

# Maverick Rates and Application Timings for Weed Control in Kansas Corn

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## Summary

Maverick herbicide was evaluated as a preemergence (PRE) treatment at Manhattan, and as a PRE and postemergence (POST) treatment at Garden City. Early in the season, Maverick applied preemergence (PRE) was as effective as Bicep II Magnum, Harness Xtra, Verdict, Resicore, or Acuron for kochia, Palmer amaranth, and green foxtail control at Garden City. Maverick PRE also controlled Russian thistle 95% early. Later in the season, Maverick or Kyro postemergence (POST) provided at least 95% kochia control, 98% Palmer amaranth control, and complete Russian thistle and green foxtail control. At the Manhattan location, Maverick was as effective on Palmer amaranth as the competitive standards. Control of entireleaf morningglory and common sunflower were more variable, but Maverick controlled these species as well as the competitive standards. Herbicide treatment at Garden City increased grain yields 57% to 81% relative to the weedy controls.

## Introduction

Herbicide combinations that contain multiple modes of action are necessary to control diverse weed populations and mitigate herbicide resistance. Maverick Corn Herbicide is a combination of mesotrione, clopyralid, and pyroxasulfone that was first available for weed control in corn during 2023. The objective of the study was to compare weed control and corn yield with Maverick rates and tank mixtures to industry standards.

## Experimental Procedures

At Manhattan, herbicides were applied at planting using a compressed-CO<sub>2</sub> backpack sprayer delivering 15 gpa at 32 psi and 3.0 mph. At the Garden City experiment, Maverick was applied PRE and/or POST using a tractor-mounted, compressed-CO<sub>2</sub> sprayer delivering 19.4 gpa at 30 psi and 4.1 mph. Application, environmental, and plant information is shown in Table 1. Plots were 10 by 30 or 35 feet, and arranged in a randomized complete block design replicated four times. Soil at both locations was a silt loam. Weed control at Manhattan was visually rated on May 8, May 16, May 22, May 30, and June 13, 2024. These dates were 14, 22, 28, 36, and 50 days after the PRE treatments, respectively. Visual weed control was determined on June 6 and July 3, 2024, at Garden City. These dates were 1 day and 28 days after the POST treatments (DAB), respectively. Corn yields at Garden City were determined on October 18, 2024, by mechanically harvesting the center two rows of each plot and correcting grain moistures to 15.5%. Yield data were not collected at Manhattan.

## Results and Discussion

At Garden City, PRE control of kochia was 95% or more with all treatments of Maverick, Harness Xtra 5.6, Resicore, and Acuron at 1 DAB (Table 2). Only Bicep II Magnum and Verdict applied PRE provided less than 90% kochia control. By 28 DAB, kochia control was 95% with all herbicides except Bicep II Magnum PRE followed by Halex GT POST. Russian thistle control at 1 DAB was slightly less with Verdict or Maverick alone applied PRE. However, all herbicides controlled Russian thistle completely by 28 DAB. While minor differences between herbicides occurred for Palmer amaranth control at 1 DAB, no herbicide provided less than 93% control. At 28 DAB, all herbicides except Bicep II Magnum followed by Halex GT controlled Palmer amaranth 98% to 100%. Acuron was the only herbicide to control green foxtail less than 100% at 1 DAB (Table 3), but foxtail control was complete regardless of herbicide by 28 DAB. Control of Palmer amaranth, entireleaf morningglory, and common sunflower at Manhattan did not differ between herbicide treatments at 14, 22, 28, or 36 DAA (data not shown). Maverick was slightly more effective for Palmer amaranth control than Bicep II Magnum at 50 DAA (Table 4) and similar to Acuron, Resicore, Trivolt, or Storen PRE. Entireleaf morningglory control at Manhattan ranged from 70% to 93% at Manhattan late in the season, but did not differ between herbicides. Similarly, common sunflower control was 87% to 99% at Manhattan by 50 DAA but no differences occurred between herbicides.

Slight (6% to 11%) corn necrosis was observed with all POST treatments at Garden City at 7 DAB (data not shown). Injury did not persist past 14 DAB, and no injury was observed with the PRE treatments at Manhattan. Grain yields at Garden City ranged from 109 to 123 bu/a for herbicide-treated corn, and did not differ between any treatments (Table 3). However, all herbicide-treated corn yielded 39 to 56 bu/a more grain than the untreated corn.

## Acknowledgments

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**Table 1. Application, environmental, and plant information for the Maverick corn trials**

| <b>Location:</b>                  | <b>Garden City</b> |                 | <b>Manhattan</b> |
|-----------------------------------|--------------------|-----------------|------------------|
| Application timing                | Preemergence       | Postemergence   | Preemergence     |
| Application date                  | April 24, 2024     | June 6, 2024    | April 24, 2024   |
| Air temperature (F)               | 50                 | 67              | 58               |
| Relative humidity (%)             | 38                 | 78              | 50               |
| Soil temperature (F)              | 52                 | 64              | 57               |
| Wind speed (mph)                  | 3 to 6             | 4 to 7          | 1 to 2           |
| Wind direction                    | East-northeast     | South-southeast | Southeast        |
| Soil moisture                     | Fair               | Good            | Good             |
| <b>Corn</b>                       |                    |                 |                  |
| Height (inches)                   | ---                | 8 to 13         | ---              |
| Leaves (no.)                      | 0                  | 4 to 5          | 0                |
| <b>Kochia</b>                     |                    |                 |                  |
| Height (inches)                   | ---                | 1 to 4          | ---              |
| Density (plants/ft <sup>2</sup> ) | 0                  | 0.2             | 0                |
| <b>Palmer amaranth</b>            |                    |                 |                  |
| Height (inches)                   | ---                | 2 to 4          | ---              |
| Density (plants/ft <sup>2</sup> ) | 0                  | 0.1             | 0                |
| <b>Russian thistle</b>            |                    |                 |                  |
| Height (inches)                   | ---                | 1 to 3          | ---              |
| Density (plants/ft <sup>2</sup> ) | 0                  | 0.1             | 0                |
| <b>Green foxtail</b>              |                    |                 |                  |
| Height (inches)                   | ---                | 1 to 2          | ---              |
| Density (plants/ft <sup>2</sup> ) | 0                  | 0.1             | 0                |
| <b>Entireleaf morningglory</b>    |                    |                 |                  |
| Height (inches)                   | ---                | ---             | ---              |
| Density (plants/ft <sup>2</sup> ) | 0                  | 0               | 0                |
| <b>Common sunflower</b>           |                    |                 |                  |
| Height (inches)                   | ---                | ---             | ---              |
| Density (plants/ft <sup>2</sup> ) | 0                  | 0               | 0                |

Table 2. Broadleaf weed control with Maverick in corn at Garden City

| Treatment <sup>1</sup> | Rate   | Timing <sup>2</sup> | Kochia               |        | Russian thistle |        | Palmer amaranth |        |
|------------------------|--------|---------------------|----------------------|--------|-----------------|--------|-----------------|--------|
|                        |        |                     | 1 DAB <sup>3</sup>   | 28 DAB | 1 DAB           | 28 DAB | 1 DAB           | 28 DAB |
|                        |        |                     | ----- % visual ----- |        |                 |        |                 |        |
| Bicep II Magnum        | 57     | PRE                 | 83                   | 88     | 100             | 100    | 93              | 93     |
| Halex GT               | 57     | POST                |                      |        |                 |        |                 |        |
| NIS                    | 0.25%  | POST                |                      |        |                 |        |                 |        |
| AMS                    | 3.0 lb | POST                |                      |        |                 |        |                 |        |
| Bicep II Magnum        | 57     | PRE                 | 80                   | 95     | 100             | 100    | 94              | 99     |
| Maverick               | 14     | POST                |                      |        |                 |        |                 |        |
| Glyphosate             | 27     | POST                |                      |        |                 |        |                 |        |
| NIS                    | 0.25%  | POST                |                      |        |                 |        |                 |        |
| AMS                    | 3.0 lb | POST                |                      |        |                 |        |                 |        |
| Harness Xtra 5.6       | 64     | PRE                 | 100                  | 100    | 100             | 100    | 100             | 100    |
| Kyro                   | 45     | POST                |                      |        |                 |        |                 |        |
| Glyphosate             | 27     | POST                |                      |        |                 |        |                 |        |
| NIS                    | 0.25%  | POST                |                      |        |                 |        |                 |        |
| AMS                    | 3.0 lb | POST                |                      |        |                 |        |                 |        |
| Harness Xtra 5.6       | 64     | PRE                 | 98                   | 100    | 100             | 100    | 99              | 100    |
| Maverick               | 14     | POST                |                      |        |                 |        |                 |        |
| Glyphosate             | 27     | POST                |                      |        |                 |        |                 |        |
| NIS                    | 0.25%  | POST                |                      |        |                 |        |                 |        |
| AMS                    | 3.0 lb | POST                |                      |        |                 |        |                 |        |
| Verdict                | 12     | PRE                 | 85                   | 98     | 90              | 100    | 95              | 98     |
| Armezon Pro            | 14     | POST                |                      |        |                 |        |                 |        |
| Glyphosate             | 27     | POST                |                      |        |                 |        |                 |        |
| NIS                    | 0.25%  | POST                |                      |        |                 |        |                 |        |
| AMS                    | 3.0 lb | POST                |                      |        |                 |        |                 |        |
| Verdict                | 12     | PRE                 | 86                   | 98     | 90              | 100    | 93              | 100    |
| Maverick               | 14     | POST                |                      |        |                 |        |                 |        |
| Glyphosate             | 27     | POST                |                      |        |                 |        |                 |        |
| NIS                    | 0.25%  | POST                |                      |        |                 |        |                 |        |
| AMS                    | 3.0 lb | POST                |                      |        |                 |        |                 |        |
| Resicore               | 45     | PRE                 | 99                   | 99     | 99              | 100    | 98              | 100    |
| Resicore               | 45     | POST                |                      |        |                 |        |                 |        |
| Glyphosate             | 27     | POST                |                      |        |                 |        |                 |        |
| NIS                    | 0.25%  | POST                |                      |        |                 |        |                 |        |
| AMS                    | 3.0 lb | POST                |                      |        |                 |        |                 |        |
| Acuron                 | 48     | PRE                 | 96                   | 99     | 98              | 100    | 95              | 99     |
| Acuron                 | 48     | POST                |                      |        |                 |        |                 |        |
| Glyphosate             | 27     | POST                |                      |        |                 |        |                 |        |
| NIS                    | 0.25%  | POST                |                      |        |                 |        |                 |        |
| AMS                    | 3.0 lb | POST                |                      |        |                 |        |                 |        |

*continued*

**Table 2. Broadleaf weed control with Maverick in corn at Garden City**

| Treatment <sup>1</sup> | Rate   | Timing <sup>2</sup> | Kochia               |        | Russian thistle |        | Palmer amaranth |        |
|------------------------|--------|---------------------|----------------------|--------|-----------------|--------|-----------------|--------|
|                        |        |                     | 1 DAB <sup>3</sup>   | 28 DAB | 1 DAB           | 28 DAB | 1 DAB           | 28 DAB |
|                        |        |                     | ----- % visual ----- |        |                 |        |                 |        |
| Maverick               | 18     | PRE                 | 95                   | 98     | 95              | 100    | 100             | 98     |
| Maverick               | 14     | POST                |                      |        |                 |        |                 |        |
| Glyphosate             | 27     | POST                |                      |        |                 |        |                 |        |
| NIS                    | 0.25%  | POST                |                      |        |                 |        |                 |        |
| AMS                    | 3.0 lb | POST                |                      |        |                 |        |                 |        |
| Maverick               | 18     | PRE                 | 100                  | 100    | 100             | 100    | 99              | 100    |
| Atrazine               | 32     | PRE                 |                      |        |                 |        |                 |        |
| Maverick               | 14     | POST                |                      |        |                 |        |                 |        |
| Atrazine               | 32     | POST                |                      |        |                 |        |                 |        |
| Glyphosate             | 27     | POST                |                      |        |                 |        |                 |        |
| NIS                    | 0.25%  | POST                |                      |        |                 |        |                 |        |
| AMS                    | 3.0 lb | POST                |                      |        |                 |        |                 |        |
| Maverick               | 24     | PRE                 | 100                  | 100    | 100             | 100    | 100             | 100    |
| Atrazine               | 32     | PRE                 |                      |        |                 |        |                 |        |
| Status                 | 5.0    | POST                |                      |        |                 |        |                 |        |
| Atrazine               | 32     | POST                |                      |        |                 |        |                 |        |
| Glyphosate             | 27     | POST                |                      |        |                 |        |                 |        |
| NIS                    | 0.25%  | POST                |                      |        |                 |        |                 |        |
| AMS                    | 3.0 lb | POST                |                      |        |                 |        |                 |        |
| LSD (0.05)             |        |                     | 5                    | 5      | 4               | NSD    | 6               | 5      |

<sup>1</sup> NIS is nonionic surfactant, AMS is ammonium sulfate.

<sup>2</sup> PRE is preemergence, POST is postemergence.

<sup>3</sup> DAB is days after the postemergence treatments.

**Table 3. Green foxtail control and grain yield with Maverick in corn at Garden City**

| Treatment <sup>1</sup> | Rate   | Timing <sup>2</sup> | Green foxtail        |        | Corn yield |
|------------------------|--------|---------------------|----------------------|--------|------------|
|                        |        |                     | 1 DAB <sup>3</sup>   | 28 DAB |            |
|                        | oz/a   |                     | ----- % visual ----- |        | bu/a       |
| Untreated control      | ---    | ---                 | ---                  | ---    | 69.3       |
| Bicep II Magnum        | 57     | PRE                 | 100                  | 100    | 110.7      |
| Halex GT               | 57     | POST                |                      |        |            |
| NIS                    | 0.25%  | POST                |                      |        |            |
| AMS                    | 3.0 lb | POST                |                      |        |            |
| Bicep II Magnum        | 57     | PRE                 | 100                  | 100    | 109.3      |
| Maverick               | 14     | POST                |                      |        |            |
| Glyphosate             | 27     | POST                |                      |        |            |
| NIS                    | 0.25%  | POST                |                      |        |            |
| AMS                    | 3.0 lb | POST                |                      |        |            |
| Harness Xtra 5.6       | 64     | PRE                 | 100                  | 100    | 113.1      |
| Kyro                   | 45     | POST                |                      |        |            |
| Glyphosate             | 27     | POST                |                      |        |            |
| NIS                    | 0.25%  | POST                |                      |        |            |
| AMS                    | 3.0 lb | POST                |                      |        |            |
| Harness Xtra 5.6       | 64     | PRE                 | 100                  | 100    | 125.2      |
| Maverick               | 14     | POST                |                      |        |            |
| Glyphosate             | 27     | POST                |                      |        |            |
| NIS                    | 0.25%  | POST                |                      |        |            |
| AMS                    | 3.0 lb | POST                |                      |        |            |
| Verdict                | 12     | PRE                 | 100                  | 100    | 122.8      |
| Armezon Pro            | 14     | POST                |                      |        |            |
| Glyphosate             | 27     | POST                |                      |        |            |
| NIS                    | 0.25%  | POST                |                      |        |            |
| AMS                    | 3.0 lb | POST                |                      |        |            |
| Verdict                | 12     | PRE                 | 100                  | 100    | 120.8      |
| Maverick               | 14     | POST                |                      |        |            |
| Glyphosate             | 27     | POST                |                      |        |            |
| NIS                    | 0.25%  | POST                |                      |        |            |
| AMS                    | 3.0 lb | POST                |                      |        |            |
| Resicore               | 45     | PRE                 | 100                  | 100    | 112.9      |
| Resicore               | 45     | POST                |                      |        |            |
| Glyphosate             | 27     | POST                |                      |        |            |
| NIS                    | 0.25%  | POST                |                      |        |            |
| AMS                    | 3.0 lb | POST                |                      |        |            |
| Acuron                 | 48     | PRE                 | 96                   | 100    | 120.0      |
| Acuron                 | 48     | POST                |                      |        |            |
| Glyphosate             | 27     | POST                |                      |        |            |
| NIS                    | 0.25%  | POST                |                      |        |            |
| AMS                    | 3.0 lb | POST                |                      |        |            |

*continued*

**Table 3. Green foxtail control and grain yield with Maverick in corn at Garden City**

| Treatment <sup>1</sup> | Rate   | Timing <sup>2</sup> | Green foxtail        |        | Corn yield |
|------------------------|--------|---------------------|----------------------|--------|------------|
|                        |        |                     | 1 DAB <sup>3</sup>   | 28 DAB |            |
|                        | oz/a   |                     | ----- % visual ----- |        | bu/a       |
| Maverick               | 18     | PRE                 | 100                  | 100    | 117.9      |
| Maverick               | 14     | POST                |                      |        |            |
| Glyphosate             | 27     | POST                |                      |        |            |
| NIS                    | 0.25%  | POST                |                      |        |            |
| AMS                    | 3.0 lb | POST                |                      |        |            |
| Maverick               | 18     | PRE                 | 100                  | 100    | 118.3      |
| Atrazine               | 32     | PRE                 |                      |        |            |
| Maverick               | 14     | POST                |                      |        |            |
| Atrazine               | 32     | POST                |                      |        |            |
| Glyphosate             | 27     | POST                |                      |        |            |
| NIS                    | 0.25%  | POST                |                      |        |            |
| AMS                    | 3.0 lb | POST                |                      |        |            |
| Maverick               | 24     | PRE                 | 100                  | 100    | 108.8      |
| Atrazine               | 32     | PRE                 |                      |        |            |
| Status                 | 5.0    | POST                |                      |        |            |
| Atrazine               | 32     | POST                |                      |        |            |
| Glyphosate             | 27     | POST                |                      |        |            |
| NIS                    | 0.25%  | POST                |                      |        |            |
| AMS                    | 3.0 lb | POST                |                      |        |            |
| LSD (0.05)             |        |                     | 3                    | NSD    | 25.6       |

<sup>1</sup> NIS is nonionic surfactant, AMS is ammonium sulfate.

<sup>2</sup> PRE is preemergence, POST is postemergence.

<sup>3</sup> DAB is days after the postemergence treatments.

**Table 4. Weed control at the Maverick corn trial in Manhattan**

| Treatment <sup>1</sup> | Rate   | Timing <sup>2</sup> | Palmer<br>amaranth   | Entireleaf<br>morningglory | Common<br>sunflower |
|------------------------|--------|---------------------|----------------------|----------------------------|---------------------|
|                        |        |                     | 50 DAA <sup>3</sup>  | 50 DAA                     | 50 DAA              |
|                        |        |                     | ----- % visual ----- |                            |                     |
| Acuron                 | 96     | PRE                 | 98                   | 82                         | 99                  |
| Glyphosate             | 20     | POST                |                      |                            |                     |
| NIS                    | 0.25%  | POST                |                      |                            |                     |
| AMS                    | 3.0 lb | POST                |                      |                            |                     |
| Bicep II Magnum        | 67     | PRE                 | 96                   | 70                         | 87                  |
| Glyphosate             | 20     | POST                |                      |                            |                     |
| NIS                    | 0.25%  | POST                |                      |                            |                     |
| AMS                    | 3.0 lb | POST                |                      |                            |                     |
| Resicore               | 88     | PRE                 | 98                   | 72                         | 93                  |
| Glyphosate             | 20     | POST                |                      |                            |                     |
| NIS                    | 0.25%  | POST                |                      |                            |                     |
| AMS                    | 3.0 lb | POST                |                      |                            |                     |
| Maverick               | 24     | PRE                 | 99                   | 80                         | 93                  |
| Glyphosate             | 20     | POST                |                      |                            |                     |
| NIS                    | 0.25%  | POST                |                      |                            |                     |
| AMS                    | 3.0 lb | POST                |                      |                            |                     |
| Maverick               | 24     | PRE                 | 99                   | 84                         | 97                  |
| Atrazine               | 24     | PRE                 |                      |                            |                     |
| Glyphosate             | 20     | POST                |                      |                            |                     |
| NIS                    | 0.25%  | POST                |                      |                            |                     |
| AMS                    | 3.0 lb | POST                |                      |                            |                     |
| Maverick               | 32     | PRE                 | 99                   | 86                         | 92                  |
| Glyphosate             | 20     | POST                |                      |                            |                     |
| NIS                    | 0.25%  | POST                |                      |                            |                     |
| AMS                    | 3.0 lb | POST                |                      |                            |                     |
| Maverick               | 32     | PRE                 | 99                   | 87                         | 99                  |
| Atrazine               | 32     | PRE                 |                      |                            |                     |
| Glyphosate             | 20     | POST                |                      |                            |                     |
| NIS                    | 0.25%  | POST                |                      |                            |                     |
| AMS                    | 3.0 lb | POST                |                      |                            |                     |
| Trivolt                | 20     | PRE                 | 99                   | 91                         | 99                  |
| Glyphosate             | 20     | POST                |                      |                            |                     |
| NIS                    | 0.25%  | POST                |                      |                            |                     |
| AMS                    | 3.0 lb | POST                |                      |                            |                     |
| Storen                 | 77     | PRE                 | 99                   | 93                         | 99                  |
| Glyphosate             | 20     | POST                |                      |                            |                     |
| NIS                    | 0.25%  | POST                |                      |                            |                     |
| AMS                    | 3.0 lb | POST                |                      |                            |                     |
| LSD (0.05)             |        |                     | 3                    | NSD                        | NSD                 |

<sup>1</sup> NIS is nonionic surfactant, AMS is ammonium sulfate.

<sup>2</sup> PRE is preemergence, POST is postemergence.

<sup>3</sup> DAA is days after the preemergence treatments.