

Evaluation of weed emergence patterns and the effect of time of weed removal on corn yield and the evaluation of one-pass postemergence systems in field corn at Rochester, MN in 2006.

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The objective of this trial was to evaluate weed emergence patterns and the effect of time of weed removal on corn yield and the evaluation of one-pass postemergence systems in field corn in southeastern Minnesota. The research site was a Lawler loam series with a pH of 7.3 and soil test P and K levels of 64 ppm and 226 ppm, respectively. Spring fertilizer was spread ahead of planting on April 20, at a rate of 109-19-85-24 (N-P-K-S). The area was side dressed with an additional 30 lb/A of N on June 7. The field was spring disked and field cultivated once prior to planting. The corn hybrid, Pioneer 38H65, was planted on May 3, 2006 at a depth of 1.5 inches in 30 inch rows at 35,000 seeds per acre. A randomized complete block design was used with four replications. Preemergence (PRE) and postemergence (POST) treatments were applied with a tractor-mounted sprayer delivering 20 gpa at 32 psi using Turbo Tee 11002 nozzles. Weed counts per square foot were taken on July 10th. Application dates, environmental conditions, and weed stages are listed below. The center two rows of each plot were harvested on November 2, 2006.

Date	May 3	May 26	June 2	June 7	June 12	June 16
Treatment	PRE	POST I	POST II	POST III	POST IV	POST V
Temperature (F)						
air	64	64	80	82	71	83
soil	66	69.1	83.8	89.2	73.8	81.5
Relative Humidity (%)	42	90	34	34	36	58
Wind (mph)	23	12	9	15	5	16
Soil moisture	adequate	adequate	dry	dry	wet	adequate
Corn						
stage	--	V2	4 collar	5 collar	6-7 collar	8 collar
height (inch)	--	3.5	6.0	11	14	20
Giant ragweed						
weed density (ft ²)	--	20.5	20.5	20.5	20.5	20.5
height (inch)	--	2.0	2.0	11.5	14.0	20.5
Common lambsquarters						
weed density (ft ²)	--	6.4	6.4	6.4	6.4	6.4
height (inch)	--	0.3	1.3	1.8	7.0	3.5
Common waterhemp						
weed density (ft ²)	--	15.3	15.3	15.3	15.3	15.3
height (inch)	--	0.3	0.8	3.8	5.0	2.0
Giant foxtail						
weed density (ft ²)	--	7.5	7.5	7.5	7.5	7.5
height (inch)	--	0.5	1.3	3.0	6.0	4.0
Rainfall after each application (inch)						
week 1	0.80	0.24	0.42	2.13	0.10	0.16
week 2	0.58	0.42	2.23	0.26	0.43	0.00
week 3	0.07	2.23	0.16	0.27	0.00	0.00

CONCLUSIONS

There is a critical herbicide application window or time of weed removal, when trying to achieve satisfactory weed control and maximize corn yields. It is also extremely important to know the weed species and densities in the field when planning herbicide programs. At this location, four weed species were present: giant ragweed, common waterhemp, common lambsquarters, and giant foxtail. Giant ragweed was the most competitive weed species in the field. Single pass applications of glyphosate, Roundup WeatherMax[®], were impractical, regardless of timing, with the weed complex and population density of weeds in this field. In this trial, the window for a single postemergence Roundup WeatherMax[®] treatment was only seven days, from POST I to POST II (from 1 to 4 inch weeds). Adding a foundation herbicide, such as Harness, widened that window nearly two-fold to 12 days, from POST I to POST III (from 1 to 6 inch weeds).

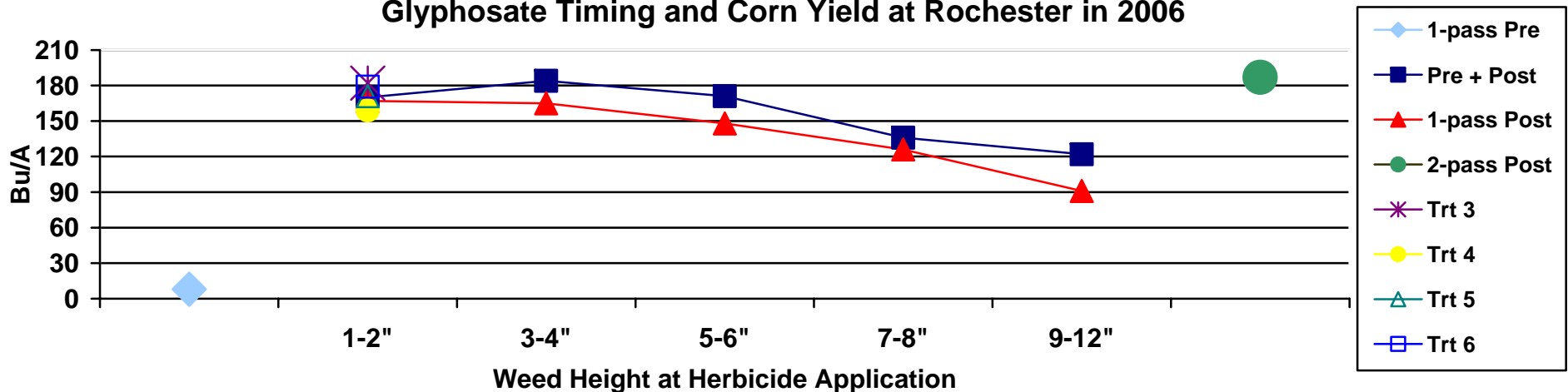
The highest grain yields from single pass Roundup WeatherMax[®] applications were achieved at the POST I (1 to 2 inch weeds) and POST II (3 to 4 inch weeds) and provided grain yields of 167 and 165 bu/A, respectively. Delaying single pass Roundup WeatherMax[®] applications beyond POST II resulted in severe yield penalties.

PRE / POST applications of Harness[®] at 1.25 pt/A followed by Roundup WeatherMax[®] at 22 oz/A applied from 1 to 2 inch through 9 to 12 inch weeds maximized yield and minimized risk when compared to the POST only application of Roundup WeatherMax[®] at 22 oz/A applied at the same time. The two-pass PRE / POST system reduced overall risk by providing early season weed control, reduced competition, and by extending the application window of the POST treatment before yield losses occurred. However, even with a PRE application, delaying weed removal beyond POST III (5 to 6 inch weeds) resulted in severe yield penalties.

POST I applications that included a residual herbicide, Lumax[®] + Touchdown Total[®] and Outlook[®] + Clarity[®] + Roundup WeatherMax[®], provided season long weed control and grain yields which were not statistically different than the weed free check, 182 bu/A and 179 bu/A compared to 181 bu/A, respectively. The POST I application of Resolve[®] + atrazine + Roundup WeatherMax[®] produced grain yield slightly lower, though not statistically different, from the weed free check, 171 compared to 181 bu/A, respectively. However, statistically higher populations of giant foxtail were evident in the Resolve[®] + atrazine + Roundup WeatherMax[®] plot. The POST I application of Harness[®] + Roundup WeatherMax[®] produced a grain yield statistically lower than the weed free check, 159 compared to 181 bu/A, respectively. This decrease was likely due to reduced giant ragweed control.

Sequential **POST I / POST V** applications of Roundup WeatherMax[®] provided excellent season long weed control and grain yield, 187 bu/A. (University of Minnesota Extension Service, Regional Center, Rochester, MN).

Glyphosate Timing and Corn Yield at Rochester in 2006



- 1-pass Pre = Harness (1.25 pt/A)
- Pre + Post = Harness (1.25 pt/A) / Roundup WeatherMax (22 oz/A)
- 1-pass Post = Roundup WeatherMax (22 oz/A)
- 2 pass Post = Roundup WeatherMax at (22 oz/A at 1-2" weeds) / Roundup WeatherMax (22 oz/A at 3" regrowth)
- Trt 3 = Lumax (3 pt)+ Touchdown Total (24 oz/A) at 1-2" weeds
- Trt 4 = Harness (1.25 pt/A)+ Roundup WeatherMax (22 oz/A) at 1-2" weeds
- Trt 5 = Resolve (22 oz/A) + atrazine (1 pt/A) + Roundup WeathrMax (22 oz/A) at 1-2" weeds
- Trt 6 = Outlook (12 oz/A) + Clarity (8 oz/A) + Roundup WeatherMAX (22 oz/A) at 1-2" weeds

Table. Weed emergence patterns, weed density on July 10, and effect of time of weed removal on corn yield at Rochester, MN in 2006.

Treatment	Rate (rate/A)	Weed Height at application (inch)	Giant ragweed density (ft ²)	Common lambsquarters density (ft ²)	Common waterhemp density (ft ²)	Giant foxtail density (ft ²)	Corn yield (bu/A)
PRE / POST I							
Harness / Roundup WeatherMax + AMS	1.25 pt / 22 oz + 2.5 lb	1-2	0.8	0.0	0.0	0.4	170
POST I							
Roundup WeatherMax + AMS	22 oz + 2.5 lb	1-2	0.6	0.9	4.1	4.3	167
Lumax + Touchdown Total + AMS	3 pt + 24 oz + 2.5 lb	1-2	0.1	0.0	0.0	1.4	182
Harness + Roundup WeatherMax + AMS	1.25 pt + 22 oz + 2.5 lb	1-2	0.4	1.0	0.8	1.1	159
Resolve + Atrazine + Roundup WeatherMax + NIS + AMS	1 oz + 1 pt + 22 oz + 0.25% v/v + 2.5 lb	1-2	0.1	0.0	2.0	9.3	171
Outlook + Clarity + Roundup WeatherMax + AMS	12 oz + 8 oz + 22 oz + 2.5 lb	1-2	0.1	0.9	1.0	2.4	179
PRE / POST II							
Harness / Roundup WeatherMax + AMS	1.25 pt / 22 oz + 2.5 lb	3-4	0.0	1.1	0.5	0.5	184
POST II							
Roundup WeatherMax + AMS	22 oz + 2.5 lb	3-4	0.0	3.8	2.9	3.3	165
PRE / POST III							
Harness / Roundup WeatherMax + AMS	1.25 pt / 22 oz + 2.5 lb	5-6	0.3	0.3	0.1	0.0	171
POST III							
Roundup WeatherMax + AMS	22 oz + 2.5 lb	5-6	0.0	0.9	2.8	3.3	148
PRE / POST IV							
Harness / Roundup WeatherMax + AMS	1.25 pt / 22 oz + 2.5 lb	7-8	0.1	0.3	0.5	0.1	136
POST IV							
Roundup WeatherMax + AMS	22 oz + 2.5 lb	7-8	0.3	0.0	1.4	2.8	126
PRE / POST V							
Harness / Roundup WeatherMax + AMS	1.25 pt / 22 oz + 2.5 lb	9-12	0.8	0.1	0.1	0.0	122
POST V							
Roundup WeatherMax + AMS	22 oz + 2.5 lb	9-12	0.4	0.3	0.1	0.3	91
PRE							
Harness	1.25 pt	0	8.8	0.3	0.0	0.0	8
POST I / POST V							
Roundup WeatherMax + AMS / Roundup WeatherMax + AMS	22 oz + 2.5 lb / 22 oz + 2.5 lb	1-2 / regrowth	0.0	0.5	3.1	2.0	187
Weed-free check			0.0	0.0	0.0	0.0	181
Weedy Check			11.4	7.1	0.0	1.4	4
LSD (P=0.10)			1.4	1.9	1.5	2.9	20