



## WEED COMPETITION IN CORN

### What You'll Learn...

- Weeds can compete differently with corn for resources, and can also impact corn in the absence of competition for resources.
- Since the critical period for early-season weed control can vary, it is best to take a conservative approach to weed management in corn and use preemergence herbicides.
- Late-emerging weeds have less of an impact in corn, but should be controlled.
- The use of preemergence and postemergence herbicides and multiple modes of action can be the best approach to reducing the impact of weeds in corn and future crops.

### The Impact of Weeds in Corn

Weeds compete with corn for limited resources such as water, nutrients, light, and space. Weeds have also been shown to alter the growth of corn seedlings even before the competition for resources begins. Weeds growing in close proximity to corn can change the quality of light following reflection off the weed foliage which may negatively impact corn productivity.<sup>1</sup> This may help to explain corn yield losses that are often more than expected from competition early in the season when the demand for light, water, and nutrients is limited. Weeds can reduce yields and harvest efficiency, and produce seed that can impact future crops.

Not all weeds compete with corn equally (Table 1).<sup>2</sup> Broadleaf weeds tend to be more competitive than grasses. For example, the predicted weed densities in plants per 40 feet of row required to cause a 10% yield loss in corn would be 80 foxtails compared to 40 pigweeds and only 10 cocklebur. Canopy closure of corn can limit the competitive ability of weeds. However, broadleaf weeds are better able to avoid shading effects of corn and compete longer into the growing season. Early germinating weeds are generally more competitive than weeds which emerge later in the growing season. Fields that experience moisture stress are also at greater risk to yield losses from weed competition. Heavier soils that hold moisture better can tolerate higher populations of weeds that may impact corn yield potential.

**Table 1. Competitive indexes of weeds in corn.<sup>2</sup>**

Weed	Competitive Index Factor
Common cocklebur	0.6 - 1.25
Giant ragweed	0.6 - 1.25
Jimsonweed	0.3 - 0.8
Velvetleaf	0.3 - 0.8
Burcucumber	0.25 - 0.5
Morningglory species	0.25 - 0.5
Smartweed	0.25 - 0.5
Spurred anoda	0.25 - 0.5
Common lambsquarters	0.15 - 0.5
Common ragweed	0.15 - 0.5
Pigweed species	0.15 - 0.5
Black nightshade	0.1 - 0.25
Johnsongrass	0.1 - 0.25
Shattercane	0.1 - 0.25
Barnyardgrass	0.1 - 0.125
Fall panicum	0.1 - 0.125
Giant foxtail	0.1 - 0.125
Crabgrass species	0.05 - 0.1

The Competitive Index Factor is a number that represents competitiveness of different weeds. The greater the number, the more competitive the weed. The factor varies within the range depending on moisture-holding capacities of soils. For weeds not listed on this chart, use the factor for weeds that are similar in size and growth characteristics.

### The Critical Period for Weed Control in Corn

The critical period is the length of time following corn planting that weeds can grow with the crop before yields are impacted.<sup>3</sup> This is basically how long you can wait before controlling the weeds without compromising corn yield. The critical period is influenced by the weeds present and their density, emergence timing and duration of emergence, environmental conditions, and cultural practices (Table 2).

Early-season weed competition causing corn yield loss can begin soon after planting. The critical period varies widely depending on the field conditions, and there are no simple guidelines to accurately predict it for all situations. Testing conducted in Roundup Ready® corn



## WEED COMPETITION IN CORN (continued)

**Table 2. Effect of various factors on critical period.**

Factor	Critical Period*
Weed density increases	Decreases
Weed emergence is delayed	Increases
Environmental stress increases	Decreases
Corn row spacing narrows	Increases

\* There is a greater risk to weed management as the critical period decreases.

over 2 years across multiple sites and states suggested that the optimum timing for initial glyphosate application to avoid yield loss was when weeds were less than 4 inches tall, no more than 23 days after planting, and before the V4 stage of corn growth.<sup>4</sup> Remember these are only guidelines, and it is important to understand that timely early-season weed control is critical to protect corn yield potential.

### The Impact of Late-Emerging Weeds

Late-emerging weeds can include those that emerge after control tactics have been implemented. The impact of late-emerging weeds decreases rapidly if weeds emerge 3 weeks or more after corn emergence. The competitiveness of late-emerging weeds is strongly influenced by how quickly the crop canopy develops. Stress factors that reduce corn growth can increase the impact of late-emerging weeds. These weeds are at a competitive disadvantage to the crop due to their delayed emergence, but are still capable of causing economic damage.

Late-emerging weeds should not be ignored because they are capable of producing significant quantities of seed. If weeds have not initiated seed set at the time of herbicide application, seed production should be eliminated or reduced. However, if the fruiting structures are visible, it is unlikely that the application will reduce weed seed production or viability of the seeds. The other benefit of late-season weed control is harvesting efficiency, and there are situations where these applications may be worthwhile.

### Weed Management Implications

- It is important to start clean with tillage or a burndown herbicide application in corn. Allowing weeds to be present at planting because of skipping or delaying the burndown application will give weeds a competitive advantage with the crop.
- The use of preemergence herbicides at corn planting can increase the critical period and reduce the risk of early-season competition by reducing weed densities that can emerge with the crop.
- The use of total postemergence herbicide application programs can be risky and have a reduced critical period for weed control. Weeds grow rapidly, and weather delays of postemergence applications can result in significant corn yield losses. Surveys have shown where weeds are managed with only postemergence herbicides, that application timings often occur too late to protect the full yield potential of corn from early weed competition.<sup>5</sup>
- The use of preemergence and postemergence herbicides in sequential applications or in tank mixtures can be the best approach to weed control in corn. Weeds should be controlled throughout the season to protect corn yield potential, using a mix of herbicides and multiple modes of action that can help to prevent the development and spread of resistant weeds.

For more information on weed management solutions, visit <http://www.RoundupReadyPLUS.com>.

**Sources:** <sup>1</sup> Rajcan, I., Chandler, K.J., and Swanton, C.J. 2004. Red-far-red ratio of reflected light: a hypothesis of why early-season weed control is important in corn. *Weed Science* 52:774-778; <sup>2</sup> VanGessel, M. Weed management in row crops: application to corn production - competitive index factor chart. Northeast IPM Module number 10. <http://northeastipm.org>; <sup>3</sup> Gantoli, G., Ayala, V.R., and Gerhards, R. 2013. Determination of the critical period for weed control in corn. *Weed Technology* 27:63-71; <sup>4</sup> Gower, S.A. et al. 2003. Effect of postemergence glyphosate application timing on weed control and grain yield in glyphosate-resistant corn: results of a 2-yr multistate study. *Weed Technology* 17:821-828; <sup>5</sup> Fickett, N.D., Boerboom, C.M., and Stollenberg, D.E. 2013. Predicted corn yield loss due to weed competition prior to postemergence herbicide application on Wisconsin farms. *Weed Technology* 27:54-62.

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**Individual results may vary**, and performance may vary from location to location and from year to year. This result may not be an indicator of results you may obtain as local growing, soil and weather conditions may vary. Growers should evaluate data from multiple locations and years whenever possible.

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