Instances of Frogeye Leaf Spot Resistance to QoIs Abundant in Iowa

Daren S. Mueller  
<i>Iowa State University, dsmuelle@iastate.edu</i>

Ethan Stoetzer  
<i>Iowa State University, stoetzer@iastate.edu</i>

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Abstract
Iowa State University researchers, with funding from soybean checkoff through the United Soybean Board and Iowa Soybean Association, have confirmed that over 70 isolates of the pathogen Cercospora sojina (cause of frogeye leafspot in soybeans in Iowa) are resistant to quinone outside inhibitor (QoI) fungicides.

Disciplines
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Instances of Frogeye Leaf Spot Resistance to QoIs Abundant in Iowa

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Iowa State University researchers, with funding from soybean checkoff through the United Soybean Board and Iowa Soybean Association, have confirmed that over 70 isolates of the pathogen *Cercospora sojina* (cause of frogeye leafspot in soybeans in Iowa) are resistant to quinone outside inhibitor (QoI) fungicides.

**Experimental design**

Throughout the months of September and October of 2019, Iowa State extension plant pathologists collected soybean leaves displaying symptoms (small round lesions with dark reddish-brown borders) of frogeye leaf spot across 73 soybean fields, spanning 51 counties. Fungal spores were collected from each leaf lesion and isolated for a strain of the *C. sojina* pathogen. One isolate from each of the 73 fields was tested for sensitivity to azoxystrobin, a QoI fungicide. Researchers compared these test results with two control groups of *C. sojina* isolates with known sensitivity to azoxystrobin.
Results

Resistance to azoxystrobin was classified as fungi germinating in the presence of 1 parts per million (ppm) of azoxystrobin. Researchers found that nearly all of the isolates tested from all 51 counties had some level of resistance to azoxystrobin, having higher than a 50% germination rate (a single field in Adair County did not have such a high rate). In fact, most isolates were able to germinate in 10 ppm of azoxystrobin.

What does this mean?

As azoxystrobin is part of the QoI class of fungicides (FRAC Code 11), it’s important to know that the *C. sojina* pathogen’s isolates are most likely resistant to other fungicides within that same class, as resistance to QoIs is often the result of a single gene/single site mutation, most commonly the G143A mutation that occurs at the fungal cytochrome b gene.

Frogeye leaf spot resistance to QoIs was confirmed in Iowa back in the 2018 growing season by the Mueller Lab. The continued development of resistance among the pathogen’s different isolates illustrates that using QoIs as the primary control of frogeye leaf spot is no longer a solution to control the disease.
QoI-resistant strains can still be managed effectively with other fungicide groups, but introducing alternative disease management practices will be even more important to preserve future use of these fungicides. Selecting a frogeye leaf spot-resistance cultivar and incorporating crop rotation with non-host crops in to an operation can provide better control of the disease.

For more information about the frogeye pathogen, disease development, and the mechanisms of fungicide, please review our previous article on the subject.

Category: Plant Diseases

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Crop:
Soybean

Tags: frogeye leaf spot QoI resistance

Authors:
Ethan Stoetzer Communications Specialist II

Daren Mueller Associate Professor
Dr. Daren Mueller is an associate professor and extension plant pathologist at Iowa State University. He is also the coordinator of the Iowa State University Integrated Pest Management (IPM) program. Dr. Mueller earned his bachelor's degree from the Univ...