

# Waterhemp Control

## Professor Tests Herbicides To Curb Resistant Weeds

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Application upon application of glyphosate will not control the waterhemp plaguing a site in Jackson County, Ill., according to Bryan Young, professor of weed science, Department of Plant, Soil and Agricultural Systems at Southern Illinois University.

"I conducted research here back in 2008. I came out here first because the grower had two applications of glyphosate and that didn't control the waterhemp," he said. "I came out last year and applied additional applications and various herbicides and found that I was unable to kill it with more glyphosate either. That's

other pigweed species prefer to germinate close to the soil surface. Thus, the use of tillage to bury the seed deeper into the soil can be part of an integrated management strategy. Tillage may not have to be used every year, but certainly should be considered as a component of a long-term approach for improving weed control.

While not blaming Roundup herbicide, he said that Roundup is a herbicide which does carry a slight risk of spurring resistance.

"We've just used it so much and didn't use other things with it, that we've created a huge opportunity for resistance to grow," he added. "We didn't use tillage, we didn't use tank mix herbicides, we didn't use residual herbicides so

**Young says they have various plots out in corn and soybeans and the study now is aimed at looking at the first few treatments, adults response of glyphosate to see if they can kill it or if they just need a higher rate.** Photo by John LaRose, Jr.



what you do with a Ph.D, you spray more glyphosate to make sure."

Again the applications didn't control the waterhemp, so Young took the seed to the greenhouse, and compared it to what you might call a normal population. The suspect waterhemp population is less sensitive to Roundup or glyphosate materials in general than a normal population, so Young is doing the research again to confirm the results were not just an abnormality from the environmental conditions in 2008.

"We have various plots out here in corn and soybeans and the study here now is aimed at looking at the first few treatments, a dose response of glyphosate to see if we can kill it or if we just need a higher rate; but we have 22, 44, 88, 176 and 352 ounces of Roundup PowerMax with ammonium sulfate applied on waterhemp that was in that four to maybe an eight inch stage about two weeks ago, and we have survivors in all those treatments," Young noted. "At the normal use rate of 22 ounces per acre, approximately 90 percent of the plants survived with minimal injury to the surviving plants. As we get to the higher rates fewer survive but it still is an unsatisfactory level of control."

"Last year we confirmed this particular waterhemp population is resistant to post-emergence applications of atrazine and ALS-inhibiting herbicides such as Pursuit in addition to glyphosate resistance, he said. We are trying to figure out just what herbicides can be tooled for the grower who might have this problem. The research site that we're in now and last year, all 86 acres had a similar level of waterhemp infestation and failure with glyphosate applications. This isn't the only spot in Jackson County that has this issue. I know of at least two to three others and even in some adjoining counties where there are some problematic fields that probably have some significant issues of waterhemp resistance to glyphosate."

When it comes to burndown, paraquat (gramoxone) offers great control of waterhemp, however, once you plant the beans or the corn you can't use that chemistry any more. Otherwise, if you hit it early, 2,4-D, Dicamba, even glufosinate (Ignite) have good activity but they must be used early. Two-inch weeds or smaller would be ideal.

"The problem is we don't always have the opportunity to make those timely applications," Young continued. "We do have some solutions but it's going to take a greater level of management by the grower or the custom applicator or the field scout possibly, whoever is in charge of making decisions when to spray and when it actually does get sprayed. It's going to take more management and so that creates more of a headache, more time involved per acre and I know that's something that nobody can afford right now. We do have some partial answers for it, but in soybeans it is a challenge because of the multiple resistance that we have, the resistance to ALS herbicides, the resistance to some of the PPO-inhibiting herbicides like Flexstar, Cobra and Blazer and then some of the size limitations that we might have with Ignite or 2,4-D or Dicamba. In the future maybe we can use 2,4-D and Dicamba with herbicide tolerant beans that are coming to market, but right now they're not a solution for us; and they won't come close to replacing the value of glyphosate."

Eight years ago, glyphosate was still killing all the waterhemp we had, growers were happy, it was a simple system," he said. "It's a progression from where it works wonderful, gives complete control, to where it's inconsistent and you have complete failure. It's important for a grower to acknowledge that continuum. If you hit it early, maybe you won't have a field that is a solid bed of waterhemp that you can't kill with Roundup anymore."

Education is necessary. Farmers who have problems with glyphosate should consider it an early sign of shifting toward a resistant population.

"Farmers need to switch what they're doing in terms of herbicide modes of action or maybe tillage," he said.

The field in question has been in a Roundup-based system for about three years, and a no-till situation for the same time.

"I wanted to plant my research site in a no-till system to improve the odds that plenty of waterhemp seed would be left on the surface to supply ample plants for research this year," Young said. "Right next to this, the grower planted corn and he tilled it because he wanted to bury his waterhemp seed. Tillage and some residual corn herbicides have resulted in no waterhemp plants in his corn field at this time. Small-seeded weeds such as waterhemp and

we destroyed the system. Roundup didn't fail us, we failed it in the way we managed our fields. So if we did use better management through tillage maybe you could get better activity and maintain the utility of glyphosate. Will it get back to normal? I don't think so, but I do foresee that Roundup will be like atrazine in corn. We do have some resistant weeds to it. It doesn't work like it used to but it sure does kill a lot of weeds and it sure is a good value and I see that for Roundup in our soybean production."

Perhaps breeders could take this weed and reengineer its makeup to where it dies from Roundup. That has been tried with insect management.

"We're always applying some sort of selection pressure because we're trying to manage it so whatever genotype out here has the environmental fitness benefit or advantage we're going to select for it and typically those are ones that survive herbicides or tillage or drought or flood and so it would be very difficult to actually manage the population through those means," Young said. "Ideally we'd have a soil sterilant to use but that's not cost effective. We do have methel bromide but I'm pretty sure several million acres of soybean won't get methel bromide any time soon. Cover crops might be an issue, but, let's face it, we have plenty of waterhemp and even marestail in our wheat that's being harvested right now. So cover crops might reduce your population, but using some cover crops with tillage for an integrated approach is something that we haven't had. We've had the polar opposite of integration, we've just used Roundup and that's it. So I guess you could say we failed glyphosate because of simplicity and cost."

Perhaps people were also blinded by the thought that Roundup was a magic pill.

"That's still the mentality, industry will always bring something to market," Young said. "We hear about Dicamba-resistant soybeans, we hear about LibertyLink soybeans, we hear about Dow's DHT-resistant soybeans and Optimum GAT. There's not going to be the second coming of Roundup Ready by any means. They're going to be integrated approaches, all of those need to be mixed with soil residual herbicides, all those may need some tank mix partners, postemergence to help control the spectrum weeds that we have, so that's very similar to what we're saying you need to do today in a Roundup Ready system."

On one particular field, one could let the weeds blossom out the way it is, burn it down at the end of the season and then till it, hoping that would make a difference

"What we have is several million plants per acre we're dealing with so even if you control 99 percent of the waterhemp that's still leaving you with 10,000 plants," Young explained. "It is a bear and I don't think we can do that simplistically. It's going to take a long-term approach."

Young presented a plan to manage glyphosate resistant marestail better by using up to three or four different herbicides. Yet, the management of this resistant marestail failed this year.

"I can't figure it out 100 percent, so I have some questions about how we managed it in wheat, where we're going to double crop our beans," he added. "Just today, I saw three fields of wheat being harvested and I saw marestail in all of them and so when you put double crop beans in those, it's going to be a challenge because its not just one pass of Roundup once the beans come up; it's going to be a little more integrated than a pass in beans. It's not just waterhemp, its marestail now, waterhemp questions are going to start coming in pretty readily over the next few weeks I imagine."

He said the value of having a good crop rotation is you get a chance to integrate other herbicides and modes of action that might be used for management of a resistant weed population. Otherwise you couldn't use those if you're just in a continuous soybean system or continuous cotton system, so it does allow for good herbicide rotation to gain better long term management.

"When I started doing research in the '90s with waterhemp we had the question of 'how low of a rate of glyphosate can you use to control waterhemp?' We were talking about 'do you need a pint instead of a full quart?' Now we're looking at 22 ounces or more concentrated glyphosate formulations as the standard rate with many growers opting for higher rates of 32 ounces and above to get the most consistent control. So it's really changed a significant amount in just the last 15 years from 'how much can I cut the rate?' to 'how high of a rate can I apply' to control the problem weeds we have today." Δ

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