



Agronomic Spotlight

Managing Nematodes in Corn

- When left undetected and untreated, nematodes can significantly reduce corn yield potential.
- Symptoms of nematode feeding can easily be misidentified as herbicide injury, soil compaction, sandy soils, and other problems.
- Corn growers should pull soil samples from low performing areas of fields to determine whether or not nematodes are present. Samples taken during the growing season or shortly after harvest can identify nematode species and densities and guide control options.

Nematode Damage Symptoms

Symptoms of nematode feeding are most noticeable when environmental conditions cause plant stress (Figure 1). Common above-ground symptoms include wilting, yellowing, and stunting of growth. However, nematodes may cause yield loss without exhibiting above-ground symptoms (Figure 2). Common below-ground symptoms include swollen roots, lack of fine roots, minimal root branching, and necrotic lesions. In many cases nematode feeding occurs at the root's growth point, and the resulting damage is apparent as stunted roots. Severe nematode damage will result in "stubby roots" with many short, swollen roots.



Figure 1. Nematode feeding injury can be mistakenly attributed to sandy soils, herbicide injury, or other problems. Photo courtesy of Bond, J. SIU Soybean Pathology. Southern Illinois University. <http://www.scnresearch.info>

Nematode damage is rarely uniform within a field, and damage is typically more visible in areas with sandier soils. A common misconception is that nematode populations are higher in sandy soils. Nematodes infest many types of soil. Drought-prone, sandy soils may allow above-ground nematode damage symptoms to become more visible. Current trends in corn production may be contributing to higher nematode populations. Some of these agronomic practices include continuous corn, reduced tillage, and less use of soil-applied insecticides.



Figure 2. Examination of corn roots and soil sampling can identify areas where nematodes are causing reduced yield potential. Photo courtesy of Bond, J. SIU Soybean Pathology. Southern Illinois University. <http://www.scnresearch.info>

Effects of Nematode Feeding

Nematodes can cause damage by feeding on corn roots. Nematodes feeding on root cells reduce the plant's ability to take up water and nutrients. Damage caused by root feeding can further injure a plant by allowing fungal and bacterial pathogens to enter into the plant. Some nematodes are also known to transmit viruses to the plants they feed on.

"Nematodes can make everything else worse," says Clemson University plant pathologist John Mueller. "A corn root system infected with nematodes can exhibit additional moisture stress, reduced nutrient uptake, and lost yield potential. Without effective management, nematode numbers can increase year-to-year, reducing yield potential of the current corn crop, as well as other crops in the rotation." (J.H. Hudson, personal communication, May 13, 2013)

Nematode Sampling

To confirm the presence of nematodes, soil and root samples must be taken and submitted to a nematode testing facility. Treatment recommendations can be made after test results confirm nematode species and approximate population density. Refer to university recommendations for treatment thresholds.

Nematode distribution can be very irregular within a field; therefore, it is important to collect several composite samples to provide an accurate population estimate. When testing a field with no symptoms of nematode damage only a general field survey is needed to determine nematode species and population and help assess risk levels. Since nematode treatment thresholds vary by soil type, fields should be divided into zones by soil texture, and separate samples should be collected for each zone.

If nematodes are a current or suspected problem, samples should be collected around the edges of symptomatic areas, and some samples should include roots of the crop. Sampling should occur while the crop is growing and when soils are not overly wet or dry. Nematode numbers will be higher, and easier to detect, later in the growing season. Plant pathologists also caution that weeds can allow nematode numbers to increase even after crop harvest.

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When collecting and shipping samples, handle with care to avoid killing nematodes before they reach the lab. Follow lab instructions for collecting, handling and shipping all nematode samples. A good sample will provide a reliable diagnosis and management strategy.

Management Options

Because there are many nematode species, identification is essential for determining the appropriate control option. For certain nematode populations the best management practice is crop rotation. Corn management practices that reduce crop stress may help the crop overcome nematode attacks. The following agronomic practices may help growers manage potential nematode infestations.

- Fertilize according to soil test recommendations. Healthy plants are less susceptible to nematode damage.
- Maintain good weed control, even after harvest. Weeds can be hosts for nematodes and may serve as a food source for the next year's crop.
- Roots protected from corn rootworm are more vigorous and healthy, and may be less prone to nematode damage. Use the most advanced traits for root protection.
- For certain nematode species, rotating to a non-host crop can reduce populations.
- Consider using a corn seed treatment like Poncho®/VOTiVO® that protects corn seedlings and roots against nematodes. It contains a bacteria that lives and grows with young corn roots, creating a living barrier that nematodes cannot break through. Poncho®/VOTiVO® can be used with the Acceleron® Seed Treatment Products for corn.
- An additional nematicide may be necessary to control high nematode populations. Check university recommendations for specific products.

Sources

Niblack, T.L. 2010. Time to plan for corn nematode sampling. The Bulletin. University of Illinois. No. 4, Article 6. bulletin.ipm.illinois.edu/.

Tylka, G. 2007. Nematodes in corn production: a growing problem? Integrated Crop Management. Iowa State University Extension. IC-498. www.ipm.iastate.edu.

Photos: Bond, J. SIU Soybean Pathology. Southern Illinois University.

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Individual results may vary, and performance may vary from location to location and from year to year. This result may not be an indicator of results you may obtain as local growing, soil and weather conditions may vary. Growers should evaluate data from multiple locations and years whenever possible. **ALWAYS READ AND FOLLOW PESTICIDE LABEL DIRECTIONS.** Tank mixtures: The applicable labeling for each product must be in the possession of the user at the time of application. Follow applicable use instructions, including application rates, precautions and restrictions of each product used in the tank mixture. Monsanto has not tested all tank mix product formulations for compatibility or performance other than specifically listed by brand name. Always predetermine the compatibility of tank mixtures by mixing small proportional quantities in advance. Acceleron® is a registered trademarks of Monsanto Technology LLC. Poncho® and VOTiVO® are registered trademarks of Bayer. All other trademarks are the property of their respective owners. ©2016 Monsanto Company.