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Corn Nematodes and Soybean Cyst Nematode: Similar But Very Different

Abstract
Corn nematodes and the soybean cyst nematode (SCN) are microscopic, plant-parasitic worms that live in the soil and feed on plant roots. Iowa crop producers and agribusiness professionals generally are aware of the soybean cyst nematode and its biology, scouting and management. But many people want to learn more about the biology, scouting and management of corn nematodes.

Keywords
Plant Pathology

Disciplines
Agricultural Science | Agriculture | Agronomy and Crop Sciences | Plant Pathology

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Corn Nematodes and Soybean Cyst Nematode: Similar But Very Different

By Greg Tylka, Department of Plant Pathology

Corn nematodes and the soybean cyst nematode (SCN) are microscopic, plant-parasitic worms that live in the soil and feed on plant roots. Iowa crop producers and agribusiness professionals generally are aware of the soybean cyst nematode and its biology, scouting and management. But many people want to learn more about the biology, scouting and management of corn nematodes.

There are some similarities but also many major differences in various aspects of corn nematodes and the soybean cyst nematode. Keeping these similarities and differences in mind is important when trying to determine the most economical and effective way to manage these pests.

**General aspects**

<table>
<thead>
<tr>
<th></th>
<th>corn nematodes</th>
<th>soybean cyst nematode</th>
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</thead>
<tbody>
<tr>
<td><strong>natural occurrence</strong></td>
<td>many different species</td>
<td>a single species</td>
</tr>
<tr>
<td></td>
<td>most are thought to be native to U.S., likely fed on prairie plants before corn was grown as a crop</td>
<td>believed to be an introduced pest – likely from Asia</td>
</tr>
<tr>
<td><strong>distribution</strong></td>
<td>a few species are commonly found at low numbers in most corn fields (ex. sprial nematode)</td>
<td>occurs in many (&gt;70%) Iowa fields; has been found in all but one Iowa county</td>
</tr>
<tr>
<td><strong>yield loss potential</strong></td>
<td>varies greatly by species; ranges from slightly to moderately damaging</td>
<td>up to 40% yield loss with no aboveground symptoms; losses &gt;50% during hot and dry seasons</td>
</tr>
<tr>
<td>Basic biology</td>
<td>corn nematodes</td>
<td>soybean cyst nematode</td>
</tr>
<tr>
<td>------------------------------------------------------------------------------</td>
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<td>-------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>morphology / body shape</strong></td>
<td>all species are microscopic worms throughout their life</td>
<td>adult females swell to a lemon shape and are visible with the unaided eye</td>
</tr>
<tr>
<td><strong>length of life cycle</strong></td>
<td>varies greatly by species; ranges from 24-30 days for some to entire growing season for others</td>
<td>generally from 24-30 days</td>
</tr>
<tr>
<td><strong>number of generations per growing season</strong></td>
<td>varies greatly by species; can range from one to as many as four or five; affected by temperature</td>
<td>in Iowa, three to five; affected by temperature</td>
</tr>
<tr>
<td><strong>reproductive capabilities</strong></td>
<td>population densities (numbers) increase gradually in season, then decline as the corn crop matures</td>
<td>numbers increase very quickly because each female produces hundreds of eggs</td>
</tr>
<tr>
<td><strong>effect of soil texture</strong></td>
<td>most species found in any texture; needle and sting nematodes only occur in soil with &gt;70% sand</td>
<td>no preference, although greater damage occurs in sandy soils</td>
</tr>
<tr>
<td><strong>influence of soil factors</strong></td>
<td>no strong relationship with any soil factor; some can be more numerous in acid (pH&lt;7.0) or neutral (pH&gt;7.0) soils</td>
<td>strong relationship with soil pH; very high numbers can occur at pH 7.7 and above</td>
</tr>
<tr>
<td><strong>host plants</strong></td>
<td>varies greatly by species; most can feed on numerous other crops (including soybean) and weeds</td>
<td>can only feed on soybean and a few other legume crops (not including alfalfa)</td>
</tr>
<tr>
<td><strong>survival</strong></td>
<td>numbers decrease moderately fast without a host because there are no special survival mechanisms</td>
<td>survives as dormant eggs for &gt;10 years without a host</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Symptoms and scouting</th>
<th>corn nematodes</th>
<th>soybean cyst nematode</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>above-ground symptoms</strong></td>
<td>thin stands; stunting; yellow foliage; mid-day wilting; uneven tasseling; smaller ears and kernels</td>
<td>stunting; yellow foliage; at times, no obvious symptoms</td>
</tr>
<tr>
<td><strong>below-ground symptoms</strong></td>
<td>stunted root system; root swelling; lack of lateral roots; necrotic lesions (dead tissue) — varies greatly by species</td>
<td>stunted roots; general brown discoloration; few nitrogen-fixing nodules; small, round, white females on roots</td>
</tr>
<tr>
<td><strong>how to scout</strong></td>
<td>collect soil and root sample for analysis</td>
<td>collect soil sample for analysis or dig roots to look for SCN females</td>
</tr>
<tr>
<td><strong>definitive diagnosis in field</strong></td>
<td>not possible</td>
<td>must see swollen white SCN females on roots</td>
</tr>
<tr>
<td><strong>when to collect soil sample</strong></td>
<td>for most species, sample mid season when symptoms are observed</td>
<td>soil samples can be collected anytime except when soil is frozen or saturated</td>
</tr>
</tbody>
</table>
Management

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>nonhost crops</td>
<td>varies by species; few crops are nonhosts because most species have a wide host range</td>
<td>nonhost crops include alfalfa, corn, oats, and many others</td>
</tr>
<tr>
<td>resistant varieties or hybrids</td>
<td>none currently available</td>
<td>hundreds of resistant varieties available, most with PI 88788 source of resistance</td>
</tr>
<tr>
<td>soil nematicides (applied at planting)</td>
<td>Counter® 15G and 20G</td>
<td>Bolster® 15G; (also Temik® 15G only for use in GA, NC, SC and VA)</td>
</tr>
<tr>
<td>seed treatment nematicides (on seed at planting)</td>
<td>Avicla® Complete Corn</td>
<td>none currently available</td>
</tr>
</tbody>
</table>

The information above is for most commonly found corn nematode species. But some of the generalizations are not true for the needle and sting nematodes. Following are specific exceptions to the generalizations listed in the table for needle and sting nematodes.

- only found in soils that are more than 70 percent sand
- sample spring or fall, not mid season
- extremely high damage potential; damage threshold is one per 100 cubic centimeters soil
- narrow host range
- nonhost crops for management include alfalfa and soybean

A printer friendly version of the article and charts can be downloaded.

Greg Tylica is a professor of plant pathology with extension and research responsibilities in management of plant-parasitic nematodes.
Symptoms of needle nematode damage to corn roots.
Swollen soybean cyst nematode females on soybean root.

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