Nematode Management

Introduction to Plasticulture II

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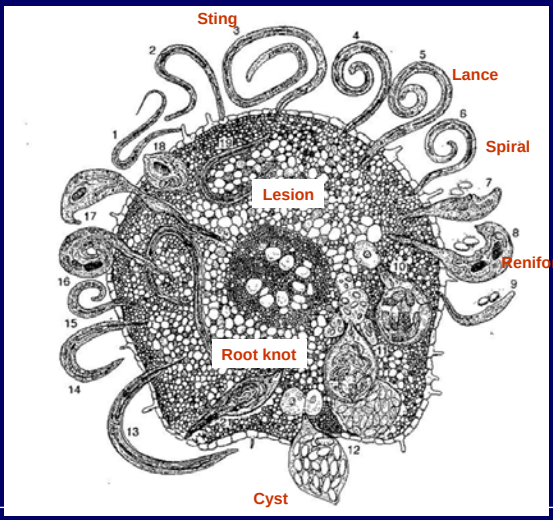
Plant-parasitic Nematodes

- injure the cells they feed on,
- steal nutrients,
- distort root growth,
- make it easier for other pathogens and pests to get into the roots.



Nematode Feeding Types (Siddiqi 2000)

Plant-parasitic Nematode Life Cycle

- egg
- 1st stage juvenile develops inside the egg
- 2nd stage juvenile hatches from the egg & must feed to continue development
- 3rd stage juvenile molts to become
- 4th stage juvenile molts to become
- adult

Many nematodes complete their life cycle in about 30 days.

2nd-stage juvenile hatching

Common Nematode Problems in Plasticulture Crops

Vegetables
- root-knot (endoparasite)

Strawberries
- dagger (ectoparasite)
- pin
- sting

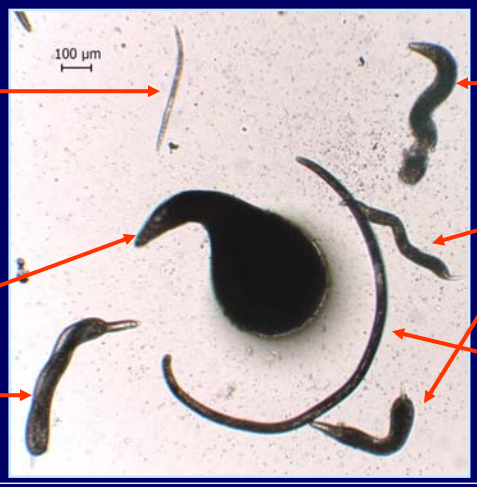
Blackberries
- dagger (ectoparasite) can transmit tomato ringspot, tobacco ringspot & grapevine fan leaf viruses

Root-knot on Vegetables

Meloidogyne incognita on cucumber
Greene County, NC

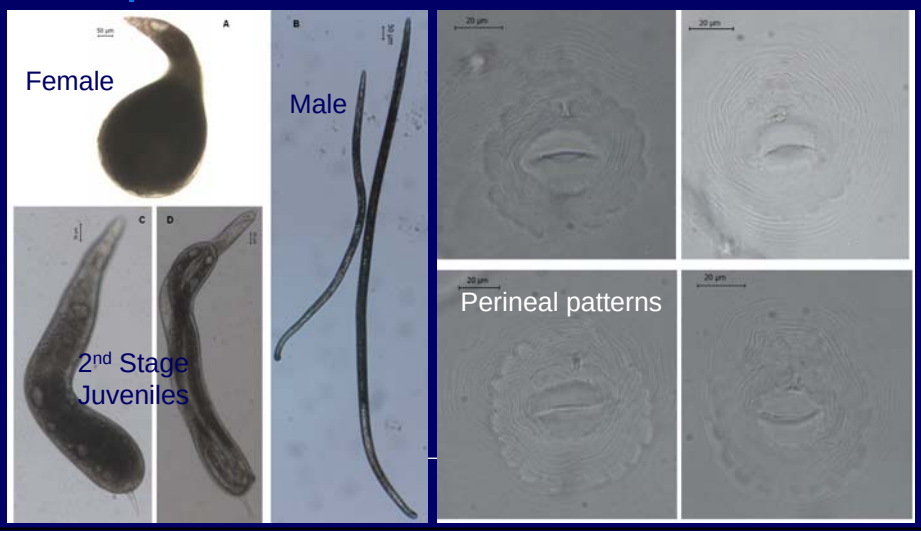
Root-knot Nematode Specimens

Root-knot Nematode Life Stages



Root-knot Nematodes on Soybean

Meloidogyne arenaria Micrographs

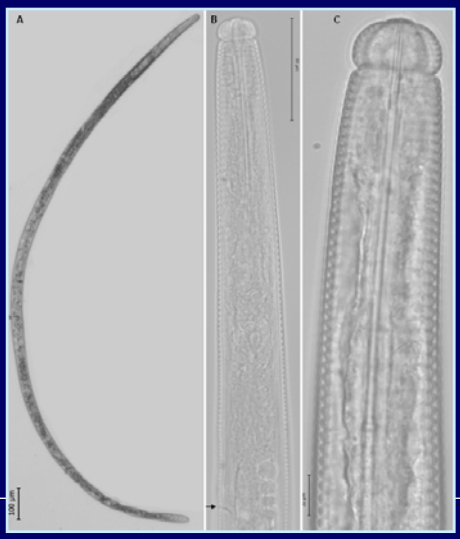


Nematode-infected Strawberries

Sting Nematode Damage

Sting Nematode Micrographs

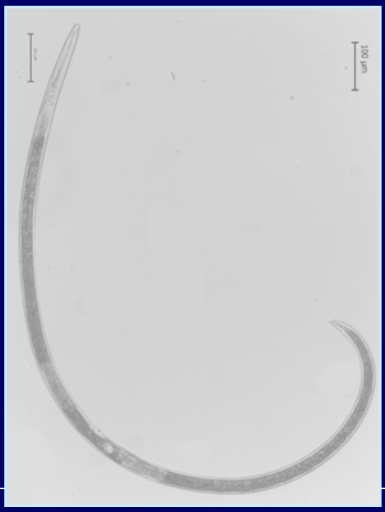
A. Entire female
B. Esophageal region
C. Head region



***Belonolaimus longicaudatus* from soybean**

Dagger Nematode Micrograph

Entire female



***Xiphinema americanum* from corn**

Pin Nematode Micrograph

Entire female

Paratylenchus sp. **from azalea**

Root-knot Nematode Micrograph

Egg mass on root cortex (left)

Two females on dissected root (right)

Meloidogyne incognita **on tomato**

Nematode Management

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

Nematode Management — Prevention

- Education
- Quarantine
- Certified Planting Materials
- Cleanliness
  - Irrigation Water
  - Equipment
  - Manure

Nematode Management — Biological Control

- Bacteria
- Fungi
- Predators

Nematode Management — Cultural Practices

- Crop Rotation
- Resistant Varieties
- Fallowing
- Cover Crops
- Plant & Harvest Dates
- Flooding
- Trap Crops
- Soil Amendments
- Plant Removal

Nematode Management — Physical Methods

- Hot Water & Chemical Dips
- Steam Sterilization
- Root Pruning

Nematode Management — 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 — Nemacur (fenamiphos), Mocap (ethoprop), Dasanit
- Carbamates — Furadan (carbofuran), Temik (aldicarb), Vydate (oxamyl, systemic)
- Natural — Clandosan 618 (chitin/urea), Nematrol (sesame chaff)

Crop Rotation

Vegetables infected with root-knot nematodes can be rotated with

- asparagus
- corn
- onion
- small grain

Sting Nematode Management

Nonhosts include

- cucumber
- okra
- peanut
- tobacco
- watermelon

Crabgrass is an excellent host plant!

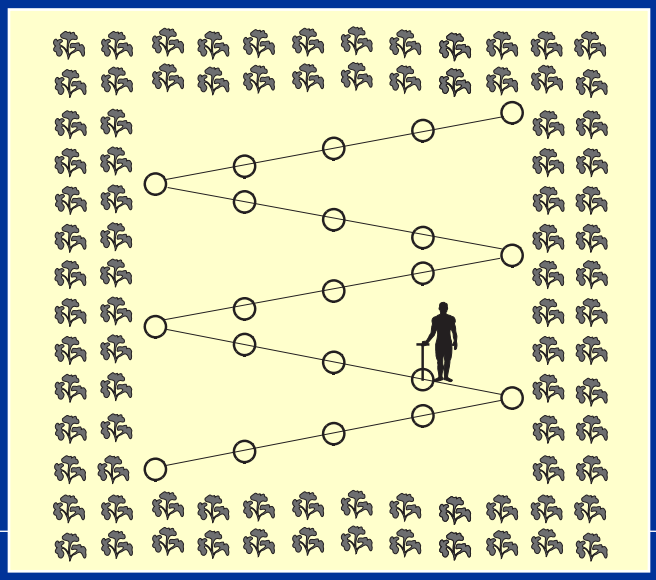
Root-knot Resistant Tomato Varieties

AB 5
APT 410
Atkinson
Auburn
Beefeater
Beefeater VFN
Better Boy
Bigset
BOS 315
BOS S-55
Celebrity
CXD 179
CXD 187
CXD 207
CXD 236
Early Girl
Goliath
HAZERA 3518
HEINZ 1100
HEINZ 2401
HEINZ 2601
HEINZ 3044
HEINZ 5003
HEINZ 5803
HEINZ 8892
HEINZ 9280
HEINZ 9382
HEINZ 9491
HEINZ 9492
HEINZ 9494
HEINZ 9553
HEINZ 9557
HEINZ 9663

Root-knot Resistant Tomato Varieties
(continued)

HEINZ 9665
HEINZ 9773
HEINZ 9780
HEINZ 9888
HEINZ 9995
HEINZ 9997
HM 830
HYPEEL 108
HYPEEL 303
HYPEEL 347
HYPEEL 45
HYPEEL 65
Monte Carlo
NEMAPRIDE 113
Park's Whopper
PETO 849
PS 345
PS 816
Royal Flush
RPT 1570
SUN 6117
SUN 6366
Sunburst
Terrific
U 729
U 941
VFN 8
Vine Ripe
Wonderboy VFN

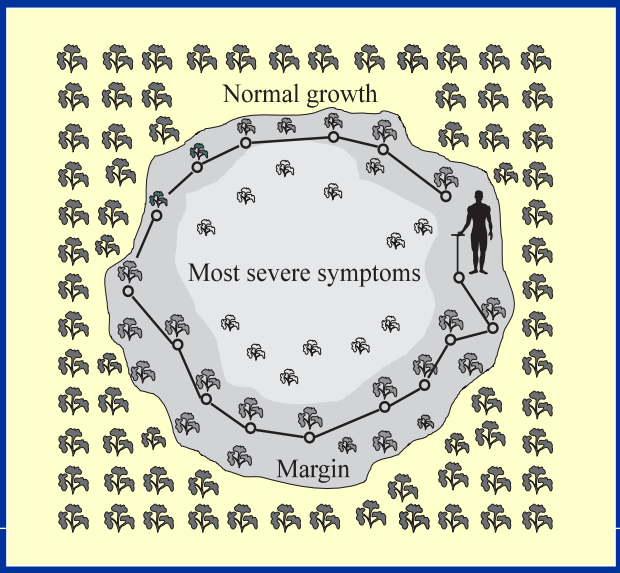
Sampling for Nematode Assay



Routine samples

Collect at least 20 cores randomly from a uniform field.

Sampling for Nematode Assay



Problem samples

Take soil cores from the margin of affected areas and only from the roots of affected plants that are still alive.