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Protecting soybean yields from early-season competition

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Protecting soybean yields from early-season competition

Abstract

Weeds impact soybean yields by competing for limited resources, primarily light, water, and nutrients. The demand for these resources early in the growing season is small enough that weeds and soybeans can coexist without yield loss. However, as plants increase in size, competition for resources begins and yields are impacted. The critical period is the point of time when soybean yields begin to be affected by weeds. Controlling weeds before the critical period is reached is essential to protect yields and maximize profits.

Keywords

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May 7, 1993

Protecting soybean yields from early-season competition

by Bob Hartzler, Department of Agronomy

Weeds impact soybean yields by competing for limited resources, primarily light, water, and nutrients. The demand for these resources early in the growing season is small enough that weeds and soybeans can coexist without yield loss. However, as plants increase in size, competition for resources begins and yields are impacted. The critical period is the point of time when soybean yields begin to be affected by weeds. Controlling weeds before the critical period is reached is essential to protect yields and maximize profits.

The majority of Iowa soybean producers utilize total postemergence systems to control weeds. These systems are facilitated by glyphosate's ability to control large weeds, therefore providing flexibility in application timing. Fields may be weed-free at harvest yet suffer significant yield losses because weeds that emerged with the crop were allowed to grow until after the critical period was reached. Once the critical period is reached, soybean yield may be reduced 1 percent for every day that weed control is delayed. Thus, controlling weeds before the critical period is critical to maximize profitability.

Unfortunately, there is no simple rule to determine the critical period for early-season competition.

Research at the University of Nebraska found that the critical period was at the V1 soybean stage in 30" row spacing, but reducing row spacing to 15" delayed the critical period until the V2 stage of growth. However, in Iowa State University research, the critical period was not reached until after the V6 stage in five out of six studies. Several factors determine the critical period, including weed species, weed density, time of weed emergence in relation to the soybean, environmental conditions, and production practices. The complex interactions among these factors make it impossible to accurately predict when weeds will begin to impact yields.

So what is the best approach to dealing with the uncertainty of the critical period? A good way of estimating the risk of early-season competition is determining the density of weeds present shortly after the soybeans emerge. If densities are greater than 3 to 5 weeds/ft² when soybeans are at the VE stage, there is a good likelihood that the critical period will occur relatively early in the season, and weeds should be controlled before the soybeans reach the V2 or V3 stage. At lower densities, applications probably can be delayed to the

V4 or V5 stage with little risk of yield loss.

Total postemergence programs in fields with high weed pressures carry a relatively high risk of early-season yield losses due to the narrow application window created by the critical period occurring early in the season. Unfavorable weather (wet fields, windy conditions, conflicts with other field operations, etc.) may prevent herbicides from being applied before the critical period. Application of preemergence herbicides in fields expected to have high weed densities can reduce the risk of early-season competition by reducing the number of weeds and delaying their emergence in relation to the crop. Full rates of preemergence herbicides are not required since the objective is not to provide full-season control but rather delay the timing of the critical period. A properly selected preemergence herbicide should allow the postemergence herbicide application to be delayed until the crop canopy has developed sufficiently so that weeds emerging after the application are not a concern.

In summary, a weed management program should be designed not only to minimize weeds present at harvest but also to eliminate yield losses caused by weeds. Under many conditions, weeds can begin to impact soybean yields very early in the growing season. Delaying application of postemergence herbicides beyond the critical period can result in significant yield losses even though the field may be clean at harvest. The risk of early-season competition can be managed through timely application of postemergence herbicides and the use of preemergence herbicides.

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