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 nematicides and resistant cultivars.
  - Manage weeds.

— Soybean Cyst

- Common host crops: soybean & snap bean
- Symptom: resembles Mn deficiency
- General management
  - 1st yr: plant nonhost crop
  - 2nd yr: plant cyst-resistant soybean variety
  - 3rd yr: plant nonhost crop
  - 4th 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

Nematode Numbers per 500 cc of soil	Sandy Clay	Mineral or Organic
10–50	Low	Low
50–100	Moderate	Low
100–200	High	Low
200–400	High	Moderate
400 +	High	High

— 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 (nematicides).
  - 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)