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Research finds mechanism of herbicide resistance

University of Adelaide researchers have identified the mechanism behind the resistance of the cereal weed brome grass to the widely used herbicide glyphosate.

Published online ahead of print in the journal *Pest Management Science,* the researchers report that it is the first weed species in Australia that has shown this mechanism of resistance.

“Great brome (*Bromus diandrus*) is a significant weed of both crops and pastures across the southern and western Australian cereal belts, causing contamination, yield reductions and damage to meat and livestock,” says postdoctoral researcher Dr Jenna Malone, from the School of Agriculture, Food and Wine at the University’s Waite campus.

Glyphosate resistant brome grass in wheat. Image: P. Boutsalis

Glyphosate is the most widely used and versatile herbicide in the world and one of the most important herbicides for weed management in Australian agriculture. Loss of glyphosate for brome grass control would cause serious issues for farmers.”

Resistance to glyphosate has been found in recent years in two different populations of great brome. Both populations showed the same mechanism of resistance —called gene amplification. In gene amplification, the resistant plant produces numbers of copies of the gene responsible for the enzyme EPSPS which is targeted by glyphosate. More enzyme production overcomes the herbicide action.

“It shows yet another way that plants are developing resistance to herbicides,” says Dr Malone. “Until now there have been just three key mechanisms for resistance. Unfortunately it means that there were will be even more cases of plants developing resistance to herbicides.”

Research group leader Associate Professor Christopher Preston says the research underlines the importance of using diverse practices for management of brome grass to reduce the risk of resistance developing.

"The bad news for farmers is that brome grass is another weed that will become increasingly harder to control," Associate Professor Preston says.

"It reinforces the need to not overuse glyphosate; to employ good practice of diverse wee management including crop rotations, fallow periods, interspersing with grazing cycles and other control mechanisms."

The researchers are continuing with further genetic investigations of brome grass to see how the gene amplification occurs and how it is controlled.

"If we can discover answers for this, we will have much better knowledge of how the genome of weeds and other plant species can rapidly adapt under stress," Dr Malone says.

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