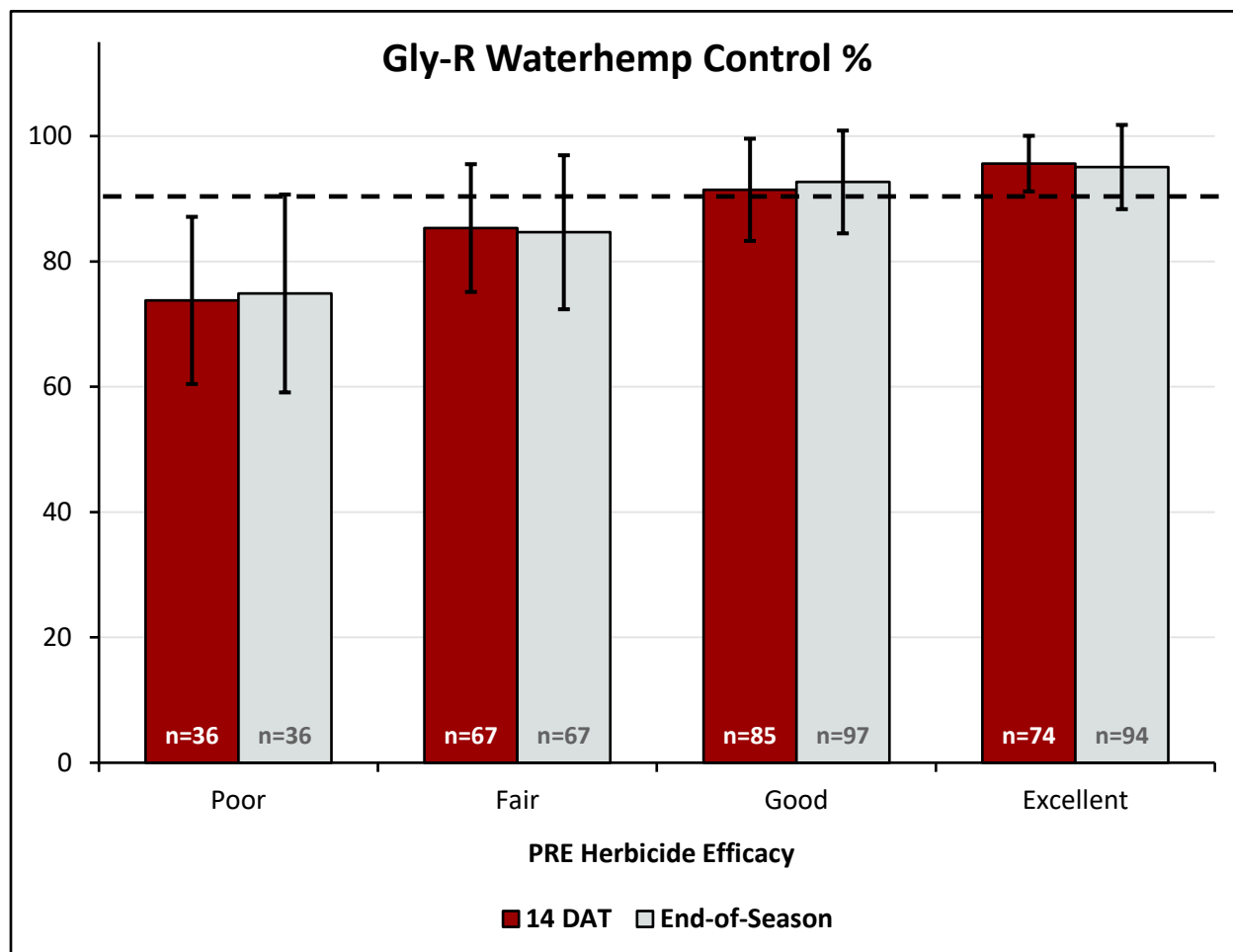
Treatments were grouped by POST herbicide program: Roundup PowerMax (glyphosate), XtendiMax (dicamba), Enlist (2,4-D choline), Liberty (glufosinate), and Liberty + Enlist. Some of the POST herbicide programs included glyphosate as tank-mix partner. Most of the POST treatments also had a group 15 herbicide for further residual control. To see how certain herbicides or herbicide tank mixes performed see individual trial data presented in this report.



**Figure 1.** Glyphosate-resistant waterhemp control (%) of four soybean POST herbicide systems. Bars indicate the average % control  $\pm$  the standard deviation 14 days after POST herbicide application and at the end of the growing season. n-values at the base of each bar represent the number of observations (plots) evaluated in each POST herbicide system. Some of the POST treatments included glyphosate as a tank-mix partner.

## Multi-Trial Summary: Waterhemp Control in Soybean

Waterhemp control was also broken down by the relative effectiveness of the PRE herbicide used prior the POST herbicide application. PRE herbicide efficacy was evaluated at or near the time of POST application and was categorized as excellent (90-100%), good (80-89%), fair (60-79%), or poor (0-59%). See Figure 3 for a visual representation of each category. Waterhemp control averaged across all POST herbicide systems is presented in Figure 2.



**Figure 2.** Glyphosate-resistant waterhemp control (%) of all POST herbicide systems evaluated at Brooklyn, WI broken down by PRE herbicide efficacy. PRE herbicide efficacy was evaluated at or near the time of POST application. Bars indicate the average % control  $\pm$  the standard deviation 14 days after POST herbicide application and at the end of the growing season. n-values at the base of each bar represent the number of observations (plots) within each PRE herbicide efficacy category.



**Figure 3.** Plot photos indicating categories of PRE herbicide waterhemp efficacy.

**Table 22. 2022 Temperature and Precipitation Summary**

| Location                                                       | Month        | Precipitation (in) |                |                | Average Temperature (F) |                |                |
|----------------------------------------------------------------|--------------|--------------------|----------------|----------------|-------------------------|----------------|----------------|
|                                                                |              | 2022               | 30-year norm** | 2022 departure | 2022                    | 30-year norm** | 2022 departure |
| <b>Arlington*</b>                                              | May          | 2.28               | 3.69           | -1.41          | 59.7                    | 55.7           | 4.0            |
|                                                                | June         | 5.85               | 4.68           | 1.17           | 66.6                    | 65.6           | 1.0            |
|                                                                | July         | 2.93               | 4.16           | -1.23          | 69.2                    | 69.4           | -0.2           |
|                                                                | August       | 6.41               | 3.90           | 2.51           | 67.6                    | 67.3           | 0.3            |
|                                                                | September    | 5.89               | 3.54           | 2.35           | 60.2                    | 59.3           | 0.9            |
|                                                                | October      | 1.06               | 2.55           | -1.49          | 47.6                    | 47.5           | 0.1            |
|                                                                | <b>Total</b> | <b>24.42</b>       | <b>22.52</b>   | <b>1.90</b>    | -                       | -              | -              |
| <b>Brooklyn*</b><br>(30-year norm from Stoughton NOAA station) | May          | 4.12               | 3.85           | 0.27           | 63.1                    | 57.8           | 5.3            |
|                                                                | June         | 3.68               | 4.34           | -0.66          | 68.8                    | 67.4           | 1.4            |
|                                                                | July         | 3.03               | 3.85           | -0.82          | 71.4                    | 71.7           | -0.3           |
|                                                                | August       | 3.72               | 4.42           | -0.70          | 69.1                    | 69.5           | -0.4           |
|                                                                | September    | 4.57               | 3.60           | 0.97           | 61.0                    | 61.2           | -0.2           |
|                                                                | October      | 0.9                | 2.62           | -0.72          | 48.0                    | 48.9           | -0.9           |
|                                                                | <b>Total</b> | <b>20.02</b>       | <b>22.68</b>   | <b>-2.66</b>   | -                       | -              | -              |
| <b>Janesville*</b><br>(30-year norm from Beloit NOAA station)  | May          | 1.86               | 3.80           | -1.94          | 64.1                    | 58.7           | 5.4            |
|                                                                | June         | 2.32               | 4.73           | -2.41          | 69.2                    | 68.6           | 0.6            |
|                                                                | July         | 3.78               | 3.85           | -0.07          | 71.8                    | 72.5           | -0.7           |
|                                                                | August       | 3.38               | 4.27           | -0.89          | 69.5                    | 70.8           | -1.3           |
|                                                                | September    | 4.50               | 3.65           | 0.85           | 61.9                    | 62.9           | -1.0           |
|                                                                | October      | 1.13               | 2.76           | -1.63          | 48.9                    | 51.0           | -2.1           |
|                                                                | <b>Total</b> | <b>16.97</b>       | <b>23.06</b>   | <b>-6.09</b>   | -                       | -              | -              |
| <b>Lancaster*</b>                                              | May          | 2.58               | 4.13           | -1.55          | 60.0                    | 57.3           | 2.7            |
|                                                                | June         | 2.81               | 5.26           | -2.45          | 68.3                    | 66.9           | 1.4            |
|                                                                | July         | 7.23               | 4.32           | 2.91           | 72.0                    | 70.8           | 1.2            |
|                                                                | August       | 4.78               | 4.20           | 0.58           | 69.9                    | 69.0           | 0.9            |
|                                                                | September    | 0.81               | 3.14           | -2.33          | 62.9                    | 60.8           | 2.1            |
|                                                                | October      | 1.03               | 2.58           | -1.55          | 49.2                    | 48.6           | 0.6            |
|                                                                | <b>Total</b> | <b>19.24</b>       | <b>23.63</b>   | <b>-4.39</b>   | -                       | -              | -              |

\*2022 data recorded from on-site weather stations.

\*\*Source: Wisconsin State Climatology Office; 30-year normals from 1981 to 2010.

## List of Tables and Figures

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| Table 6            | Annual grass control and corn yield with 2-pass conventional corn herbicide programs                | CN12    | 26     |
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| Table 8            | Residual weed control with PRE soybean herbicides                                                   | SB01    | 31     |
| Table 9            | Waterhemp control and soybean yield in XtendFlex soybeans                                           | SB06    | 35     |
| Table 10           | Waterhemp control , crop injury, and soybean yield in XtendFlex soybeans                            | SB22    | 39     |
| Table 11           | Waterhemp control and soybean yield in XtendFlex soybeans                                           | SB07    | 45     |
| Table 12           | Giant ragweed control and soybean yield of 2-pass herbicide programs with Tendovo                   | SB09    | 50     |
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| Table 15           | Waterhemp control and yield following 2-pass layered residual herbicide programs in Enlist soybeans | SB12    | 63     |
| Table 16           | Waterhemp and giant ragweed density at POST application                                             | SB13    | 67     |
| Table 17           | Waterhemp control and soybean yield in Enlist soybeans: FMC                                         | SB13    | 68     |
| Table 18           | Giant ragweed control and soybean yield in Enlist soybeans: FMC                                     | SB13    | 69     |
| Table 19           | Waterhemp control and soybean yield in Enlist soybeans: UPL                                         | SB17    | 73     |
| Table 20           | Burndown weed control programs with Reviton in soybean                                              | SB31    | 77     |
| Table 21           | Waterhemp residual control with metribuzin                                                          | USB02   | 80     |
| Table 22           | Temperature and precipitation summary                                                               | -       | 84     |
| Figure 1           | Waterhemp control in soybean: multi-trial summary                                                   | -       | 81     |
| Figure 2           | Waterhemp control in soybean: multi-trial summary                                                   | -       | 82     |
| Figure 3           | PRE efficacy categories plot photos                                                                 | -       | 83     |

**Index of Weed Species Evaluated**

| Weed (common name)    | Bayer Code | Page Number(s)                                 |
|-----------------------|------------|------------------------------------------------|
| foxtail, giant        | SETFA      | 9, 13, 17, 26                                  |
| grasses, annual       | GGGAN      | 9, 13, 26                                      |
| lambsquarters, common | CHEAL      | 9, 13, 21, 31, 50, 69, 77                      |
| marestail (horseweed) | ERICA      | 77                                             |
| panicum, fall         | PANDI      | 35, 39, 45, 63, 68, 73                         |
| ragweed, common       | AMBEL      | 9, 13, 31                                      |
| ragweed, giant        | AMBTR      | 5, 21, 50, 67, 69                              |
| velvetleaf            | ABUTH      | 31, 35, 39, 45, 63, 69                         |
| waterhemp, common     | AMATA      | 17, 21, 27, 35, 39, 45, 58, 63, 67, 68, 73, 80 |
| woolly cupgrass       | ERBVI      | 9, 13, 26                                      |

**Index of Adjuvants**

| Adjuvant Brand         | Adjuvant Type                   | Page Number(s)             |
|------------------------|---------------------------------|----------------------------|
| Amsol                  | AMS (liquid)                    | 2, 7, 11, 33, 37, 41, 71   |
| BlueAg spray grade AMS | AMS (dry)                       | 16, 23, 47, 56, 60, 65, 75 |
| Class Act Ridion       | water conditioner + NIS         | 2, 41, 47, 52, 56          |
| CropOil                | crop oil concentrate            | 3, 11, 23                  |
| Destiny HC             | high surfactant oil concentrate | 75                         |
| Emulate                | methyated seed oil              | 3, 23                      |
| Induce                 | non-ionic surfactant            | 61                         |
| Intact                 | drift reduction agent           | 41, 47                     |
| Prefer90               | non-ionic surfactant            | 2, 7, 11, 16, 23           |
| Superb HC              | high surfactant oil concentrate | 23                         |
| VaporGrip Xtra         | volatility reducing agent       | 29, 37, 41, 47             |

## Index of Herbicides Evaluated

| Herbicide             | Active Ingredient(s)                               | Page Number(s)     |
|-----------------------|----------------------------------------------------|--------------------|
| 2,4-D ester, LO-VOL 4 | 2,4-D                                              | 75                 |
| Aatrex/atrazine 4L    | atrazine                                           | 2, 15, 19          |
| Accent Q              | nicosulfuron + safener                             | 23                 |
| Acuron                | bicyclopyrone+mesotrione+ atrazine+S-metolachlor   | 2, 15, 19          |
| Acuron GT             | bicyclopyrone+mesotrione+S-metolachlor+ glyphosate | 2, 7, 11           |
| Acuron Flexi          | bicyclopyrone + mesotrione + S-metolachlor         | 7, 11, 19, 23      |
| Anthem Maxx           | pyroxasulfone + fluthiacet                         | 65                 |
| Armezon               | topramezone                                        | 23                 |
| Armezon PRO           | topramezone + dimethenamid-P                       | 3, 15, 23          |
| Arrow 2EC             | clethodim                                          | 75                 |
| Authority Edge        | sulfentrazone + pyroxasulfone                      | 48                 |
| Authority Elite       | sulfentrazone + S-metolachlor                      | 65                 |
| Authority First DF    | sulfentrazone + cloransulam                        | 65                 |
| Authority MTZ         | sulfentrazone + metribuzin                         | 29, 41             |
| Authority Supreme     | sulfentrazone + pyroxasulfone                      | 65                 |
| Balance Flexx         | isoxaflutole                                       | 19                 |
| Bicep Lite II Magnum  | S-metolachlor + atrazine                           | 19                 |
| Boundary              | S-metolachlor + metribuzin                         | 47, 56, 65, 71     |
| Broadaxe XC           | S-metolachlor + sulfentrazone                      | 47                 |
| Callisto              | mesotrione                                         | 3, 19, 23          |
| Canopy                | chlorimuron + metribuzin                           | 56                 |
| Capreno               | tembotrione + thienicarbazone                      | 2, 7, 11, 23       |
| Corvus                | isoxaflutole + thienicarbazone                     | 19                 |
| DiFlexx               | dicamba (DGA salt)                                 | 19                 |
| DiFlexx Duo           | dicamba (DGA salt) + tembotrione                   | 2, 23              |
| Dual Magnum           | S-metolachlor                                      | 71                 |
| Dual II Magnum        | S-metolachlor                                      | 11, 19, 24, 52, 79 |
| Durango DMA           | glyphosate (DMA salt)                              | 60                 |
| Enlist One            | 2,4-D (choline salt)                               | 56, 60, 65         |
| EverpreX              | S-metolachlor                                      | 60                 |
| Fierce EZ             | flumioxazin + pyroxasulfone                        | 29, 33, 37, 41, 61 |
| Fierce MTZ            | flumioxazin + pyroxasulfone + metribuzin           | 61                 |
| Fierce XLT            | flumioxazin + pyroxasulfone + chlorimuron          | 48, 56             |
| FirstRate             | cloransulam-methyl                                 | 71                 |
| Halex GT              | S-metolachlor + mesotrione + glyphosate            | 7, 11, 15          |
| Harness               | acetochlor                                         | 3, 19, 23          |
| Harness MAX           | acetochlor + mesotrione                            | 2, 7, 19, 23       |
| Harness Xtra          | acetochlor + atrazine                              | 19                 |
| Helmet MTZ            | metolachlor + metribuzin                           | 75                 |
| Hornet WDG            | clopyralid + flumetsulam                           | 3, 19              |

| Herbicide           | Active Ingredient(s)                     | Page Number(s)                       |
|---------------------|------------------------------------------|--------------------------------------|
| Impact              | topramezone                              | 3                                    |
| Interline           | glufosinate                              | 71                                   |
| InterMoc            | glufosinate + S-metolachlor              | 71                                   |
| Kyber               | flumioxazin + pyroxasulfone + metribuzin | 60, 65                               |
| Laudis              | tembotrione                              | 2, 24                                |
| Liberty             | glufosinate                              | 33, 37, 41, 47, 60, 65, 71, 75       |
| Lumax EZ            | mesotrione + atrazine + S-metolachlor    | 2                                    |
| Mauler              | metribuzin                               | 29, 33, 42                           |
| Maverick            | mesotrione + clopyralid + pyroxasulfone  | 11, 15, 19                           |
| Metricor DF         | metribuzin                               | 65, 79                               |
| Moccasin            | S-metolachlor                            | 71                                   |
| Moccasin MTZ        | S-metolachlor + metribuzin               | 71                                   |
| MON 301668*         | acetochlor (encapsulated)                | 37                                   |
| Perpetuo            | flumiclorac + pyroxasulfone              | 16, 61                               |
| Prefix              | S-metolachlor + fomesafen                | 56                                   |
| Preview 2.1SC       | sulfentrazone + metribuzin               | 71                                   |
| Princep 4FL         | simazine                                 | 11, 19, 23                           |
| Rancor 4F           | metribuzin                               | 75                                   |
| Resicore            | clopyralid + acetochlor + mesotrione     | 2, 7, 11, 15, 19                     |
| Restraint           | tolpyralate + acetochlor                 | 3, 11                                |
| Reviton             | tiafenacil                               | 75                                   |
| Revulin Q           | nicosulfuron + mesotrione                | 23                                   |
| Roundup PowerMAX II | glyphosate (potassium salt)              | 15, 75                               |
| Roundup PowerMAX 3  | glyphosate (potassium salt)              | 2, 7, 11, 33, 37, 41, 47, 56, 61, 65 |
| Select Max          | clethodim                                | 61                                   |
| Sequence            | S-metolachlor + glyphosate               | 56, 61                               |
| Shieldex            | tolpyralate                              | 3, 11, 24                            |
| Sinate              | glufosinate + topramezone                | 3                                    |
| Sonic               | sulfentrazone + cloransulam              | 47, 56                               |
| Spartan             | sulfentrazone                            | 79                                   |
| Status              | dicamba (sodium salt) + diflufenzopyr    | 3, 7, 11, 23                         |
| Surestart II        | acetochlor + clopyralid + flumetsulam    | 19, 23                               |
| Tavium              | dicamba + S-metolachlor                  | 47                                   |
| Tendovo             | S-metolachlor + metribuzin + cloransulam | 47, 52, 56, 61                       |
| Tricor DF           | metribuzin                               | 52                                   |
| TripleFlex II       | acetochlor + clopyralid + flumetsulam    | 11                                   |
| Tripzin ZC          | pendimethalin + metribuzin               | 71                                   |
| TriVolt             | isoxaflutole + flufenacet + thiencazone  | 2, 11                                |
| Valor EZ            | flumioxazin                              | 29, 34, 41                           |
| Verdict             | saflufenacil + dimethenamid-P            | 3, 19, 23, 61                        |

| Herbicide     | Active Ingredient(s)                          | Page Number(s)                                                                                                              |
|---------------|-----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| Warrant       | acetochlor                                    | <a href="#">24</a> , <a href="#">29</a> , <a href="#">33</a> , <a href="#">41</a> , <a href="#">56</a>                      |
| Warrant Ultra | acetochlor + fomesafen                        | <a href="#">29</a> , <a href="#">33</a> , <a href="#">37</a> , <a href="#">42</a>                                           |
| XtendiMax     | dicamba (DGA salt) with VaporGrip® Technology | <a href="#">29</a> , <a href="#">37</a> , <a href="#">41</a>                                                                |
| Zidua SC      | pyroxasulfone                                 | <a href="#">23</a> , <a href="#">61</a> , <a href="#">79</a>                                                                |
| Zidua PRO     | pyroxasulfone + saflufenzicil + imazethapyr   | <a href="#">48</a> , <a href="#">52</a> , <a href="#">56</a> , <a href="#">61</a> , <a href="#">65</a> , <a href="#">71</a> |

\*Pending approval for use in Wisconsin as of January 2023.

## Index of Trial Sponsors

| Company                | Trial Number (s)*                                                |
|------------------------|------------------------------------------------------------------|
| Adjuvants Unlimited    | SB12, SB36, SB37                                                 |
| Albaugh                | BG07, BG08, BG09                                                 |
| AMVAC                  | CN02                                                             |
| BASF                   | CN02, CN09, SB15, SB16, SB32, SB33                               |
| Bayer Crop Science     | CN01, CN02, SB01, SB02, SB03, SB04, SB05, SB06, SB07, SB08, SB22 |
| CHS Agronomy           | BG01, BG02, BG03                                                 |
| Corteva Agriscience    | CN08, SB12                                                       |
| Exacto                 | SB27, SB28, SB29                                                 |
| FMC                    | SB13                                                             |
| Helm Agro              | SB31                                                             |
| Summit Agro            | CN02, CN05                                                       |
| Syngenta               | CN03, CN04, CN05, SB09, SB10, SB11                               |
| UPL                    | SB17                                                             |
| United Soybean Board   | USB02                                                            |
| Valent                 | CN06, CN07, SB12                                                 |
| Wisconsin Weed Science | CN11, CN12, SB12, SB22                                           |

\*Not all trials listed are presented in this research report.