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Community Analysis Of Parasitic Nemic Fauna Around The Root Zone Of Mango Plant (*Mangifera Indica*) In Hapur Region

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Abstract

Nematodes are tiny, round-bodied, unsegmented worms. Nematodes occupy any niche of any environment like marine, fresh water or terrestrial environment (free living or parasitic).Nematodes constitute a large group of all metazoans in the world. Plant parasitic and soil inhabiting nematodes are well- recognized factor in soil productivity. Phyto-nematodes feed on cell sap of plants with the help of stylet. They causes many diseases and some deformities like stunting growth, formation of galls on root, wilting of plant. They cause serious damage to crop yield and heavy crop losses.

Keywords: *Niche, Phytonematodes, deformities, Productivity.*

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Introduction

Nematodes are microscopic, wormlike organisms that live in water films and water filled pore spaces >30ìm diameter (Killham, 1994) in the soil. They are mainly found in the upper soil layers where organic matter, plant root and other resources are most abundant.

They can be grouped as fungal feeder, algal feeder, bacterial feeder and predator according to feeding habit. These feeding habit can be deduced from the structure of their mouthparts. Phytonematodes attack the roots stem and leaf of cultivated crops. The plant parasitic nematodes are highly diversified organisms. Their abundance and distribution pattern depend upon soil texture, crop cycle and other anthropogenic factors (Chirchiret al. 2008).

They adversely affect the agricultural production as they act as major pest and caused various diseases. The economic consequences of crop losses due to pests and diseases are to the farmer, consumer, state and the country. The estimated annual yield loss of world's major crops to plant nematodes has been reported to the extent of 12.3%.

They are silent enemies, they lose upto 80% of vegetable fields (Siddiqe, 2000), (Kaskvalc, 2007) similarly as Indian forest decline day by day (Khan et al. 2010) due to this pathogenic micro-organism.

Some Nematodes are harmless and act as bio indicators to help measure soil health (Neilsen and Winding, 2002) and play an important role in ecosystem function by regulating decomposition (Beare et al. 1992).

Nematodes have very wide range of host and attack all kinds of plants but here the investigation deals with the community structure of nematodes inhabiting in soil around the rhizopheric roots of mango plant (*Mangifera indica*).

Materials and Methods

In present study soil samples were collected from Mango orchard at Hapur region from July to November soil samples (250gm) were taken from vertical depth (0-30cm) and horizontal depth (30-60 cm) away from the host plant.

Decanting and sieving technique by Cobb(1918) was supplied to extract the nematodes from soil samples. The estimation of nematodes population per 10gm.root sample from 250gm. soil sample was done in multi chambered counting dish under microscope.

The population densities of nematode species in the samples were calculated by using the formulae (Norton, 1978) X 100

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$$\text{Absolute Frequency (A.F.)} = \frac{\text{No. of samples containing Species}}{\text{No. of samples collected}} \times 100$$

$$\text{Relative Frequency (R.F.)} = \frac{\text{Frequency of Species}}{\text{Sum of frequency of all species}} \times 100$$

$$\text{Relative Density (R.D.)} = \frac{\text{No. of individual of Species in sample}}{\text{Total no. of all individuals of sample}} \times 100$$

$$\text{Prominence Value (P.V.)} = \text{Density } \overline{\text{v Frequency}}$$

Results

In present study the parasitic nematodes constitute the major segment 53.9%and 64.9% of total nemic community at both vertical depth (0-30cm) and (30-60cm) horizontal depth, followed by other sluggish 31.7% and 26.2%, free living 14.2% and 8.88%. This observation showed that population of parasitic forms was higher in comparison to other forms of nematodes. (Table1&2)

Community Analysis of Plant Parasitic Nematode at different depths.

Table 1

Nemic community	Nematode/ 250gm soil	A.F%	R.F%	R.D%	P.V%
Parasitic forms	681	100	36.3	53.9	539

A.F =Absolute frequency R.F =Relative frequency ,RD = Relative frequency PV =Prominence value.

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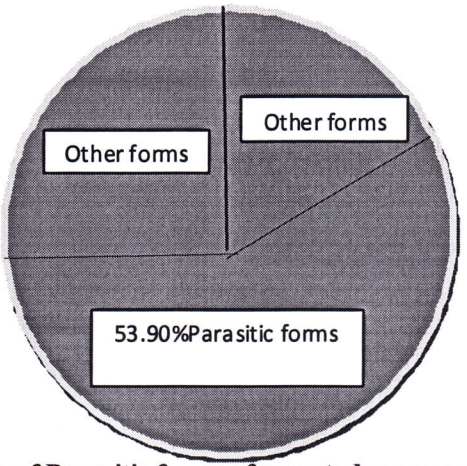

Distribution of Parasitic forms of nematodes occupying the soil environment at 0-30 cm vertical depth and at 30cm horizontal distance.

Table 2

Nemic Community	Nematode/ 250gm soil	A.F%	R.F%	R.D%	P.V%
Parasitic forms	1023	100	37.0	64.91	649

A.F =Absolute frequency R.F =Relative frequency ,RD = Relative frequency PV =Prominence value

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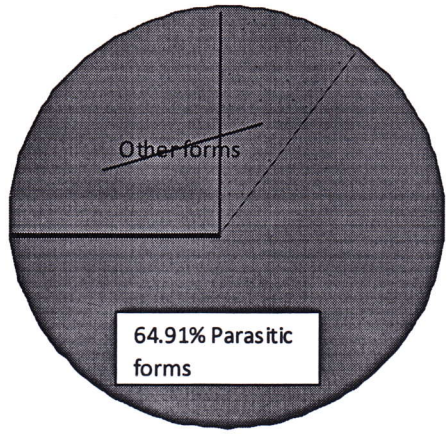

Distribution of Parasitic forms of nematodes occupying the soil environment at 30-60 cm vertical depth and at 30cm horizontal distance

Discussion

The distribution of nematodes in soil around the rhizospheric root of *Mangifera indica* was not uniform. The increasing the no of parasitic forms at 30-60cm showed enough food material present (secondary rootlets)and thereby creating large platform at deeper strata of soil resulting in increased population of parasitic forms of nematodes like *Helicotylenchus*, *Hemicriconemoides*, *Tylenchrohynchus* and *Longidorus*. The population density and biochemical constituent of plant parasitic nematode were influenced by altitude (Elsen *et al.* 1998)

A large number of plant parasitic nematodes were collected in the month of November that might be due to emergence of secondary roots on the onset of winter in the deeper soil providing more food to plant parasitic nematodes (Berney *et al.* 2004).

In India the community analysis of plant parasitic nematodes carried out by many workers associated with various crops and include (Senthilkumar and Rajendran, 2005) (Tamil Nadu); (Joymati and Mema, 2007)(Manipur); (Tiwari *et al.* 2000) and (Singh *et al.* 2010)(Madhya Pradesh). Community analysis of plant parasitic nematodes have been studied by (Ansari and

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Ahmed, 2000) Guava, (Roy *et a*l. 2007) Leguminous, (Srinivasan *et al.*, 2011) Banana (Patel et al. 2007) Agriculture crops and (Devi, 2007) Pineapple. In addition Nematodes infest in major forest trees like Eucalyptus, Acacia, Bamboo, Pine and Mangrove. (Mujeebur Rahman, 2012).

In the present investigation the nemic community was studied around root zones of *Mangifera indica*. The parasitic forms of nematodes mainly occupied the deeper strata and followed by the upper strata of the soil. Higher no. of parasitic forms at deep level might be influenced with the soil factors and availability of food resources. (Secondary rootlets and organic carbons).

References:

Ansari, M.A. and W. Ahmad, 2000. Community analysis of plant parasitic and predatory nematodes in Guava (*Psidium guajava*) orchard. **Med. Fac. Lanudbouww. Univ. Gent., 65: 557-562.**

Beare, M.H.; Parmelee, R.W.; Hendrix, P.F.; Cheng, W., 1992. Microbial and faunal interaction and effects on litter nitrogen and decomposition in agro ecosystem. **Ecol. Monogr., 62:569-591.**

Berney, M.; Bird, G. and Harwood, R.R., 2004. Seasonal changes in nematode community structure of selected treatments of the long term ecological research.

Chirchir, A.K., J.W. Kimenju, F.M. Olubayo and G.K. Mutua, 2008. Abundance and distribution of plant parasitic nematodes associated with sugarcane in Western Kenya. **Asian J. Plant Pathol., 2: 48-53.**

Cobb, N.A., 1929. The characteristic of carnivorous, free living nemas including predators. **J. Parasitol 15; 284-285.**

Devi, G., 2007. Community analysis of plant-parasitic nematodes in pineapple ecosystem in Meghalaya. **Indian J. Nematol., 37: 106-107.**

Elsen,A.,Spejer,P.R.,Swennen,R.andDewaele.,D. 1998.Effect of Cultivar and altitude composition.root damage and yield of Musa in Uganda. **Nematologica,44;490-491**

Joymati, L. and W. Mema, 2007. Association of Moloidogyne incognita and other plant parasitic nematodes with different crops of Manipur. **Zoos Print J., 22: 2933-2934.**

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Kaskavalci, G., 2007. Effects of soil solarization and organic amendment treatments for controlling Meloidogyne incognita in tomato cultivars in Western Anatolia. **Turk. J. Agric. For., 31: 159-167.**

Khan, M.R., R.K. Jain, R.V. Singh and A. Pramanik, 2010. Economically Important Plant Parasitic Nematodes Distribution Atlas. ICAR, Directorate of Information and Publications of Agriculture, New Delhi, India, Pages: 145.

Killham, K., 1994. Soil Ecology. Cambridge University Press, New York, 242 pp.

Mujeebur, Rahman Khan, 2012. Nematodes, an Emerging Threat to Global Forests.

Neilson, M.N., and Winding, A. 2002.Microrganisms as indicators of Soil Health. National Environment Research Institute, Denmark. **Technical Report No. 388.**

Norton, D.C., 1989. Abiotic soil factors and plant parasitic nematode communities. ***J.Nematol, 21:299-302.***

Patel, A.D., B.K. Panickar, B.A. Patel and D.J. Patel, 2007. Community analysis of plant parasitic nematodes associated with agricultural crops in Junagadh district of Gujarat and Diu-union territory. **Ind. J. Nematol., 37: 68-71.**

Roy, K., A.K. Mukhopadhyay and A. Pramanik, 2007. Occurrence, distribution and community analysis of plant parasitic nematodes associated with leguminous vegetable crops in West Bengal. **Ind. J. Nematol., 37: 58-62.**

Senthilkumar, T. and G. Rajendran, 2005. Plant parasitic nematodes associated with grapevine in Coimbatore district of Tamil Nadu. Madras Agric. J., 92: 592-595.

Siddiqi, M.R., 2000. Tylenchida Parasites of Plants and Insects. 2nd Edn., CAB International, Wallingford, UK., ISBN: 085199-202-1, pp: 848.

Singh, R.K., D. Jola and G. Sudershan, 2010. Documentation of plant parasitic and beneficial soil nematodes and their communities in madhya pradesh, **India. Indian J. Nematol., 40: 66-73.**

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