Weeds herbicides resistance on the verge of being explained

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THE agriculture industry is on the path to finding solutions for one of the biggest threats to global cereals production and food security.

Herbicide resistance in weed species is one of the road blocks to increased cereal yields and farming productivity.

However, a team of researchers from The University of Western Australia's Australian Herbicide Resistance Initiative (AHRI) and Bayer CropScience has made a major breakthrough.

Until now, it has been a mystery how resistant weeds can break down several different herbicides. Using new technology, the team has identified for the first time six different genes that are expressed at a high level in ryegrass populations resistant to Group A and some Group B herbicides.

Weeds resistant to these two herbicide groups account for the majority of the in-crop weed control challenge. The discovery could now lead to practical new solutions in the future.

"By knowing more about it, we can look at coming up with solutions," Dr Todd Gaines, Post-Doctoral Research Associate with BayerCrop Science, told delegates at the Global Herbicide Resistance Challenge international conference in Fremantle.

"The long-term goal is if we understand how weeds are breaking down herbicides, we can develop new options or maybe add ingredients to old chemicals to protect them."

Dr Gaines, who is part of Bayer CropScience's weed resistance research team led by Dr Roland Beffa, said identifying the specific genes had been too difficult until recently.

"This research breakthrough has been made possible by using next generation sequencing technology to get a foothold and then to analyse and identify the genes involved. The technology takes all the DNA and sequences it all at once."

"Compared to the old sequencing method, this costs a lot less and is significantly quicker. "We obtained sequences for thousands of genes that are expressed in ryegrass seedlings and then compared resistant and susceptible populations.

"We firstly identified 350 genes that were expressed at either a higher or lower level in ryegrass populations resistant to Group A and some Group B herbicides. Then we further identified six genes that have a high association with resistance.

"We have sequenced a lot of genes for ryegrass using the new technology at low cost and in just a few months - we couldn't do that before." Dr Gaines said the discovery also would assist improved diagnostic testing.

"In future, growers could send resistant weed samples to a laboratory to quickly check whether they have non-target site metabolism resistance," he said.

Dr Beffa said, hopefully, simple tests could be developed for use in the field and from that information, agronomists and advisers could make better recommendations. He said the research team planned to publish the data and the sequences of the six identified genes soon.

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