

A troublesome trio: SCN, SDS and BSR



Interaction

It is common for other soybean pathogens to be present in SCN-infested fields and for interactions among the pathogens to occur.

Infection by SCN juveniles and the eruption from roots by the maturing females create wounds in the root surface that can serve as entry points for other soilborne soybean pathogens.

The fungi that cause SDS and BSR live in the soil with SCN and are fully capable of causing disease on their own. However, research has shown SCN hastens the development of SDS and BSR symptoms and increases their severity, leading to greater yield loss from these diseases, in addition to the yield loss directly resulting from the SCN damage.

Soybean Cyst Nematode

Soybean cyst nematode (SCN) is by far the soybean crop's most destructive pest and the most yield-limiting disease of soybeans in Iowa.

This plant-parasitic roundworm wreaks havoc on soybeans by infecting the plants' roots. When SCN females die, their egg-filled bodies become hardened cysts on the root. Offspring, which may number up to 300 per female, repeat the cycle approximately every 30 days and cause irreparable damage to roots.

SCN infection can mean dwarfed or stunted roots, fewer nitrogen-fixing nodules and increased susceptibility to attacks by other soilborne plant pathogens. Substantial yield loss can take place without noticeable symptoms. In hot and dry years, up to 50 percent yield loss can occur as a result of SCN because plants produce fewer pods.

Damage caused by SCN gives other diseases an opportunity to take hold. **That's why SCN makes other diseases worse, especially sudden death syndrome (SDS) and brown stem rot (BSR).**

Sudden Death Syndrome

SDS in soybeans occurs when the fungus *Fusarium virguliforme* infects the soybean plant root. Under certain conditions, yellow and brown spots appear in mid-season on leaves that looked healthy just days before. Problems may show up after plants start flowering or later in the season.

Soybeans infected with SCN develop symptoms of SDS earlier in the season than plants not infected with the nematode. Also, symptoms of the SDS disease are more severe in plants that are infected with SCN. The time of symptom development and disease severity are the two major factors that determine how much soybean yield loss is caused by SDS.



▲ Foliar symptoms of SDS

Brown Stem Rot

BSR is caused by the soilborne fungus *Phialophora gregata*. The fungus survives on crop residue. In the spring, the fungus infects soybean roots, with the pathogen eventually reaching and invading the vascular system of soybean plants. Infection impedes the movement of water (and possibly nutrients) needed for plant growth.

Symptoms include internal stem discoloration and yellowing and browning of leaves. Foliar symptoms of BSR are difficult to distinguish from those caused by SDS.



▲ Internal stem-rotting symptom of brown stem rot disease



▲ Soybean cyst nematode-infected roots on right are stunted, discolored and have fewer nitrogen-fixing nodules than non-infected roots on left.



▲ Soybeans can be produced profitably on SCN-infested fields with a tailored management program.

This fact sheet was prepared with information and editing from Dr. Greg Tylka, Extension nematologist, Iowa State University.

Symptoms of BSR often don't occur until after pod development begins. At that time, internal stem browning is evident in infected plants if the stems are split longitudinally.

Plants infected with SCN typically show symptoms of BSR earlier in the growing season, compared to non-infected plants. Soybean varieties bred to resist BSR lose resistance to the fungus when infected with SCN.

Research shows BSR-resistant varieties develop unusually high levels of internal stem rot when grown in fields infested with SCN.

Integrated Pest Management Approaches

Once present in the soil, SCN can never be eliminated. However, SCN can be managed to minimize reproduction and maximize crop yields. Here's how:

- Grow non-host crops such as corn, sorghum, oats, sunflower and alfalfa in rotation with SCN-resistant varieties. Growing non-host crops can reduce SCN population densities for the first year or two. This rotation is the cornerstone of SCN management.
- Grow soybean varieties with various sources of resistance to SCN to discourage the build-up of SCN populations with increased reproduction on a single source of resistance.
- Grow several different high-yielding varieties with PI 88788 SCN resistance if varieties with different sources of resistance cannot be found.
- Control winter annual weeds such as henbit, chickweed and purple deadnettle, if present, as they can serve as hosts for SCN.
- Use of soil- and seed-applied nematicides may provide early season protection.



▲ SCN-resistant and susceptible varieties growing side by side in a heavily infested soybean field. There is no way to tell which is which by looking at the plants. In this field, the resistant variety yielded more than 30 percent better than the susceptible variety. Photo: Terry Niblack