Nematode Management

NCDA&CS Agronomic Division

2010
Methods

- Prevention
- Biological Control
- Cultural Practices
- Physical Methods
- Chemical Control
— Prevention

- Education
- Quarantine
- Use of certified planting materials (check materials before planting and check manures)
- Clean equipment before moving
- Avoid contaminated irrigation water
— Biological Control

- Bacteria — Activate (*Bacillus* spp.)
- Fungi — Ditera, Nem-Out or Melocon
- Predators — beneficial nematodes
— Cultural Practices

- Crop Rotation
- Resistant Varieties
- Fallowing
- Cover Crops
- Date of Planting & Harvest
— Cultural Practices (cont.)

- Flooding . . . alternating 2- to 3-week cycles of flooding & drying is especially effective
- Trap crops
- Removal of plants with symptoms
— Cultural Practices (cont.)

➢ Use of soil amendments
  — The potential level of nematode control depends on type of material (e.g., pine bark is good) and its age (e.g., compost should be immature).
  — Caution: immature compost may not only be difficult to handle & have an offensive odor, but it may also contain salts and metabolites that are toxic to plants.
— Physical Methods

- Hot water & chemical dips
- Steam sterilization
- Root pruning
- Solarization — better in heavier (loamy to clay soils) rather than sandy soils
— Chemical Control

- **Fumigants** — carbon disulfide, chloropicrin, methyl bromide, ethylene dibromide (EDB), DD, dibromochloropropane (DBCP), 1,3-dichloropropene (Telone II, 1,3-D), metam sodium (mit, methyl-isothiocyanate) (Vapam, Soil Prep, Sectagon), Enzone (sodium tetrathiocarbonate)

- **Organophosphates** — Mocap (ethoprop), Dasanit

- **Carbamates** — Furadan (carbofuran), Temik (aldicarb), Vydate (oxamyl, systemic)

- **Natural** — Clandosan 618 (chitin/urea), Nematrol (sesame chaff)
Specific Nematodes & How to Manage Them
— Root Knot

➢ Common host crops
  — Fruits & vegetables
  — Corn
  — Potato
  — Peanut
  — Soybean
  — Tobacco

➢ Distribution
  — Found in nearly all soils, but incidence is higher in sandy soils

➢ General management
  — Use resistant varieties to suppress populations
  — Remove residual crop roots
  — Till multiple times in fall
  — Incorporate green manures of sudangrass hybrids, sorghum-sudan hybrids or various crucifers into warm soil to obtain biofumigant action
— Southern Root Knot

- Common host crops: cotton & sweetpotato
- Distribution: warm, sandy soils
- General management
  - Plant early, when soil temperatures are cool.
  - Rotate with alfalfa, sorghum or RKN-resistant cowpea.
  - Use green manures and/or poultry litter.
  - Subsoil in areas where there are hardpans.
  - Use nematicicides and resistant cultivars.
  - Manage weeds.
— Soybean Cyst

- **Common host crops:** soybean & snap bean
- **Symptom:** resembles Mn deficiency
- **General management**
  - 1\(^{st}\) yr: plant nonhost crop
  - 2\(^{nd}\) yr: plant cyst-resistant soybean variety
  - 3\(^{rd}\) yr: plant nonhost crop
  - 4\(^{th}\) yr: plant cyst-susceptible soybean variety
  - Rotate with corn, cotton, grain sorghum, peanut or tobacco. Small grains are NOT host crops
— Columbia Lance

- **Common host crops**: corn, cotton & soybean
- **Distribution**: most severe on sandy soils
- **General management**
  - Choose tolerant varieties (these neither limit nor prevent nematode reproduction & development).
  - Rotate with peanut, tobacco or small grains.
  - Use green manures and/or poultry litter.
  - Subsoil to alleviate hardpan soils.
## Potential for Columbia Lance Nematode Based on Soil Type

<table>
<thead>
<tr>
<th>Nematode Numbers per 500 cc of soil</th>
<th>Sandy Clay</th>
<th>Mineral or Organic</th>
</tr>
</thead>
<tbody>
<tr>
<td>10–50</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>50–100</td>
<td>Moderate</td>
<td>Low</td>
</tr>
<tr>
<td>100–200</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>200–400</td>
<td>High</td>
<td>Moderate</td>
</tr>
<tr>
<td>400 +</td>
<td>High</td>
<td>High</td>
</tr>
</tbody>
</table>
— Lance

- **Common host crops**: corn, cotton & turf
- **Associations**
  - High populations with stressful growing conditions
  - Damage related to nutrition & soil factors
- **General management**
  - Provide optimum growing conditions (adequate moisture, proper soil pH & fertility).
  - Use chemical control (nematicides).
  - Choose resistant varieties.
— Dagger

- **Common host crops**: apple, blackberry & strawberry
- **Distribution and associations**
  - High populations in light, well-drained soils
  - Vector of tomato ringspot, tobacco ringspot & grapevine fan leaf viruses
- **General management**
  - Use chemical control (nematicides).
— Lesion

- **Common host crops:** apple, corn, cotton, peanut, potato, strawberry & tobacco
- **Associations:** stress (too much or too little water)
- **General management**
  - Incorporate green manures (sudangrass hybrids, sorghum-sudan hybrids or various crucifers) into warm soil to obtain biofumigant action.
  - Use chemical control (nematicicides).
  - Choose resistant varieties.
  - Leave land fallow in winter or summer.
— Reniform

- **Common host crops:** cotton, sweetpotato & vegetables
- **Distribution**
  - Fine-textured soils with < 80% sand
  - Currently reported in ten N.C. counties
- **General management**
  - Rotate with grasses, corn, peanut, small grains, sorghum, mustard, pepper or soybean (resistant).
  - Use chemical control (nematicides).
  - Manage weeds.
— Ring

- **Common host crops:** corn, peach, peanut & turf
- **Associations**
  - Stress (too much or too little water)
  - Improper fertility
- **General management**
  - Provide optimum growing conditions (adequate moisture, proper soil pH & fertility).
  - Use chemical control (nematicides).
  - Choose resistant varieties.
  - Rotate with nonhost or poor host crops.
— Sting

- **Common host crops:** corn, cotton, peanut, soybean, strawberry & turf
- **Distribution:** soils with > 80% sand
- **General management**
  - Rotate with watermelon, clover (excluding white clover), alfalfa, grain or tobacco.
  - Provide optimum growing conditions (adequate moisture, proper soil pH & fertility).
— Stubby Root

- **Common host crops**: corn, cotton & turf
- **Distribution & associations**
  - Sandy soils
  - Environmental stress
- **General management**
  - Use nonvolatile, chemical nematicides.
  - Rotate with bahiagrass, peanut or tobacco.
  - Plant crop after soil temperature has warmed (nematodes “like” cool, wet soils).
— Other Nematode Species

- Needle
- Northern root knot
- Sheath
- Spiral
- Stunt
- Tobacco cyst
- Foliar nematodes (on greenhouse & nursery crops)
Tips for Homeowners

- provide optimum growing conditions
- add organic matter before planting
- provide adequate moisture
- ensure proper soil pH and fertility levels
- prune and mow at right time, in correct way, at appropriate height, etc.
- choose resistant or tolerant plants from reliable sources (common nematodes in home plantings include root knot, stunt, lesion, ring & sting)