

Researchers find waterhemp has evolved resistance to four herbicide sites of action

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Four-way resistance (PPO, ALS, PS II, and EPSPS inhibitors) was confirmed in a waterhemp biotype collected from a soybean production field in eastern Nebraska (insets on left showing dose-response to different herbicides); the DG210 mutation conferring PPO-inhibitor resistance was confirmed using a Kompetitive Allele Specific PCR (KASPTM) assay. Credit: Debalin Sarangi.

A research study featured in the journal *Weed Science* provides worrisome new details about the evolution of herbicide resistance in

waterhemp—an annual weed that represents a significant threat to Midwest corn and soybean crops.

When a waterhemp biotype in eastern Nebraska survived a post-emergent application of the PPO inhibitor fomesafen, a team of university scientists decided to take a close look. They discovered the population was resistant to four distinct herbicide sites of action, including PPO inhibitors, ALS inhibitors, EPSPS inhibitors and PS II inhibitors.

Among their findings:

- All samples of the resistant waterhemp biotype tested positive for a G210 mutation in the PPX2L gene.
- The population exhibited a four- to six-fold resistance to PPO-inhibiting herbicides, a three-fold resistance to EPSPS inhibitors (glyphosate) and a seven-fold resistance to atrazine (a PS II inhibitor).
- When the ALS inhibitors chlorimuron and imazethapyr were applied at 32 times the label application rate, they achieved a less than 80 percent reduction in the aboveground biomass of the resistant waterhemp [biotype](#).

"Our study showed there simply are no effective post-emergent [herbicide](#) choices for the control of resistant waterhemp in either glyphosate-resistant or conventional crops," said Debalin Sarangi, a postdoctoral researcher at the University of Nebraska-Lincoln. "Growers will need to diversify their approaches to [weed](#) management and complement the use of chemicals with cultural and mechanical controls."

More information: Debalin Sarangi et al, Protoporphyrinogen oxidase (PPO) inhibitor-resistant waterhemp (*Amaranthus tuberculatus*) from Nebraska is multiple herbicide resistant: confirmation, mechanism of

resistance, and management, *Weed Science* (2019). DOI: [10.1017/wsc.2019.29](https://doi.org/10.1017/wsc.2019.29)

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