Researchers identify new soybean aphid biotype

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University of Illinois researchers recently identified a new soybean aphid biotype that can multiply on aphid-resistant soybean varieties. Soybean aphids are the No. 1 insect threat to soybean production in the North Central region of the United States.

Last year, aphid infestation on soybean was high enough that many growers had to spray their fields to control aphids. Despite this, many aphids survived and took flight last fall causing a public nuisance. Migrating soybean aphids have delayed Major League baseball games, closed outdoor cafes and curtailed outdoor activities.

The soybean aphid is the only soybean insect pest known to have multiple biotypes, said Glen Hartman, U of I professor of crop sciences and USDA research plant pathologist. When farmers plant aphid-resistant soybean varieties, they provide protection against Biotype 1. However, recent research indicates that Biotype 2, which was first discovered in 2006, can overcome some aphid-resistant varieties.

The most recently identified soybean aphid, Biotype 3, was discovered in Springfield Fen, Ind., on an overwintering host, glossy buckthorn. Biotype 3 has not been found outside of this location to date and is not distinguishable by its appearance.

Researchers identified Biotype 3 by testing this aphid on soybean plants with known resistance genes. They found it was capable of feeding and multiplying on varieties carrying the resistance genes Rag1 and Rag2.

"Identifying a biotype that can overcome Rag1 and Rag2 resistance, even before soybean varieties with these resistance genes were deployed in production, suggests high variability in virulence within soybean aphid populations," said Curt Hill, U of I principal research specialist. "This gives the pest a high potential to adapt to and reduce the effective life of resistance genes deployed in production."

What does this mean for soybean farmers? A limited number of soybean varieties carrying the Rag1 resistance gene were planted in 2009, and more varieties are now available. The discovery of an aphid biotype that can overcome the gene means breeders and seed companies will need to keep pace with the pest.

Hartman recommends that farmers should plant aphid-resistant varieties if they have experienced aphid problems in the past. In addition, farmers should closely monitor aphid populations in their fields and spray when populations reach the economic threshold level, approximately 250 aphids per plant. If farmers find threshold populations on resistant varieties, they should contact their local Extension agent.

Fortunately aphid infestations can easily be controlled with insecticides, Hill said. However the question of timing becomes a key factor that requires scouting of fields and entomologist recommendations regarding threshold levels. Hartman said farmers can save some of their yield if they follow guidelines found in U of I Extension literature.

"Soybean aphids have a closer relationship with their host than other bugs," Hill said. "They can feed on other plants, but they only readily reproduce during the summer months on soybean. They suck all of the life out of the plant in a matter of weeks, causing tremendous yield loss for farmers. This makes scouting crucial."

U of I researchers are continuing to look for new resistance genes while

studying the genomics of the soybean aphid to better understand its virulence. Hill believes plant resistance can provide an effective, economical and sustainable method of insect control.

"We hope the use of molecular markers to identify biotypes will be available soon so we can take samples in the field and perform quick DNA tests to determine distribution of these biotypes," Hill said. "Our goal is to help the soybean seed industry determine where to market soybean varieties with particular soybean aphid resistance genes to ultimately help producers select appropriate resistant varieties based on the virulence potential in their area."

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