Herbicide-resistant weeds?

Kelly Backscheider
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Keeping corn and soybean fields clean is one of the most important steps toward getting a good yield at harvest each season. However, some years, weed escapes may thwart plans for perfectly clean rows. An important question to ask when this happens is: "Did something go wrong with the weed control program or are the weeds herbicide resistant?" Corteva Agriscience North America Herbicide Biology Leader Kelly Backscheider has advice to help answer this question.

Why herbicide resistance develops

Backscheider says there are several reasons weeds will develop resistance to herbicides.

"Some herbicide modes of action will develop herbicide resistance more easily than others based on the way the herbicide works in the plant. Some weed species will be more likely to develop resistance due to the characteristics of that weed," Backscheider says. "However, generally, herbicide resistance develops by the repeated use of the same herbicide or repeated use of herbicides from the same mode of action."

Backscheider says resistance can develop in a certain location quickly or slowly, depending on multiple factors, one of those being the weed species.

For example, she says waterhemp and Palmer amaranth can become resistant more quickly than some other weed species, because they're dioecious with separate male and female plants. This allows for more reproductive variation. "A resistant male pigweed can pollinate a susceptible female pigweed and, by next year, the offspring are all resistant as a result."

This isn't the only example that can impact the speed at which herbicide resistance progresses.

"Additionally, herbicide resistance often might not be noticed until it has been present for a few years. It might just be one escaped weed in year one that quickly turns into hundreds of resistant weeds in a matter of a few years," Backscheider says. "Or, in one situation, there might be a weed that gradually builds up resistance to a level where the labeled rate no longer controls it. In other situations, there are mechanisms of resistance such as gene amplification where say a 50x rate won't control the resistant weed, so resistance develops very quickly to a point where a labeled herbicide rate will not control the weed."

Are the weeds herbicide resistant?

While herbicide resistance is certainly a problem, Backscheider says, the problem on a farm might not be resistance. The weed control program might just have been ineffective, leading back to the original question in this article: Are there weed escapes because of resistance or because of an unsuccessful program? "A weed control program might be unsuccessful for a number of reasons. Maybe it wasn't a solid program for a specific weed species. It also might be that the environmental conditions made it difficult to manage weeds in that particular season," Backscheider says. "If it's been too dry, maybe the residual herbicide didn't get activated and weeds emerged sooner than they should have. Maybe it was cold and cloudy when the postemergence herbicide was applied and that herbicide needs sunlight to work in the plant. Maybe the weeds were too large for the application."

She says resistance will be evident when the right environmental conditions, along with an effective and timely herbicide program, are in place and yet the weeds are not controlled. There are other signs of resistance to look for as well.

"An unsuccessful weed control program often only happens once and then the weeds are able to be controlled," Backscheider says. "Pay attention to the fields. Scout fields a few weeks after making an application. Are there survivors? In a resistance situation, a dead plant can often be seen within a short distance of a surviving plant of the same size."

Backscheider says certain weeds can also be tested to see if they're resistant to certain herbicides.

"Farmers can send in suspected resistant weeds to university labs for testing. Waterhemp and Palmer amaranth are usually able to be tested, but so can other weed species such as marestail or giant ragweed. Keep in mind that there might not yet be testing for resistance to a particular herbicide though," Backscheider says. "The best bet is to assume there is resistance. If resistance has been talked about in a state and there is trouble controlling weeds, it's best to assume resistance exists. Plan a weed control program accordingly."

Mitigating herbicide resistance

While it's a good idea to have weeds tested to help keep resources like the International Herbicide-Resistance Weed Database up to date, Backscheider says taking steps to prevent or mitigate herbicide resistance is always the right move.

Here are some reminders to do that:

- Create an effective weed control program.
  - Include burndown, and pre- and postemergence applications.
  - Use multiple effective modes of action in each pass.
  - Overlap residual herbicides.
- Utilize other weed control tools including:
  - Crop rotation
  - Cover crops
  - Tillage

"Herbicide resistance isn't going away," Backscheider says. "So companies are focusing on new traits, new herbicide products and new tools that can help manage resistant weeds so farmers can maximize yield."

And while waiting for those new tools and technologies, Backscheider says it's also important to keep an ear to the ground about resistance.

"Pay attention to neighboring fields. Pay attention to university weed science social media accounts, blogs, podcasts, etc.," Backscheider advises. "Pay attention to neighboring states. If resistant weeds are showing up across the border, it's likely just a matter of time before resistance weeds cross over."

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