The Nematode Attack

Diagnosing, Curbing Corn Nematode Damage Begins With Sampling

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Nematodes that attack the corn crop and ways to curb the damage was addressed recently by Dr. Terry Niblack, University of Illinois Professor in the Department of Crop Sciences,

"We've seen changes in corn production practices over the past couple of decades that have encouraged the buildup of nematodes that attack corn," she said.

Dr. Terry Niblack, University of Illinois Professor in the Department of Crop Sciences, discusses the changes in corn production practices that encouraged buildup of nematodes.

Photo by John LaRose

There are many different species of corn nematodes. While soybean cyst nematodes are an exotic pest, the nematodes that attack corn are all native species. They were here on the prairies. The Indians, however, did not have problems with them.

"If you have a lot of biodiversity, then the nematodes are spread out and they don't become a problem; but with our mono-culture, they've moved into corn, which looks like a grass to many of them," Niblack added. "In the past couple of decades we've moved to no-till or minimum, conservation till, which doesn't disturb the soil very much and that allows a certain group of nematodes to build up. These nematodes are very sensitive to tillage. We've moved to a significant percentage of corn-on-corn, and that also allows the buildup of nematodes because they have long life cycles, much longer than soybean cyst nematode; so if you give them a couple of seasons, they're going to take advantage of it."

Another factor is the disinterest in using the old chemistries, such as soil applied insecticides. The old chemistries, carbamates and organophosphates, that were applied to the soil, added the side benefit of suppressing nematode populations. It didn't kill them at the rate recommended, but it suppressed them. Today's soil applied insecticides are chemistries that have no effect on nematodes. Fungicides, as well, have no affect on them.

"We've created an environment where the nematodes are able to come in and take advantage of the situation," she said. "So about 10 years ago, a couple of extension educators in northern Illinois, Dave Feltes and Jim Morrisson, both retired now, came to me and said 'what really is the potential for yield loss due to nematodes in corn in Illinois?' I said I don't know because I work on soybeans. So they went out and got some federal funding to do a survey which we completed from 2008 through 2010 and that involves the participation of numerous collaborators around the state sending in samples."

Extension educators, county directors and nematology lab personnel participated in the random survey, and there was a very strict protocol to follow. The levels of nematodes that have appeared in corn fields and the identities of the nematodes that are known corn pathogens are stunning. It's way beyond anything imagined.

"Damage due to nematodes is very difficult to diagnose because it doesn't cause any symptoms that are diagnostic in the fields," she continued. "What it looks like in most cases is uneven growth. So you have areas in the field where the corn just doesn't get quite as tall and perhaps doesn't produce quite as much.

"You can tell on a yield monitor there's a nematode problem. In the heavy sand soils, the nematodes that are associated with those soils can actually kill corn seedlings and that's why you get these big bare spots. But in most soils you don't get that at all; you just get uneven growth, and you can't tell by looking at the roots either because these nematodes are often associated with root rot. They make holes in the roots and then the fungi are able to take advantage of those holes and penetrate them."

Taking a soil sample is the only way to get a diagnosis. For an initial diagnosis, grid sampling is not recommended as it is for soybean cyst nematodes. Sampling for diagnostic purposes should be taken from areas where yield isn't what it should be compared to the rest of the field. The way to sample that is to sample on the outer edges of those low yielding spots. Sampling in the center would not be helpful as the nematodes will not be there because there aren't enough roots.

"They're moving out. They're expanding. So the edges of those hot spots are the places to look," she said. "Those hot spots will move, they'll expand and move usually in the direction of tillage over time; but sometimes the farmers tell me the spots stay in the same place for years and years."

While Illinois specialists have surveyed these, the problem is not unique to Illinois. It's throughout the midwest, it's throughout the corn belt.

Financial loss has not been calculated recently. The last time an estimate was published was in the mid 1990s and at that time the specialist said farmers were losing $82 million in yield due to corn nematodes.

"That's a significant percentage, one I can't even guess," Niblack said. "I would guess that both the percentage and monetary value has increased a lot since then, because that's when we started to see significant shifts in the populations; and the problem is apparently getting worse. The corn belt nematologists meet every year and all of us have seen an increase in problems that could easily be attributed to nematodes; there's an increase in the number of samples that had damage and levels of nematodes."

So a soil test is the first effort at defense.

"Right. If you're sick you've got to figure out why your sick before you can treat it. So the management recommendations really depend on which nematode is there and how high the population densities are; but, in general, tillage helps. This is not an anti- no-till statement; in general tillage helps. Also, rotation with soybeans helps because these are native species and they really don't like the taste of soybeans very much."

While there are many such corn nematodes, the most common ones are the spiral nematode, the lesion nematode – that's the most pathogenic one – stunt nematodes, lance nematodes, sting nematodes and needle nematodes.

Treatment includes several labeled products from Syngenta.

"The product is called Avicta Complete Corn which is a package with insecticides and fungicides. We've looked at Avicta in the greenhouse, and it has worked well there. The field is a different situation because we're not dealing with a one-plant, one-nematode situation. It's more like one-plant, seven-nematodes.

"Avicta has been on the market for a while, but I don't think they've done any widespread selling," she said. "Bayer will be marketing a product called Votivo for nematode management. We've worked with both products for several years in the field and, in fact, we've worked with both of them on corn and soybeans, but the big marketing push hasn't started yet."

There are some cultural controls, including tillage, and there are differences in hybrids that offer some control. Some tolerate nematodes better, but researchers don't have a good handle on that yet.

"We can use tillage, as I've said; we can use rotation, we can use the old chemistries like a soil applied Counter treatment. All are still available in lock and load, you know smart box; but a lot of people don't like to use those just because it's another thing they have to do, they prefer the seed treatment approach." Δ

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