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Early-season weed competition

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Abstract
The critical period of competition is the point of time when weeds that emerge with the crop begin to impact yields. This information is essential when implementing total postemergence weed management programs. Most studies have found that crop yields are protected if weeds are controlled before they reach a height of 4 to 5 inches in corn or a height of 6 to 8 inches in soybeans. When making management decisions, it is important to remember that the critical period varies widely, depending upon weed species and densities, environmental conditions, and cultural practices.

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Critical periods such as the ones mentioned above usually are based on the means of several studies. Although means are useful, they provide little information on risks associated with different herbicide application timings. To understand the risks associated with total post programs, a large number of similar studies must be conducted under a wide range of conditions to observe crop responses across different environments. During 1998 and 1999, Monsanto sponsored university research across the Midwest to evaluate critical periods of competition in Roundup Ready corn. Application of Roundup Ultra was based on the heights of weeds that emerged soon after corn planting. A second Roundup Ultra application was made to control weeds that emerged after the initial application, thus differences in corn yield are due to early-season competition.

The mean yield loss is the average response of 37 experiments in this study (Table 1). On average, corn yields were not affected if weeds were controlled when they reached a height of 2 inches. Delaying application until weeds were 4 inches in height resulted in a 2 percent yield loss, whereas a 6 percent yield loss occurred when weeds were removed at a 6-inch height. Corn yields were reduced 22 percent on average if weeds were allowed to reach a height of 12 inches before removal. The range of responses within the 50th percentile of experiments illustrates the variability in the critical period across the local conditions. Eighteen (50 percent) of the experiments had a yield response that fell within the range of values, whereas 25 percent of the studies had a yield loss less than or equal to the low value. Similarly, 25 percent of the studies had a yield response greater than or equal to the high value. These numbers indicate that if weeds reach a height of 6 inches, there would be a 25 percent chance that no yield loss would occur, but there also would be a 25 percent chance that the yield loss would be greater than 13 percent.

Total post programs can effectively control weeds and protect crop yields. However, timing of the initial application is critical to prevent early-season competition. The critical period is reduced under conditions of high weed populations or limited soil moisture. If this spring's dry weather continues, growers should adjust their application timings accordingly. Early applications increase the likelihood that a second trip (herbicide application or cultivation) will

be required to control late-emerging weeds; however, the potential yield savings should recoup the additional costs associated with this trip.

Table 1. Effect of timing of weed removal on early-season weed competition in corn.[a]

Weed Height at Application (inches)	% Corn Yield Loss		
	Mean	Range of responses	
2	0	0-3	
4	2	0-7	
6	6	0-13	
9	8	0-18	
12	22	7-35	

[a] Results compiled by S.A. Gower et al., Ohio State University, Proceedings of the 1999 North Central Weed Science Society, volume 54. Data collected from 37 experiments conducted across the Corn Belt.

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