Lecture 12 - Interaction of Nematodes with Micro-Organisms

Plant parasitic nematodes favour the establishment of secondary pathogens viz., fungi, bacteria, virus etc. The nematodes alter the host in such a way that the host tissue becomes suitable for colonization by the secondary pathogens. Even though the nematodes themselves are capable of causing considerable damage to the crops, their association with other organisms aggravate the disease. The nematodes cause mechanical wound which favours the entry of micro organisms. In some cases, the association of nematode and pathogen breaks the disease resistance in resistant cultivators of crop plants.

Nematode – fungus Interaction

Nematode – fungus interaction was first observed by Atkinson (1892) in cotton. *Fusarium* wilt was more severe in the presence of *Meloidogyne* spp. Since then the nematode – fungus interaction had received considerable attention on important crop like banana, cotton, cowpea, brinjal, tobacco and tomato. Some examples of nematode – fungus interaction are given in the following table.

Crop	**Name of the disease**	**Nematode**	**Fungus**	**Role of nematode**
Cotton	Damping off	*Meloidogyne incognita acrita* *M. incognita acrita debaryanum*	*Rhisctonia solani* *Pythium*	Assists *Pythium*
	Vascular wilt	*M. incognita acrita*	Fusarium *Osysporum* F. *vasingectum*	Assists

	Rotylenchulus Reniformis	*F. oxysporium* f.sp *Vasinfectum*	Assists
	Belonolaimus gracicilis	*F.oxysporum* f.sp	
	B. longicaudatus		Assists
Blank shank (vascular wilt)	*M. incognita acrita*	*Pytophtora Parasitica var nicotianae*	Assists

Nematode – bacterium interactions

Nematode – bacterium interactions are comparatively fewer than the nematode – fungal interactions. Some examples of nematode – bacteria association are presented.

Crop	Name of the disease	Nematode	Bacterium	Role of nematode
Wheat	Tundu Vascular wilt	*A. tritici* *M. incognita*	*C. tritici* *Pseudomonas solanacearum*	Essential Assists

Nematode – Virus Interaction

In nematode – virus complex, nematode serves as a vector. Numerous virus – nematode complexes have been identified after the pioneer work by Hewit, Raski and Goheen (1958) who found that *Xiphinema* index was the vector of grapevine fan leaf virus. *Xiphinema* spp., *Longidorus* spp., and *Paralongodorus* spp. tansmit the ring spot viruses which are called "NEPO" derived from Nematode transmitted polyhedral shaped particles. *Teichodorus* spp. and *Paratrichodorus* spp. transmit the rattle viruses and called "NETU" derived from Nematode transmitted tubular shaped particles. All these nematodes have modified bottle shaped *oesophagus* with glands connected by short ducts directly to the lumen of the oesophagus. This

actually of nematodes. Certain examples of the viral diseases and the nematode vectors are given in the following table.

Viruses	Nematode
NEPO – viruses	
Arabis mosaic	*Xiphinema diversicaudatum*
Arabis mosaic, grapevine fan leaf Arabis mosaic, Grpevine	*X. paraelongatum*

NETU Viruses

Tabacco rattle	*Paratrichodorus pachydermus* *P.allius,P.nanus,* *P.porosus,P.teres* *Trichodorus christei* *T.Primitivus, T.cylindricus,* *T. hooperi*
Pea early browning	*P.amenous, P.pachydermus,* *P.teres,T.viruliferus.*

Nematodes acquire and transmit the virus by feeding, which requires as little as one day. Once acquired, the virus persists for longer period in the nematode body than in vitro. For example, the grapevine fan leaf virus will exist for as many as 60 days in X. index. Two types of mechanisms are observed in virus transmission (i) retention through close biological association between virus and vector as in *Xiphinema*; (ii) retention of virus mechanically as in *Logidours.* Virus is retained in the inner surface of the guiding sheath of *Longidorus,* cuticle lining of the lumen of *oesophagus* in *Trichodorus* and *Paratrichodrous,* cuticle lining of style t extension and *oesophagus* in *Xiphinema.* The virus particles are released into plant cell with the help of *oesophagus*.