Science Societies

Soybean cyst nematode management in the Mid-Atlantic

By Susan Winsor

January 6, 2021



Soybean cyst nematode. Photo courtesy of Sam Markell, North Dakota State University.

This is the final article of a four-part series on soybean cyst nematode (SCN) management. This article focuses on the Mid-Atlantic U.S., which is at an early stage in managing this pest. Education and regular testing can prevent it from being the plague that it is in the Corn Belt.

Most Midwestern farmers wish they could turn the clock back on soybean cyst nematode (SCN). Fortunately, Mid-Atlantic states are still at an early SCN stage. Education and regular testing can prevent it from being the plague that it is in the Corn Belt. Because it works underground, SCN can silently rob 30 to 50% of soybean yield. In the Midwest, "I foresee yield losses of 15–30 bu/acre if there is not a drastic change in genetic SCN resistance in soybean varieties," says Iowa State University nematologist and SCN expert Greg Tylka.

The numbers tell the story: Almost one-third of Virginia counties are infested with SCN. Pennsylvania first detected SCN in 2002 (in Lancaster County), yet 83% of that state's farmers and crop consultants/agronomists had never scouted/soil sampled for SCN, says Paul Esker, Penn State assistant professor of epidemiology and field crop pathology. And, 81% were not aware of the source of resistance in the varieties they use.

"Pennsylvania is in the unique situation of having lower SCN populations than the Midwest, and we can be proactive," Esker, says. "We use various digital and in-person

channels and Extension collaborations to train farmers what to look for, the importance of sampling, and how to sample properly in the context of farmer profitability.

“Producers who’ve transitioned out of potatoes definitely appreciate nematode vigilance,” Esker says. “We have very diverse cropping systems, and there’s a learning curve among soybean growers to know their (SCN) number (from soil sampling).” Penn State provides free SCN sampling and educational programs through collaborations with the SCN Coalition, the state soybean board, the Soybean Checkoff, and the North Carolina Nematode Lab.

Hope on the Horizon

Syngenta released a new soybean variety with resistance to SCN derived from the breeding line PI 89772 in small quantities in 2020. Full commercial launch is happening this year.

“It could offer a novel mode of action that shifts SCN populations in a different direction than the PI 88788 breeding line and possibly the Peking breeding line, too,” says Melissa Mitchum, molecular nematologist at the University of Georgia and co-leader of The SCN Coalition. The variety will have two brand names: Golden Harvest GH2329X and NK Brand S23-G5X. It’s a Maturity Group 2.3 bean with SCN resistance, good SDS tolerance, and the Roundup Ready 2 Xtend trait.

Mitchum says earlier research by herself and her predecessors at the University Missouri showed promise for PI 89772 resistance. “It showed that if you have an SCN population that’s highly virulent (able to feed and reproduce) on PI 88788, the population drops significantly when you test it on PI 89772. We showed a similar

response to the breeding line PI 90763. We are looking more at this in collaboration with soybean breeders."

Iowa State University graduate student Nicole Deitloff tested Syngenta's new variety on four Minnesota farms in 2020, comparing it to varieties with PI 88788 and Peking SCN resistance with and without Saltro seed treatment.

New York first identified SCN in 2016 in Cayuga County, and it has since been identified in seven other counties at very low population numbers. "We are where parts of the Midwest were 20 years ago in SCN presence and farmer awareness," says Gary Bergstrom, Cornell University professor of plant pathology. "White mold is New York State's biggest soybean disease right now. We emphasize SCN recognition, testing, and prevention."

Virginia is in a similar low-SCN population position, according to Hillary Mehl, former Virginia Tech Extension plant pathologist. (She's presently USDA-ARS research plant pathologist in Tucson.)

"SCN isn't much of a priority for farmers until they personally have a significant problem with it. Once very large SCN and/or nematode populations are established, it's hard to deal effectively with the problem."

Symptoms like stunting, wilting, unexplained nutrient deficiencies, and/or high sudden death syndrome (SDS) incidence would typically bring farmers to one of Virginia Tech's plant diagnostic labs for testing. "Most of the time, we'd find SCN or root-knot nematode in the roots," Mehl says. "You only need 60 SCN juveniles per 500 cm^3 or 170 cysts per 500 cm^3 of soil to damage your crop" (Table 1).

Table 1. This Virginia Tech threshold guideline sets “Moderate” as being soil-test soybean cyst nematode (SCN) population levels where crop damage may occur if other stressors are present. “High” denotes population levels likely to cause crop damage and significant yield loss

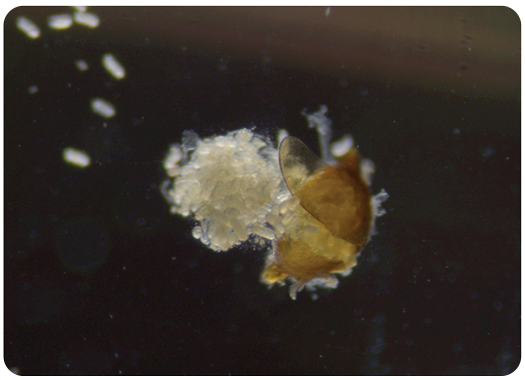
	Nematode economic damage thresholds for soybean (per 500 cm^3 soil)		
	Low	**Moderate**	**High**
SCN juveniles	0–20	20–60	>60

“Even one cyst is too many,” says agronomist Paul Bodenstine of Ashland, VA. He’s the founder of ag.systems, advising growers in eight southern, Mid-South, Delta, and Mid-Atlantic states. “It’s hard to convey SCN’s damage capacity.

“I assume most fields have SCN and sample to establish benchmarks,” Bodenstine says. “Be sure to draw your root samples correctly, refrigerate samples, and mail them so that samples don’t sit over a weekend before testing.” (Tips on correct sampling can be found at bit.ly/sample_SCN.)

A zero SCN count doesn’t necessarily mean there is no SCN in the field, according to Iowa State’s Tylka. “SCN may be present but not widespread, and thus missed in the soil sample(s).”

SCN Prevention and Control



Bergstrom, Esker, and Mehl advocate for an integrated approach to prevent and treat SCN:

- Sample your soil before at least every third soybean crop to know your SCN number. Track changes in these numbers, and proactively manage SCN populations before they grow out of control. “We had fields with continuous soybeans for 10 years, and at that point, it’s really difficult to get populations back down,” Mehl says. Tips for properly drawing a nematode root sample can be found at **https://bit.ly/SamplingTips**.
- Choose an effective resistant variety. This can make a 20-bu yield difference and an 80% reduction in SCN numbers, according to annual Iowa State University SCN-resistant variety trials (see bit.ly/_study_). In an Iowa State University trial in southeastern Iowa where SCN reproduction was high, varieties with PI 88788 resistance yielded on average 51 bu/ac, whereas varieties with Peking SCN resistance yielded 72 bu/ac on average. Also, SCN numbers decreased by 80% in plots where varieties with Peking SCN resistance was grown, but SCN numbers increased up to 900% on individual varieties with PI 88788 resistance. This article has further details: **https://bit.ly/IowaSCNSTudy**.
- Rotate sources of SCN resistance. “SCN has adapted really well to the widely used PI 88788 source of resistance,” Iowa State’s Tylka says. This happened over the last 20 years, just as weeds became resistant to glyphosate and other herbicides over time.
- Keep your ears open for new SCN-resistance sources. Presently 97% of the varieties on the market use PI 88788 resistance, which SCN has grown resistant to over the years.
- Alter the crop rotation away from soybeans. Non-host crops include corn, wheat, sorghum, oats, alfalfa, or sunflowers.
- Learn about the effectiveness of nematicide seed treatments for SCN. Not all treatments have always proven to be cost-effective, according to university research (see **https://bit.ly/seedtreatments.)** A list of seed treatments used on

nematodes is available at **https://bit.ly/nematicides_.**

- Clean equipment to prevent the spread of cysts from one location to the other. As an example, the first-found New York State SCN in 2016 was able to reproduce to soybeans carrying resistance from PI 88788 before it had time to develop that resistance. Most likely, uncleaned out-of-state machinery carried SCN with it when it arrived in Cayuga County.

With the perspective of seeing SCN's damage across Southern, Mid-South, and Delta states, Virginia agronomist Bodenstine says, "SCN has kicked us in the teeth."

SCN Management Resources

- For SCN prevention and management information, see: **https://bit.ly/Cornell_SCN**.
- Is SCN overcoming resistance in your fields? See **https://bit.ly/SCN_resistance**.
- See **https://bit.ly/SCN_resources** for more SCN-related tools.
- TheSCNCoalition.com has lots of resources, including PowerPoint presentation files with scripts that can also serve as farmer/customers presentations. It also has a listing of each state's university SCN expert.
- Iowa State University's annual SCN resistance variety trials can be found at isuscntrials.info.
- Information about SCN biology and management can be found at soybeancyst.info.
- For a clearinghouse of information on soybean diseases, pests, diagnostic tools, and curated summaries of the latest soybean research funded by the Soybean Checkoff, see www.soybeanresearchinfo.com. Information about SCN is listed

under the website's pathogen section.

- Treatment recommendations and six-year rotations for various SCN population levels from Iowa State University are available at: **https://bit.ly/SCN_thresholds**.

More integrated pest management

Back to issue

Back to home

Text © . The authors. CC BY-NC-ND 4.0. Except where otherwise noted, images are subject to copyright. Any reuse without express permission from the copyright owner is prohibited.