

Weed Competition in *Roundup Ready* Soybeans and Corn

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Weed Competition Reduces Crop Yield

Weeds compete with crops for light, nutrients, and soil moisture. When weeds are uncontrolled for the entire season, yield losses can exceed 75%. Using a total postemergence weed control strategy, yield losses from weed competition may occur when herbicide application is delayed too long. In *Roundup Ready* soybeans and corn, weeds can be effectively controlled with glyphosate at a wide range of heights. It is critical that glyphosate application is timed early enough to avoid yield loss from early season weed competition.

Research was conducted at Michigan State University in 1998 through 2001 to study the effect of glyphosate application timing and row spacing on corn and soybean yield loss from weed competition, and weed growth following glyphosate application. Glyphosate was applied when weeds reached 2, 4, 6, 9, and 12 inches in height.

Benefits of Narrow Row Soybeans and Corn

Over 50% of Michigan's soybeans are planted in narrow rows and the benefits of using narrow rows for corn are currently being studied at MSU. Some potential benefits are higher yield potential and increased crop competitiveness with weeds. Planting crops in narrow rows reduces the time between planting and canopy closure. Narrow rows also increase the amount of shading by the crop canopy. If less light is available, weed growth will be suppressed. In this study there was a yield advantage for narrow row soybeans and corn in three of four years. In 2001, when there was no yield advantage, drought conditions limited the yield response of narrow rows.

Delaying Glyphosate Application Reduces Soybean and Corn Yield

Weed competition reduced the yield of soybeans planted in 7.5-inch rows when weeds reached 9-inches in 1998, 6-inches in 1999, and after weeds

exceeded 12-inches in 2000 and 2001 (Table 1). Yield of soybean planted in 15-inch rows was reduced when weeds reached 6-inches in 1999, and after weeds exceeded 12-inches in 1998, 2000, and 2001. Yield of soybean planted in 30-inch rows was reduced only when weeds exceeded 12-inches in all four years.

Weed competition reduced the yield of corn planted in 30-inch rows when weeds reached 12-inches in 1998 (16 Bu/A), 6-inches in 1999 (18 Bu/A), 12-inches in 2000 (11 Bu/A), and 9-inches in 2001 (21 Bu/A) (Table 1). Yield of 15-inch row corn was reduced when weeds reached 6 inches in 1998, 4-inches in 1999, 12-inches in 2000, and 9-inches in 2001. Corn yield was also reduced when glyphosate was applied to 2-inch weeds in 2001 (data not shown). This was likely due to competition from weeds that emerged following glyphosate application. This was the only time in four years that yield was reduced by late-emerging weeds.

Table 1. Weed height at glyphosate application when yield loss first occurred, East Lansing, MI. Numbers in parentheses represent yield loss in Bu/A.^a

Year	Soybeans			Corn	
	Row Spacing (inches)				
	7.5	15	30	15	30
	Weed Height (inches)				
1998	9	> 12	>12	6	12(16) ^a
1999	6	6	>12	4	6(18) ^a
2000	>12	>12	>12	12	12(11) ^a
2001	>12	>12	>12	9	9(21) ^a

In 2000, weeds were less competitive with corn due to higher than normal rainfall and lower weed densities compared to the other three years this experiment was conducted.

Weed Competition in Roundup Ready Soybeans and Corn (continued)

Under these conditions, corn yield losses did not occur until weeds reached 12 inches in height (Table 1). Under more typical growing conditions, yield losses occurred at smaller weed heights.

Narrow Rows Suppressed Weed Growth in Soybean but not in Corn.

The amount of shading by both narrow row soybeans and corn was greater than that of wide rows early in the season (Figure 1). Shading by soybeans continued to be higher in narrow rows throughout the season. However, by the end of the growing season, the amount of shade under the corn canopy was similar for corn in both narrow and wide rows (Figure 1).

Because of the high levels of shade under narrow row soybeans (over 95%), weed growth was almost completely suppressed (Figure 2). However, the shade under corn was not high enough to completely suppress weed growth in either row spacing, and there was no difference in weed growth (comparing wide and narrow rows) in corn following glyphosate application (Figure 2).

A timely application of glyphosate in narrow row soybeans will usually be sufficient for season-long weed control. This will not be the case for corn (or soybeans in 30-inch rows), which will often need a second herbicide application, a residual herbicide, or cultivation to obtain acceptable season-long weed control.

Important Observations:

- Corn is more sensitive to early season weed competition than soybeans.
- Yield loss from weed competition occurs earlier in narrow rows than wide rows (in both corn and soybeans).
- Narrow row soybeans have a high level of shading which often eliminates the need for weed control measures in addition to a timely glyphosate application.
- Corn (both narrow and wide row) and wide row soybeans usually do not provide sufficient shading to eliminate the need for weed control measures in addition to a timely glyphosate application.

Figure 1. The effect of row spacing on shading by corn and soybeans, 1999. Asterisks above the columns denote a significant difference ($p < 0.05$) in shading due to row spacing.

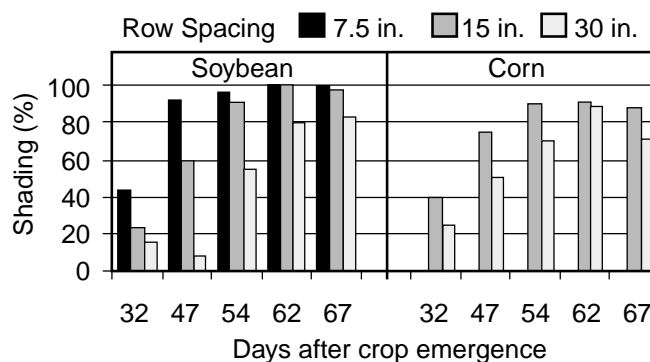
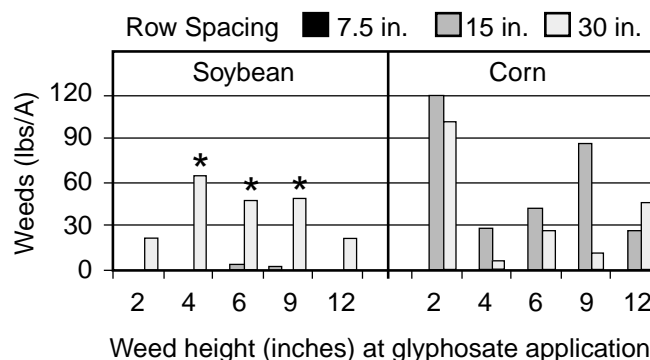


Figure 2. Weed growth in corn and soybeans in narrow and wide row spacings following glyphosate application, 1999. Asterisks above the columns denote a significant difference ($p < 0.10$) in the weight of harvested weeds due to row spacing.



Recommendations:

Apply glyphosate before weeds exceed:

- 2 inches in 15-inch row corn
- 4 inches in 30-inch row corn
- 4 inches in 7.5- and 15-inch row soybeans
- 6 inches in 30-inch row soybeans

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