

PLANT AND SOIL NEMATODES (NEMATODA) OF BIHAR

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INTRODUCTION

The terrestrial nematodes are generally called plant and soil nematodes. Though they are considered as one of the most diversified and important groups of invertebrates, their economic importance could be realised rather late in India. The first plant parasitic nematode was reported by Barber (1901) from south India, i.e., 158 year after the first discovery of phytophagous nematode (= now *Anguina tritici*) by Needham in 1743. A review of the nematology literature reveals that only a few stray reports were published from India until Siddiqi (1959) and Das (1960) initiated series of research papers on taxonomy of plant and soil nematodes. During the last 40 years, a wealth of information has been gathered on the distribution of plant and soil nematodes in India. We feel that time has now come to prepare the baseline data on the distribution of these nematodes in different biogeographical zones/ecosystems/states (Baqri, 1994).

An attempt has been made in this paper to provide information on the distribution of known species of plant and soil nematodes in Bihar state so that the database may be prepared. As per nematological records from Bihar, Lal Das (1957), Sen (1960) and Siddiqi, Parsad and Ansari (1961) reported two species of root knot nematodes (*Meloidogyne incognita* and *M. javanica*) from various localities. In 1961, Chakravorti & Singh reported *Anguina tritici* causing 40% loss in crop yield of a local variety of wheat. Siddiqi (1964) added *Xiphinema orbum* as a new species to science from Bihar. Birat and his co-workers (1964-'68) reported a number of species of phytophagous nematodes (*Hirschmanniella oryzae*, *Hoplolaimus indicus*, *Meloidogyne incognita*, *Meloidogyne javanica*, *Paralongidorus citri*, *Xiphinema insigne*, etc.) from different localities of the state. Meanwhile, Siddiqi (1965), Mathur, Khan & Parsad (1966) and Khan, Parsad & Mathur (1967) described many species of the orders Tylenchida and Dorylaimida from Bihar. During the last three decades, the contribution of the following nematologists is worth mentioning : Mulk & Jairajpuri, 1975, Chaturvedi & Kansal, 1984; Gupta & Uma, 1985; Ganguli & Khan, 1987; Ahmad, Khan & Bilgrami, 1988; Chaturvedi & Kansal, 1991(a) & 1991(b); Khan & Ahmad, 1991; Nath & Pathak, 1993; Ahmad & Khan 1994; Haider, Jha & Nath, 1995; etc.

The present paper reports one hundred and eleven species which have been reported from Bihar till date. Out of these 111 species, 67 belong to Tylenchida, 8 to Aphelenchida, 11 to Dorylaimida, 2 to Triplonchida and Mononchida each while the remaining 21 saprophagous species have been reported under the order Alaimida, Enoplida, Monhysterida, Rhabditida, etc.

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In this paper, all the known species of plant parasitic and predaceous nematodes belonging to the order Tylenchida, Aphelenchida, Dorylaimida, Triplonchida and Mononchida are being listed according to their systematic position along with the information to their host(s) and locality (ies). The names of free living (saprophagous) nematodes belonging to different orders have been listed under the separate heading "Miscellaneous". Out of 21 species listed under miscellaneous groups, seven have been identified up to genus level. Since the free living or saprophagous nematodes are either preyed upon by the other invertebrates or they feed on dead organic matter directly in the soil, the information on the plant host is not important and thus habitat has been mentioned.

Order TYLENCHIDA THORNE, 1949

Suborder TYLENCHINA Chitwood in Chitwood & Chitwood, 1950

Family : TYLENCHIDA Orley, 1880

1. *Tylenchus butteus* Thorne & Malek, 1968

Hosts : Chilli, Castor

Locality : Raant, district Madhubani

2. *Filenchus filliformis* (Butschli, 1873) Mely, 1961

Hosts : Arhar (*Cajanus*), Radish, Rice, Sponge gourd, Brinjal, Castor, Chilli, Gram, Okra, Turmeric.

Localities : Patot, Kanpa, Umerabad, Inglis, Baikathpur, Bakhtyarpur, Mosimpur, Nukumpura, Metra and Hathidan, district Patna; Bherakhara, district Vaishali; Basantpur, Nawkatola, Khusitola, Chhota Berawat and Bara Barawat, district West Champaran.

3. *Coslenchus costatus* (de Man, 1921) Siddiqi, 1978

Host : Rice

Localities : Madhubani, Sitamarhi and West Champaran districts.

4. *Neopsilenchus magnidens* (Thorne, 1949) Thorne & Malek, 1968

Host : Rice

Locality : Madhubani district.

5. *Neopsilenchus microdens* Ahmad & Khan, 1994*

Host : Rice

Locality : Raanti, district Madhubani.

* Species described as new to science from Bihar

6. *Basiria graminophila* Siddiqi, 1959

Host : Rice

Localities : Gopalganj, East Champaran, West Champaran, Muzaffarpur and Madhubani districts.

7. *Basiria lathyrae* Kakar, Siddiqi & Khan, 1994*

Host : Chapta mattar or Hiran Khuri (*Lathyrus sativus*)

Locality :

8. *Basiria tumida* (Colbran, 1960) Geraert, 1968

Host : Rice

Localities : Madhubani, Sitamarhi and West Champaran districts.

9. *Malenchus nobilis* Andrassy, 1981

Hosts : Tomato, Potato

Localities : Bhadas and Mabsauri, district Khagaria.

10. *Malenchus* sp.

Host : Rice

Localities : Madhubani, Sitamarhi and West Champaran districts.

11. *Zanenchus oryzae* Khan & Ahmad, 1991*

Host : Rice

Locality : Madhubani district.

Family : DOLICHODORIDAE Chitwood in Chitwood & Chitwood, 1950
(Skarbilovich, 1959).

12. *Tylenchorhynchus brassicae* Siddiqi, 1961

Host : Brinjal, Tomato, Chilli

Localities : Sharabjal, district Vaishali; Basantpur, Basantitola, Bhitaha and Bara Berawat, district West Champaran.

13. *Tylenchorhynchus clarus* Allen, 1955

Hosts : Brinjal, Green gram

Locality : Lai, district Patna

14. *Tylenchorhynchus divittatus* Siddiqi, 1961

Hosts : Brinjal, Rice

Localities : Kutupur, district Patna; Madhubani, Sitamarhi and West Champaran districts.

15. *Tylenchorhynchus elegans* Siddiqi, 1961

= *T. goldeni* Rashid & Singh, 1982

Host : Turmeric

Localities : Muzaffarpur and Sitamarhi districts.

16. *Tylenchorhynchus mashhoodi* Siddiqi & Basir, 1959

Hosts : Okra, Cauliflower, Potato, Chulai (*Amaranthus* sp.), Sponge gourd, Spinach, Brinjal, Radish, Lobia, Cucumber, Chilli, Turmeric, Pointed gourd.

Localities : Kanpa, district Patna; Bhadas and Mahasauri, district Khagaria; Patedha.

17. *Tylenchorhynchus nudus* Allen, 1955

Hosts : Paddy, Turmeric

Localities : Gopalganj, East Champaran, West Champaran, Samastipur, Mazarffarpur, Sitamarhi and Madhubani districts.

18. *Bitylenchus dubius* (Butschli, 1873) Siddiqi, 1986

Hosts : Maize, Okra, Brinjal, Castor, Coriander

Localities : Bhidipur, Sitamarhi; Nirpur, Lai, Hardasbigha, Athmalgola and Dargahitolá, district Patna.

19. *Bitylenchus brevilineatus* (Williams, 1960) Siddiqi, 1986

Locality : Patna

20. *Telotylenchus indicus* Siddiqi, 1960

Hosts : Brinjal, Tomato, Chilli

Localities : Sherabjal, district Vaishali; Basantpur, Basantitola, Bhitaha, Bara Berawat, district West Champaran.

Family : PSILENCHIDAE Paramonov, 1967 (Khan, 1969)

21. *Psilenchus* sp.

Host : Tomato

Locality : Maner, district Patna.

Family : HOPOLOLAIMIDAE Filipjev, 1934

22. *Hoplolaimus dubius* Chaturvedi & Khera, 1979

Hosts : Castor, Coriander, Tomato, Cabbage, Brinjal.

Localities : Bhadas, Bachchota, Mehsauri and Sansarpur, district Khagaria.

23. *Hoplolaimus indicus* Sher, 1963

Hosts : Arhar, Coriander, Castor, Sunhemp, Kidney bean (Bakla), Tomato, Onion, Peas Mustard, Cauliflower, Okra, Lobia, Radish, Cucumbar, Sponge gourd, Chilli, Rice, Turmeric.

Localities : Kasimpur, Srinagar, Nirpur, Nukunpura, Pandarak, Chhatarpur, Barkatpur, Bidhipur and Sahnaura, district Patna; Adastola & Purainea, district Vaishali; Kargahia, Nawkatola, Khusitola, Bhitaha and Chhota Berawat, district West Champaran; many localities in East Champaran, Muzaffarpur, Gopalganj, Madhubani, Sitamarhi, and Samastipur districts.

24. *Rotylenchus robustus* (de Man, 1876) Filipjev, 1936
= *Hoplolaimus uniformis* Thorne, 1949

Hosts : Peas, Okra

Localities : Sabour, Kanke, Netrahat and Nawada Farms.

25. *Helicotylenchus astriatus* Khan & Najappa, 1972

Host : Rice

Localities : Gopalganj, East Champaran, Muzaffarpur, Sitamarhi and Madhubani districts.

26. *Helicotylenchus behari* Mulk & Jairajpuri, 1975*

Locality : Gaya

27. *Helicotylenchus digonicus* Perry in Perry, Darling & Thorne, 1959

Host : Cucumbar, Bean, Brinjal, Gram, Pea, Sponge gourd, Pumpkin, Okra.

Localities : Manpura, Manar, Baikathpur, Bakhtyarpur, Faridpur, Silauhari and Dariyapur, district Patna.

28. *Helicotylenchus dihystra* (Cobb, 1893) Sher, 1961

Localities : Madhubani, Sitamarhi and West Champaran districts.

29. *Helicotylenchus erythrinae* (Zimmermann, 1904) Golden, 1956

Hosts : Chilli, Banana, Castor, Potato, Brinjal, Cucumbar, Sponge gourd, Okra.

Localities : Bachhota, district Khagaria; Pantepur, district Vaishali; Khusitola, Bhitaha and Bara Berawat, district West Champaran.

30. *Helicotylenchus indicus* Siddiqi, 1963

Hosts : Banana, *Cajanus*, Brinjal, Potato, Sponge gourd, Radish, Turmeric.

Localities : Bedhari-English, Dilwarpur and Barkathpur, district Patna; Chandpur, district Vaishali; Khusitola and Bhitola, district West Champaran; Muzaffarpur and Sitamarhi districts.

31. *Helicotylenchus macronatus* Mulk & Jairajpur, 1975*

Host : *Lens culinaris*

Locality : Gaya.

32. *Helicotylenchus multicinctus* (Cobb, 1893) Golden, 1956

Host : Banana

Locality : Chattarpur, district Patna.

33. *Helicotylenchus paraconurus* Rashid & Khan, 1972

Host : Plum

Locality : Pachmarhi.

34. *Helicotylenchus pisi* Swarup & Sethi, 1968

Host : Brinjal

Locality : Khusitola, district West Champaran.

35. *Helicotylenchus pseudorobustus* (Steiner, 1914) Golden 1956

Host : Turmeric.

Localities : Muzaffarpur and Sitamarhi districts.

36. *Rotylenchoides whiteheadi* Ganguli & Khan, 1987*

Host : Bhindi (*Abelmoschus esculentus*)

Locality : Pusa.

Family : ROTYLENCHULIDAE Husain & Khan, 1967

37. *Rotylenchulus reniformis* Linford & Oliveira, 1940

Hosts : Castor, *Cajanus*, Brinjal, Tomato, Cauliflowers, Okra, Lobia, Sponge gourd, Pointed gourd, Turmeric.

Localities : Dargahitola, Hardasbigha and Chhatarpur, district Patna; Kutupur and Bachhota, district Khagaria; Purainea, district Vaishali; Chhawani, Basantitola, Bhitaha and Bara Berawat, district West Champaran; Muzaffarpur district and Sitamarhi district.

Family : PRATYLENCHIDAE Thorne, 1949

38. *Pratylenchus coffeae* (Zimmerman, 1898) Filipjev & Schuurmans Stekhoven, 1941

Host : Banana

Localities : Bachhota, district Khagaria; Machubani, Sitamarhi and West Champaran districts.

39. *Pratylenchus crenatus* Loof, 1960

Hosts : Cucumber. Sponge gourd.

Locality : Bhitaha, district West Champaran

40. *Pratylenchus fallax* Seinhorst, 1968

Host : Chaulai (*Amaranthus* sp.), Brinjal, Tomato, Cauliflower, Sponge gourd.

Localities : Basantitola, Jamadartola, Kargahia and Batiah, district West Champaran.

41. *Pratylenchus penetrans* (Cobb, 1917) Filipjev & S. Stekhovan, 1941

Host : Brinjal

Localities : Mehasauri and Sansarpur, district Khagaria.

42. *Pratylenchus pratensis* (de Man, 1880) Filipjev, 1936

Hosts : Sponge gourd, Brinjal, Greengram (Mung), Cucumbar, Castor.

Localities : Faridpur, Lai, Manar and Patat, district Patna; Bhitaha and Bara Barawat, district West Champaran.

43. *Pratylenchus teres* Khan & Singh, 1974

Host : Potato

Locality : Sharabjal, district Vaishali

44. *Pratylenchus thornei* Sher & Allen, 195

Host : Rice

Localities : Madhubani, Sitamarhi and West Champaran districts.

45. *Pratylenchus zae* Graham, 1951

Host : Turmeric

Localities : Muzaffarpur and Sitamarhi districts.

46. *Hirschmanniella exacta* Kakar, Siddiqi & Khan, 1994*

Host : Rice

Locality :

47. *Hirschmanniella oryzae* (van Breda de Haan, 1902) Luc & Goodey, 1964

Hosts : Rice, Sponge gourd, Okra

Localities : Umerabad, district Patna; Mirchram, district Vaishali; Jamadartola, Nawkatola, Chhota and Beraiot, district West Champaran; Gopalganj, East Champaran, Sitamarhi and Madhubani districts.

Family : MELOIDOGYNIDAE Skarbilovich, 1959

48. *Meloidogyne areneria* Cooper, 1955

Host :

Locality :

49. *Meloidogyne incognita* (Kofoid & White, 1919) Chitwood, 1949

Hosts : Brinjal, Okra, Turmeric, Potato, Groundnut, Pea, Tomato, Chilli, Papaya.

Localities : Nagwan, district Patna; Muzaffarpur district; Kanke Farm, district Ranchi; Sitamarhi, Netrahat Sarbour and Nawada Farms.

50. *Meloidogyne javanica* (Treub, 1885) Chitwood, 1949

Hosts : Okra, Potato, Brinjal, Tomato, Rice.

Localities : Silhauri, district Patna; Kanke Farm, district Ranchi; Netrahat, Newada and Sabour Farms.

Family : HETERODERIDAE Filipjev & Schuurmans Stekhoven, 1941

51. *Heterodera cajani* Koshy, 1967

Host : Arhar (*Cajanus cajan*)

Localities : IARI Substation, Pusa : Darbhanga.

52. *Heterodera zae* Koshy, Swarup & Sethi, 1971

Host : Maize (*Zea mays*)

Localities : Fathepur and Manika, district Muzaffarpur; Dwarka Nagar, Motipur and Surajpur, district Darbhanga; Pusa IARI Substation; Dholi Agricultural College Farm; Mour and Gaajpur, district Patna; Kandi, district Gaya.

53. *Golobodera rostochiensis* (Woolenweber, 1923) Behram, 1975

Host :

Locality :

Remarks : Sen (1960) reported a species of *Heterodera* which he tentatively identified as *H. rostochiensis* (= now *Globodera rostochiensis*) from Bihar. However, its identification was neither confirmed by him or the later workers.

Suborder : CRICONEMATINA Siddiqi, 1980

Family : CRICONEMATIDAE Taylor, 1936

54. *Hemicriconemoides cocophillus* (Loos, 1949) Chitwood & Birchfield, 1957

Host : Rice

Localities : Madhubani, Sitamarhi and West Champaran districts.

Family : CALOOSIDAE Siddiqi, 1980

55. *Caloosia exilis* Mathur, Khan, Nand & Prasad, 1969*

Host : Rice

Locality : Nokha, district Arrah.

56. *Caloosia paxi* Mathur, Khan, Nand, & Prasad, 1969*

Host : Rice

Locality : Nokha, district Arrah.

Family : PARATYLENCHIDAE Thorne, 1949 (Raski, 1962)

57. *Paratylenchus nainianus* Edward & Misra, 1963

Host : *Cajanus* sp.

Locality : Patna.

58. *Paratylenchus neonanus* Mathur, Khan & Prasad, 1967*

Host : Bair (*Zyzyphus* sp.)

Locality :

59. *Paratylenchus nawadus* Khan, Prasad & Mathur, 1967**Host* : Papaya*Locality* : Nawada

Suborder : HEXATYLINA Siddiqi, 1980

Family : ANGUINIDAE Nicoll, 1935

60. *Angunia tritici* (Steinbuch, 1799) Filipjev, 1936*Host* : Wheat*Localities* : Jahanabad, Gaya, Nawada, Darbhanga, Muzaffarpur, Monghyr, Patna districts.

Remarks : Nath & Pathak (1994) have reported that ear-cockle disease caused by *A. tritici* affected almost all the wheat growing areas of Bihar. It was most prevalent in Gaya and Nawada districts followed by Jahanabad and Jamui during 1991-93.

61. *Ditylenchus myceliophagus* Goodey, 1958*Host* : Mustard*Locality* : Bhadas, district Khagaria.62. *Ditylenchus* sp.*Host* : Coriander*Locality* : Hardasbigha, district Patna.63. *Safianema anchilisposoma* (Tarjan, 1958) Siddiqi, 1980*Hosts* : Arhar (*Cajanus* sp.), Brinjal, Chilli, Tomato, Castor & Pointed gourd.

Localities : Patat, district Patna; Mehasauri and Sausarpur, district Khagaria; Purainea, district Vaishali; Basantipur, Khusitola and Bara Berawat, district West Champaran.

64. *Safianema indicum* (Sethi & Swarup, 1967) Siddiqi, 1986*Hosts* : Mustard, Castor, Cauliflower, Cucumber, Sponge gourd, Brinjal, Chilli.

Localities : Bidhipur, Nirpur and Nikumpura, district Patna; Killa Betial and Bhitaha, district West Champaran.

65. *Nothotylenchus alii* Khan & Siddiqi, 1968*Host* : Rice*Localities* : Gopalganj, East Champaran, West Champaran, Muzaffarpur and Sitamarhi districts

66. *Nothotylenchus bhatanagari* Tikyani & Khera, 1969

Hosts : Brinjal, Bean, Onion, Saunf, Pea, Castor.

Localities : Hathidah, Bidhipur, Dargahitola, Chattarpur, Nukumpura and Pandarak, district Patna.

67. *Nothotylenchus oryzae* (Mathur, Khan & Prasad, 1966) Siddiqi, 1986

Host : Rice

Locality : Bikramganj, district Arrah (Bhojpur)

Order : APHELENCHIDA Siddiqi, 1980

Family : APHELENCHIDAE Fuchs, 1937 (Thorne, 1949)

1. *Aphelenchus avenae* Bastian, 1865

Hosts : Castor, Lemon, Okra, Turmeric, Lobia, Brinjal, Smooth gourd, Onion, Tomato, Chilli, Cauliflower, Banana, Bean, Coriander, Pea, Pigeonpea, Gram, Anisud, Spinach, Sponge gourd, Pointed gourd.

Localities : Dargahitola, Silauhani, Palganj, Inglis and Kanpa, district Patna; Bachhota, Mehasauri and Parmaupur, district Khagaria; Bherukhera, Basantitola, Chawani, Jamadartola, Bara Berawat and Chota Berawat, district West Champaran.

Family : APHELENCHOIDIDAE Skarbilovich, 1947 (Paramonov, 1953)

2. *Aphelenchoides asterocaudatus* Das, 1960

Host : Chilli

Locality : Bachhota, district Khagaria

3. *Aphelenchoides besseyi* Christie, 1942

Host : Rice

Localities : Madhubani, Sitamarhi and West Champaran districts.

4. *Aphelenchoides bicaudatus* (Imamura, 1931) Filipjev & Shuurmans Stekhoven, 1941

Hosts : Coriander, Tomato

5. *Aphelenchoides perientinus* (Bastian, 1865) Steiner, 1932

Hosts : *Cajanus* sp., Brinjal

Locality : Hathidah and Patna, district Patna.

6. *Aphelenchoides saprophilus* Franklin, 1957

Host : Castor

Locality : Dargahitola, district Patna.

7. *Aphelenchoides subtenuis* (Cobb, 1926) Steiner & Buhner, 1932

Hosts : Brinjal, Chilli, Cauliflower, Sponge gourd, Lobia, Okra.

Localities : Sharabjal, district Vaishali; Chhawani, Bhitah, Chota Berawat and Bara Berawat, district West Champaran.

Family : SEINURIDAE Husain & Khan, 1967

8. *Seinura hechlerae* Chaturvedi & Khera, 1979

Hosts : Chilli, Castor, Okra

Localities : Dargahitola and Kasimpur, district Patna; Mehauri, district Khagaria; Chotta Berawat, district West Champaran.

Order : DORYLAIMIDA Pearse, 1942

Suborder : DORYLAIMINA Pearse, 1936

Family : DORYLAIMIDAE de Man, 1876

1. *Ischiodorylaimus paraugandanus* Khan & Ahmad, 1994*

Host : Rice

Locality : Janki Asthan, district Sitamarhi

Family : THORNENEMATIDAE Siddiqi, 1969

2. *Thornenema mauritanum* (Williams, 1959) Baqri & Jairajpuri, 1967

Hosts : Tomato, Castor.

Locality : Kutupur and Bachhta, district Khagaria.

3. *Thornenema* sp.

Hosts : Cauliflower, Okra.

Localities : Purainea, district Vaishali; Bara Berawat, district West Champaran.

Family : LONGIDORIDAE Thorne, 1935

4. *Longidorus vineacola* Sturhan & Weischer, 1964

Host : Potato

Locality : Adastola, district Vaishali

5. *Longidorus* sp.

Host : Brinjal

Locality : Bara Berawat, district West Champaran.

6. *Paralongidorus citri* (Siddiqi, 1959) Siddiqi, Hooper & Khan, 1963

Host :

Locality :

Family : XIPHINEMATIDAE Dalmasso, 1969

7. *Xiphinema insigne* Loos, 1949

Host : Rice

Localities : Madhubani, Sitamarhi and West Champaran districts.

8. *Xiphinema orbum* Siddiqi, 1964*

Host : Rice

Locality : Patna.

Family : BELONDIRIDAE Thorne, 1939

9. *Dorylaimellus parvulus* Thorne, 1939

Host : Banana

Locality : Bachhota, district Khagaria

Family : MYDONOMIDAE Thorne, 1964

10. *Dorylaomoides modestus* Siddiqi, 1965*

Host : Citrus

Locality : Kharagpur.

Suborder : NYGOLAIMINA Ahmad & Jairajpuri, 1979

Family : NYGOLAIMIDAE Thorne, 1935

11. *Aquatides thornei* (Schneider, 1937) Ahmad & Jairajpuri, 1982

Host : Rice

Locality : Magadh University Campus, district Bodh Gaya

Order : TRIPLONCHIDA Cobb, 1920

Suborder : DIPHTHEROPHORINA Coomans & Loof, 1970

Family : DIPHTHEROPHORIDAE Micoletzky, 1922

1. *Diphtherophora* sp.

Host : Brinjal

Locality : Bhawanpur, district Vaishali.

Family : TRICHODORIDAE Thorne, 1935 (Siddiqi, 1961)

2. *Paratrichodoros porosus* (Allen, 1957) Siddiqi, 1974

Host : Rice

Localities : Madhubani, Sitamarhi and West Champaran districts.

Order : MONONCHIDA Jairajpuri, 1969

Family : MYLONCHULIDAE Jairajpuri, 1969

1. *Mylonchulus lacustris* (N. A. Cobb in M. V. Cobb, 1915) Andrassy, 1958

Hosts : Tomato, Banana

Localities : Kutupur, Bhadas and Bachhota, district Khagaria.

2. *Mylonchulus* sp.

Host : Okra

Locality : Bidhipur, district Patna.

MISCELLANEOUS GROUPS
(SAPROPHAGOUS OR FREE LIVING NEMATODES)

1. *Alaimus* sp.

Habitats : From soil around roots of Brinjal, *Amaranthus* sp., Cauliflower, Cucumber, Okra.

Localities : Sharabjal, district Vaishali; Basantitola, Killa Betiah, Bhitaha and Chhota Berawat, district West Champaran.

2. *Amphidelus candidus* Siddiqi & Basir, 1965

Habitat : From soil around roots of Cauliflower.

Locality : Bhadas, district Khagaria.

3. *Rhabdolaimus terrestries* de Man, 1880

Habitats : From soil around roots of Brinjal, *Amaranthus* sp., Cauliflower, Sponge gourd, Okra, Castor, Chilli, and Lobia.

Localities : Sharabjal, district Vaishali; Basantitola, Chhawanti, Jamadartola, Kargahia, Ghusukpur, Killa Betiah, Nawkatola, Khusitola, Bhitaha, Chhota Berawat and Bara Berawat, district West Champaran.

4. *Chronogaster* sp.

Habitat : From soil around roots of *Amaranthus* sp.

Locality : Basantitola, district West Champaran.

5. *Plectus granulosus* Bastian, 1865

Habitat : From soil around roots of Okra, Chilli.

Localities : Nawkatola, Bhitaha and Chhota Berawat, district West Champaran.

6. *Achromadora ruricola* (de Man, 1880) Micoletzky, 1925

Habitat : From soil around roots of Mustard

Locality : Mehauri, district Khagaria.

7. *Ironus longicaudatus* de Man, 1876

Habitats : From soil around roots of Banana and Chilli.

Locality : Bachhota and Sansarpur, district Khagaria.

8. *Abunema indicum* Khera, 1971

Habitat : From soil around roots of Brinjal

Locality : Khusitola (Betiah), district West Champaran.

9. *Prismatolaimus andrassyi* Khera & Chaturvedi, 1977

Habitats : From soil around roots of Potato, Cauliflower and Brinjal

Localities : Permanpur, district Khagaria; Chhawani, Kargahia and Khusitola, district West Champaran.

10. *Acrobeles ciliatus* Linstow, 1877

Habitat : From soil around roots of Brinjal.

Locality : Hirachak, district Vaishali.

11. *Acrobeles eleboratus* Thorne, 1925

Habitat : From soil around roots of Potato.

Locality : Chandpura, district Vaishali.

12. *Acrobeles timmi* Chaturvedi & Khera, 1979

Habitat : From soil around roots of Tomato.

Localities : Bhada and Sansarpur, district Khagaria.

13. *Acrobeloides bustchlii* (de Man, 1884) Steiner and Buherer, 1953

Habitats : From soil around roots of Brinjal and Cucumber.

Localities : Sansarpur, district Khagaria; Sharabjal, district Vaishali; Bhitaha, district West Champaran.

14. *Cephalobus persegnis* Bastian, 1865

Habitats : From soil around roots of Brinjal, Cauliflower, Castor, Okra, Cucumber, Sponge gourd, Chilli, Turmeric, Pointed gourd and Lobia.

Localities : Sharabjal, district Vaishali; Ghusukpur, Khusitola; Bhitaha, Chhota Berawat and Bara Berawat, district West Champaran.

15. *Chiloplacus lentus* (Maupas, 1900) Thorne, 1937

Habitats : From soil around roots of Chilli, Potato, Brinjal, Okra and Sponge gourd.

Localities : Bhesukhera, Amritpur, Maderna, district Vaishali; Nawkatola and Bara Berawat, district West Champaran.

16. *Chiloplacus* sp.

Habitats : From soil around roots of Brinjal and Chilli.

Locality : Kutupur and Meshauri, district Khagaria.

17. *Eucephalobus* sp.

Habitats : From soil around roots of Potato, Cauliflower and Brinjal.

Locality : Ghogatola, district Vaishali; Kargharia and Bara Berawat, district West Champaran.

18. *Seleborca timmi*

Habitats : From soil around roots of Potato, Cauliflower, Tomato and Okra.

Localities : Abastola and Patedha, district Vaishali; Basantitola, Nawkatola, district West Champaran.

19. *Panagrolaimus* sp.

Habitats : From soil around roots of Brinjal and Okra.

Localities : Nagwan, district Patna; Nawkatola, district West Champaran.

20. *Turbatrix aceti* (Muller, 1783) Peters, 1927

Habitat : Cauliflower

Locality : Kargahia, district West Champaran.

21. *Mesorhabditis* sp.

Habitat : Potato

Locality : Ghogatola, district Vaishali.

DISCUSSION

In all, 111 species of plant and soil nematodes have been reported from Bihar till date. On the basis of frequency of occurrence in different localities, the following species may be considered as serious pests in the state : *Tylenchorhynchus brassicae*, *T. mashhoodi*, *T. nudus*, *Hoplolaimus indicus*, *Helicotylenchus astriatus*, *H. dihystra*, *H. erythrinae*, *H. indicus*, *Rotylenchulus reniformis*, *Pratylenchus coffeae*, *P. pratensis*, *Hirschmanniella oryzae*, *Meloidogyne incognita*, *M. javanica*, *Heterodera cajani*, *H. zaeae*, *Anguina tritici* and *Aphelenchoides besseyi*. The recent report of wide spread disease 'ear cockle' caused by *Anguina tritici* inflicting heavy losses in wheat crop is alarming in the state (Nath & Pathak, 1994). Though the 'white-tip' disease in rice crop has not been noticed, the report of *Aphelenchoides besseyi* by Ahmad, Khan and Bilgrami (1988) from Madhubani, Sitamarhi and West Champaran districts of Bihar is also important.

The information on the distribution of plant and soil nematodes furnished in this paper reveals that Bihar still remains a poorly surveyed state in India. The total number of known species (111) from Bihar comes to about 7% of the known Indian nematode fauna (about 1600 spp.). This conclusion may easily be supported from the fact that about the same number of species have been reported from Haryana, a small state of India occupying only 1.34% area of the country whereas Bihar occupies about 5.29% area. Our knowledge on the distribution of important nematode pests of the suborder Criconeematina, superfamily Longidoroidea and family Trichodoridae is insignificant whereas they are frequently encountered in Gangetic plains of Uttar Pradesh and West Bengal.

Amongst the predaceous nematodes, the following families of the suborder Dorylaimina are yet to be recorded from Bihar : Aporcelaimidae, Oudsianematidae, Nordiidae, Actinolaimidae, Carcharolaimidae, Tylencholaimidae, Leptonchidae, etc. Similarly, the members of the suborders Nyglaimina and Mononchina are represented only by one and two species, respectively, in Bihar occupying 1,73,877 sq. kms. area.

The analysis of the literature further reveals that only the following districts have been surveyed

significantly; East Champaran, West Champaran, Khagaria, Madhubani, Muzaffarpur, Nawada, Patna, Sitamarhi and Vaishali. The names of important districts like Dhanbad, Jamshedpur, Jharkhand, Purnia, Ranchi, Siwan, etc. do not exist in nematology literature while the other districts have been surveyed insignificantly. The information on the degree of dominance and abundance of important nematode pests of crops is not available.

SUMMARY

An attempt has been made in this paper to collate information on the distribution and hosts/habitat of plant and soil nematodes from Bihar state so that the baseline data may be prepared. In all, 111 species of phytophagous, predaceous and saprophagous groups of nematodes have been reported from Bihar till date. In view of their economic importance, the phytophagous and predaceous nematode species have been listed according to their systematic position under the following orders : Tylenchida (67 spp.), Aphelenchida (8 spp.), Dorylaimida (11 spp.), Triplonchida (2 spp.) and Mononchida (2 spp.). A list of 21 species of free living nematodes has been provided under the heading "Saprophagous" (Miscellaneous). The following species of plant parasitic nematodes have been found widely distributed : *Tylenchorhynchus brassicae*, *T. mashhoodi*, *T. nudus*, *Hoplolaimus indicus*, *Helicotylenchus astriatus*, *H. dihystra*, *H. erythrinae*, *H. indicus*, *Rotylenchulus reniformis*, *Pratylenchus coffeae*, *P. pratensis*, *Hirschmanniella oryzae*, *Meloidogyne incognita*, *M. javanica*, *Heterodera cajani*, *H. zaeae*, *Anguina tritici* and *Aphelenchoides besseyi*. Recent reports of ear-cockle disease in wheat crop, caused by *Anguina tritici*, have been found alarming in many districts. The report of *Aphelenchoides besseyi* from rice fields in a few districts should also be considered an important finding.

On the basis of the information furnished in the paper, this has been concluded that Bihar should be considered as one of the poorly surveyed states of India. The names of the families comprising important nematode species (phytophagous/predaceous), which still remain unrepresented in Bihar, have been mentioned. Besides, the significantly surveyed and not surveyed districts have also been identified.

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