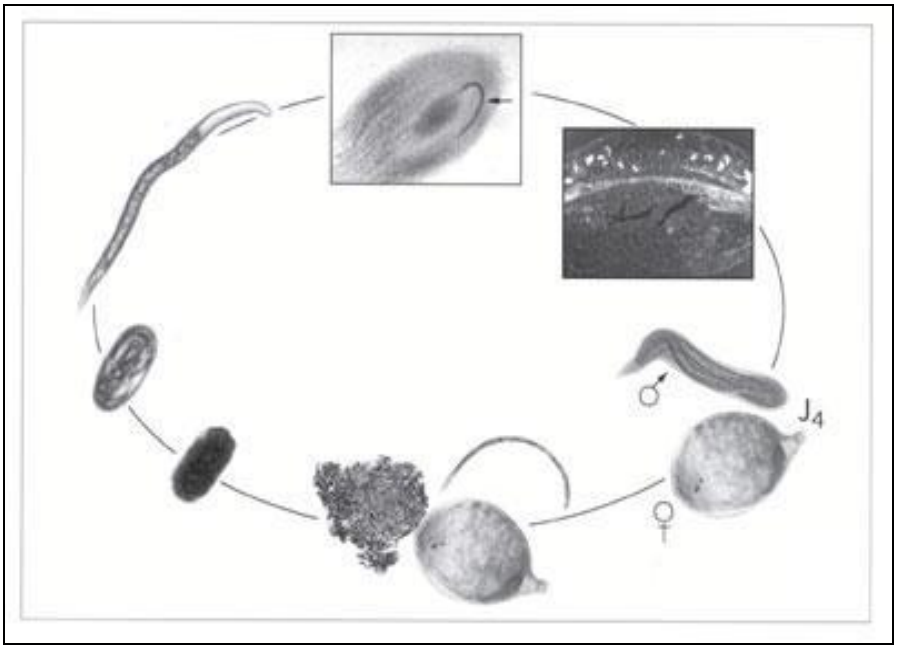
Lecture 10 - Identification of economically important plant nematodes

Root knot nematode (*Meloidogyne incognita, M. javanica, M.arenaria, M.halpa)*

Parasitism and habitat

Females as well as third and fourth stage juvenile are sedentary endoparasites on many plants. Males and second stage juvenile are migratory and can be located in soil also. The root-knot nematodes are widely distributed in nurseries and uplands or in well-drained soils all over India.



Main Morphological characters

Body **:** Elongate juvenile (0.5mm) and males (1.0-2.0mm); typically saccate, spheroid with a distinct neck in females (0.8mm long and 0.5mm wide)

Stylet **:** Strong and rounded knobs in males; in females more slender than malesor juveniles but with strong basal knobs.

Oesophagous **:** With very large median bulbfollowed by a short isthmus

Excretory pore **:** Often seen with part of excretory tube in the area between posterior part of stylet knobs and opposite to median bulb.

Vulva and annus **:** In females, typically opposite to neck and surrounded by a pattern of fine lines resembling human finger prints. (These are used for identification of species in this genus)

Spicules **:** Very near the terminus of males; bursa absent

Resembling genus **:** *Heterodera*

Root-Lesion Nematode (*Pratylenchus spp)*

Parasitism and habitat

Migratory endo parasite, feeding in root cortex of many plants. All stages are found in root or soil. Males common in many speices, unknown or less common in others.

Main Morphological characters

Body length : 0.4-0.8mm

Lip region : slightly set off from body

Stylet : Typically short, strong with massive knobs

Ovary : Typically one and posterior ovary rudimentary to form a post uterine sac.

Vulva : Typically on the posterior fourth of the body (75-80%)

Tail : Nearly round to pointed and in the case of male, tail has bursa

Resembling genus : *Radopholus* (Two ovaries present instead of one and great morphological difference between male and females observed in *Radopholus*).

Spiral nematode (*Helicotylenchus multicinctus)*

Parasitism and habitat

Endoparasitic and ectoparasitic on many plants; all stages are found in soli and root.

Main Morphological characters

Body **:** Typically arcuate or spiral in shape when dead or relaxed. Length from 0.5-1.2mm

Stylet **:** Moderately long

Dorsal oesophageal gland orifice **:** Typically located more than one – half stylet length posterior to stylet knobs.

Ovaries : Two

Vulva : posterior to middle of body (60-70%)

Tail : In females, round to nearly pointed; often with short projection on ventral side and in males the tail is short with bursa.

Resembling genus **:** *Hoplolaimus, Scutellonema* and *Rotylenchus*

Cyst nematode (*Heterodera)*

Parasitism and habitat

Parasitic on many plants mostly in temperate zone (notably potato, sugarbeet, oat and other grains, clover, soyabean and various crucifers). Adult female with neck embedded in plant roots and the body exposed. Juveniles, males and cysts found in soil.

Main Morphological characters

Body **:** Slender in males (1.0-2.0mm) and juveniles (0.3-0.6mm); in females, typically swollen lemon shaped (0.5-0.8mm in length), white or yellow in colour. Cysts dark brown, lemon shaped (0.8mm long and 0.5mm wide) or nearly the same shape as that of *Meloidogyne* female

Stylet **:** Short in males with rounded basal knobs and in juveniles, more than 0.02mm long.

Oesophagous **:** With well developed median bulb and lobe extending back and overlapping the intestine

Spicules : Near the posterior end of females

Resembling genus : *Meloidogyne* (stylet of juveniles only 0.01-0.014mm long; adult females fully embedded in roots in case of *Meloidogyne)*

Potato cyst Nematode **:** (*Globodera*): The adult females are globular in shape and hence, the genus is named as *Globodera.*

Lance nematode (*Hoplolaimus spp.)*

Parasitism and habitat

Ectoparasitic and endoparasitic on many plants. All stages are found in soil or root.

Main Morphological characters

Body: Length of males and females rangesfrom 1.0-2.0 mm

Lip: Typically set off with annules divided into small segments (visible under oil immersion)

Stylet: Strongly developed with typically elongated and closely arranged basal knobs.

Oesophagus: With median bulb; oesophageal glands with short lobe overlapping dorsally to the anterior end of intestine.

Ovaries: Two

Vulva: Centrally located

Bursa: Present

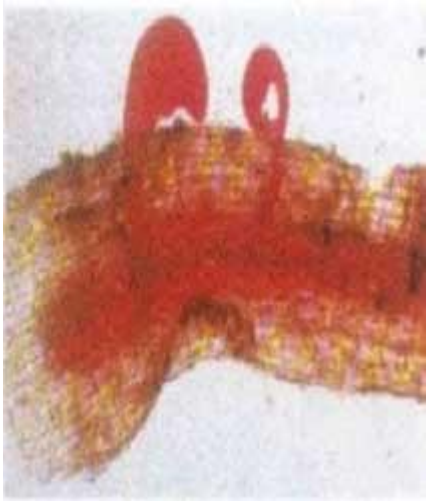
Resembling Genus: *Scutellonema* and *Rotylenchus* (Stylet knobs broder and male tail shorter in these two genera)

Helicotylenchus (Dorsal gland orifice located atleast one half of the stylet length posterior to stylet)

Reniform nematode (*Rotylenchulus)*

Parasitism and habitat

Parasitic on many plants. Mature females with only their neck embedded in roots as semiendoparasites



(difficult to see because covered with egg masses and soil particles); juveniles, males and immature females are found in soil.

Main Morphological characters

Body: Slender and small in males (0.3-0.50mm), immature females (0.3-0.45mm); typically reniform (kidney shaped) in adult females (0.6-0.9mm)

Oesophagus: Dorsal oesophageal gland typically open about one stylet length posterior to stylet knobs.

Resembling genus: *Tylenchulus*

Stubby Root nematode (*Trichodorus)*

Parasitism and habitat

Ectoparasitic on many plants. All stages are found in soil.

Main Morphological characters

Body: 0.4-1.5 mm

Stylet: Solid, typically curved dorsally, without knobs

Oesophagus: With typical pyriform basal bulb

Ovaries: Usually Two

Vulva: Near middle of the body

Tail: Bluntly rounded in both female and male

Anus: Near posterior end

Stunt Nematode (*Tylenchorhynchus spp.)*

Parasitism and habitat

Ectoparasitic on many plants and rarely endoparasitic. All stages are found in the rhizosphere.

Main Morphological characters

Body	**:** 0.6-1.4 mm in length
Lip	**:** Typically continuous with body or slightly set off
Stylet	: Usually strong with large basal knobs
Oesophagus	**:** Typically with procarpus, meta carpus and well developed posterior bulb without overlapping the intestine

Ovaries	**:** Two
Vulva	: Almost near the middle of the body
Tail	: In female it is tapering to rounded, usually one or more times as long as anal body diameter
Resembling genera	: Tylenchus (In this genera only one ovary is present and vulva located in the posterior region and Psilenchus (the tail is slender and longer)