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NEMATODES FROM WEST BENGAL (INDIA) VIII. QUALITATIVE AND QUANTITATIVE STUDIES OF PLANT AND SOIL INHABITING NEMATODES ASSOCIATED WITH PADDY CROP IN BURDWAN DISTRICT

By

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(With 1 Text-figure)

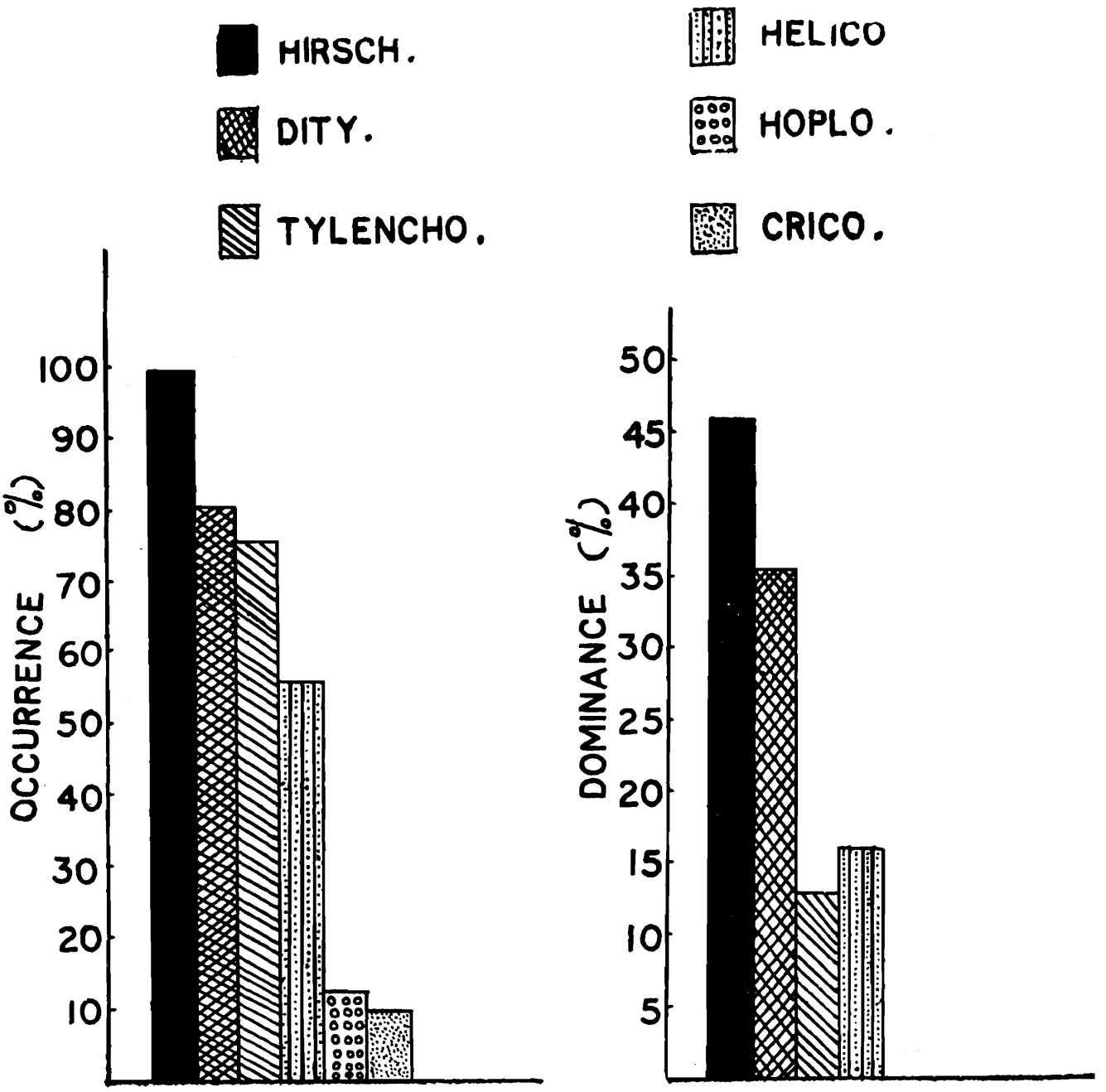
INTRODUCTION

This is the eighth paper of the series on "Nematodes from West Bengal (India)" which deals with the qualitative and quantitative studies of plant and soil inhabiting nematodes associated with paddy crop in Burdwan district of West Bengal. The present study was undertaken as a part of All India Co-ordinated Research Project on Nematode Pests of Crops and their Control, jointly sponsored by I. C. A. R. and D. S. T. during 1977-79. Since this type of studies provide useful informations regarding relative abundance and degree of dominance of different phytophagous nematodes, an intensive survey was therefore made during the month of December, 1977 at Memari, Jamalpur and Bursul Blocks of Burdwan district which is one of the major rice growing districts of West Bengal.

Despite an attempt to study the effect of soil texture on the occurrence and the dominance of different parasitic nematodes, their relationship could not be established in the present study. The results are being provided in the separate tables for each Block so that they may be helpful in future studies.

MATERIAL AND METHODS

The Head Quarter of each developmental block was made as centre and the survey was made in its North, South, West and East directions. In each direction, a village was selected and made centre. An attempt was made, subject to the availability of paddy crop, to take about 4 soil samples from each direction up to 2 Km from village centre. Several



Text-fig. 1

informations regarding management practices etc. were collected from the farmers to correlate these data in future studies.

For the quantitative study, the bulk of a sample was thoroughly mixed with hand and 100 gm of soil was taken separately for processing. This 100 gm soil was processed for the isolation of nematodes through the modified Baermann funnel technique. After 24 hours the counting was made thrice in a counting dish and the mean values were obtained. Only the commonly found nematodes were identified up to genera and counted separately under the stereoscopic microscope. The remaining nematodes were counted under the following groups ; other tylenchids, other dorylaimids and saprophagous.

DETAILS OF SURVEY

1. BLOCK : MEMARI

Village Centre	Adjoinig localities	Soil samples collected from different Soil texture				Total No. of samples collected
		Sandy-loam	Clayey-loam	Clayey	Loam	
(a) Balut	(i) Balut	—	7	—	—	7
	(ii) Garaghata	—	2	—	—	2
	(iii) Kanaidanga	1	—	—	—	1
	(iv) Palla	—	1	—	—	1
	(v) Navagram	—	1	—	—	1
	(vi) Dolui Bazar	—	1	—	—	1
	(vii) Rasulpur Stn.	—	1	—	—	1
(b) Saldah	(i) Saldah	5	7	—	—	12
	(ii) Mahes danga Camp.	—	—	1	—	1
(c) Radhakantapur						
	(i) Radhakantapur	2	5	—	—	7
	(ii) Diamagra	—	1	—	—	1
	(iii) Balidanga	—	—	2	—	2
	(iv) Kamalpur	—	—	2	—	2
	(v) Munshidanga	—	—	1	—	1
(d) Shyamnagar						
	(i) Shyamnagar	—	—	3	—	3
	(ii) Kantapur	1	—	—	—	1
	(iii) Kantanagar	—	1	—	—	1
	(iv) Chotkhanda	1	1	—	—	2
	(v) Maghlampur	1	—	1	—	2

2. BLOCK : JAMALPUR

(a) Abujhati						
	(i) Abujhati	1	4	3	—	8
	(ii) Seromani	1	2	—	—	3
	(iii) Amra	2	—	—	—	2
(b) Autpara						
	(i) Autpara	4	4	—	1	9
	(ii) Bartika	2	—	—	—	2
	(iii) Dakshnpara	2	—	—	—	2
	(iv) Amtara	1	—	—	—	1
(c) Manirambati						
	(i) Manirambati	1	—	—	1	2
	(ii) Basantabati	1	—	—	—	1
	(iii) Madhavpur	1	1	—	—	2

Village Centre	Adjoining localities	Soil samples collected from different Soil texture				Total No. of samples collected
		Sandy-loam	Clayey-loam	Clayey	Loam	
(d) Choubaria						
	(i) Masagram	2	—	2	—	4
	(ii) Choubaria	1	1	—	2	4
	(iii) Saranpur Bartala	2	—	—	—	2
	(iv) Mear Ban	—	1	—	—	1
	(v) Panchra	3	—	—	—	3
3. BLOCK : BURSUL						
(a) Majherpara						
	(i) Majherpara	1	2	—	2	5
	(ii) Sonakur	—	—	—	2	2
	(iii) Krishnapur	—	—	—	1	1
(b) Ryan						
	(i) Ryan	—	7	1	—	8
	(ii) Nari	—	1	—	—	1
(c) Pamra						
	(i) Pamra	8	—	—	2	10
	(ii) Nandur	1	—	—	—	1

A. Qualitative Study :

The samples upon analysis yielded 18 parasitic species belonging to 13 genera, 9 families of the order Tylenchida and Dorylaimida. Besides, 18 soil inhabiting species have also been identified. The following is the list of parasitic nematode species arranged according to their systematic position.

Order TYLENCHIDA Thorne, 1949

Superfamily TYLENCHOIDEA (Orley, 1880) Chitwood & Chitwood, 1937.

Family TYLENCHIDAE Orley, 1880

Genus **Tylenchus** Bastian, 1865

T. davainei Bastian, 1865

T. filiformis Butschili, 1873

Genus **Ditylenchus** Filipjev, 1936

D. mirus Siddiqi, 1963

Family TYLENCHORHYNCHIDAE (Elieva, 1964) Golden, 1971.

Genus **Tylenchorhynchus** Cobb, 1913

T. mashhoodi Siddiqi & Basir, 1959

Family HOPLOLAIMIDAE (Filipjev, 1934) Wieser, 1953

Genus **Hoplolaimus** Daday, 1905

H. indicus Sher, 1963

H. columbus Sher, 1963

Genus **Helicotylenchus** Steiner, 1945

H. crenacauda Sher, 1966

H. retusus Siddiqi & Brown, 1964

Family PRATYLENCHIDAE (Thorne, 1949) Siddiqi, 1963

Genus **Hirschmanniella** Luc & Goodey, 1963

H. oryzae (Soltwedel, 1889) Luc & Goodey, 1963

H. gracilis (De Man, 1880) Luc & Goodey, 1963

Superfamily HETERODEROIDEA (Filipjev, 1934) Golden, 1971.

Family NACOBBIDAE (Chitwood & Chitwood, 1950) Golden, 1971.

Genus **Rotylenchulus** Linford & Oliveira, 1940

R. reniformis Linford & Oliveira, 1940

Superfamily CRICONEMATOIDEA (Taylor, 1936) Geraert, 1966

Family CRICONEMATIDAE (Taylor, 1936) Thorne, 1949

Genus **Macroposthonia** de Man, 1880

M. onoensis (Luc, 1959) De Grisse & Loof, 1965

M. ornata (Raski, 1958) De Grisse & Loof, 1965

Genus **Hemicriconemoides** Chitwood & Birchfield, 1957

H. cocophillus (Loos, 1949) Chitwood & Birchfield, 1957

Family PARATYLENCHIDAE (Thorne, 1949) Raski, 1962

Genus **Paratylenchus** Micoletzky, 1922

P. dianthus Jenkins & Taylor, 1956

Genus **Gracilacus** Raski, 1962

*G. janai** Baqri, 1979

Superfamily APHELENCHOIDEA (Fusch, 1937) Thorne, 1949

Family APHELENCHIDAE (Fusch, 1937) Steiner, 1949

Genus **Aphelenchus** Bastian, 1865

A. avenae Bastian, 1865

Order DORYLAIMIDA (De Man, 1876) Pearse, 1942

Superfamily DORYLAIMOIDEA (de Man, 1876) Thorne, 1934

Family LONGIDORIDAE (Thorne, 1935) Meyl, 1961

Genus **Paralongidorus** Siddiqi *et al.*, 1963

P. citri (Siddiqi, 1959) Siddiqi *et al.*, 1963

Apart from these parasitic nematode species, the following soil inhabiting nematode species belonging to the order Dorylaimida have also been identified :

1. *Ischiodorylaimus* n. sp.
2. *Thornenema mauritianum* (Williams, 1959) Baqri & Jairajpuri 1967
3. *Sicaguttur sartum* Siddiqi, 1971
4. *Medalinema coomansi** Baqri & Jana, 1980
5. *Jairajpuria shamimi** Baqri & Jana, 1980
6. *Aporcelaimellus heynsi* Baqri & Jairajpuri, 1968
7. *Aporcelaimellus tropicus** Jana & Baqri, 1981
8. *A. coomansi* Baqri & Khera, 1975
9. *Tylencholaimus pakistanensis* Timm, 1964
10. *Proleptonchus clarus* Timm, 1964
11. *Dorylaimoides elaboratus* Siddiqi, 1965
12. *Dorylaimoides parvus* Thorne & Swanger, 1936
13. *D. arcuicaudatus* Baqri & Jairajpuri, 1969
14. *Morasia bengalensis** Jana & Baqri, 1982
15. *Dorylaimellus discocephalus* Siddiqi, 1964
16. *Dorylaimellus indicus* Siddiqi, 1964
17. *Dorylaimellus deviatus* Baqri & Jairajpuri, 1968
18. *Neoactinolaimus thornei* Chaturvedi & Khera, 1979

The species marked with asterisk in the list have been reported earlier as new (Baqri, 1979 ; Baqri and Jana, 1980 ; Jana & Baqri, 1980 ; Baqri & Jana, 1981 ; and Jana & Baqri, 1982.). The male specimens of *Sicaguttur sartum*, Siddiqi 1971 have been reported for the first time.

B. Quantitative Study of Nematodes

1. BLOCK : MEMARI

Soil samples examined : 49

Nematodes	Per 100 gm of soil
Ditylenchus	20—510
Tylenchorhynchus	20—700
Helicotylenchus	10—530
Hirschmanniella	10—360
Macroposthonia	10— 80
Other Tylenchids	20—370
Other Dorylaimids	30—630
Saprophagous	40—370

Nematodes found from different types of soil in the Block Memari (per 100 gm of soil)

Nematodes	Sandy-loam		Clayey-loam		Clayey	
	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
Ditylenchus	20	410	30	510	20	290
Tylenchorhynchus	20	300	10	200	20	700
Helicotylenchus	10	280	10	530	20	60
Hirschmanniella	80	220	10	280	20	360
Macroposthonia	10	80	10	—	—	—
Other Tylenchids	20	130	10	370	—	—
Other Dorylaimids	30	560	40	630	40	380
Saprophagous	80	360	60	370	40	210

2. BLOCK : JAMALPUR

Soil samples examined : 46

Nematodes	Per 100 gm of soil
Ditylenchus	20—2270
Tylenchorhynchus	10— 610
Hoplolaimus	10
Helicotylenchus	20— 240
Hirschmanniella	10— 290
Macroposthonia	10— 40
Rotylenchulus	50— 100
Other Tylenchids	30— 130
Other Dorylaimids	20—1200
Saprophagous	30— 400

Nematodes found from different types of soil in the Block Jamalpur (per 100 gm of soil)

Nematodes	Sandy-loam		Clayey-loam		Clayey		Loam	
	Mini-mum	Maxi-mum	Mini-mum	Maxi-mum	Mini-mum	Maxi-mum	Mini-mum	Maxi-mum
Ditylenchus	20	2270	40	2050	80	1190	100	—
Tylenchorhynchus	10	610	10	100	20	110	70	—
Hoplolaimus	10	—	10	—	—	—	—	—
Helicotylenchus	20	240	10	40	40	70	—	—
Hirschmanniella	10	230	30	280	30	290	110	210
Macroposthonia	10	40	—	—	—	—	—	—
Rotylenchulus	50	100	—	—	—	—	—	—
Other Tylenchids	40	110	30	40	—	—	130	—
Other Dorylaimids	50	1200	110	410	20	700	160	270
Saprophagous	30	400	30	310	60	260	120	300

3. BLOCK : BURSUL (BURDWAN SADAR)

Soil samples examined : 29

Nematodes	Per 100 gm of soil
Ditylenchus	10—470
Tylenchorhynchus	20—290
Hoplolaimus	15—130
Helicotylenchus	20—240
Hirschmanniella	15—410
Macroposthonia	50
Paralongidorus	10
Other Tylenchids	10— 80
Other Dorylaimids	40—610
Saprophagous	20—230

Nematodes found from different types of soil in Block Bursul (per 100 gm of soil)

Nematodes	Sandy-loam		Clayey-loam		Clayey		Loam	
	Mini-mum	Maxi-mum	Mini-mum	Maxi-mum	Mini-mum	Maxi-mum	Mini-mum	Maxi-mum
Ditylenchus	10	180	20	330	470	—	50	190
Tylenchorhynchus	20	160	30	100	220	—	290	—
Hoplolaimus	15	130	—	—	—	—	—	—
Helicotylenchus	240	—	20	40	110	—	50	110
Hirschmanniella	50	410	20	325	130	—	15	250
Macroposthonia	50	—	—	—	—	—	—	—
Paralongidorus	—	—	10	—	—	—	—	—
Other Tylenchids	20	40	30	80	—	—	10	20
Other Dorylaimids	40	380	50	610	140	—	150	320
Saprophagous	20	180	40	230	90	—	30	120

Among the plant parasitic nematodes, species of *Hirschmanniella* Luc & Goodey, 1963 were most abundant and present nearly in all the samples. *Hirschmanniella gracilis* (de Man, 1880) Luc & Goodey, 1963 was found dominating over other parasitic species in 46% samples.

The occurrence of *Ditylenchus* spp., *Tylenchorhynchus mashhoodi* Siddiqi & Basir, 1959 and *Helicotylenchus crenacauda* Sher, 1966 has been noted in 81%, 76% and 56% samples respectively. The *Ditylenchus* spp. were dominating in 36% samples. *Tylenchorhynchus mashhoodi* and *Helicotylenchus crenacauda* were generally present in small numbers but dominating in 13% and 16% samples respectively. The species of the genus *Hoplolaimus* Daday, 1905 has been recorded in 13% samples. The species of *Macroposthonia* de Man, 1880 and *Hemicriconemoides* Chitwood & Birchfield, 1957 were quite numerous in 10% samples (Text-fig. 1). The other parasitic species are less abundant.

The effect of soil texture on the relative abundance and degree of dominance of different parasitic nematode species remained inconclusive at this stage, but more intensive surveys in future would be certainly helpful in this regard.

Summary

During the month of December, 1977 an intensive survey was made to study the relative abundance and degree of dominance of plant parasitic nematodes associated with paddy crop at Memari, Jamalpur and Bursul Blocks of Burdwan district in West Bengal. Upon analysis, 18 parasitic nematode species belonging to 14 genera and 9 families are being identified. In addition to these parasitic nematode species, 18 soil inhabiting nematode species have also been found. The list of species also includes the names of the following species and genera which have been found new to science in this collection : *Gracilacus janai* Baqri, 1979 ; *Ischiodorylaimus* n. sp., *Medalinema coomansi* Baqri & Jana, 1980 ; *Jairajpuria shamimi* Baqri & Jana, 1980 ; *Aporcelaimellus tropicus* Jana & Baqri, 1981 and *Morasia bengalensis* Jana & Baqri, 1982. The male specimens of *Sicaquttur sartum* Siddiqi, 1971 have been found for the first time. The present study also reveals that among the plant parasitic nematodes, *Hirschmanniella gracilis* (de Man, 1880) Luc & Goodey, 1963 is the most abundant species and dominates in 46% samples in the area surveyed.

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