Kochia Resistance
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Kansas weed research scientist delivers sobering news on resistant kochia

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Phil Stahlman was been battling glyphosate-resistant kochia probably longer than any other weed scientist in the U.S., since the problem first started showing up in Kansas. The message he brought to those attending a recent seminar on weed resistance at the Carrington Extension Research Center was rather sobering-resistant kochia has now spread to five additional states, including North and South Dakota and Montana, and there are indications the weed is developing resistance to other herbicides. In addition, resistant populations have been discovered in Canada.

Kochia was introduced to the U.S. around 1900 from the Eurasian region and because some kochia takes on a red color, Stahlman believes it may have been brought here for an ornamental purpose. During the drought years in the 1930s the plant spread throughout the northern Great Plains and much of the western United States. It can grow to as tall as seven feet and roots commonly grow to a depth of six to eight feet, however during extremely dry years, Stahlman has seen evidence of kochia roots going as deep as 16 feet in search of moisture.

The reproductive traits of kochia leads to a wide genetic diversity in the population. The plant cross breeds, and in fact the pollen in the kochia plant matures at a later time than the female portion of the plant, thus encouraging this cross pollination instead of self-pollination.

"Kochia, because of this genetic diversity, is one of the species that is really quite prone to develop herbicide resistance," Stahlman said. "Kochia is also a tumble weed and in the fall they have cells at the base of the plant that harden allowing the plant to break off from the root. That plant is then blown across the landscape by wind and it deposits seeds as it rolls along the ground, which is a pretty effective way of distributing the seed."

Because of the openness of the plains region, he figures a tumbling kochia plant can easily move two miles in a day's time, scattering seeds along its path.

Stahlman noted it's a widely held belief that using reduced rates of herbicides is one of the driving factors that helps select for resistance. And that certainly was the case in southwest Kansas, as farmers tried to control cost by using one half to two-thirds of the normal recommended rates for glyphosate on kochia. In 2005 Monsanto received some complaints from growers in that region that kochia wasn't being controlled as it once was. Monsanto then dispatched a research team to that area and found that there was a degree of tolerance in some of the kochia stands, but not outright resistance, Stahlman said.

However, Monsanto continued to monitor those areas and in 2007 they confirmed there was populations of kochia that could not be controlled with elevated rates of glyphosate and the resistance factor was proven in greenhouse testing. Three other populations of kochia in Kansas were proven to be resistant that year, with the distance between these populations up to 70 miles apart. In fact they ranged all the way from the southwestern part of the state northward to almost the Kansas-Nebraska border.

"We realized at that time that we had a pretty significant problem in the making," he said. "Things literally exploded in 2010. We went from a few scattered populations to lots of populations across the state.

"Because of the traveling nature of kochia, you as an operator can do everything right, but unless your neighbor is diligent in taking care of the problem on his operation, you can easily become re-infested and then of course you have the ditches and roadside areas that you have to be concerned with as well."

From a survey conducted last summer of crop advisors, he estimates that as of last year Kansas has between three to five million acres of farmland infested with resistant kochia, and that might be on the conservative side.

Some Kansas producers have embarked on different practices as a way to control the resistant kochia population. These methods include using a tank mix of glyphosate and additional herbicides such as dicamba, chemical for a post application; using both a pre-emergence and post emergence application and incorporating tillage into the system. Of those three changes, the best response is coming from a tillage operation, although that is the one thing, Stahlman said, they don't want to see.

He made reference to a recent publication by weed control experts that the resistance weed problem is causing a threat to all conservations gains that have been made in the past 10 years or so and also to the sustainability of farming, due to the return of more tillage operations to control these resistant weeds.

Stahlman then listed several things growers can do to lessen the impact of resistant kochia in this region, noting that we are in the position right now that Kansas was at several years ago, meaning we can more proactive in our response to the problem.

- Using full rates of herbicides
- Spraying when the kochia are less than four inches tall
- Using a tank mix of other chemicals with glyphosate
- Using both a pre-emergence and post herbicide application
- Don't let any survivors go to seed-either mow them or use tillage to kill them before they can produce seed
- Control the kochia along the edges of the field, in ditches and along the roads

In closing his remarks, Stahlman said, "I would certainly encourage you to take the early indications of resistance seriously, and make changes to your management in such a way that you can get on top of it so that it doesn't get away with you."

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