

# SDS Research



*Courtesy of Silvia Cianzio, Iowa State University*

**Checkoff-funded researchers throughout the North Central region are working hard to crack the sudden death syndrome (SDS) genetic code for soybean producers. Ongoing research includes:**

- 1 Mapping the genes responsible for SDS resistance in the soybean plant**
- 2 Breeding SDS-resistant varieties for early maturity groups**
- 3 Sequencing the genome of *Fusarium virguliforme*, the pathogen that causes SDS**
- 4 Studying how the SDS pathogen infects the soybean plant**
- 5 Exploring interactions between SDS, soybean cyst nematode and brown stem rot**

# Finding so

**T**he good news is: "There seem to be many different sources of SDS resistance, even within our elite varieties," says Brian Diers, soybean breeder at the University of Illinois. "The problem is, we don't have a good understanding of what resistance genes are in different resistant varieties and how many resistance genes are needed to achieve a high level of resistance."

"As part of the North Central Soybean Research Program (NCSRP) project, we've mapped two specific genes responsible for SDS resistance, and we've bred them into different soybean varieties," Diers adds. "We will now test how much we improve resistance in these different backgrounds. The genetic markers used in mapping genes should help breeders increase their speed in developing SDS-resistant varieties."

## **SDS is a tough research subject**

Diers explains that one of the challenges in breeding for SDS resistance is that field tests are difficult. "There's a lot of variability, because the soil environment is more complex in the field than in the greenhouse."

"It's a tough pathogen to control in a complex environment," says Jason Bond, a plant pathologist from Southern Illinois University. But through an NCSRP project that began in 2000, researchers have improved field inoculation techniques and developed new screening protocols for growth chambers and greenhouse tests.



*Courtesy of Brian Diers, University of Illinois*

**▲ Planting resistant varieties (left) is the best management practice to manage SDS.**

# Solutions for farmers

"These are necessary tools to help public and private companies develop better SDS-resistant varieties," Bond says. "At the end of the day, farmers benefit from improved SDS resistance."

"We've made a lot of progress in nine years," says Silvia Cianzio, a soybean breeder at Iowa State University. "The new procedures allow for efficient, repeatable screening results. In developing new sources of SDS resistance, we're relying on screening, so we need to be quite confident."

## New genetics

Cianzio recently released a new breeding line with improved resistance to SDS in maturity group 2. "Private companies are licensing the line to breed into their elite cultivars," she explains.

"In our program, we're using five or six different resistance sources," Cianzio continues. "We also have a number of breeding lines in our pipeline, and our hope is that every year, we'll be able to release new germplasm."

"It's extremely important that from now on, even though we have good sources of resistance, we continue to look for new ones," Cianzio adds, "because resistance only lasts as long as it takes for the fungus to find a way to overcome it."

Another reason SDS is so challenging: "We may be dealing with two completely different resistance mechanisms; one in the roots, and one controlling foliar symptoms. Researchers found that not all cultivars with infected roots show foliar symptoms," says Cianzio.

According to Bond, "The resistance in 99.9 percent of varieties is the type that protects against foliar symptoms. The pathogen still infects the root, but it's unable to produce toxins. Or even if it does produce toxins, it doesn't harm the soybean plant."

Bond believes there's root resistance in older cultivars, and an interesting debate among geneticists about which type of resistance to use.

"The easiest type to work with is the resistance against foliar symptoms. Root resistance is harder to get – the donor varieties are agronomically poor. You're



*Courtesy of Iowa State University*

stepping back 20 years in yield progress," he explains. "But there's also the argument that you shouldn't let the SDS pathogen build up in the roots, because you're increasing the pathogen load in the soil."

There's no argument among geneticists, however, about the need to develop better SDS-resistant varieties – especially for farmers in northern growing areas. That's the goal of the NCSRP, United Soybean Board and several state soybean boards. For years, they've been working in partnership to provide soybean growers with SDS solutions that yield.

For more information on managing for higher yields log on to [www.planthealth.info](http://www.planthealth.info). Here you will find the latest science-based information on best management practices to increase yield through variety selection, seeding rates, tillage practices, disease and insect management and more.

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