

Biodiversity of Nematodes in Chilli Crop Inranga Reddy District Of Telangana

Sk. Zareena¹, V. Vanita Das²

¹Department of Zoology, University college of Science,Osmania University, Hyderabad, Telangana, India.

Abstract: Nematode population was studied in Chilli(*Capsicum annum*)crop in Ranga Reddy district of Telangana state. Plant parasitic nematodes were diversified in Root and Soil of Chilli, four types of Nematode species identified by observing under microscope based on morphological characters Soil and Root samples were collected from 3 locations in Rangareddy district. *Helicotylenchus* species(Spiral nematode), *pratylenchus* species(Lesion nematode)were present in two locations and *Meloidogyne* species (Root-knot nematode) and *Rotylenchus* species were present in all the three locations in Rangareddy District

Keywords: Phytonematodes, Meloidogyne species, Chilli, Baermann funnel method

1. Introduction

Chilli is an important cash crop in India and is grown for its pungent fruits and extract of green chillies can be used as bio-insecticide. The nematodes cause reduced and altered root growth and the affected plants are unable to adequately explore the soil for water and nutrients. The nematode-induced damage to plants is often aggravated in soils deficient in moisture and nutrients. On worldwide basis 12.2% loss was recorded on Chilli crop by plant parasitic nematodes (Sasser and Freckman 1987). Root-knot disease caused by *Meloidogyne* species has been found as the most frequently encountered disease and is one of the limiting factors affecting the production of Chilli in India (Nagnathan 1984; Jain, 1992). Nematodes are generally cylindrical shape that attack mainly on roots of plants at the anterior region stylet is present which is hypodermal needle like structure with the help of stylet nematode penetrates into the root of plant.

2. Materials and Methods

Nematodes from soil sample and root sample were collected in a polyethylene bag and fastened with rubber band with a proper label inside the bag. The soil and root samples in polyethylene bags should not be left in the Sun as the accumulated heat may kill the nematode. The samples should also not be left under pressure or in heaps. The polyethylene bag was made of 100 mm thick sheet as a thinner may be torn in handling. The soil sample was stored at low temperature (10-15°C) and root sample stored at low temperature of 5°C in moist condition. There are many methods for extracting nematodes from soil and root samples. Some methods are more effective than others for specific types of nematodes. The choice of nematode extraction method depends on the objective of the investigation and availability of equipment and facilities. Extraction of nematodes from roots and soil samples by following method

3. Baermann funnel method

The basic requirement for the Baermann funnel method is a funnel with a piece of rubber tube attached to a small glass

tube and closed with a clip or clamp. The funnel is mounted on a support with a 5-cm rubber tubing attached to the end of the funnel system. A molded stainless steel wire basket is placed in the funnel and a pinch clamp on the rubber tubing below the funnel stem. The funnel is filled nearly to the top with fresh tap water. The inside of the wire basket is covered with a double layer of tissue paper. The material for extraction is placed carefully on the tissue paper in the wire basket. Within 24 hours active nematodes pass through the tissue paper and settle at the base of the funnel stem. A petridish or vial is held below, the end of the rubber tubing and the pinch clamp is opened to collect about 10ml of water containing nematodes. This method is suitable for migratory endoparasitic nematodes (Fisher et al. 1979) and (Nandakumar et al. 1976)

4. Results

Identified 4 nematodes with their systematic position and identifying characters:

Helicotylenchus species (Spiral nematode)
Pratylenchus species (Lesion nematode)
Meloidogyne species (Root-knot nematode)
Rotylenchus species (Reniform nematode)

Helicotylenchus species



Systematic position

Phylum -	Nematoda
Class -	Secernentea
Order -	Tylenchida
Family -	Hoplolaimidae
Genus -	Helicotylenchus

Identifying characters of genera:

- Body is spiral shape, more so posteriorly striae distinct.
- Helicotylenchus forms a complete spiral when the nematode is dead or relaxed
- Female grows up to 0.61 - 0.86 mm.
- Lip region hemi spherical with 4 or 5 annules.
- The tail is asymmetrical, being curved dorsally with a rounded projection
- Helicotylenchus species survived for 6 months in soil and also stored in plastic bags.

Pratylenchus species



Systematic position

Phylum - Nematoda
 Class - Adenophorea
 Order - Tylenchida
 Family - Pratylenchidae
 Genus - Pratylenchus

Identifying characters of genera:

- Female's measures up to 1.0 – 1.48 mm.
- Body is cylindrical, slightly tapering towards front end, curved ventrally into an open circle when relaxed by gradual heating.
- Lip region is generally low and flat. Adult nematode has stout tail and stout body
- Tail shorter than anal body diameter, rounded with 10 - 17 annules, striations encircling the tip or sometimes irregular.
- It is endo parasitic nematode.

Meloidogyne species



Systematic position

Phylum - Nematoda
 Class - Secernentea
 Order - Tylenchida
 Family - Meloidogynidae
 Genus - Meloidogyne

Identifying characters of genera:

- Body is slender and vermiform, stylet is stomo stylet and stylet knobs are small but well developed.
- It is a typical round worm, it attacks the roots of plants, and the roots became nodulated forming galls, hence the term 'Root knot' nematode.

- Root knot nematode females lay eggs into a gelatinous matrix.

Rotylenchus species



Systematic position

Phylum - Nematoda
 Class - Secernentea
 Order - Tylenchida
 Family - Hoplolaimidae
 Genus - Rotylenchus

Identifying characters of genera:

- Body is spiral shaped
- Female body is large and slightly curved
- Stylet is strong and needle shaped
- Body configuration usually rounded at both the ends

5. Conclusion

Many plant parasitic nematodes were associated with Chilli in Ranga Reddy district with nematode species Helicotylenchus, Pratylenchus, Rotylenchus and Meloidogyne species. Pratylenchus species population densities of Meloidogyne species during growing season were above damage threshold level at many locations. Although population levels of other plant parasitic nematodes were below economic or damaging threshold levels, their cumulative numbers were above levels which might be causing economic damage to the Chilli plants.

However the nematode population observed in these areas was above the threshold level which shows the need of immediate controlling measures. Integrated nematode management (INM) is an economically viable and socially acceptable approach to crop protection

References

- [1] Anwar, S.A., A. Zia M. Hussain and M. Kamran. 2007. Host suitability of selected plants to Meloidogyne incognita in the Punjab, Pakistan. Int. J. Nematol. 2:41-47.
- [2] Banjard, P and B.Martiny.1995.Ecology and pathogenicity of the Hoplolaimidae (Nemata) from the Sahelian zone of West Africa:7.Helicotylenchus dihystra (Cobb,1893) Sherr,1961 and comparison with Helicotylenchus multicinctus (Cobb,1893) Golden,1956.Fundamental and Applied Nematology 18:503-511.
- [3] Courtney, W.D., Polley, D., and Miller, V.L. 1955. TAF, an improved fixative and nematode technique.

- [4] IARI (Indian Agricultural Research Institute), 1992- National nematode collection of India, New Delhi, India. Division of Nematology, IARI 28 PP.
- [5] Jain PK. 1992. Nematode pests of vegetable crops. Nematode pest of crops. ppI 81-96. Bhatti, D.S. and Walia, R.K. (Eds) C.B.S Publishers and Distributers, Delhi, India
- [6] Khan, F.A. and Khan, A.M. 1973. Studies on the reniform nematode, *Rotylenchulus reniformis* I. Host range and population changes. Indian Journal of Nematology **3**: 24-30.
- [7] K.K. Kaushal, A. Sirohi and Pankaj¹ - Extraction Methods
- [8] Plin.e.diez.and Dusenbery.5.nematology.20:605-608(1988) Extremely sensitive thermotaxis of the nematode *Meloidogyne incognita*.
- [9] Thomas SH, Schroeder, J,Murray Lco.2004 Cyperustubers protect *Meloidogyne incognita* from 1,3-dichloropropene.J.Nematology 36:131-136.