A Complex Disease

How SDS

Two-stage disease
"SDS has two stages, the seedling stage early, then foliar symptoms later," says George Bird, nematologist at Michigan State University. "You can have reduced stands due to seedling disease."

Courtesy of Palle Pedersen, Iowa State University

Several scientists conducting checkoff funded research are exploring how *Fusarium virguliforme*, the fungal pathogen that causes sudden death syndrome (SDS), infects soybean plants. "We have a lot to learn yet about the relationship between the root and foliar phases of the disease," says Iowa State University Plant Pathologist Leonor Leandro.

"Several other Fusarium species cause root rot, but this one also produces toxins," she adds. One of Leandro's colleagues, X.B. Yang, found that the pathogen needs to colonize the vascular system of the plant for these toxin(s) to be transported to the leaves where they cause leaf symptoms. "If the fungus is only in the outer root tissues, it is possible to get root rot, but not leaf symptoms," Leandro says.

▲ ***SDS symptoms*** *can be seen even on young seedlings.*

Infection occurs quickly

When researchers studied how quickly the fungus could cause infection in the root, they discovered the SDS pathogen can infect the plant within days of seed germination. "The greater the number of fungal spores that are in contact with the root, the faster the root rot appears, and the more foliar symptoms you see," Leandro explains.

Younger plants are more susceptible

"Seedlings are very susceptible to infection," Leandro explains. "There's a decrease in susceptibility as plants get older. It's related to the ability of the fungus to penetrate the plant's vascular system."

Warmer soil is better

Leandro's team also found that soybeans were most likely to show symptoms when planted in cooler soils. "In cooler soils the roots are susceptible for a longer period of time. Whatever the plant is doing to resist

infects soybean

infection happens much more quickly in warm soil," she adds. "For growers, this means that delayed planting can reduce SDS, but it doesn't prevent it if infection occurs on young seedlings."

What happens around flowering?

According to Leandro, scientists don't know yet whether the soybean plant becomes susceptible again later in the season. "There may be another stage of infection that occurs after flowering," she explains.

Additional research led Leandro to conclude that flowering seems to trigger the expression of foliar symptoms. "The more we delayed flowering, the later the disease appeared," she continues.

However, Leandro says researchers at the University of Illinois inoculated soybean plants with the SDS pathogen at flowering, and plants got the disease. In contrast, researchers also have managed to produce foliar symptoms – without a fungal infection – by exposing the plants to toxins.

Despite all the new knowledge on SDS, Leandro concludes that "there's still a lot more to learn about the infection process of this fungus."

▲ ***"If SDS comes in after R5 or R6**, your yields are so close to being made that the impact is minimal," says Jason Bond, plant pathologist at Southern Illinois University. "If it shows up at flowering you are in trouble."*

▲ ***Is there a connection between SDS and row width?***
Jason Bond, Southern Illinois University plant pathologist and Palle Pedersen, Iowa State University Extension soybean specialist agree: "No. We studied 15-inch and 30-inch rows. Because it's a soilborne issue, it's more related to where the pathogen is in the field vs. planting or row width."