

**Specialty  
Agro Inputs  
(Nematode Management)**

**PERFONEMAT**

# Introduction – Nematodes

## Scientific Classification:

- ▶ Phylum Nematoda
- ▶ Roundworms
- ▶ Microbial Feeders (90% plus)
- ▶ Animal Parasitic
- ▶ Human Parasitic
- ▶ Insect Parasitic
- ▶ Plant Parasitic

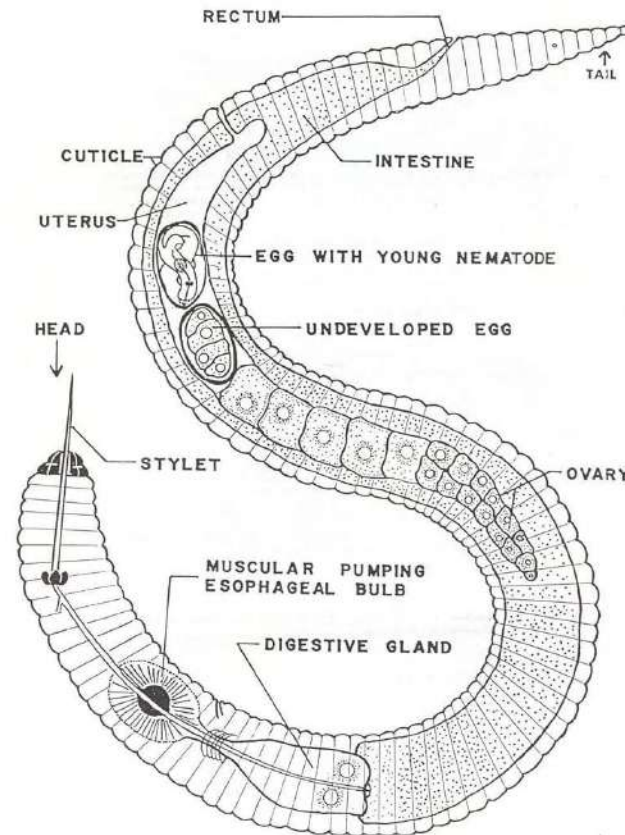


FIGURE 1.—PLANT DESTRUCTIVE NEMATODE

## Morphology:

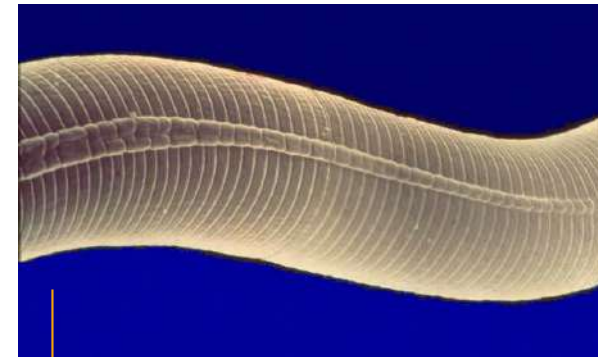
### A nematode has -

- ▶ Digestive organs
- ▶ Reproductive organs
- ▶ Excretory structures
- ▶ Muscles
- ▶ Nerves
- ▶ Tough skin or “Cuticle”

# Introduction – Nematodes

## Interesting Fact-file:

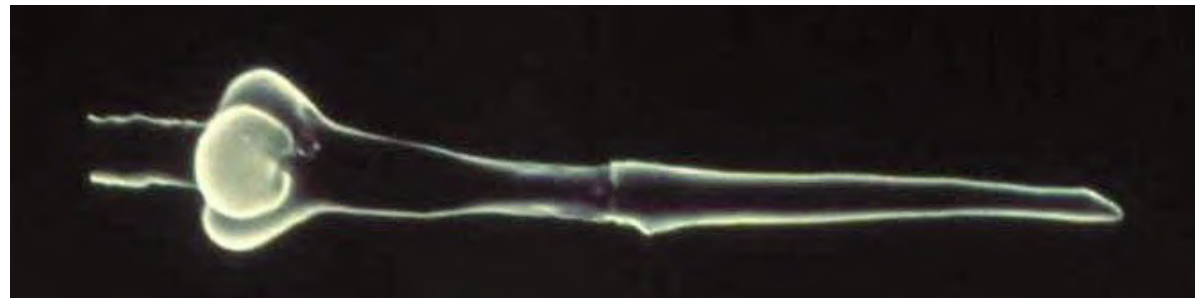
- ▶ Most numerous animal
- ▶ Second most numerous species
- ▶ Size: mostly microscopic
- ▶ Longest is 26 feet (in Blue whale)
- ▶ Simple morphology
- ▶ No circulatory system
- ▶ No respiratory system
- ▶ No skeleton
- ▶ **2 types – Non-plant Parasitic & Plant Parasitic**



# Plant Parasitic Nematodes

## Morphology:

Plant-parasitic nematodes all have stylets (spears) that penetrate cells and withdraw the contents



## Names:

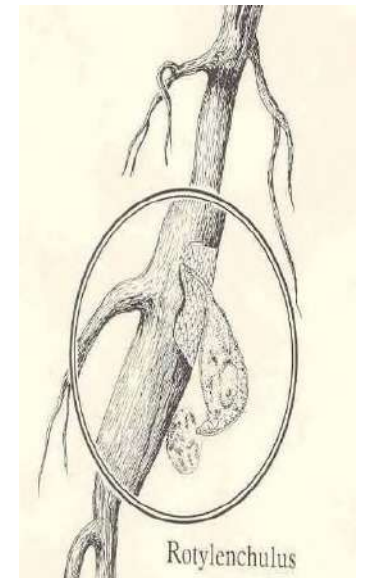
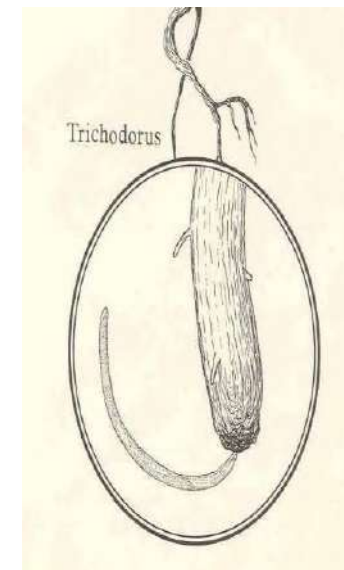
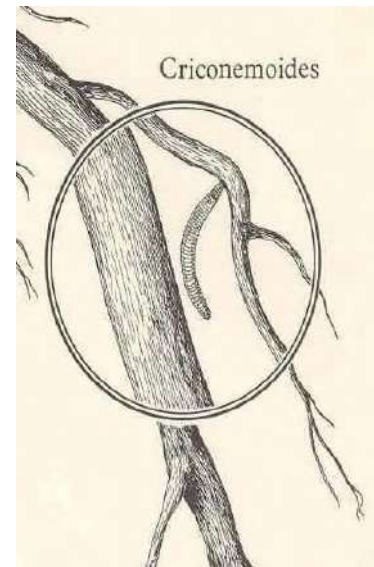
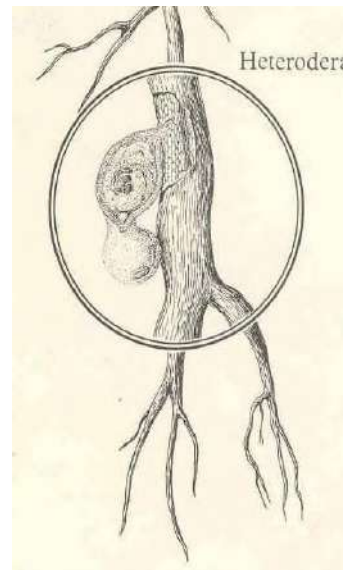
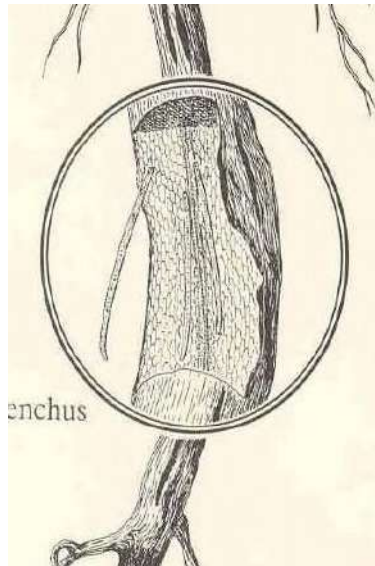
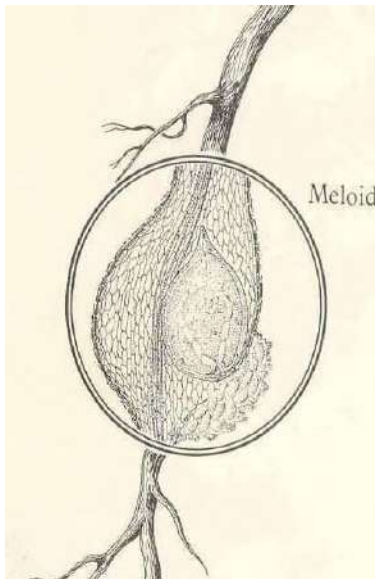
Root-knot, Sting, Stubby-root, Reniform, Lance, Ring, Lesion, Burrowing, Citrus, Spiral, Cyst

# Plant Parasitic Nematodes

- ▶ Over 6000 known species
- ▶ Present in all ecological niches
- ▶ Attacks almost all plants
- ▶ Reduces ornamental growth
- ▶ Serious problems in turf & tree crops
- ▶ Cause 10% losses to crops
- ▶ **75 species of Root-knot nematodes**
- ▶ **Meloidogyne incognita & Meloidogyne indica species' are commonly found in equatorial & tropical climate (India)**

# Plant Parasitic Nematodes

## Feeding Habit of some plant parasitic nematodes:



Root  
knot

Lesion

Cyst

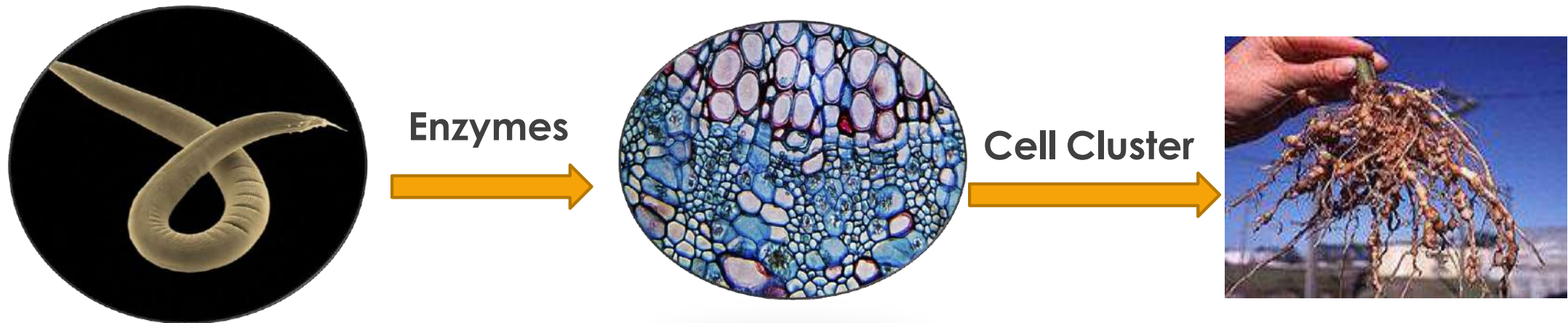
Ring

Stubby  
root

Reniform

# How are Root-Knots formed?

- ▶ The female nematode sucks the nutrients from the tiny roots & releases enzymes.
- ▶ These enzymes affix the cells to form large cells.
- ▶ These cells increase in size & form knots on the roots.



# What damage do Nematodes cause?

- ▶ Nematodes reduce / modify the root mass of plants.
- ▶ They kill/ modify root cells which form their food.
- ▶ Symptoms of nematode damage are visible in roots & foliage of plants.



# What damage do Nematodes cause?

## Foliage Damage Symptoms:

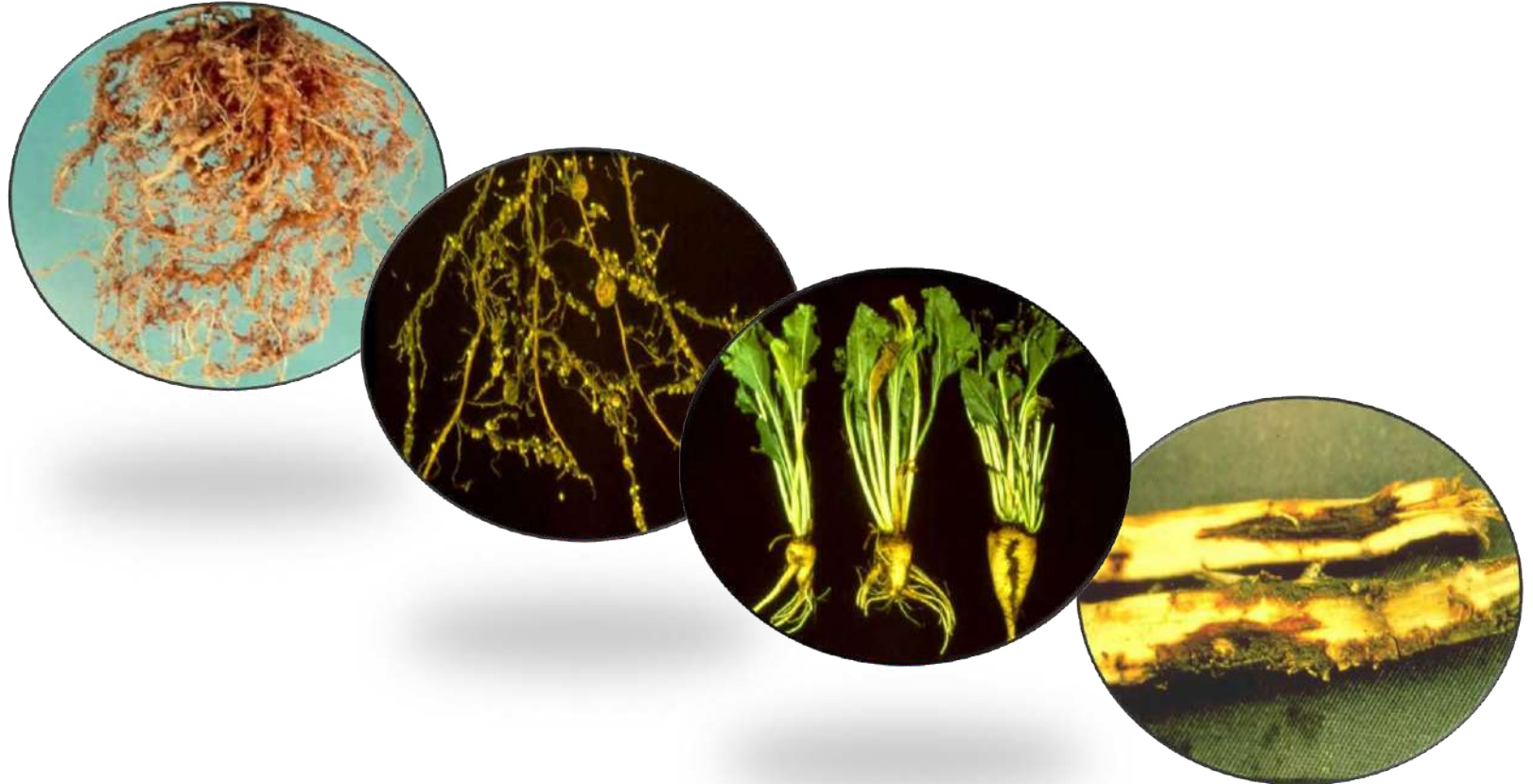
- ▶ Water and Nutrient Stress
- ▶ Premature Wilting
- ▶ Leaf Yellowing (Chlorosis)
- ▶ Plant Stunting
- ▶ Irregular growth patterns



# What damage do Nematodes cause?

## Root Damage Symptoms:

- ▶ Galled Roots
- ▶ Stunted Roots
- ▶ Swollen Root Tips
- ▶ Root Lesions
- ▶ Increase in Lateral Roots



# Root Knot Nematode Infecting Fruits in India\*

11

S.No.	Crop	State	District
1.	Citrus	Gujarat	Mehsana
2.	Citrus	Gujarat	Anand
3.	Pomegranate	Gujarat	Anand
4.	Pomegranate	Maharashtra	Ahmednagar
5.	Banana	Karnataka	Bangalore
6.	Banana	Karnataka	Tumkur
7.	Guava	Tamil Nadu	Coimbatore
8.	Papaya	Tripura	North Tripura

\* Source: Root Knot Nematodes in India (2014) by M.R.Khan, R.K.Jain, T.M.Ghule, S.Pal; AICRP Project on Plant Parasitic Nematodes with Integrated Approach for their Control; Division of Nematology (IARI-India).

# Nematode Management Methods

- ▶ **Exclusion** – Using nematode-free plants or soil
- ▶ **Sanitation** – Disinfecting soil/medium, removing infected plant roots
- ▶ **Rotation** – Using poor-host plants, maintaining high organic matter levels
- ▶ **Plant Resistance** – Using resistant breeding technique to prevent nematode growth
- ▶ **Fallow** – Leaving the farm unploughed/unirrigated for some time
- ▶ **Solarization** – Increasing soil temperature using plastics in hottest months
- ▶ **Nematicides** – Using toxic chemicals in soil & foliage
  
- ▶ **Combination of 2 or more treatments is the key to effectively control Nematodes.**

# Eco-friendly Nematode Suppressor

*PERFONEMAT*

**Di-Aldehyde Mixture-based  
Nematode Suppressor**

# Eco-friendly Nematode Suppressor

## Unique Features:

- ▶ Effectively controls Nematodes
- ▶ Free of toxic Insecticides/Pesticides
- ▶ Does not leave residues on plants

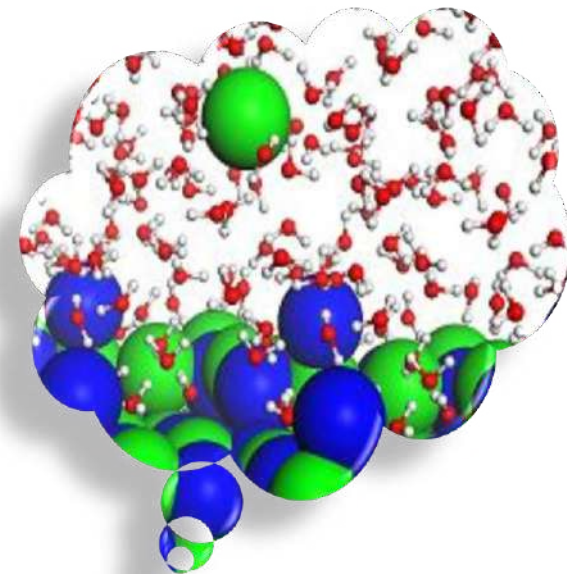
***PERFONEMAT***

# Eco-friendly Nematode Suppressor

## Mechanism of Action: Protein Dissolution on contact



Skin protein  
dissolves



# Eco-friendly Nematode Suppressor

## Dosage & Method of Use:

- ▶ **Primary infection** - 2 ml per litre water as drench around the roots/stems. Repeat if required.
- ▶ **Severe infection** – 4 ml per litre water as drench around the roots/stems. Repeat after 3 days.

*PERFONEMAT*





**AGREO SOLUTIONS LLP** • 101 - A Neelam Center • Worli Mumbai - 400030 • India  
Tel No. +91 22 4001 3036 • M. 77188 48090 • [www.s-amit.com](http://www.s-amit.com)