

Late-season postemergence issues in Roundup Ready soybeans

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Weeds continue to defy control in a number of fields throughout Ohio and Indiana, and lambsquarters, giant ragweed, and marestail appear to top the list of most problematic weeds. No surprises here. Failure to make initial postemergence glyphosate applications early enough in the season can be a primary reason for poor control, due to the advanced size and age of weeds at the time of application. Dry weather caused many growers to delay postemergence applications, with the hope that an ensuing rain would improve conditions and the weeds' response to herbicide. While the rain may have cooperated in some areas, the continued lack of rain in other areas resulted in older weeds that were generally more tolerant of herbicide. The effect of weather was evident in our research plots, where the effectiveness of the standard rate of glyphosate, 0.75 lbs ae/A, was reduced compared to wetter years, especially on lambsquarters and giant ragweed. Glyphosate was much more effective in our plots where it was applied at a rate of 1.5 lbs ae/A, or where the activity of preemergence herbicides resulted in smaller weeds at the time of postemergence application. Many growers continue to apply glyphosate at the rate of 0.75 lbs ae/A regardless of weed size and age or weather conditions, when applying a higher rate can be the better decision.

We are also hearing reports that many of the weeds not controlled by postemergence glyphosate applications have been infested with stem-boring insects. University research has shown some potential for a reduction in control when the stems have been infested with borers, and that increasing glyphosate rate can partially compensate for the reduction in control. This same research shows that borers are a problem primarily when the weeds were initially treated when they were too large or too old, which allows enough time for borers to infest the weeds. Applying glyphosate to small weeds, prior to the appearance of stem-boring insects, is the most effective means of avoiding this problem. We suggest that glyphosate be included in late-season applications even where stem borer is occurring, on the assumption that it will still contribute to the control of borer-infested weeds.

We can offer the following information on late-season control of weeds, especially those weeds that have escaped prior treatment.

Timing of late postemergence applications

Our research generally shows that an interval of no more than 3 to 4 weeks should occur between postemergence glyphosate applications, which means that postemergence treatments should be largely finished by the second week of July. This allows enough time for surviving weeds to show some regrowth, but weeds have typically not regrown to a large size. It's not necessary to allow the weeds to regrow to the point that they are taller than the soybeans. Weeds that are about the same height or slightly smaller than the soybeans can receive adequate amounts of herbicide spray. Soybeans treated in late July or later in the summer are more likely to be injured by glyphosate. Labels for Monsanto brand glyphosate products state that they can be applied to soybeans through the R2 growth stage (flowering), but not after the R3 growth stage begins. The R3 growth stage begins when one of the uppermost four nodes with a fully developed leaf has a pod that is at least 3/16 inches long. Application of glyphosate to soybeans that have started the R3 stage is not



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supported by the labels (i.e not legal). We assume that the labels for most other glyphosate products contain similar guidelines, but we have not conducted a thorough search of labels to verify whether this is the case.

What to spray?

It is important to keep in mind that the amount of glyphosate that can be applied to Roundup Ready soybeans between emergence and the end of R2 growth stage is 2.25 lb ae/A. So, if you applied 0.75 lb ae/A in the first postemergence treatment (22 oz/A of Roundup Weathermax or 24 oz/A of Touchdown, or 32 oz/A of a generic glyphosate), you can apply up to 1.5 lb ae/A in the second treatment. If you applied 1.5 lb ae/A in the first treatment, you are limited to 0.75 lb ae/A in the second treatment.

Marestail. Glyphosate-resistant marestail is widespread in southern Indiana and Ohio. However, most populations are somewhat suppressed by glyphosate, so the best strategy will be to apply the maximum amount of glyphosate allowed (0.75 to 1.5 lb ae/A) in a mixture with either FirstRate or Classic. There are a few populations of marestail that are resistant to both glyphosate and Classic/FirstRate, but Purdue surveys suggests that less than 10% of the populations in Indiana are resistant to both glyphosate and ALS inhibitors. FirstRate typically provides 5 to 10% better control of marestail than Classic. If you don't know if whether your population is resistant to ALS inhibitors, consider past herbicide use in that field. Repeated use of FirstRate, Classic, or Synchrony in a field over the past 5 to 7 years increases the probability of ALS resistance.

Common lambsquarter. Under dry weather conditions, lambsquarter becomes more difficult to control with glyphosate or any other systemic herbicide. As mentioned above, the best strategy at this point in the season would be to increase the glyphosate rate if you have the ability to do so based on the rate used in earlier treatments. Including additional nonionic surfactant may result in slight improvements in lambsquarter control, but is not a substitute for increasing glyphosate rate where it is possible to do so. If the 1.5 lb ae/A rate of glyphosate was used in the first postemergence treatment, and you are limited to 0.75 lb ae/A, the addition of Harmony GT may improve activity on lambsquarter.

Giant ragweed. Populations that have evolved a low level of resistance to glyphosate can be found in at least 10 counties in Indiana and 11 counties in Ohio. The populations in Indiana are randomly scattered all over the state. The best strategy at this point would be to increase the glyphosate rate if you have the ability to do so based on the rate used in earlier treatments. If the 1.5 lb ae/A rate of glyphosate was used in the first postemergence treatment, and you are limited to 0.75 lb ae/A, the addition of FirstRate, Flexstar, Cobra, or Phoenix may improve activity. Important points to keep in mind as you think about tankmix partners for giant ragweed include:

- 1) Although we haven't stumbled across a large number of populations resistant to both glyphosate and FirstRate, keep in mind that if you have previously observed poor performance by ALS inhibitors on giant ragweed in the field of concern, that the population may be ALS resistant. This could result in inadequate control with mixtures of FirstRate and glyphosate.
- 2) Flexstar carryover potential is greater when it is used late in the growing season. You may want to use Cobra or Phoenix instead, to reduce the potential for Flexstar carryover. Also, keep in mind that the use of PPO herbicides such as Flexstar or Cobra can antagonize the activity of glyphosate on some weeds. We have conducted trials to evaluate the use of different adjuvants in mixtures of glyphosate and Flexstar or Cobra, and our preliminary results suggest that we should stay with nonionic surfactant when mixing Flexstar and glyphosate. Our current research seems to indicate that while the use of crop oil concentrate reduces glyphosate activity, the mixture of Cobra plus glyphosate may be more effective when crop oil concentrate is added.

- 3) We have research in progress to resolve the rates that should be used in mixtures of glyphosate plus Cobra. While our information is incomplete at this time, this research seems to suggest that where the glyphosate rate is limited to 0.75 lbs ae/A in a late application, the Cobra rate should be 12.5 oz product/A. The Cobra rate can be reduced where it's possible to use higher glyphosate rates.

Manganese and glyphosate

The activity of glyphosate can be reduced when applied in mixtures with manganese, and this reduction in activity is of greater concern when trying to control weeds that have escaped prior herbicide treatment and under droughty conditions. Control of velvetleaf can be especially problematic when using these mixtures. Our best suggestion is to apply glyphosate and manganese separately when trying to clean up weedy fields this late in the season. Ideally, the glyphosate is applied first, followed by application of manganese at least one day later. When it's impossible to avoid mixing glyphosate and manganese, follow these guidelines:

1. Use an EDTA-chelated form of manganese, which has less potential to reduce glyphosate's activity in comparison with other forms of manganese.
2. Include ammonium sulfate in the spray mixture at the rate of 17 lbs/100 gallons. Add the ammonium sulfate to the spray tank first, followed by the manganese, followed by the glyphosate.
3. Use the highest glyphosate rate that can legally be applied, based on the amount used in previous postemergence applications (see comments on rate earlier in article).