

The Problem

SDS: It's s

Lost yield.

Sudden death syndrome (SDS) is now among the top four yield robbing diseases in soybeans. From 1999 to 2004, average losses were estimated at \$190 million a year, and the disease is spreading and intensifying.



Courtesy of Jason Bond, Southern Illinois University

"In Wisconsin, yield losses are in the 20 to 50 percent range," says Shawn Conley, University of Wisconsin Extension soybean specialist. Yield losses of 100 percent have been recorded in heavily infested areas of individual fields.

There's a lot going on with sudden death syndrome (SDS). On the positive side, scientists conducting checkoff-funded research are breeding varieties with better resistance, and learning more about how and when SDS infects soybean plants.

Unfortunately, researchers also are discovering that SDS appears to be spreading at a fairly rapid clip. While soybean growers in Illinois, Indiana and states further south have been dealing with SDS for nearly 25 years, it's relatively new to the Great Lakes region.

Confirmed in Michigan in 2006, "SDS is most severe in the southwest corner of the state, but it also has been reported in the southeast and east central Michigan," says Michigan State University Nematologist George Bird.

In Wisconsin, SDS was first documented in 2005. "In 2009 we saw more SDS than ever before and it's creeping north," says Shawn Conley, University of Wisconsin Extension soybean specialist.

According to Dean Malvick, University of Minnesota Extension pathologist, "It wasn't confirmed in Minnesota until 2002, and it's already in at least 23 counties. Now we know of SDS as far north as Benson, Minnesota, about 130 miles southeast of Fargo, North Dakota."

No problem finding SDS

Bird, Conley and Malvick all agree it's hard to pinpoint exactly how long SDS has been in the Upper Midwest. "We know its distribution is wider than it was a couple years ago, but it may have been here awhile before being detected," says Malvick. "The question is how fast is it moving vs. how fast is it being discovered?"



Courtesy of Shawn Conley, University of Wisconsin-Madison.

▲ **Sudden death syndrome** infected leaf.

preading

"It could be the pathogen has always been here and we're just noticing it. But we're also growing more soybeans, and there's more frequent rotation with corn," says Jason Bond, Southern Illinois University plant pathologist. "There are likely many factors coming together that are either helping spread the organism, or at least spreading awareness of it."

Hitching a ride on cysts

One of those factors is soybean cyst nematode (SCN). "It's quite apparent that you find SDS in close association with SCN," Bond says. "We find the pathogen that causes SDS inside the cysts, so we know there's some interaction."



Courtesy of Albert Tenuta, OMAFRA

▲ **The fungus that causes SDS** has been found inside SCN cysts.

"There's no doubt that SDS is following SCN populations north," says Palle Pedersen, Iowa State University agronomist. "I see SDS getting worse every year in Iowa. When SCN-resistant varieties fail, SDS shows up more frequently."

SDS in the absence of SCN

Bird says that until 2008, "I'd never seen SDS in the absence of SCN. Now I've seen it in a couple of places in Michigan where we can't detect SCN, but we don't know why." For now, says Bird, "If you have SDS symptoms in Michigan, you also need to test for SCN."

Pedersen notes, "In Iowa, we see SDS without SCN if there's compaction, but the biggest yield loss occurs from the combination of SDS and SCN. When you have a pathogen like

SCN minimizing uptake of nutrients and moisture, and the SDS pathogen speeding up defoliation, there's no doubt these two combined will have a high impact on yield."

Bond believes most soybean fields infested with SCN also have SDS. "You almost have to assume that if you have one or the other, you probably have both," he explains. "And you should make management decisions based on both."

That's easier to do when you farm further south. "Southern Illinois growers have better options when selecting resistant varieties," Bond adds. "You have to work harder to find SDS resistant varieties in the early maturity groups."

Pedersen agrees. "I'd like to see more varieties in earlier maturity groups that have more resistance to SDS than those available today."

New resistant varieties

University soybean breeders are working on it. A new maturity group 2 breeding line was recently released and is being evaluated by several companies.

Checkoff-funded scientists also have been testing varieties and breeding lines to identify those with resistance to SDS.

"In our trials, we found varieties labeled as susceptible that were resistant and vice versa," Pedersen adds. "That tells me there's a lot of work to be done and a lot of things we don't know."

Different SDS genotypes

"Are we dealing with multiple races?" Pedersen asks. "Is there genetic diversity between the SDS in Illinois and what we're dealing with in Iowa?"

Bond also wonders about genetic diversity. "Published studies in the 1990s showed that when comparing 40 different isolates in the greenhouse, some are more aggressive than others. We don't know why yet."

Actually, we may be getting closer. Preliminary research shows there are more than a dozen different genotypes of *Fusarium virguliforme*, the pathogen that causes SDS.

These genetic variations don't seem to be related to aggressiveness. The more aggressive strains do, however, seem to produce more toxins. (Read about SDS toxins on p. 8.)