

# Soybean Weed Management Studies

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## Introduction

Several studies were conducted in soybeans to evaluate commercially available herbicides for weed control, crop phytotoxicity, and crop yield. Various herbicide treatment combinations and application methods were evaluated.

## Materials and Methods

The studies were established using a randomized complete block design with three or four replications. Herbicide evaluation plot size was 10 feet  $\times$  25 feet. Herbicides were applied in 20 gallons of water/acre. Visual estimates of percentage weed control and crop injury data were made throughout June and July 2001. Weed control observations were compared with an untreated control and made on a 0–100 rating scale, with 0% = no weed control. Crop injury ratings were made on a 0–100 rating scale, with 0 = no crop injury. Weed species and populations that were evaluated included 100–150 foxtail/ft<sup>2</sup>, 3–5 common ragweed/ft<sup>2</sup>, 30–50 waterhemp/ft<sup>2</sup>, 5 Pennsylvania smartweed/ft<sup>2</sup>, 1–2 velvetleaf/ft<sup>2</sup>, and 3 lambsquarters /ft<sup>2</sup>.

The soil was a Canisteo Nicollet clay loam with a pH 6.2 and 5.9% organic matter. The 2000 crop was corn. Tillage included fall chisel-plowing and a spring field cultivation. Asgrow AG2101 glyphosate-tolerant soybeans were planted 1.75 inches deep on May 14, at 190,000 seeds/acre in 30-inch rows. Preplant-incorporated treatments were incorporated with two field cultivations at four-inch depth, within 20 minutes of application. Herbicide application dates and crops stages are presented in Table 1. Precipitation data is presented in Table 2.

## Results and Discussion

*KS-adjuvants (Table 3).* Glyphosate was applied at the label-recommended and one-half label-recommended rates, with various petroleum and seed oil adjuvants. The trend was for less broadleaf weed control at the half-rate, independent of adjuvant. This was significant for lambsquarter control. At the full glyphosate rate, inclusion of an adjuvant did not affect broadleaf weed control.

*KS-systems (Table 4).* This experiment compared various herbicide systems typically used in north-central Iowa. First evaluations were made on the same day as the early post-emergence treatments, so these ratings do not reflect the activity of the post-emergence treatment. No significant injury was observed with any treatment (data not shown). Treatment 9 showed significantly lower waterhemp control than the other treatments. Treatments 5 and 7 resulted in lower common ragweed. However, the removal of the foxtail following the post-emergence application in Treatment 7 may have resulted in emergence of a second population of ragweed.

*KS-glyphosate (Table 5).* Four formulations of glyphosate were applied at two rates, full and reduced, in this experiment. Full and reduced rates contained an equal amount of glyphosate calculated as acid equivalent (a.e.). All applications provided acceptable weed control. This supports the statement that different glyphosate formulations provide equal control when compared on an a.e. basis.

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**Table 1. 2001 herbicide application dates and crop stages at Kanawha, Iowa.**

| Treatment   | Date    | Crop stage |
|---|---------|------------|
| Preemergence/Preplant Incorporated (PRE/PPI)          | May 14  | --         |
| Early postemergence (EPOST)                           | June 11 | 3 in.      |
| Postemergence (POST) – KC-systems                     | June 27 | 6 in.      |
| Postemergence (POST) – KC-glyphosate and KC-adjuvants | July 6  | 16 in.     |

**Table 2. Weekly rainfall totals and largest single rainfall following planting.**

| Weeks after planting | Total rainfall<br>(inches) | Largest single rainfall<br>event<br>(inches) |
|----------------------|----------------------------|--|
| 1                    | 2.19                       | 2.05   |
| 2                    | 1.71                       | 0.86   |
| 3                    | 0.35                       | 0.16   |
| 4                    | 1.56                       | 1.06   |
| 5                    | 1.93                       | 1.53   |

**Table 3. Evaluation of petroleum and seed oil adjuvants with glyphosate (KS-adjuvants).**

| Treatment                  | Rate                    | Unit | Timing  | Foxtail |      | C. Ragweed |      | P. Smartweed |      | Velvetleaf |      | Waterhemp |      | Lambsquarter |      |   |
|----------------------------|-------------------------|------|---------|---------|------|------------|------|--------------|------|------------|------|-----------|------|--------------|------|---|
|                            |                         |      |         | 8/3     | 8/3  | 8/3        | 8/3  | 8/3          | 8/3  | 8/3        | 8/3  |           |      |              |      |   |
| ----- % weed control ----- |                         |      |         |         |      |            |      |              |      |            |      |           |      |              |      |   |
| 1                          | Dual II Magnum          | 1    | PT/A    | pre     | 99.0 | a          | 83.3 | a            | 84.0 | a          | 86.7 | abc       | 96.3 | a            | 92.3 | a |
|                            | Glyphomax Plus          | 32   | FL OZ/A | post    |      |            |      |              |      |            |      |           |      |              |      |   |
| 2                          | Dual II Magnum          | 1    | PT/A    | pre     | 99.0 | a          | 63.3 | c            | 73.3 | a          | 73.3 | cd        | 96.3 | a            | 75.0 | b |
|                            | Glyphomax Plus          | 16   | FL OZ/A | post    |      |            |      |              |      |            |      |           |      |              |      |   |
| 3                          | Dual II Magnum          | 1    | PT/A    | pre     | 99.0 | a          | 81.7 | a            | 86.7 | a          | 91.7 | a         | 96.0 | a            | 97.0 | a |
|                            | Glyphomax Plus          | 32   | FL OZ/A | post    |      |            |      |              |      |            |      |           |      |              |      |   |
|                            | COC                     | 1    | QT/A    | post    |      |            |      |              |      |            |      |           |      |              |      |   |
| 4                          | Dual II Magnum          | 1    | PT/A    | pre     | 97.7 | a          | 78.3 | a            | 76.7 | a          | 73.3 | cd        | 96.3 | a            | 83.3 | b |
|                            | Glyphomax Plus          | 16   | FL OZ/A | post    |      |            |      |              |      |            |      |           |      |              |      |   |
|                            | COC                     | 1    | QT/A    | post    |      |            |      |              |      |            |      |           |      |              |      |   |
| 5                          | Dual II Magnum          | 1    | PT/A    | pre     | 99.0 | a          | 83.3 | a            | 86.7 | a          | 88.3 | ab        | 96.3 | a            | 93.3 | a |
|                            | Glyphomax Plus          | 32   | FL OZ/A | post    |      |            |      |              |      |            |      |           |      |              |      |   |
|                            | Farm for Profit Veg Oil | 1    | QT/A    | post    |      |            |      |              |      |            |      |           |      |              |      |   |
|                            | Achieve                 | 4    | FL OZ/A | post    |      |            |      |              |      |            |      |           |      |              |      |   |
| 6                          | Dual II Magnum          | 1    | PT/A    | pre     | 99.0 | a          | 68.3 | bc           | 70.0 | a          | 66.7 | d         | 96.3 | a            | 80.0 | b |
|                            | Glyphomax Plus          | 16   | FL OZ/A | post    |      |            |      |              |      |            |      |           |      |              |      |   |
|                            | Farm for Profit Veg Oil | 1    | QT/A    | post    |      |            |      |              |      |            |      |           |      |              |      |   |
|                            | Achieve                 | 4    | FL OZ/A | post    |      |            |      |              |      |            |      |           |      |              |      |   |
| 7                          | Dual II Magnum          | 1    | PT/A    | pre     | 99.0 | a          | 86.0 | a            | 87.3 | a          | 83.3 | abc       | 94.7 | a            | 93.3 | a |
|                            | Glyphomax Plus          | 32   | FL OZ/A | post    |      |            |      |              |      |            |      |           |      |              |      |   |
|                            | Farm for Profit Veg Oil | 1    | QT/A    | post    |      |            |      |              |      |            |      |           |      |              |      |   |
| 8                          | Dual II Magnum          | 1    | PT/A    | pre     | 99.0 | a          | 75.0 | ab           | 73.3 | a          | 76.7 | bcd       | 86.7 | a            | 81.7 | b |
|                            | Glyphomax Plus          | 16   | FL OZ/A | post    |      |            |      |              |      |            |      |           |      |              |      |   |
|                            | Farm for Profit Veg Oil | 1    | QT/A    | post    |      |            |      |              |      |            |      |           |      |              |      |   |
| 9                          | Dual II Magnum          | 1    | PT/A    | pre     |      |            |      |              |      |            |      |           |      |              |      |   |
|                            | Untreated check         |      |         |         |      |            |      |              |      |            |      |           |      |              |      |   |
| LSD (P = .05)              |                         |      |         |         | 1.3  |            | 8.0  |              | 11.7 |            | 9.7  |           | 6.1  |              | 6.3  |   |

Means followed by same letter do not significantly differ (P = .05, Student-Newman-Keuls).