Lecture 11 - Symptoms Caused by Nematodes

Most of the plant parasitic nematodes affect the root portion of plants except *Anguina spp., Aphelenchus spp., Aphelenchoides spp.,Ditylenchus spp, Rhadinaphelenchus cocophilus* and *Bursaphelenchus xylophilus.* Nematodes suck the sap of the plants with the help of stylet and causes leaf discolouration, stunted growth, reduced leaf size and fruits and lesions on roots, galls, reduced root system and finally wilting.

Symptoms of nematode diseases can be classified as

I. Symptoms produced by above ground feeding nematodes

II. Symptoms produced by below ground feeding nematodes

I. Symptoms produced by above ground feeding nematodes

Leaf discolouration: The leaf tip become white in rice due to rice white tip nematode *Aphelenchoides besseyi*, yellowing of leaves oin Chrysantyhemum due to Chrysanthemus foliar nematodes, *A. ritzemabosi*.

White tip symptom in rice

Leaf discoloration in Chrysanthemum

Dead or devitalized buds: In case of straw berry plants infected with *A. fragariae*, the nematodes affect the growing point and kill the plants and result in blind plant.

Seed galls: In wheat, *Anguina tritici* larva enter into the flower primordium and develops into a gall. The nematodes can survive for longer period (even upto 28 years) inside the cockled wheat grain.

Twisting of leaves and stem: In onion, the basal leaves become twisted when infested with *D. angustus*.

Crinkled or distorted stem and foliage: The wheat seed gall nematode. *A tritici* infests the growing point as a result distortions in stem and leaves take place.

Necrosis and discoloration:

The red ring disease on coconut caused by *Rahadinaphelenchus cocophilus*. Due to the infestation, red coloured circular area appears in the trunk of the infested palm.

Red colored ring on coconut trunk

Lesions on leaves and stem: Small yellowish spots are produced on onion stem and leaves due *D.dipsaci*, and the leaf lesion caused by *A. ritzemabosi* on Chrysanthemum.

II. Symptoms produced by below ground feeding nematodes

The nematodes infest and feed on the root portion and exhibit symptoms on below ground plant parts as well as on the above ground plants parts and they are classified as

a. Above ground symptoms
b. Below ground symptoms

a. Above ground symptoms

Stunting: Reduced plant growth, and the plants can not able to withstand adverse conditions. Patches of stunted plants appears in the field. (eg.) in potato due to *Globodera rostochiensis*, in gingelly, due to *Heterodera cajani* and in wheat by *Heterodera avenae.*

Discolouration of foliage: Patchy yellow appearance in coffee due to *Pratylenchus coffeae, G. rostochiensis* infested potato plants show light green foliage. *Tylenchulus semipenetrans* induce fine mottling on the leaves of orange and lemon trees.

Wilting: Day wilting due to *Meloidogyne* spp. i.e. In hot weather the root – knot infested plants tend to droop or wilt even in the presence of enough moisture in the soil. Severe damage to the root system due to nematode infestation leads to day wilting of plants.

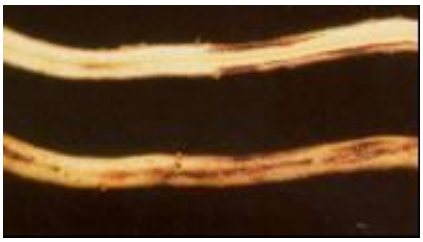
B. Below ground symptoms

Root galls or knots: The characteristic root galls are produced by root – knot nematode, *Meloidogyne* spp. false root galls are produced by Nacobbus batatiformis on sugar beet and tomato. Small galls are produced by *Hemicycliophora arenaria* on lemon roots. *Ditylenchus*

radicicola cause root galls on wheat and oats. *Xiphinema* diversicaudatum cause galls on rose roots.

Root galls

Root lesion: The penetration and movement of nematodes in the root causes typical root lesions eg. Necrotic lesions induced by *Pratylenchus* spp on crossandra; the burrowing nematode, *Radopholus similes* in banana. Similarly *Pratylenchus coffeae* and *Helicotylenchus multicinctus* cause reddish brown lesion on banana root and corm. The rice root nematode also cause brown lesions on rice root.



Root lesion

Reduced root system: Due to nematode feeding the root tip growth is arrested and the root produce branches. This may be of various kinds such as coarse root, stubby root and curly tip.

Coarse root: *Paratrichodorus* spp. infestations arrest the growth of lateral roots, and leads to a open root system with only main roots without lateral roots.

Stubby roots : The lateral roots produce excessive rootless (eg.*P.christei*)

Stubby roots

Curly tip: In the injury caused by *Xiphinema* spp. the nematode retard the elongation of roots and cause curling of roots known as "Fish book' symptom.

Root proliferation: Increase in the root growth or excessive branching due to nematode infestation. The infested plant root produced excessive root hair at the point of nematode infestation.
(eg.) *Trichodorus christei, Nacobbus spp., Heterodera spp. Meloidogyne hapla* and *Pratylenchus* spp. etc.

Root – rot: The nematodes feeds on the fleshly structure and resulting in rotting of tissues (eg.) Yam nematode *Scutellonema bradys* and in potato *Ditylenchus destructor* cause root rot.

Root surface necrosis: The severe injury caused by *T. semipenetrans* on citrus leads to complete decortications of roots and results in root necrosis.

Cluster of sprouts on tubers: On the tubers, clusters of short and swollen sprouts are formed due to *D. dipsaci* infestation in many tuber plants.