

Farm Industry News



University of Illinois

CROP PROTECTION

Taking on weed resistance

Waterhemp has become public enemy No. 1 in Midwest soybean fields; dealing with it will take new tactics.

Willie Vogt | Mar 29, 2017

Times are changing in the herbicide world. In a recent webinar sponsored by FMC, there was as much talk about using the company's product as adding in other brands to make sure everything worked. Welcome to the world of managing resistant weeds. And the key is knowing what sites of action you're using when dealing with your weeds, especially waterhemp.

First a bit about waterhemp, which Aaron Hager, weed scientist, University of Illinois, points out is native to the Midwest. "25 years ago we weren't even talking about this weed, it was a small problem," he recalled. "We didn't even recognize it as

a unique species of amaranthus." With its red roots, often farmers would mistake it for redroot pigweed, rather than as waterhemp.

Today, waterhemp is the "driver for broadleaf weed species and farmers make critical management decisions" around this weed. And herbicide stewardship is important. He notes that in Illinois waterhemp plants have been found to be resistant to 6 different

site of action herbicide groups.

With a weed like waterhemp, standards of control have changed, explained Nick Hustedde, technical service manager, FMC. If one female waterhemp survives every 100 square feet in a field that would mean about 87,120,000 seeds per acre. At 30% viability after two years that would drop to 25,136,000 plants. If you get 95% control, that still leaves more than 1.3 million escapes, he explained. In the past, 95% control was acceptable, perhaps not so much today.

"We need to take a zero tolerance approach for the [weed] seed bank to manage resistant pigweeds," Hustedde said. That will challenge most weed control programs.

Hustedde hosted the webinar with Hager, and talked about one tool that can be used against waterhemp preemergence, to help get ahead of the weed. Interestingly, the site of action is a PPO herbicide, which works well premerge, but waterhemp has developed resistance to a foliar application.

The PPO mode of action - which is an inhibitor of protoporphyrinogen oxidase in the plant, to speak scientifically - has been effective for some time. FMC's Authority herbicide is a PPO inhibitor, which Hustedde noted has longer activity in the soil than some competitors, offering farmers a better window of control for those early resistant plants.

The challenge with waterhemp, Hustedde noted, is that it doesn't just emerge with the crop, in fact it has multiple emergence times throughout the growing season. As ALS-inhibitors, and glyphosate, failed there evolved selection pressure on foliar-applied PPO inhibitors where glyphosate no longer worked creating resistance to that mode of action as well.

And that resistance has spread. In Illinois, Hager said that it is likely they could confirm, or find PPO resistant waterhemp in every county in the state.

The evolution of the resistance from a genetic standpoint is interesting too. Waterhemp is dioecious, meaning there are male and female plants. Hager noted that genetic resistance to a herbicide is based on alleles of a gene - essentially two alleles can work in combination to create sensitivity or resistance. It's basic genetics, Hager said, noting that when a resistant allele is present in a plant you get resistance to the PPO, but if the allele is recessive then the plant remains sensitive.

However, below-label application rates can let even those recessive allele plants survive, passing on that resistance gene to other plants where it may become dominant, creating more resistance in the field. Essentially, total control is needed to keep clear.

Sites of action at work

More farmers than ever have taken to using a preemergence herbicide as part of their weed control program. It offers a two-fold advantage. First, it keeps weeds out of the way early when the crop is emerging. Second, it widens the window for use of a viable postemergence herbicides because emerged weeds will be smaller at application time.

However, knowing the sites of action you're putting to work on a field is important too. You may think you're putting more on than you actually are. For example, if you use Authority Maxx or Valor XLT as a preemergence you have a Group 2 and a Group 14 site of action at work, but only one of those modes of action is effective (Group 14)

with resistant waterhemp. Then your post program has glyphosate plus Marvel herbicide or Flexstar herbicide, you have a Group 9 and a Group 14 at work, but again only 1 effective site of action. You've applied three sites of action, but in fact only 1 was effective, Hustedde said.

It's that kind of herbicide confusion farmers have to manage for, and that means working closely with your herbicide supplier to bring as many effective sites of action to bear on weeds at the right time as possible. Hager noted that Authority as a Group 14 PPO herbicide is effective, but adding in a Group 5 like metribuzin would work to take out sensitive plants in the field. "You would have two effective herbicides in the mix," he added.

Diversity in action

Maintaining effectiveness of the herbicides farmers have left is key, Hager noted, and another avenue for that is to consider non-herbicide tactics to defeat weeds. He recommends bringing diversity to your weed control program with both herbicide and non-herbicide activity.

A key is managing the weed seed bank. Small-seeded broadleaves like pigweed, for example, don't germinate if they're buried. So deep tillage is one answer, though not for highly erodible soils. During the webinar work by Kevin Bradley at the University of Missouri was highlighted showing a dramatic drop in viable seed density for small-seeded broadleaf weeds under deep tillage.

While that won't work for producers aiming to hold soil where it belongs, other tactics that can help reduce weed seed density include boosting plant populations. For example, in Bradley's work 130,000 seeds per acre for soybeans, seed density for weeds was much higher than a boost to 160,000 seeds per acre. While even higher populations lowered the density more, the biggest benefit was that first increment - boosting population from 130,000 to 160,000.

Another cultural practice to consider is narrow rows, which allow plants to canopy earlier, stunting or even stopping weeds early. In drilled soybeans, the late-season density of weeds seeds was remarkably lower than in 30-inch rows, in Bradley's work.

A key weakness for waterhemp is that seed life is short at four to five years. If you can bury, or stop, those seeds from germinating, they become less trouble in a short amount of time. The key message from Hager is that you have to use a range of tactics to beat a tough, resistant weed like waterhemp. "We do not see a new blockbuster chemical coming to market within the next five years," he said.

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