



Impact of Different Weed Removal Timings on Corn Yields in Canandaigua, NY

Trial Objective

The negative impact of weeds on multiple crop yields has been demonstrated for multiple years. The term **Critical Period of Weed Control (CPWC)** is defined as the period in the growth cycle of a crop when weeds must be controlled to help avoid or reduce the potential for yield loss. The time when weeds must be controlled is a moving target that depends on multiple factors such as seedling emergence and vigor, soil moisture, nutrient availability, weed seed bank, tillage practices, and farm equipment availability. The objective of this trial was to quantify the yield loss due to delayed weed control.

Experiment/Trial Design

- This study was planted in May 2023 at the Bayer Market Development Research Farm located in Canandaigua, New York. Planting and harvest details are described below.
- The trial was a Randomized Complete Block Design (RCBD) with four replications.
- Individual plots were 15 feet wide by 55 feet long. The four center rows were sprayed, and the two outer rows were left as buffers.
- Plots were planted in 30-inch rows with a four-row John Deere planter equipped with Precision Planting® vSet® meters.
- 200 lb/acre of nitrogen was split applied with 60 lb/acre applied as a 2x2 starter and 140 lb/acre broadcast applied at V4 stage.
- 25 lb/acre phosphate was applied as a 2x2 starter, and 140 lb/acre potassium was preplant applied.
- A 90-Day Relative Maturity (RM) corn product was selected from the Bayer offering portfolio.
- Weed management consisted of five treatments, four different weed control timings plus an untreated check. Products, rates, and timing are described on Table 1.
- Plots were sprayed using a CO₂ pressurized backpack sprayer set to deliver 20 gallons/acre.
- Average yield (bu/acre) determined by harvesting with a Kincaid 8-XP small plot combine using the two center rows of the plot to collect weight, moisture content, and test weight data.
- All yield data was corrected to 15.5% moisture content

Location	Soil Type	Previous Crop	Tillage Type	Planting Date	Harvest Date	Potential Yield (bu/acre)	Seeding Rate (seeds/acre)
Canandaigua, NY	Loam	Soybean	Conventional	05/19/23	10/10/23	220	36,000

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Table 1. Treatments, rates, and timing.

Treatment	Products and rates	Date Sprayed	Days after Planting (5/19/23)	Corn Stage
PRE Emergent	Harness MAX® herbicide @ 2 qts/acre + Atrazine 4L herbicide @ 1 qt/acre	05/21/23	2	Not applicable
Early POST (spiked)	Harness MAX herbicide @ 2 qts/acre + Atrazine 4L herbicide @ 1 qt/acre + NIS (nonionic surfactant) @ 0.25% v/v	06/02/23	14	Emergence
POST	Harness MAX herbicide @ 2 qts/acre + Atrazine 4L herbicide @ 1 qt/acre + NIS @ 0.25% v/v	06/16/23	28	V2 – V3
Late POST (Rescue)	Roundup PowerMAX® 3 herbicide @ 30 oz/acre + DiFlexx® herbicide @ 8 oz/acre + NIS @ 0.25% v/v	6/30/23	42	V5 – V6
Untreated control	None	Not applicable	Not applicable	Not applicable

Table 2. Weather data.

Month	Rain (inches)	Average Air Temperature, °F	Average Soil Temperature at 2 inches, °F	Growing Degree Unit Accumulation
May	1.6	56.1	59.3	298
June	4.8	65.2	69.5	462
July	6.0	71.8	75.5	692
August	2.5	67.5	73.0	555
September	2.2	62.3	68.6	413
October	2.1	53.5	58.6	221

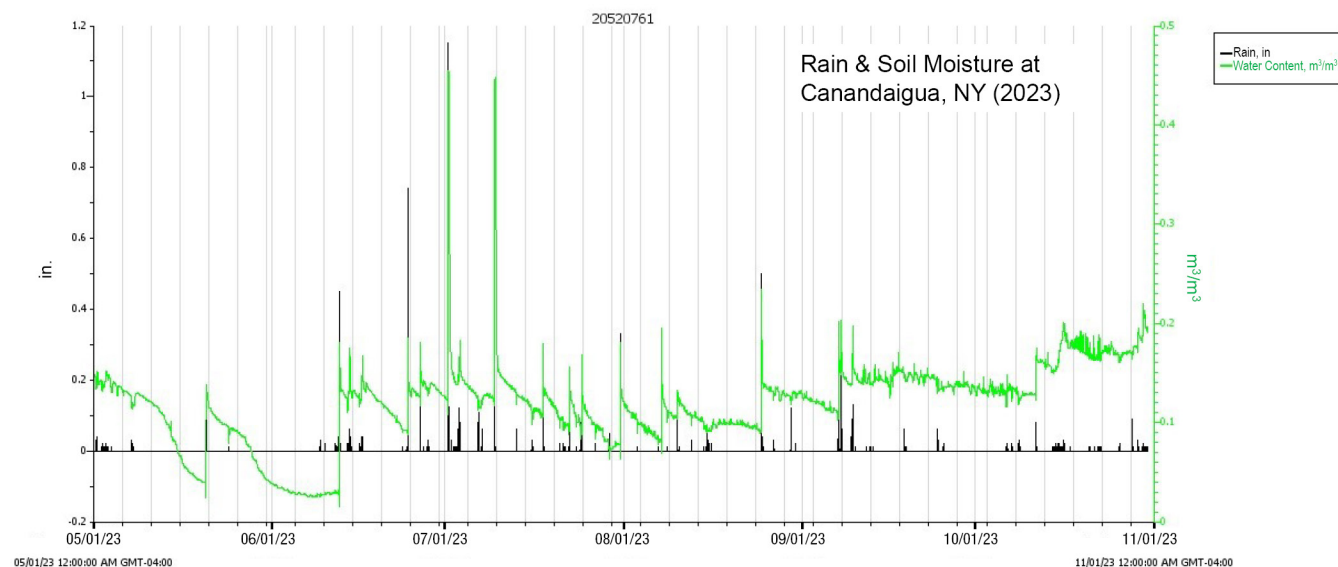


Figure 1. Rain events (black line, left axis) and soil moisture (green line, right axis) for the growing season at Canandaigua, New York. (Data from HOBOWare® software weather station located at the research farm.)



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Understanding the Results

- The weeds present across the plots were a combination of crabgrass (*Digitaria* spp.), fall panicum (*Panicum dichotomiflorum*), foxtails (*Setaria* spp.), pigweeds (*Amaranthus* spp.), common lambsquarters (*Chenopodium album*) and velvetleaf (*Abutilon theophrasti*).
- In this trial, all weed management treatments provided great to excellent weed control. Grass breakthroughs were observed on the PRE emergent treatment once the crop started to senesce (Figures 2, 3, 4 and 5).
- The Late POST emergent treatment was changed from the original weed management treatment used in the PRE, Early POST, and POST weed management treatments because corn had exceeded the labeled required height (Figure 7).
- The highest yielding treatment was the PRE emergent treatment yielding an average of 255.3 bushels/acre. The longer weed control was delayed, the higher the impact on yield loss was (Table 3).
- With no weed management, the untreated plots (Figure 6) yielded an average of 189.6 bushels/acre. Timely rains, mild temperatures, (Table 2 and Figure 1) and no observed deficit of soil water content (Figure 1) past the first month of planting plus an adequate nutrient management program can be attributed to the surprising yields.
- Although test weight was low at harvest, it may have increased by about 55 to 56 lb/bu if the corn was allowed to dry in the field for a longer time as observed in other plots that had the same product. It is important to note that there was a reduction of over one pound of test weight/bu on the untreated plots (Table 3).

Table 3. Harvest parameters.

Treatment	Average Moisture Content (%) at Harvest	Average Test Weight (lb/bu)	Average Yield (bu/acre) at 15.5% Moisture Content	Average Loss (bu/acre)	Income Lost/acre at \$4.70/bu*
PRE emergent	27.6	51.2	255.3	0.0	0.0
Early POST (spiked)	29.0	51.1	247.3	8.1	37.80
POST	28.7	51.2	239.1	16.2	76.20
Late POST (Rescue)	26.4	51.1	216.7	38.7	181.80
Untreated (Control)	27.1	49.8	189.6	65.8	309.10

*October 2023 local corn price (Canandaigua, NY)



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Figure 2. Weed control prior to harvest with PRE Emergent treatment at Canandaigua, NY.



Figure 3. Weed control prior to harvest with Early POST treatment at Canandaigua, NY.

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Figure 4. Weed control prior to harvest with POST treatment at Canandaigua, NY.



Figure 6. Untreated (control) plot prior to harvest at Canandaigua, NY.



Figure 5. Weed control prior to harvest with Late POST treatment at Canandaigua, NY.



Figure 7. Corn height was 20 inches at the time of Late POST treatment at Canandaigua, NY.

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Key Learnings

- For this trial, the findings suggest that a PRE emergent weed control treatment can provide the highest yield potential possible and that the longer a farmer waits to control weeds, the greater the lost yield potential increases due to weed competition.
- The feasibility of using a PRE emergent herbicide program is dependent on many agronomic and environmental factors.
- Weather conditions for the growing season may have reduced the yield difference between treatments. Under dryer or droughty conditions, the yield difference between treatments would be expected to be higher.
- Even though adequate to excellent weed control was achieved with a one-pass program in this trial, it is always recommended to scout fields in case a second application is needed to control breakthrough weeds.
- Always consult with your local retailer and agronomist for the weed management options recommended for your region. Different weed species, tillage practices, soil types, and other factors help determine the best weed management program for each individual region.
- This trial should be conducted again next year to accumulate data on another unique growing season.

Legal Statements

The information discussed in this report is from a single location, replicated trial. This informational piece is designed to report the results of this demonstration and is not intended to infer any confirmed trends. Please use this information accordingly.

ALWAYS READ AND FOLLOW PESTICIDE LABEL DIRECTIONS.

Performance may vary, from location to location and from year to year, as local growing, soil and environmental conditions may vary. Growers should evaluate data from multiple locations and years whenever possible and should consider the impacts of these conditions on their growing environment.

The recommendations in this material are based upon trial observations and feedback received from a limited number of growers and growing environments. These recommendations should be considered as one reference point and should not be substituted for the professional opinion of agronomists, entomologists or other relevant experts evaluating specific conditions.

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