



Increasing Yield through SCN Management

By LeAnn Strother

Soybean cyst nematode (SCN) is soybean producers' number one yield robber, costing more than an estimated \$1.5 billion nationwide in 2009. It silently reduces yield, often without visible symptoms.

Extension plant pathologists from the North Central states organized an education initiative to deliver a consistent message on SCN management. Their goal was to establish on-farm demonstration plots in and provide usable information for all 12 of the North Central states, showing the effects of SCN-resistant sources on field populations.

Loren Giesler from the University of Nebraska, who served as co-leader of the project, says there were varying levels of issues to address. "In some states, generally to the east, hearing about SCN is old news. Many of those growers tested for SCN long ago. They plant resistant varieties and have forgotten anything else regarding SCN management. Our goal was to remind them that managing SCN goes beyond planting a variety labeled as SCN-resistant. For those farmers, the questions should be, 'Yes, I have SCN, so what is the population doing? Is it a type that reproduces on the varieties I'm raising?'"

"In states to the west, SCN is new, and farmers need to answer the question, 'Do I have SCN?' For them, the demonstration's purpose was to show what SCN looks like and what the issues are. Those growers need to test to find out if they have SCN and to what degree."

The overall goal of soybean farmers is always to increase yield. To do so, they should choose the highest yielding soybean varieties available, but they should not forget SCN management.

"We realize farmers are trying to manage many things, but we want them to remember to check for SCN every few years," says Giesler.

For project consistency, the same field protocol was followed in all the states. Strip trials were established in producer fields at multiple locations in each state. At every location a susceptible variety was planted, in addition to varieties representing the three main sources of resistance to SCN. In the spring and again in the fall, soil samples were taken and sent to Terry Niblack of the University of Illinois to see how populations changed through the season.

According to Niblack, having the demonstrations in growers' field has been key to the project's impact; the way to convince farmers is to have them actively involved. "It is one thing to sit in a room and hear an Extension person tell you what you should do. It's another thing to actually see it working in the field."

Anne Dorrance of Ohio State University says, “The producer cooperators have been outstanding. We couldn’t have done this if they hadn’t let us put a susceptible variety in their fields.”

In 2008, team members delivered SCN information to more than 5,000 participants through a total of 30 field days and 33 indoor educational programs. In 2009, Extension programs on SCN were delivered to more than 11,000 participants through 56 field days and 80 indoor education programs.

Ohio farmers have driven across the state to see a demonstration of susceptible and resistant varieties next to each other. “In one particular case, it was a perfect night as we dug up roots,” Dorrance recalls. “Everyone in the group was able to see the cysts on the roots. It was as though light bulbs came on as they were able to connect the dots. Seeing truly is believing.”

Farmers have also been able to see SCN populations vary within a field as nematodes tend to sit in pockets. “We’ve had farmers say, ‘I know I have cysts, but they have not shown up in sampling. Now I know why,’” Dorrance says.

The demonstration shows clearly the earlier maturity in infected areas, as well as accompanying yield loss. “Having a resistant variety next to a susceptible variety gives a good handle on the yield difference, as much as 20 bushels per acre,” Dorrance says.

Besides field demonstrations, a “Cyst Management Guide” was published, and 300,000 copies have been distributed throughout 12 states and Canada.

While it has been an educational demonstration, the project also involved research. “We’ve never before run tests in so many states, so this is helping us fine tune recommendations for managing SCN,” Dorrance says. “The ‘Guide’ prescribes a general management plan, based on the number of cysts in a sample, but we have learned recommendations for individual states vary with the different soil types.”

When results for 2009 were compiled, data showed yield consistently increased with use of resistant varieties though response varied significantly among locations. Yields were highest for varieties utilizing the PI88788 source of resistance.

Besides yield checks, SCN reproduction factors were also calculated, based on SCN populations at planting and at harvest.

Niblack explains there are basically two types of nematodes in the soybean belt: Type 0 (Race 3) and Type 2, the nematode most adapted to resistant varieties of soybeans. Type 2 is also the most common type of SCN, accounting for 44 percent of locations sampled in 2009.

“What we found in the demonstration plots was not unexpected,” Niblack says. “If susceptible varieties are planted, nematode numbers go up. And if we plant resistant varieties with the PI88788 source of resistance where there are Type 2 nematodes, the numbers go up. If we plant soybeans with Hartwig or Peking sources of resistance, the nematode numbers go down.”

“The main thing farmers throughout the soybean belt need to know is nematodes are adapting to soybean varieties with the PI88788 source of resistance. We usually don’t need to run a type test to know which SCN type farmers have,” Niblack says. “We’ll know if they’re planting a resistant variety and the number of nematodes is increasing.”

Niblack says adaptation occurs when resistant genetics are misused, as has been the case with PI88788. “It’s been planted over and over, and nematodes have adapted. That’s why we need soybean breeders to come up with other sources of resistance,” she says.

“But an important message for farmers is even planting different varieties with the same source of resistance is effective,” Niblack adds. “Different varieties have different levels of resistance and different combinations of resistant genes, even if they have the same source of resistance. Nematodes adapt to the variety before they adapt to the source of resistance so the main thing is not to plant the same variety over and over.

“Ultimately, this demonstration says farmers need to hear the message that they need to keep sampling,” Niblack says. “It’s the only way to know if nematodes in their fields have adapted to the resistant varieties they’re using.”

Dorrance says, “The demonstration project provides evidence that farmers need to be conscientious in their choice of a variety and stay aware of SCN numbers. They won’t get rid of cysts completely, but they need to manage the population.”