



Nematode Management in Cotton

Nematodes are microscopic, worm-like soil organism that feed on the roots of cotton plants and other crops. High populations of plant-parasitic nematodes can cause major losses in cotton and increase plant susceptibility to diseases. Plant-parasitic nematodes have been identified in every cotton-producing state, and continue to be a problem for cotton producers especially in the southeast and midsouth regions.

The presence of certain nematode species can vary according to environmental conditions, soil types and actively growing plants. Nematodes can cause damage by feeding on cotton roots. Nematodes feeding on root cells reduce the plants ability to uptake water and nutrients. Damage caused by root feeding can further injure a plant by allowing fungal and bacterial pathogens to enter into the plant and cause disease complexes.

The three most common nematode species associated with cotton damage are: root-knot, reniform and Columbia lance. Even though differences in symptoms occur between each species, laboratory testing should be conducted to verify type prior to treatment. (Table 1). Knowing the nematode species will also help determine what crop rotation options may help suppress the nematode population.

Symptoms of Nematode Damage

Symptoms of nematode feeding are most noticeable when environmental conditions cause plant stress. For all nematode species, common above-ground symptoms include wilting by midday and stunting of growth. Common below-ground symptoms include swollen roots, galls on roots (root-knot nematode), lack of fine roots, minimal root branching and necrotic lesions. Nematode damage is rarely uniform within a field, and is typically more visible in areas with sandier soils.

In many regions, nematodes are perceived as an increasing problem among cotton producers. Current trends in cotton

production may be contributing to higher nematode populations. Some of these agronomic practices include limited use of crop rotation, reduced tillage, and less use of soil-applied insecticides.

Testing for Nematodes

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 the nematode species and approximate population density. Refer to university recommendations for treatment thresholds.

Nematode Sampling

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. This can help assess risk levels and minimize future nematode problems.

If nematodes are a current problem or suspected problem, a definitive sampling procedure should be used. Samples should be collected around the edges of symptomatic areas near the plant's root zone when soils are not overly wet or dry. In cotton, nematode populations are easiest to detect when bolls begin to open. In fields with a history of nematode problems, samples can be taken in the fall so appropriate management strategies can

Nematode Type	Symptoms	Rotation Options
Root-knot	Elliptical areas with stunted plant growth. Galls on roots. Root discoloration.	resistant soybean varieties, peanuts
Reniform	Uneven plant growth wide-spread throughout the field. Leaf margins may become purple. Egg masses and necrosis on roots	resistant soybean varieties, corn, peanuts or grain sorghum
Columbia Lance	Above-ground symptoms same as root-knot. Small brownish yellow lesions may appear on the roots	peanuts

Table 1. Symptoms and crop rotation options for the three major cotton nematode species.

▶ from previous page

Nematode Management in Cotton

be determined prior to planting. Samples should be placed in a plastic bag to inhibit drying, kept cool and handled with care to avoid killing nematodes before they reach the lab. When mailing samples, overnight shipment when possible. A good sample will provide a reliable diagnosis and thus a suitable management strategy. Sampling procedures may vary by testing facility, contact your local laboratory for specific sampling guidelines.

Control Options

Because there are many nematode species, identification is essential for determining the appropriate control option. Protecting cotton from nematodes is most important early in the season to establish a healthy root system. Nematicides can be used to protect young seedling roots for four to six weeks. Other nematode control options are centered on reducing crop stress. The following agronomic practices may help growers manage potential nematode infestations.

1. Fertilize according to soil test recommendations. Healthy plants are less susceptible to nematode damage.
2. Maintain good weed control as weeds can also be a host plant for nematodes. For example, weeds that are good hosts for root-knot and Columbia lance nematodes include nutsedge, pigweed and sicklepod. Weed hosts for reniform nematodes includes jimsonweed, sow thistle and cocklebur.
3. For certain nematode species, rotating to a non-host crop can reduce populations. Rotate to corn or resistant soybean varieties when reniform nematodes are present (see Table 1 for a more complete list).
4. Chemical nematicides may be an option; however, application timing may not be convenient and may require extra safety precautions.

Gazaway, W. Nematodes in Cotton in Alabama. Alabama Cooperative Extension System. November 1996. ANR-967. <http://www.aces.edu>

Mueller, J.D. Cotton Nematode Control. Clemson University. Edisto Research and Education Center April 1996. <http://www.clemson.edu/>

Understanding Cotton Nematodes. National Cotton Council. <http://www.cotton.org>

Wrather, A. and Laura Sweets. Cotton Nematodes in Missouri: Your Hidden Enemies. University of Missouri Extension. September 2009. G4259 <http://extension.missouri.edu>

Picture: Clemson University. USDA Cooperative Extension Slide Series, Bugwood.org



Figure 1. Cotton root mass damaged by nematode feeding. [Clemson University, bugwood.org](http://bugwood.org)

Nematicide Treatments

Nematicide treatments have been found to provide an inconsistent return on investment, but may be needed in fields with high populations. To protect young cotton plants chemical options include: fumigants, soil applied insecticides, seed treatments and foliar applications. Control options may vary from state to state, check with local extension services for specific recommendations.

Future of Nematode Control in Cotton

Seed treatments are being considered for nematode control due to ease of application, compatibility with other insect-controlling seed treatments and traits, and ability to target specific areas of a field. Monsanto is continuously testing and evaluating seed treatment nematicide options that should help cotton producers more effectively manage nematode populations.

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.

Technology Development by Monsanto and Design(SM) is a servicemark of Monsanto Technology LLC. All other trademarks are the property of their respective owners. ©2010 Monsanto Company. CRB05272010