

Farmers still early in game of glyphosate-resistant weeds

By Forrest Laws
Farm Press Editorial Staff
flaws@farmpress.com

It wasn't supposed to turn out this way for glyphosate. For years, weed scientists said the risk of weeds developing full-blown resistance to the one-time burndown herbicide was relatively low.

That thinking has been drastically altered

in recent years, however, as first glyphosate-resistant Italian ryegrass, then horseweed or marehail, then Palmer amaranth and now giant ragweed reared their ugly heads.

Compared to other herbicide modes of action, the number of documented cases of resistance to glyphosate — 20 — is still low, says Alan York, William Neal Reynolds professor of crop science and Ex-

tension specialist at North Carolina State University.

"When you look at the number of cases for glyphosate resistance, you think that that's not such a big deal," says York. "We don't have as many as we do of ACCase inhibitors (Poast and Fusilade — 25), and certainly we're nowhere near where we are with triazines or with ALS inhibitors (90 and 120 cases)."

But the latter have been around a lot longer, York said at the first-ever joint annual meeting of the American Society of Farm Managers and Rural Appraisers, the National Alliance of Independent Crop Consultants and the American Society of Agricultural Consultants in Atlanta.

Roundup Ready systems have been available for about a decade. The ALS inhibitors (imidazolinones, sulfonylureas, triazolopyrimidines and pyrimidinylthio-benzoates) have been out two decades and the triazines (atrazine, etc.) five decades.

"The question is where glyphosate will be 10 years from now," he said. "And the answer to that depends on how well we can convince our farmers that it's a real threat, and how we can convince them to begin to take some action."

Why glyphosate resistance when the conventional wisdom for years was that the risk of getting resistance to glyphosate was much lower than with some of the other herbicide chemistries that farmers use?

"Nobody said it would never happen," says York. "You put enough selection pressure on any herbicide, and you're probably going to find resistance. So even though there is still, in my opinion, relatively low risk of resistance with glyphosate, we are using so much glyphosate we're going to find resistance."

In the Mid-South and Southeast, Roundup Ready crops literally have taken over with growers planting nearly 100 percent Roundup Ready cotton with the soybeans in those states not far behind.

Those crops have brought major changes in the use of tillage practices and herbicides. Fifteen years ago, farmers were using conventional tillage and cultivations, DNAs, Cotoran pre-emergence with Command or Zorial and Cotoran plus MSMA and Bladex plus MSMA post-directed.

"Now that we have Roundup Ready, most farmers are doing conservation tillage — the Southeast is 50 percent no-till," says York. "No one cultivates any more. Now we depend almost 100 percent on glyphosate."

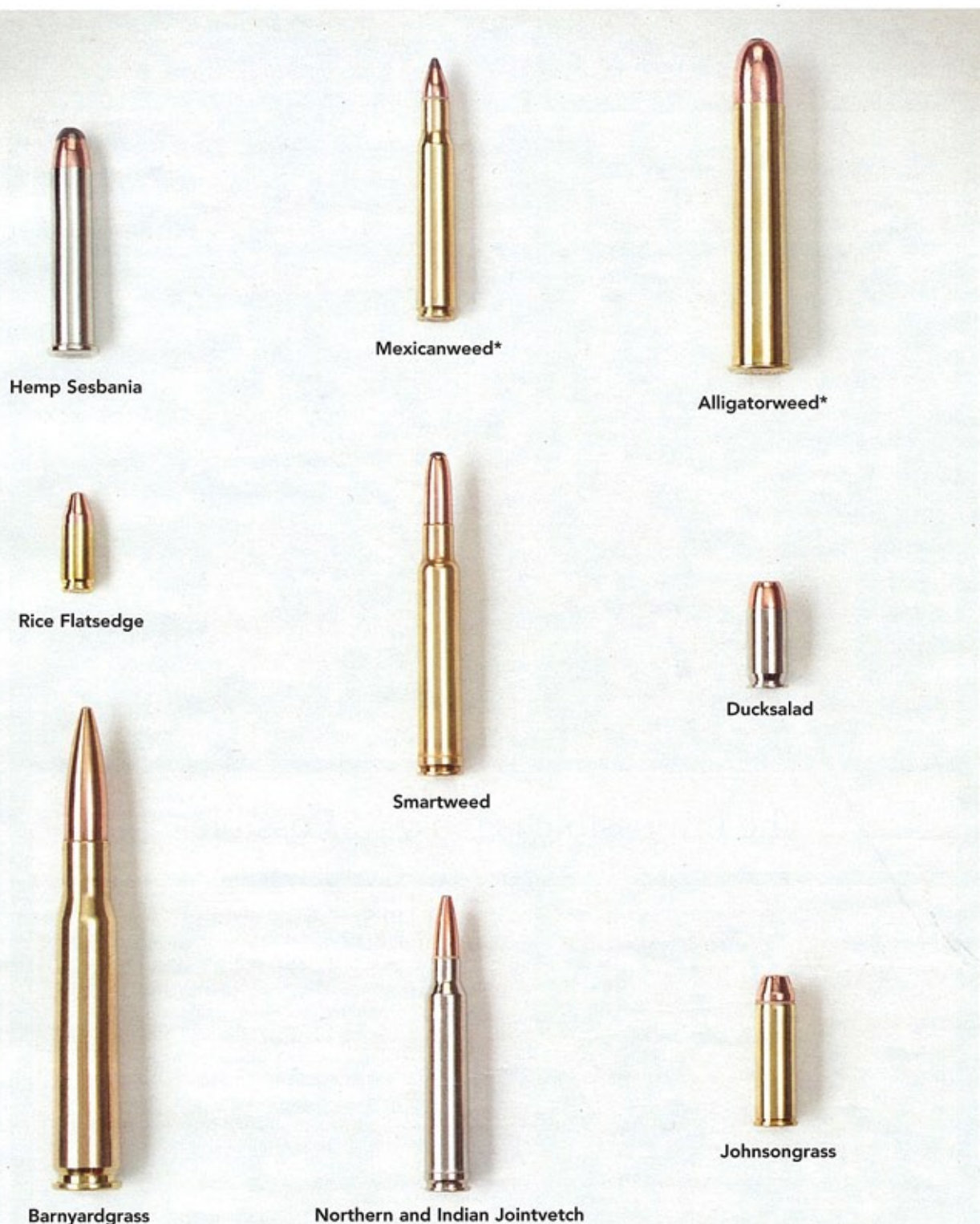
It's easy to say farmers should simply go back to the plow, but that isn't practical given labor availability and fuel costs. "I wouldn't worry about resistance if we weren't so dependent on herbicides," says York.

"Cultivation has almost become a cuss word in some areas."

Nevertheless, farmers should reduce their reliance on herbicides — where practical, he says. They should also plant competitive crops and cover crops and, yes, use cultivation when they can. Crop rotation, with appropriate herbicide selection, can also help.

"Multiple modes of action will be a phrase farmers will hear more and more as we try to keep resistance from spreading even further," says York. "We think farmers should use at least two different modes of action in corn and soybeans and three in cotton. Residual herbicides and full use rates will also be important."

Glyphosate-resistant Palmer amaranth is giving weed scientists the most concern now. Weed scientists have documented glyphosate resistance in Palmer amaranth in Georgia, North Carolina, and South



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Carolina. Resistance is suspected in Arkansas and Tennessee.

An extremely prolific plant, Palmer amaranth can become the dominant weed in a field in short order, says York. Research has shown one Palmer amaranth plant per square yard can cause a 50 percent yield reduction in cotton. "We've seen fields with 200 weeds per square yard," said York. "You can get 99 percent control and still lose the crop."

Farmers who suspect they might have a problem with glyphosate resistance should try to stop depending entirely on glyphosate in their Roundup Ready cotton or soybeans or corn.

"We must begin incorporating herbicides with multiple modes of action in our weed control systems," he said. For openers, that can include residual herbicides preplant or pre-emergence. For preplant, Direx and Valor are choices, and for pre-emergence, growers can consider Cotoran, Direx, Prowl, Reflex and Staple.

When farmers get to the postemergence stage of weed control, tank mixes of Dual Magnum, Envoke or Staple with glyphosate are possibilities. At layby, residual herbicides such as Direx, Layby Pro, Suprend or Valor can be tank-mixed with either MSMA or glyphosate.

"With glyphosate-resistant Palmer amaranth, one of the keys will be to reduce the seedbank," said York. "If you can get three or four years of good control, you can reduce the populations down to where you can live with them."

"And, again, use residual herbicides.



MIKE OWENS, right, Extension weed scientist with Iowa State University, talks about resistance management issues with Alan York, left, Extension weed scientist at North Carolina State University, and Orvin Bontrager, secretary of the National Alliance of Independent Crop Consultants from Dodge City, Kans., at the group's annual meeting in Atlanta. York and Owens spoke on the subject at one of the NAICC sessions.

Residual control is important. We also need to protect the ALS inhibitors such as Staple and Envoke. We receive some of our best control from herbicides such as Staple. But we really want to avoid multiple resistance to glyphosate and Staple."

York and his colleagues have put together a series of recommended herbicide programs for trying to keep Palmer amaranth at bay in Roundup Ready cotton systems in the Southeast. Those could be helpful in the Mid-South, as well.

Where growers have been able to con-

tinue to control Palmer amaranth with glyphosate or ALS-inhibitor herbicides, weed scientists recommend a pre-emergence application of Staple, Reflex, Direx, Cotoran, Caparol or Prowl. For light infestations of Palmer amaranth (one to four-leaf stage), growers may apply glyphosate postemergence; for heavy infestations, glyphosate plus Dual Magnum II or glyphosate plus Sequence. At layby (Palmer amaranth larger than 3 inches), the choices are MSMA plus Valor, Suprend, Direx or Layby Pro or glyphosate

plus Valor, Suprend, Direx or Layby Pro. If resistance has developed to ALS inhibitors, the weed scientists recommend that farmers omit Staple from the pre-emergence options and MSMA plus Suprend or glyphosate plus Suprend from the layby options.

For fields that have Palmer pigweed resistant to glyphosate, the pre-emergence recommendations include Prowl plus Reflex or Prowl plus Direx for heavier soils. For postemergence, growers may apply glyphosate plus Dual Magnum or Sequence if no Palmer amaranth has emerged. For Palmer amaranth less than 2 inches tall, glyphosate plus Staple may be applied. For layby, the recommendations include MSMA plus Valor, Suprend, Direx or Layby Pro.

York suggests growers monitor fields closely for signs of herbicide control failures. "We don't have a quick assay or kit to help us detect herbicide resistance. We have to grow plants in the greenhouse and spray them to determine if they are resistant. So the quicker you can detect resistance, the better off we will be."

If growers suspect a problem, they should first eliminate other potential causes for control failure. Then, they should look for known indicators of resistance.

"We have some situations where resistance is questionable," says York, referring to possible discoveries of glyphosate resistance in giant ragweed and Italian ryegrass. "But if a 4X rate of glyphosate won't kill it, you know something is wrong."

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