



Community Analysis of Plant Parasitic Nematodes in and Around Bilara, Rajasthan

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ABSTRACT

During the survey of Bilara area some interesting findings were noted. In some area pearl millet and vegetable crop are in very flourishing conditions. The survey was conducted to the nematodes community structure soil and root sample, representing 15 locations were examined. Eight important genera of plant-parasitic nematodes namely *Meloidogyne incognita*, *Tylenchorhynchus mashhoodi*, *Hoplolaimus indicus*, *Helicotylenchus indius*, *Xiphenema sp.*, *Longidorus sp.*, *Paralongidorus sp.* and *Paratrichodorus porosus* were found (Kamra A, Pankaj, Sharma H K and Mishra S D 2001). 13 agriculture field surveyed where mustard (*Brassica campestris*), jawar (*Sorghum vulgare*), peart-millet (*Pennisetum tyhoides*), wheat (*Triticumae aestivum*), castor (*Ricinus commiinii*), caner (*Nerium indicum*), tulsi (*Ocimum scanctum*), pumpkin (*Cucurbitta moschata*), spinach (*Spincea oleracca*), lemon (*Citrus limon*), brinjal (*Solanum melongena*) and aak (*Calotropis procera*). The relative density and Relative prominence value of *Tylenchorhynchus mashhoodi* was (56.41) and (61.24) followed by *Helicotylenchus indius* (26.11) and (26.09). *Tylenchohrynychus mashhoodi* most dominant in study area in which nematodes population very highest in Brinjal per 200 cm³ soil. The relative densities of *Hoplolaimus sp.*, *Meloidogyne incognita* were (6.91) and (3.34) relative prominence values were (5.89) and (2.66). Respectively soil samples were collected from crop fields in order to study the community analysis of plant parasitic nematodes community (Shivakumar M, Poornima K, Mani M P and Umamaheshwari 2002).

Keywords: Community analysis, *Melidogyne incognita*, *Tylenchorhynchus mashhoodi*, *Hoploaimus sp.*, *Heilcotylenchus indicus*, *Xiphenema*, *Longidorus*, *Paralongidorous* and *Paratrichodorus porosus*.

INTRODUCTION

Bilara is a city and a municipality located in the Jodhpur district of Rajasthan with 26.18 degree N latitude and 73.70 degree E longitude. It is the administrative headquarters for Bilara tehsil and a market center for the surrounding agricultural area. Agricultural crops and naturally grown angiosperm trees, vast stretcher of grasslands have made the area beautiful and green. People harvest multiple crops almost whole of the year like brinjal, lemon, spinach, pumpkin, tulsi, caner, aak, castor, wheat, pearl-millet, jawar and mustard due to the availability of water throughout the year. As vegetable crops are dominant in

this region, the presence of plant-parasitic nematodes was expected in the area (Ali S and Sharma S B 2002). A survey was therefore, conducted to assess the community structure of plant-parasitic nematodes in the field soil.

MATERIALS AND METHODS

Survey was conducted in different vegetable growing tracts in study area includes the agricultural field to study the major soil inhabit nematodes associated with vegetable crops. All together 15 soil samples collected from the rhizosphere of the vegetable crops. Samples were taken at the distance of at least 8 k.m. Several cores of sample to a depth of 10-20 c.m. and was packed in polythene

bags. Nematodes were extracted from composite soil samples by Cobb's decanting and sieving technique followed by modified Baermann's funnel method (Christie and Perry, 1951).

The nematodes thus collected were fixed in hot 4% formaline and stored for analysis species and genera of plant-parasitic nematodes were identified and listed in tables 1 and 2. The population of nematodes in each sample was counted three times using stereoscopic zoom microscope and mean was taken community analysis was done by determining absolute frequency (AF), relative frequency (RF), absolute density (AD), relative density (RD), prominence value (PV) and relative prominence value (RPV) as described by Norton (1978).

The following plant parasitic nematodes were observed:

1. *Meloidogyne incognita* (Order: Tylenchida,

Family: Heteroderidae)

2. *Tylenchorhynchus mashhoodi* (Order: Tylenchida, Family: Belonolaimidae)
3. *Helicotylenchus indicus* (Order: Tylenchida, Family: Hoplolaimidae)
4. *Hoplolaimus indicus* (Order: Tylenchida, Family: Hoplolaimidae)
5. *Xiphenema sp.* (Order: Dorylaimida, Family: Longidoridae)
6. *Longidorus sp.* (Order: Dorylaimida, Family: Longidoridae)
7. *Paralongidorus sp.* (Order: Dorylaimida, Family: Longidoridae)
8. *Paratrichodorus porosus* (Order: Triplonchida, Family: Trichodoridae)

Table 1 .Nematodes associated with different crops in and around Bilara.

Nematodes per 100cm³ of soil.

CROP	<i>M. incognita</i>	<i>T. moshhodi</i>	<i>Heli. indicus</i>	<i>Hoplo. indicus</i>	<i>Xiphenema sp.</i>	<i>Longidorous sp.</i>	<i>Paralongidorous sp.</i>	<i>P. porosus</i>
Brinjal	20	240	117	-	-	-	-	-
lemon	7	219	-	-	17	-	-	25
Rijaco	-	58	-	17	16	8	18	16
Pumpkin	-	22	38	-	-	-	-	-
Tulsi	-	33	-	-	-	-	-	-
Caner	-	36	-	16	6	5	-	-
Aak	-	-	25	9	-	-	-	-
Castor	16	205	237	19	-	-	-	-
Wheat	9	208	16	-	-	-	-	-
Wheat	14	63	49	36	-	-	-	-
Wheat	7	77	89	33	24	-	-	15
Pearl millet	-	85	14	-	16	7	-	-
Jawar	-	75	38	9	-	-	-	-
Mustard	14	-	33	42	-	-	-	-
Mustard	-	148	24	-	-	-	15	-

Table2: Community analysis of plant parasitic nematodes occurring in study area of Bilara.

No .of samples=15, size of sample=100cm³

Nematodes	Absolute Frequency %	Relative frequency %	Absolute density	Relative Density %	Prominence value	Relative prominence value
<i>Meloidogyne incognita</i>	46.66	13.46	5.8	3.34	39.61	2.66
<i>Tylenchorhynchus mashhoodi</i>	86.66	25.00	97.93	56.41	910.74	61.24
<i>Helicotylenchus indicus</i>	73.33	21.15	45.33	26.11	388.02	26.09
<i>Hoplolaimus indicus</i>	53.33	15.38	12.0	6.91	87.6	5.89
<i>Xiphenema sp.</i>	33.33	9.61	5.26	3.03	30.35	2.04

Longidorus sp.	20.00	5.76	1.33	0.76	5.94	0.39
<i>Paralongidorus sp.</i>	13.33	3.84	2.2	1.26	8.03	0.54
<i>Paratrichodorus porosus</i>	20.00	5.76	3.73	2.14	16.67	1.12

Absolute frequency % = (Number of samples containing a species/Total number of samples examined) × 100

Relative Frequency % = (Frequency of a species in a sample/sum of frequency of all species present) × 100

Absolute density % = (Number of individuals of a species in a sample/Volume of the sample)

Relative Density % = (Density of a species in a sample/Sum of density of all species present) × 100

Prominence Value = Density × √ Absolute frequency

Relative prominence value = (Prominence value of a species in a sample/sum of prominence value of all species present) × 100

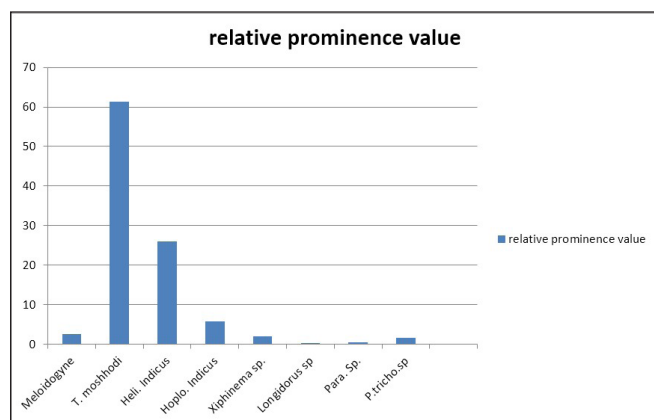


Fig 1: Comparative account in relative prominence value in different species of nematodes in study area.

RESULTS

Eight genera of most important plant-parasitic nematodes in study area of Bilara, Rajasthan in which nematodes population namely *Meloidogyne incognita*, *Tylenchorhynchus mashhoodi*, *Hoplolaimus indicus*, *Helicotylenchus indicus*, *Xiphinema sp.*, *Longidorus sp.*, *Paralongidorus sp.*, and *Paratrichodorus porosus* were encountered. (Table 1)

Meloidogyne incognita had high density in 7 out of 15 locations surveyed, brinjal, lemon castor, wheat and mustard. Heavy root galling and presence of root knot egg masses.

The stunt nematode *Tylenchorhynchus moshhodi* in 13 out of 15 locations being dominant in brinjal field @240 nematodes per 100 cm³ soil. It was also present in high

number in lemon (219/100 cm³), castor (205/100cm³) and wheat (208/100 cm³) field.

The spiral nematode *Helicotylenchus indicus* was dominant in a castor field where its density was (237/100 cm³) soil.

Nematodes, *Hoploaimus indicus* was high number in mustard field (42/100cm³).

Other plant parasitic nematodes are rare dominant are as dagger nematode *Xiphinema sp.* was in number in wheat (24/100 cm³), Needle nematode *Longidorus sp.* (8/100 cm³), *Paralongidorus sp.* nematode in pearl millet (18/100 cm³) and *Paratrichodorus porosus* in lemon (25/100 cm³) fields.

Although a high absolute frequency was observed for the stunt nematode (*Tylenchorhynchus mashhoodi*) (86.66) followed by spiral nematode (*Helicotylenchus indices*) (73.33), (46.66) for lance and root knot nematodes, (33.33) for dagger nematode (*Xiphinema sp.*), (13.33) for *Paralongidorus sp.* and (20.00) for needle nematode (*Longidorus*) and (20.00) for stubby root nematode (*Paratichodorus porosus*).

The relative density was (56.41) for stunt nematode followed by (26.11) for spiral nematode, (6.91) for lance nematode, (3.34) for root knot nematode, (3.03) for dagger nematode, (2.14) for stubby root nematode and low of (1.26) *Paralongidorus sp.* and (0.76) for needle nematode, respectively.

The prominence value was maximum for stunt nematodes (910.74) followed by spiral nematode (388.02), lance nematode (87.6), root knot (39.61), dagger nematode (30.35), stubby root nematode (16.67), *Paralongiodorus sp.* (8.03) and needle nematode (5.94) respectively.

DISCUSSION

The stunt nematodes as the most emergent important nematode in this region. Most of the agriculture field showed the spaces in between the crops and the high temperature has increased the occurrence of nematode population on depth. No association of fungal or bacterial pathogen was observed. It is possible that good population of the stunt nematode in brinjal field has affected the growth of pumpkin.

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