
- In 2004 - 2006, research compared 5 glyphosate timings (1”, 3”, 5”, 7” and 9” weed heights), with and without a ½-rate of a PRE herbicide, on crop yield and economic returns.

- Major Weed Species at each location:
  - Lamberton: Yellow foxtail, Common lambsquarters, Redroot pigweed
  - Luverne: Giant foxtail, Common lambsquarters, Tall waterhemp
  - Morris: Green foxtail, common lambsquarters, Powell amaranth, wild mustard
  - Potsdam: Wild proso millet, Common lambsquarters, Velvetleaf
  - Rochester: Giant foxtail, Giant ragweed, Common waterhemp, common lambsquarters
  - Waseca: Giant foxtail, Common ragweed, Common lambsquarters, Velvetleaf & Redroot pigweed & Common cocklebur

- University of Minnesota Cooperators: Jeffrey Gunsolus, Fritz Breitenbach, Lisa Behnken, Tom Hoverstad, Jodie Getting, and George Nelson

### Glyphosate Timing and Corn Yield Across Locations, 2004

- **Glyphosate Timing and Corn Yield Rochester, 2004** (heavy giant ragweed pressure)

- **Glyphosate Timing and Corn Yield Across Locations, 2004**

- **Glyphosate Timing and Corn Yield Across Locations, 2004** (Excluding Rochester)

- "POST Roundup WeatherMax (22 oz/A)
- "PRE + POST = Harness (1.25 pt/A) / Roundup WeatherMax (22 oz/A) + AMS
- "PRE Harness (1.25 pt/A)
- "POST Roundup WeatherMax + AMS at 3” weeds / Roundup WeatherMax + AMS at 2-4” regrowth

- "11-26 bu/A
- "4 to 7 days
Corn Yield at Potsdam 2005

150 170 190 210 230

bu/A

1" 3" 5" 7" 9"

Weed Height

Post
1-pass Pre
Harness + Roundup
Pre + Post
2-pass Post
Lumax + Touchdown

= POST Roundup WeatherMax (22 oz/A)
■ = PRE + POST = Harness (1.25 pt/A) / Roundup WeatherMax (22 oz/A) + AMS
● = PRE Harness (1.25 pt/A)
▲ = POST Roundup WeatherMax + AMS at 3” weeds / Roundup WeatherMax + AMS at 2-4” regrowth
Ҳ = POST at 1-2” weeds = Lumax (3 pt/A) + Touchdown Total (24 oz/A)
Ο = POST at 1-2” weed = Harness (1.25 pt/A) + Roundup WeatherMax (22 oz/A)

Glyphosate Timing and Corn Yield Across Locations 2005

7 to 11 days
3 to 4 days
13 bu/A
26 bu/A

150 170 190 210 230

bu/A

1" 3" 5" 7" 9"

Weed Height

Post
1-pass Pre
Lumax + Touchdown
Pre + Post
2-pass Post
Harness + Roundup

= POST Roundup WeatherMax (22 oz/A)
■ = PRE + POST = Harness (1.25 pt/A) / Roundup WeatherMax (22 oz/A) + AMS
● = PRE Harness (1.25 pt/A)
▲ = POST Roundup WeatherMax + AMS at 3” weeds / Roundup WeatherMax + AMS at 2-4” regrowth
Ҳ = POST at 1-2” weeds = Lumax (3 pt/A) + Touchdown Total (24 oz/A)
Ο = POST at 1-2” weed = Harness (1.25 pt/A) + Roundup WeatherMax (22 oz/A)

Widening the Window of Control

2006 Glyphosate Timing and Corn Yield Rochester Location

5/3 5/26 & 6/16 7 days 6/7 12 days 6/12 17 days 6/16 21 days 6/16

5/3

Post
1-pass Pre
Pre + Post
2-pass Post

= POST Roundup WeatherMax (22 oz/A)
■ = PRE + POST = Harness (1.25 pt/A) / Roundup WeatherMax (22 oz/A) + AMS
● = PRE Harness (1.25 pt/A)
▲ = POST Roundup WeatherMax + AMS at 3” weeds / Roundup WeatherMax + AMS at 2-4” regrowth
Ҳ = POST at 1-2” weeds = Lumax (3 pt/A) + Touchdown Total (24 oz/A)
Ο = POST at 1-2” weed = Harness (1.25 pt/A) + Roundup WeatherMax (22 oz/A)

LSD (P=0.10) = 20 bu/A

Residual herbicide + glyphosate

Applications made at POST I, 1 – 2” weeds
2006 Summary Across all Locations

<table>
<thead>
<tr>
<th>Trt</th>
<th>Herbicide</th>
<th>Post App. Stage</th>
<th>Cost</th>
<th>$Returns</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Harness / Roundup</td>
<td>WeatherMAX + AMS</td>
<td>1&quot; Weeds</td>
<td>37.75</td>
<td>434</td>
</tr>
<tr>
<td>2 Roundup WeatherMAX</td>
<td>+ AMS</td>
<td>1&quot; Weeds</td>
<td>17.85</td>
<td>440</td>
</tr>
<tr>
<td>3 Harness / Roundup</td>
<td>WeatherMAX + AMS</td>
<td>3&quot; Weeds</td>
<td>37.75</td>
<td>433</td>
</tr>
<tr>
<td>4 Roundup WeatherMAX</td>
<td>+ AMS</td>
<td>3&quot; Weeds</td>
<td>17.85</td>
<td>442</td>
</tr>
<tr>
<td>5 Harness / Roundup</td>
<td>WeatherMAX + AMS</td>
<td>5&quot; Weeds</td>
<td>37.75</td>
<td>433</td>
</tr>
<tr>
<td>6 Roundup WeatherMAX</td>
<td>+ AMS</td>
<td>5&quot; Weeds</td>
<td>17.85</td>
<td>426</td>
</tr>
<tr>
<td>7 Harness / Roundup</td>
<td>WeatherMAX + AMS</td>
<td>7&quot; Weeds</td>
<td>37.75</td>
<td>402</td>
</tr>
<tr>
<td>8 Roundup WeatherMAX</td>
<td>+ AMS</td>
<td>7&quot; Weeds</td>
<td>17.85</td>
<td>398</td>
</tr>
<tr>
<td>9 Harness / Roundup</td>
<td>WeatherMAX + AMS</td>
<td>9&quot; Weeds</td>
<td>37.75</td>
<td>381</td>
</tr>
<tr>
<td>10 Roundup WeatherMAX</td>
<td>+ AMS</td>
<td>9&quot; Weeds</td>
<td>17.85</td>
<td>386</td>
</tr>
<tr>
<td>11 Harness</td>
<td></td>
<td></td>
<td></td>
<td>19.89</td>
</tr>
<tr>
<td>12 Roundup WeatherMAX</td>
<td>+ AMS / 3&quot; Weeds / Roundup WeatherMax + AMS</td>
<td>2-4&quot; regrowth</td>
<td>35.70</td>
<td>438</td>
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<tr>
<td>13 Weed Free</td>
<td></td>
<td></td>
<td></td>
<td>0.00</td>
</tr>
<tr>
<td>14 Weedy</td>
<td></td>
<td></td>
<td></td>
<td>0.00</td>
</tr>
<tr>
<td>15 Lumax + Touchdown Total + AMS</td>
<td>1&quot; weeds</td>
<td>34.89</td>
<td>428</td>
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<tr>
<td>16 Harness + Roundup WeatherMAX + AMS</td>
<td>1&quot; weeds</td>
<td>30.75</td>
<td>417</td>
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</tr>
<tr>
<td>17 Resolve+a atrazine+Roundup WeatherMax + AMS+NIS</td>
<td>1&quot; weeds</td>
<td>26.20</td>
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</tr>
<tr>
<td>18 Outlook + Clarity + Roundup WeatherMax + AMS</td>
<td>1&quot; weeds</td>
<td>36.97</td>
<td>427</td>
<td></td>
</tr>
</tbody>
</table>

LSD (0.10) = 29

Mean returns vs standard error of mean returns for corn treatments across locations in 2006.

Glyphosate Timing and Corn Yield Across Locations 2006


Legend:
♦ = POST Roundup WeatherMax (22 oz/A)
■ = PRE + POST = Harness (1.25 pt/A) / Roundup WeatherMax (22 oz/A) + AMS
● = PRE Harness (1.25 pt/A)
▲ = POST Roundup WeatherMax + AMS at 3" weeds / Roundup WeatherMax + AMS at 2-4" regrowth
<table>
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<tr>
<th>Trt</th>
<th>Herbicide</th>
<th>Post App. Stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Harness / Roundup WeatherMAX + AMS</td>
<td>1” Weeds</td>
</tr>
<tr>
<td>2</td>
<td>Roundup WeatherMAX + AMS</td>
<td>1” Weeds</td>
</tr>
<tr>
<td>3</td>
<td>Harness / Roundup WeatherMAX + AMS</td>
<td>3” Weeds</td>
</tr>
<tr>
<td>4</td>
<td>Roundup WeatherMAX + AMS</td>
<td>3” Weeds</td>
</tr>
<tr>
<td>5</td>
<td>Harness / Roundup WeatherMAX + AMS</td>
<td>5” Weeds</td>
</tr>
<tr>
<td>6</td>
<td>Roundup WeatherMAX + AMS</td>
<td>5” Weeds</td>
</tr>
<tr>
<td>7</td>
<td>Harness / Roundup WeatherMAX + AMS</td>
<td>7” Weeds</td>
</tr>
<tr>
<td>8</td>
<td>Roundup WeatherMAX + AMS</td>
<td>7” Weeds</td>
</tr>
<tr>
<td>9</td>
<td>Harness / Roundup WeatherMAX + AMS</td>
<td>9” Weeds</td>
</tr>
<tr>
<td>10</td>
<td>Roundup WeatherMAX + AMS</td>
<td>9” Weeds</td>
</tr>
<tr>
<td>11</td>
<td>Harness</td>
<td>PRE</td>
</tr>
<tr>
<td>12</td>
<td>Roundup WeatherMAX + AMS /</td>
<td>3” Weeds /</td>
</tr>
<tr>
<td></td>
<td>Roundup WeatherMAX + AMS</td>
<td>2-4” regrowth</td>
</tr>
</tbody>
</table>

Mean returns vs standard error of mean returns for corn treatments across locations in 2004-2006

Glyphosate Timing and Corn Returns $/A Across Locations 2004 - 2006

Corn Across all Locations 2004 - 2006 Summary

- Weed species and density are critical factors to consider when planning a herbicide program.
- Under most situations, one-pass glyphosate does not maximize yield or returns (weed species and density will impact).
- The longer the duration of competition the greater the negative impact on yield and returns.
- PRE / POST (at 5 inch weeds) and POST (at 3 inch weeds) systems gave the best economic returns. However, achieving one pass POST of glyphosate at 3” weeds is very risky – the window for application is very narrow!
  - Weed growth from 3” to 5” occurs in about 3 to 5 days
  - Weed growth from 5” to 7” occurs in about 3 to 5 days
- Two pass glyphosate can work but has more time management risk (1-2” / 2-4” regrowth) compared to PRE / POST (5 inch weeds).
- Two pass glyphosate is not a very robust system for managing herbicide resistance.
- One pass tank mix programs (residual product plus glyphosate) applied at 1-2 inch weeds can maximize yields and returns.