OCCASIONAL PAPER NO. 240

RECORDS OF THE
ZOOLOGICAL SURVEY OF INDIA

Studies on plant and soil Nematodes associated with crops of economic importance in Gujarat

QAISER H. BAQRI
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INTRODUCTION

Nematodes are economically most important, diversified, abundant and one of the largest groups of invertebrates. In fact they are comparable only to insects in their number, abundance, range of habitat and economic importance. They are grouped under the phylum Nematoda. Nematodes are worm-like invertebrates having appendageless and unsegmented body, generally cylindrical in shape, but females in some groups may become swollen pouch-like, lemon, pear or kidney shaped, possessing bilateral symmetry. They are characterized by having four longitudinal hypo-dermal chords, a body cavity, complete digestive system with trifid pharynx, to some extent a well developed nervous system, simple excretory system, one or two tubular gonads and generally possessing a well defined tail in both sexes. The sexes are generally separate and well-defined into males and females.

Based on their feeding habits, Pionar (1983) has divided all types of nematodes into following groups, which are :

1. Vertebrate parasites, which depend on vertebrate hosts for their food.
2. Invertebrate parasites, which are feeding on invertebrate
3. Plant parasite attacking on plants.
4. Micro phototrophic, saprophagous or free living, which feed on microorganisms. They live in soil, marine, brackish or fresh water (without any parasitic relationship with animals or planktons)
5. Predaceous nematodes, which prey upon other organisms, like rotifers, microorganisms, nematodes etc. for their food.

The first group is studied under Helminthology while the other groups form an independent discipline called Nematology.

Though the nematodes are both type aquatic and terrestrial but the terrestrial nematodes (phytophagous, saprophagous groups) have drawn special attention in recent decades. In order to increase the agricultural production, the study of phytophagous nematodes is being considered very important. Since the predaceous and saprophagous nematodes are also collected from around roots of plants along with the phytophagous nematodes in the same soil samples so they are also studied extensively under Nematology.

Among the terrestrial nematodes (plant and soil nematodes) those belonging to orders Tylenchida and Mononchida have received much attention because the former act as plant parasites and play an important role in restricting agricultural productivity while the latter as predaceous nematodes in biological control of the phytophagous nematodes. The members of the order Dorylaimida also constitute an important group because some of them are ecto-parasites of plants and act as virus vector. Besides, significant numbers of the dorylaims are also predaceous.

The plant parasitic nematodes attack all kind of plants, mostly the root system, except a few attcking above ground parts. Their infestation destroys plant roots either as ecto or endoparasites. The injuries caused by nematodes at feeding sites may become responsible for the secondary infection by bacteria, viruses and fungi. They not only puncture the plant cells through stylet but also may inject secretion by which cells begin to enlarge or divide abnormally. As a result, the average loss in agricultural and horticultural crops has been estimated 10-15% but this may go up to 90%, e.g. in potato crop due to *Globodera rostochiensis*, in deep water rice due to *Ditylenchus angustus* etc. Sasser and Freckman (1987) have estimated crop loss due to phytophagous nematodes up to 100 billion dollars all over the world.

Though the first plant parasitic nematode was discovered in 1743 by Needham in England, the economic importance of these nematodes could only realized in 1859 when a serious disease of sugarbeet caused by a cyst nematode was noted in Germany. Later, the discovery of root-knot nematodes (*Meloidogyne* sp.) and cyst nematodes (*Heterodera* spp.) accelerated the development in research on nematodes in Europe and America during nineteenth century. Cobb (1917) made excellent contribution, which led to the creation of separate division of nematology in the U.S.D.A. In fact, Cobb had coined the term nematology in 1932 and his taxonomical contribuion provided a solid foundation for the establishment of Nematology as an independent discipline of agricultural sciences. Thereafter, the excellent taxomonical contributions by Thorne, Chitwood, Goodey, Andrassy, Coomans, Siddiqi, Jairajpuri, Southey, Maggenti, Seshadri, Swarup, Khan, Baqri and Poinar provided initial realization of the significance of these pests in agriculture.

After the Second World War the realization that nematode control could reduce the gap between the human population and food availability further helped the development of Nematology. During the second half of the 20th century, the study of phytophagous and soil nematodes has attracted scientists from all over the world.

OBJECTIVE

As mentioned earlier plant parasitic nematodes are economically very important because they inflict severe yield losses in agricultural and horiticultural crops. In India Van Berkum and Seshadri (1970) have estimated crop losses of about 10 million dollars in wheat due to seedgall nematode (*Anguina tritci*) and of about 8 million dollars in Barley and wheat due to molya diseases caused by cereal cyst nematode (*Heterodera avenae*) in Rajasthan state alone. Losses caused by root knot and cereal cyst nematodes (*Meloidogyne* and *Heterodera* sps.)have been estimated from 25 to 90% depending upon the cultivation season and cropping pattern.

Keeping in the view the poor state of knowledge of nematode fauna from Gujarat state, the project was under taken to study the plant and soil nematodes associated with economically important crops. So that the wide gap in our knowledge may be filled up.

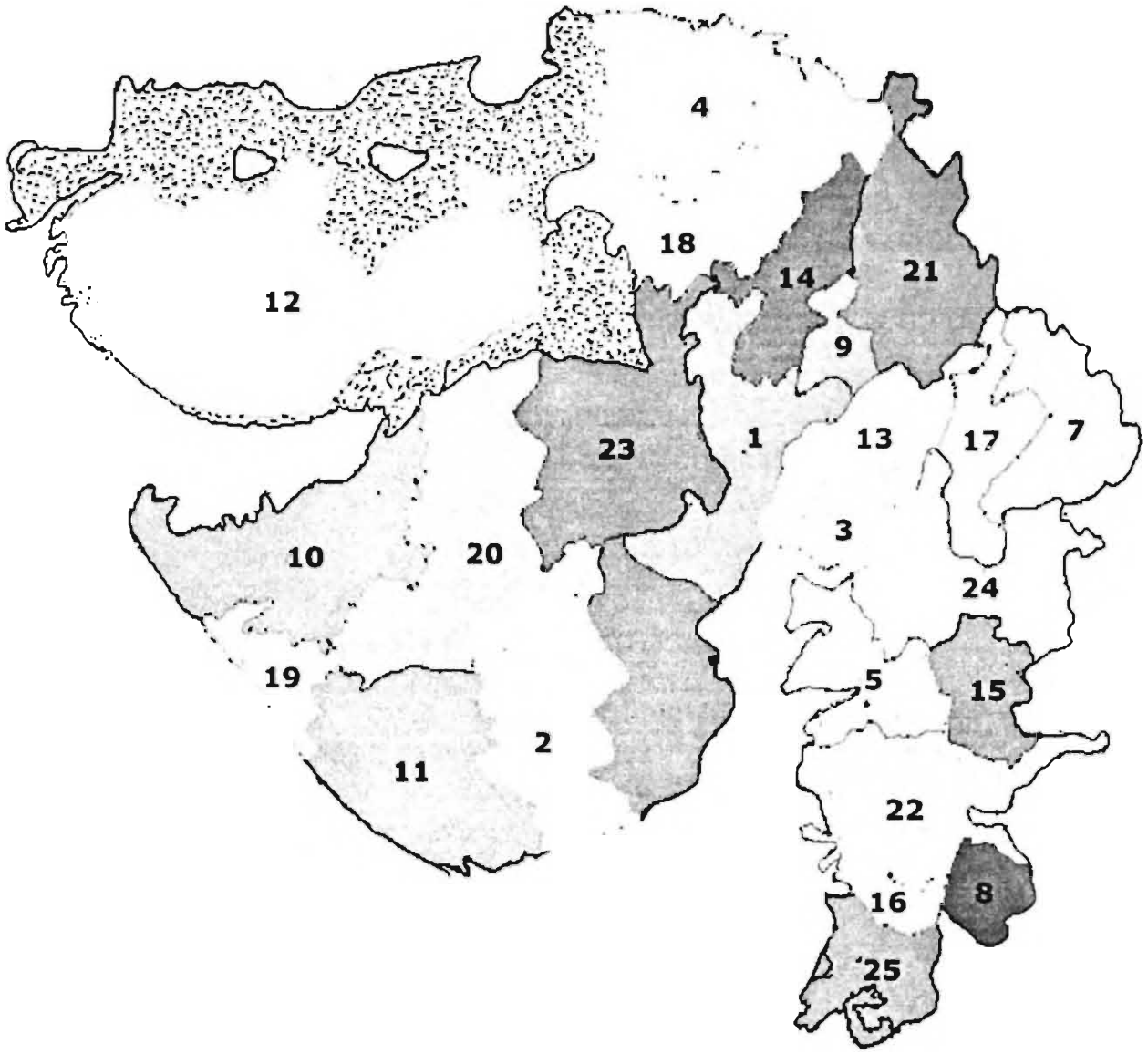
TOPOGRAPHY OF GUJARAT

The state occupies 1,96,024 sq. kms. area and is situated on the west coast of India between 20° and 25° north latitudes and 68° and 75° east longitude. Gujarat is fringed by the Arabian Sea in the west, bordered by Rajasthan in the North West, Madhya Pradesh in the east and Maharashtra in the south east and south. The Kutch region of the state in north-west shares the borders with Pakistan. Near about 25% in western part is arid; 34% in north is semi arid and 50% in the middle is arid / semi arid. The 20% of the total area is of the state is drought prone. Three seasons are distinct viz., winter, summer and monsoon. During summer, the central and northern parts are hottest where the maximum temperature may rises up to 44.5°C while in the southern parts temperature remains lower (30°C). The winter in the northern parts is also severe. The monsoon season is generally from June to September. The heaviest rain fall is recorded in July. The average rainfall of the state is about 800 mm. and varying from 340-1800 mm. in the different zones. The Ghat region of Valsad and Dangs district receives the maximum rainfall while the minimum in the Kutch region. Out of total land mass in the state, only about 12% area is under irrigation. About 5.2% of the area is utilized as a permanent pasture and grazing land and 5.4% remains under fodder crops. The total area under forests in state is about 18,707 sq. kms. which is about 9.53% of the total area of state.

REVIEW OF LITERATURE

In India the history of Nematology starts from the survey report of root knot nematode by Barber (1901) from the tea gardens in south India. Prior to 1959 only a few stray references are available (Butler, 1913, 1919; Ayyar, 1926, 1933; Dastur, 1936; Luthra & Vasudeva, 1939; Goodey, 1951 and few others). Siddiqi, 1959, Das, 1960, and Jairajpuri, 1962 were first to initiate the work in a systematic way on the taxonomy of plant and soil nematodes. Since the many nematologists have made significant contribution in taxonomy (Seshadri and his coworkers, 1962; Prasad and Dasgupta, 1962; Khan.E, 1963; Edward and Misra, 1963; Husain and Khan, 1965, Khera, 1965; Baqri and Jairajpuri, 1967; Sukul, 1967; Bajaj, 1976; and Sultan, 1980 etc.

During the last four decades, commendable work has been done by nematologists on survey, distribution and taxonomy of plant and soil nematodes. However, our knowledge on nematode fauna of Gujarat has been found meagure (Baqri & Jairajpuri, 1995). In Gujarat, most of the surveys have been conducted for important phytophagous nematodes (root-knot and cyst nematodes) only. In fact, the survey and identification work started rather late in the state. Patel, Desai and Shah (1962) were the first to publish a survey report on stunt nematode associated with tobacco crop in Gujarat. Other important references on taxonomical studies from Gujarat are : Jairajpuri & Baqri (1968), Husain & Rasheed (1969), Patel, D.J. *et al.*, (1979-1988), Patel, B.A. *et al.*, (1987) Patel, G.J. *et al.*, (1962), 1986), Patel, H.K. *et al.*, (1988), Shah *et al.*, (1985), Siddiqi & Patel (1990), Desai (1992), Sharma *et al.*,



Map Of Gujarat

1. Ahmadabad 2. Amreli 3. Anand 4. Banaskantha 5. Bharuch 6. Bhavnagar 7. Dahod 8. Dangs 9. Gandhinagar 10. Jamnagar 11. Junagarh 12. Kachchh 13. Kheda 14. Mehsana 15. Narmada 16. Navsari 17. Panchmahal 18. Patan 19. Porebandar 20. Rajkot 21. Sabarkantha 22. Surat 23. Surendernagar 24. Vadodara 25. Valsad

(1992-93), Ahmad (1993), Khan *et al.*, (1994 &1995), Huseni *et al.*, (1997), Baqri & Bohra (2003), & Bohra & Baqri (2004) and a few others.

MATERIAL AND METHOD

Soil samples were collected by the survey parties of D.R.S., Z.S.I. while on survey of different district of Gujarat. About 670 soil samples from 250 localities from around roots of 39 host plant were collected. The list of host plant and localities is furnished in table-I and II respectively.

(i) **Soil Sampling** : Soil samples are collected from around roots of host plants with the help of shovel from the depth of 5-15 cm. in moist soil fields. If the field is arid or semi-arid, the depth is increased. For making a bulk soil sample, 4-5 sub-samples are collected from the fields. The soil is collected in a polythene bag and brought to laboratory. A label bearing information regarding host, locality, district, date, etc. is tied at the neck of polythene bag with the help of rubber band. In order to avoid evaporation of moisture from soil sample they are stored in a refrigerator and processed as soon as possible.

(ii) **Processing** : Extraction of plant and soil nematodes from soil samples was made by modified Bearmann funnel technique.

Soil samples are placed in a bucket (A) of 15 liter capacity and filled to 1/3rd of its volume with water. The soil and water are thoroughly mixed by hand to make a homogenous suspension. The bucket is left undisturbed for 20-30 seconds so as to allow the heavy particles of soil to settle down at the bottom. This suspension is then filtered through a 25 mesh sieve to get rid of debris and is collected in a bucket (B). The same process is repeated with 300 mesh sieeve.

The aliquot from 300 mesh sieve is collected in a beaker and is poured gently on moist double tissue paper placed on a small supporting coarse sieve with 2 mm pores. The air bubbles should not be allowed between the tissue paper because they will check the filtration of nematodes. The supporting sieve is placed into a shallow petri dish filled with water touching the bottom of coarse sieve and left undisturbed for 24 hours. After 24 hours the nematodes are collected in a test tube with the help of the dropper.

(iii) **Killing and Fixation** : The suspension containing the nematodes is placed in a test tube for 20-30 minutes so that nematodes may settle down at the bottom. Most of water is discarded carefully from the test tube with the help of dropper. The nematodes are fixed in hot 4% formalin.

(iv) **Permanent Slides** : The nematodes are transferred from fixative to a solution of 5 parts of glycerin and 95 parts of alcohol in a cavity block. The cavity block having the nematodes is placed in a desiccator for dehydration of nematodes at room temperature for 2-3 weeks. The nematodes are finally mounted in a glass/metal slide in pure anhydrous

glycerine. Ordinary nail polish is used as a sealing material. All measurements were made on specimens mounted in anhydrous glycerine with the help of ocular micrometer. De Man's (1884) formula for denoting body dimensions of nematodes was used.

Table-I : List of crops surveyed

1 Arvi (*Colacasia sp.*)	2. Banana (*Musa paradisica*)
3. Bean (*Phaseolus sp.*)	4. Brinjal (*Solanum melongona*)
5. Cabbage (*Brassica oleracea*)	6. Carrot (*Daucas carota*)
7. Castor (*Ricinus communis*)	8. Cauliflower (*Brassica oleracea*)
9. Chilli (*Capsium annuum*)	10. Coriander (*Corcandrum sativum*)
11. Cotton (*Gossypium spp.*)	12. Cucurbit (*Cucurbita sp.*)
13. Cumin (*Cuminum cymynum*)	14. Garlic (*Allium sativum*)
15. Gram (*Phaseolus sp.*)	16. Groundnut (*Archis hypogea*)
17. Guar (*Cyamopis tetrogondoba*)	18. Lady's finger (*Abelmoschus esculentus*)
19. Lobia (*Vigna unguiculata*)	20. Methi (*Trigonella toenum graceus*)
21. Millet (*Pennisetum americanum*)	22. Mustard (*Brassica compestris*)
23. Oat (*Hordeum vulgare*)	24. Onion (*Allium cepa*)
25. Paddy (*Oryza sativa*)	26. Papaya (*Carica papaya*)
27. Pigeon pea (*Cajanu scajan*)	28. Potato (*Solanum tuberosum*)
29. Raddish (*Raphanus sativus*)	30. Rijaco (*Medicago sativa*)
31 Sesame (*Sesamum indicum*)	32. Souf (*Glycine max*)
33. Soya (*Glycine max*)	34. Spinach (*Spinacia oleracea*)
35. Sugarcane (*Sacchharum officinarum*)	36. Sweet potato (*Ipomoea batatos*)
37. Tobacco (*Nicotiana tobacum*)	38. Tomato (*Lycopersicon esculentum*)
39. Wheat (*Triticum saestivum*)	

Table-II : List of Localities surveyed

Sl. No.	District	Name of the Localities
1	Ahmadavad	Vekariya, Sarvad, Bhooji, Sonoid, Bhagodra, Miani, Eevthal, Rangark, Dhurji, Barvalia.
2	Amreli	Barvala, Bagasara, Ishwarpura, Lathi, Chavand, Babra, Chital, Chakkergarh, Sabarkundla, Santola, Jafrabad, Khambha, Chalala.
3	Anand	Karamsad, Peprao Ashapuri, Tarapura, Khambhat, Ansar.
4	Banaskantha	Bamodara, Rajosana, Ratanpur, Palanpur, Chhota, Danta, Pipala, Diesa, Ramesherpura, Shihari, Kankrej, Peplawaliwal.
5	Bharuch	Nahiyar, Kasmachi, Narmada river, Dayadra, Meghnad, Baghpura, Mangodhania, Poitra, Sapotra, Pathar.
6	Bhavnager	Patana, Mangra, Radhaywada, Bhandariya, Dhardi, Prithvi, Mahuva, Laxmangurh, Soangurh, Ramdhara, Ranghole,Mandva, Pipadla, Palitana, Gariadhar.
7	Dahod	Piplod, Devgarh Baria, Devvada
8	Dangs	Bazz, Beddacha, Jakhara, Jamla Jamlapada, Kurkas, Moolchowk,Pipari, Rambhasform, Saputara.
9	Gandhinagar	Dehgam, Chiloda.
10	Jamnagar	Jodiya, Barunda, Bhodara, Mabapo, Motivanagar, Kherejaria, Dhorol, Bajrangpur, Kala, Falla.
11	Junagarh	Kandipur, Bagada, Amarpur, Mandodra, Bhondargada, Nanikhodipur, Sandhera, Kotharia, Davadia, Sasan Gir, Palsel, Visvadar, Sattadhar, Talala, Navgam.
12	Kheda	Kheda, Kundela, Rampura, Bazarpura, Shivalia, Badodala, Balasinor.

13	Kutch	Anjar, Bhuj, Bujadi, Dahisara, Kodhai, Kera, Mundra, Khavda, Nakhtaran, Bhachau, Lilpar, Rapar, Aadipur, Sapoda, Nirona.
14	Mahesana	Kalar, Becharaji, Samatra, Kadi, Dhamasana, Munupur, Kheradu, Rampura, Tarakui, Visnagar.
15	Narmada	Gangapur, Nimblada, Ralda, Babari, Rajpipla, Ranipur, Tunda, Chaupadav, Sagbara, Almpura,' Kesarpura, Navapara.
16	Navsari	Bansda, Pipalkhalid, Gadak, Khakhwada, Bansda.
17	Panchmahal	Baganpura, Brahmp.ura, Rinkey, Palanpur, Vadgam, Shiverajpur, Kalol, Oatwada, Oterwada, Lunawada.
18	Patan	Khosa, Vagdod, Balisana, Unjha Road, Siddpur, Sabdapura, Datarwada, Hariz, Jashalpur, Mehsana Road, Chanssona, Shunkheswar.
19	Porebander	Falna, Kutiyana, Mandva.
20	Rajkot	Gaurider, Dhokpur, Deepalia, Bibiyala, Mohaiya, Hadola, Kasturba, Paidi, Gonda, Maika, Hadimata, Radio Station, Bhojpura, Rampur, Tamta, Kalipat, Ariyara, Cauridor, Bedi, Rajsamandyala, Reebara.
21	Sabarkantha	Lok-1-496, Rampura, Balva, Prantiz, Tenpura, Dhansura, Harsol, Tezpura, Mohanpura, Badli.
22	Surat	Beddacha, Nadira, Koribharsana, Bundha, Kadod, Malda,Rupan, Sathva, Tarsada, Aadhanirat, Jahangirpura, Srinath nagar, Valod, Vutwada.
23	Surendernagar	Patradia, Lakhter, Wadhawan, Kedu, Ratanpur, Ukara, Taldonri, Viramgam, Virendragarh, Dhargadhara, Sahad, Varsani, Talsania, Dewalia, Nanikotta, Rangat.
24	Vadodara	Chotaudaipur, Pavi, Sarola, Motahadipur, Parikha, Gandhara, Karjan, Vemardi, Gaj, Suryaghoda, Samial, Baijalpur.
25	Valsad	Atakparadi, Dharampur, Kharari, Pathari, Sarai, Nanapada, Chikhala, Dungra, Karamvilla, Nargol, Sarigoan, Umbergoan, Chikhala, pardi, Dadiafaria.

ACHIEVEMENTS

The species identified during the present study are being listed below according to their systematic position. The information on distribution of the species recorded from Gujarat is being furnished below:

Order TYLENCHIDA Thorne, 1949

Suborder TYLENCHINA Chitwood in Chitwood & Chitwood, 1950

Infraorder TYLENCHATA Siddiqi, 2000

Superfamily TYLENCHOIDEA Orley, 1880

Family TYLENCHIDAE Orley, 1880

Subfamily BOLEODORINAE Khan 1964

Genus ***Basiria*** Siddiqi, 1959

1. ***Basiria brevistylus*** (Khera, 1970) Ebsary, 1991

Material Examined : 4 females, 1 Male.

Host : Til, Castor

Locality : Jamnagar Road, district Rajkot.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

Suborder HOPLOLAIMINA Chizhov & Berezina, 1988

Superfamily HOPLOMAIMOIDEA Filipjev, 1934 (Paramonov, 1967)

Family HOPLOMAIMIDAE Filipjev, 1934 (Wieser, 1953)

Subfamily HOPLOLAIMINAE Filipjev, 1934

Genus ***Hoplolaimus*** Daday, 1905

2. ***Hoplolaimus indicus*** Sher, 1963

Material Examined : 50 females, 40 Males.

Host : Groundnut, Sugarcase, Maize, Cotton, Chilli, Brinjal and Lady's finger.

Locality : Different localities of Junagarh, Jamnagar, Rajkot, Surat, Valsad, Vadodara, Dang, Sabarkantha, Kheda, Panchmahal, Dahod, Amreli and Bhavnagar.

Elsewhere : Rajasthan, Delhi, West Bengal, Himanchal Pradesh, Bihar, Punjab, Haryana, U.P. and Sikkim etc.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

Subfamily Rotylenchoidinae Whitehead, 1958

Genus ***Helicotylenchus*** Steiner, 1945

3. ***Helicotylenchus dihystera*** (Cobb, 1893) Sher, 1961

Material Examined : 20 females.

Host : Jawar, Groundnut.

Locality : Bhojpur, district Rajkot, Sasan Gir, Junagarh, Amreli and Kutch.

Elsewhere : Rajasthan, West Bengal, Himanchal Pradesh, Bihar, Karnataka, Orissa, Haryana, M.P., Sikkim and Maharashtra etc.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

4. ***Helicotylenchus anehelicus*** Sher, 1966

Material Examined : 2 females.

Host : Cotton.

Locality : Reebara, district Rajkot.

Remarks : Bohra Baqri (2004) reported this species for the first time from the India.

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

Material Examined : 10 females.

Host : Groundnut and Unidentified Grass.

Locality : Sasan Gir, district Junagarh, Bedi, district Rajkot.

Elsewhere : Rajasthan, West Bengal, Tamilnadu.

6. ***Helicotylenchus exallus*** Sher, 1966

Material Examined : 2 females.

Host : Unidentified Grass.

Locality : Sasan Gir, district Junagarh.

Elsewhere : Rajasthan and Sikkim.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

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

Material Examined : 5 females.

Host : Groundnut and Unidentified grass.

Locality : Sasan Gir, distict Junagarh, Bhavanagar.

Elsewhere : Rajasthan, West Bengal, Orissa.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

8. ***Helicotylenchus orthosomaticus*** Siddiqi, 1972

Material Examined : 2 females.

Host : Til.

Locality : Veraval Junagarh Road Junagarh.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the India.

9. ***Helicotylenchus retusus*** Siddiqi & Brown, 1964

Material Examined : 8 females.

Host : Groundnut.

Locality : Khedipur and Sasan Gir, Junagarh Road Junagarh.

Elsewhere : West Bengal, Rajasthan, Bihar and Maharashtra.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

10. ***Helicotylenchus rotundicauda*** Sher, 1966

Material Examined : 3 females.

Host : Groundnut.

Locality : Sasan Gir, district Junagarh.

Elsewhere : Rajasthan.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

11. ***Helicotylenchus truncatus*** Roman, 1965

Material Examined : 3 females.

Host : Groundnut.

Locality : Sasan Gir, Junagarh.

Elsewhere : Rajasthan.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

Family ROTYLENCHULIDAE Husain & Khan, 1967, Husain, 1976

Subfamily ROTYLENCHULINAE Husain & Khan, 1967

Genus ***Rotylenchulus*** Linford & Oliveira, 1940

12. ***Rotylenchulus reinformis*** Linford & Oliveira, 1940.

Material Examined : 4 immature females, 3 juvenles.

Host : Maize.

Locality : Godhara, district Panchmahal.

Remarks : This species is sedentary and semi-endoparasitic attacking several crops and fruit trees in India.

Family PRATYLENCHIDAE Thorne, 1949 (Siddiqi, 1963)

Subfamily PRATYLENCHINAE Thorne, 1949

Genus ***Pratylenchus*** Filipjev, 1936

13. ***Pratylenchus loosi*** Loof, 1960

Material Examined : 2 females.

Host : Sugarcane.

Locality : Piplakhaid, district Navsari.

Elsewhere West Bengal, Sikkim.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

14. ***Pratylenchus thornei*** Sher & Allen, 1953

Material Examined : 3 females.

Host : Groundnut.

Locality : Sasan Gir, Junagarh.

Elsewhere : Rajasthan.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

15. ***Pratylenchus zeae*** Graham, 1951

Material Examined : 2 females.

Host : Chilli.

Locality : Gondal, district, Rajkot.

Elsewhere : Haryana and Punjab.

Subfamily HIRSCHMANNIELLINAE Fotedar & Handoo, 1978

Genus ***Hirschmanniella*** Luc & Goodey, 1964

16. ***Hirschmanniella gracilis*** (de Man, 1880) Luc & Goodey, 1964

Material Examined : 5 females, 2 males.

Host : Paddy

Locality : Godhara, district Panchmahal.

Elsewhere : Rajasthan.

Remarks : This species is widely distributed in U.S.A., Canada, Netherland, Germany and India. In India *H. gracilis* has been established as key pest of paddy in West Bengal.

Family TELOTYLENCHIDAE Siddiqi, 1960

Subfamily TELOTYLENCHINAE Siddiqi, 1960

Genus ***Telotylenchus*** Siddiqi, 1960

17. ***Telotylenchus paaloofi*** Tikyani & Khera, 1970

Material Examined : 1 female, 1 male.

Host : Unidentified grass.

Locality : Sabarkantha district.

Elsewhere : Rajasthan.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

Genus ***Tylenchorhynchus*** Cobb, 1913

18. ***Tylenchorhynchus divittatus*** Siddiqi, 1961

Material Examined : 1 female.

Host : Cauliflower.

Locality : Vutwada, district Surat.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

19. ***Tylenchorhynchus latus*** Allen, 1955

Material Examined : 1 female.

Host : Mustard.

Locality : Lilpar, district Kutch.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

20. ***Tylenchorhynchus mashhoodi*** Siddiqi & Basir, 1959

Material Examined : 5 females, 5 males.

Host : Brinjal.

Locality : Dang and Kutch district.

Elsewhere : Rajasthan, West Bengal, Delhi, Himanchal Pradesh, Bihar, Orissa, Haryana, etc.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

21. ***Tylenchorhynchus nudus*** Allen, 1955

Material Examined : 3 females, 1 male.

Host : Sugarcane.

Locality : Rajpipla, district Narmada.

Elsewhere : West Bengal, Maharashtra and Punjab.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

Order APHELENCHIDA Siddiqi, 1980
Suborder APHELENCHINA Geraert, 1966
Superfamily APHELENCHOIDEA Fuchs, 1937 (Thorne, 1949)
Family APHELENCHIDAE Fuchs, 1937 (Steiner, 1949)
Subfamily APHELENCHINAE Fuchs, 1937

Genus ***Aphelenchus*** Bastian, 1865

22. ***Aphelenchus avenae*** Bastian, 1865

Material Examined : 15 females, 5 males.

Host : Maize, Groundnut, Wheat, Sugarcane, Chilli, Brinjal, etc.

Locality : Throughout the state.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

Order DORYLAIMIDA Pearse, 1942
Suborder DORYLAIMINDA Pearse, 1936
Superfamily DORYLAIMOIDEA de Man, 1876
Family DORYLAIMIDAE de Man, 1876
Subfamily DORYLAIMINAE deMan, 1876

Genus ***Dorylaimus*** Dujardin, 1845

23. ***Dorylainus stagnalis*** Dujardin, 1845

Material Examined : 10 females, 11 males.

Host : Wheat, Brinjal, Cotton.

Locality : Tarapura, district Anand, Tegpura, district Sabarkantha and Kheda

Elsewhere : West Bengal, Rajasthan.

Remarks : This species is being reported first time from the state.

24. ***Dorylaimus*** sp. n.

Material Examined : 5 females, 5 males.

Host : Wheat.

Locality : Tarapura, district Anand.

Remarks : The new species will be named and illustrated in separate paper.

Genus ***Laimydorus*** Siddiqi, 1969

25. ***Laimydorus baldus*** Baqri & Jana, 1982

Material Examined : 5 females, 5 males.

Host : Maize, Groundnut, Brinjal.

Locality : From almost all the localities in Junagarh, Jamnagar, Surendernagar, Rajkot, Dang, Sabarkantha, Kheda, Anand and Panchmahal.

Welwhere : West Bengal, Rajasthan.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

26. ***Laimydorus finalis*** Thorne, 1975

Material Examined : 1 female, 1 male.

Host : Maize.

Locality : Godhara, district Panchmahal.

Elsewhere : West Bengal.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

27. ***Laimydorus kherai*** Baqri, 1985

Material Examined : 1 female, 1 male.

Host : Maize.

Locality Godhara, district Panchmahal.

Elsewhere : West Bengal.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

Genus ***Calodorylaimus*** Andrassy, 1965

28. ***Calodorylaimus wasimi*** Baqri & Bohra, 2003

Material Examined : 2 females, 2 males.

Host : Gram.

Type Locality : Bansada, district Navsari.

Remarks : Baqri & Bohra (2003) reported this species as new to science from the state.

Genus ***Mesodorylaimus*** Andrassy, 1959

29. ***Mesodorylaimus adalbarti*** Andrassy, 1963

Material Examined : 3 females, 2 males.

Host : Maize.

Locality : Dhokpur, district Rajkot.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the India.

30. ***Mesodorylaimus brassicus*** Soni & Nama, 1981

Material Examined : 1 femal, 1 male.

Host : Barley.

Locality : Godhara, district Panchmahal.

Elsewhere : Rajasthan.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

31. ***Mesodorylaimus margeritus*** Basson & Heyns, 1974

Material Examined : 3 females.

Host : Unidentified grasses.

Locality : Sasan Gir, district Junagarh.

Elsewhere : Rajasthan.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

32. ***Mesodorylaimus mesonyctius*** (Kreis, 1930) Andrassy, 1959

Material Examined : 3 females, 2 males.

Host : Castor.

Locality : Dhokpur, district Rajkot.

Elsewhere : Rajasthan.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

33. ***Mesodorylaimus szunyoghyi*** Andrassy, 1968

Material Examined : 2 females.

Host : Barley.

Locality : Sabarkantha, district.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the India.

Subfamily THORNENEMATINAE Siddiqi, 1969

Genus ***Thornenema*** Andrassy, 1959

34. ***Thornenema mauritianum*** (Williams, 1959) Baqri & Jairajpuri, 1969

Material Examined : 20 females.

Host : Maize, Barley, Groundnut, Sugarcane, Chilli, Brinjal, etc.

Locality : From almost all the localities in Junagarh, Jamnagar, Surendernagar, Vadodara, Bharuch, Valsad, Rajkot, Dang, Sabarkantha, Kutch, Bhavnagar, Amreli.

Elsewhere : Rajasthan, Delhi, West Bengal, U.P.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

35. ***Thornenema baldum*** (Thorne, 1939) Andrassy, 1959

Material Examined : 5 females.

Host : Rizka.

Locality : Bazarpura, district Kheda.

Remarks : This species is being reported first time from the state.

Genus ***Sicaguttur*** Siddiqi, 1971

36. ***Sicaguttur sartum*** Siddiqi, 1971

Material Examined : 15 females.

Host : Maize, Til, Barley, Groundnut, Sugarcane, Chilli, Brinjal, etc.

Locality : Junagarh, Jamnagar, Surendernagar, Narmada, Bharuch, Rajkot, Dang, Kheda, Anand, Panchmahal.

Elsewhere : Rajasthan.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

Genus ***Prothornenema*** Baqri & Bohra, 2003

37. ***Prothornenema capitatum*** Baqri & Bohra, 2003

Material Examined : 10 females, 5 males.

Host : Cotton, Wheat, Chilli.

Locality : Bundha, district Surat, Bansada, district Navsari and Kundela, district Kheda.

Remarks : Bohra & Baqri (2003) reported this genus and species as new to science from the state.

Family APORCELAIMIDAE Heyns, 1965

Subfamily APORCELAIMINAE Heyns, 1965

Genus ***Aporcelaimellus*** Heyns, 1965

38. ***Aporcelaimellus heynsi*** Baqri & Jairajpuri, 1968

Material Examined : 10 females.

Host : Maize, Barley, Wheat, Groundnut, Sugarcane, Chilli, Brinjal, etc.

Locality : From almost all the localities in Junagarh, Jamnagar, Surendernagar, Rajkot, Bharuch, Dang, Dahod, Bhavnagar, Amreli, Kheda and Panchmahal.

Elsewhere : Rajasthan, West Bengal, U.P.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

Genus ***Tubixaba*** Monteiro & Lordello, 1980

39. ***Tubixaba parva*** Pretorius, Kruger & Heyns, 1987

Material Examined : 10 females.

Host : Maize, Wheat, Groundnut, Sugarcane, Chilli, Brinjal, etc.

Locality : Junagarh, Jamnagar, Surendernagar, Rajkot, Vadodra, Bharuch, Dang, Dahod, Bhavnagar, Amreli, Kheda and Panchmahal, Anand.

Elsewhere : Rajasthan.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

Genus ***Makatinus*** Heyns, 1965

40. ***Makatinus*** sp. n.

Material Examined : 2 females.

Host : Groundnut.

Locality : Khavda, Visvader, district Junagarh.

Remarks : The new species will be named and illustrated in a separate paper.

Family QUDSIANEMATIDAE Jairajpuri, 1965
Subfamily QUDSIANEMATIDAE Jairajpuri, 1965

Genus ***Labronema*** Thorne, 1939

41. ***Labronema confusum*** (Jana & Baqri, 1983) Andrassy, 1991

Material Examined : 10 females.

Host : Maize, Wheat, Groundnut, Sugarcane.

Locality : Junagarh, Jamnagar, Surendernagar, Rajkot, Narmada, Dang, Sabarkantha, Bhavnagar, Amreli, Kheda.

Elsewhere : West Bengal.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

Genus ***Eudorylaimus*** Andrassy, 1959

42. ***Eudorylaimus chauhani*** (Baqri & Khera 1975) Andrassy, 1986

Material Examined : 10 females.

Host : Onion.

Locality : Tezpura, Himmatnagar, district Sabarkantha.

Elsewhere : Rajasthan, West Bengal.

Remarks : This species is being reported first time from the state.

43. ***Eudorylaimus*** sp. n.

Material Examined : 5 females, 7 males.

Host : Cotton.

Locality : Badala, Balasinor, district Kheda.

Remarks : The new species will be named and illustrated in a separate paper.

Genus ***Ecumenicus*** Thorne, 1974

44. ***Ecumenicus monohystera*** (de Man, 1880) Thorne, 1974

Material Examined : 10 females.

Host : Maize, Barley, Wheat, Brinjal, Lady's finger etc.

Locality : Junagarh, Jamnagar, Surendernagar, Sabarkantha, Rajkot, Surat, Dang, Bhavnagar, Amreli, Kheda and Panchmahal.

Elsewhere : West Bengal, Rajasthan.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

Subfamily DISCOLAIMINAE Siddiqi, 1969

Genus ***Discolaimus*** Cobb, 1913

45. ***Discolaimus major*** Thorne, 1939

Material Examined : 15 females.

Host : Maize, Wheat, Groundnut, Sugarcane.

Locality : Junagarh, Jamnagar, Surendernagar, Sabarkantha, Rajkot, Surat, Navsari, Kheda.

Elsewhere : Rajasthan.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

46. ***Discolaimus texanus*** Cobb, 1913

Material Examined : 3 females.

Host : Castor.

Locality : Nirona, district Kutch.

Remarks : This species is being reported first time from the state.

47. ***Discolaimus tenax*** Siddiqi, 1964

Material Examined : 4 females

Host : Cotton

Locality : Kera, Mundra, district Kutch

Elsewhere : Rajasthan

Remarks : This species is being reported first time from the state.

Genus ***Discolaimium*** Thorne, 1939

48. ***Discolaimium simplex*** Siddiqi, 1965

Material Examined : 3 females.

Host : Castor.

Locality : Dahisara, Bhuj, district Kutch.

Remarks : This species is being reported first time from the state.

49. ***Discolaimium mukhtarpuriense*** Baqri & Jairajpuri, 1969

Material Examined : 5 females.

Host : Unidentified grasses.

Locality : Sasan Gir, district Junagarh.

Elsewhere : Rajasthan and U.P.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

Genus ***Discolaimoides*** Heyns, 1963

50. ***Discolaimoides bulbiferus*** (Cobb, 1906) Heyns, 1963

Material Examined 5 females.

Host Unidentified grasses and Maize,

Locality : Sasan Gir, Lakhtar district Junagarh and Jamnagar.

Elsewhere : Rajasthan, West Bengal and Maharashtra.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

51. ***Discolaimoides intrastariatus*** (Loss, 1954) Loof, 1964

Material Examined : 5 females.

Host : Cotton.

Locality : Bagasara, district Amreli.

Remarks : This species is being reported first time from India.

Genus ***Latocephalus*** Patil & Khan, 1982

52. ***Latocephalus gracile*** Patil & Khan, 1982

Material Examined : 1 female.

Host : Barley.

Locality : Sabarkantha.

Elsewhere : Maharashtra.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

53. ***Latocephalus smithi*** (Heyns, 1963) Patil & Khan, 1982

Material Examined : 2 females.

Host : Onion

Locality : Himmatnagar, district Sabarkantha

Elsewhere : Rajasthan

Remarks : This species is being reported first time from the state.

Genus ***Poronemella*** Siddiqi, 1969

54. ***Poronemella shamimi*** Baqri & Bohra, 2003

Material Examined : 5 females.

Host : Cotton, Sugarcane.

Type locality : Malda, district Surat.

Other Localities : Piplakhalid, district Navsari, Chakkargarh, Amreli.

Remarks : This species is found new to science from the state.

55. ***Poronemella amini*** Siddiqi, 1969

Material Examined : 10 females.

Host : Cotton, Lady's finger.

Locality : Navgam Kodiar, district Junagarh, Bagasara, Amreli and Bhavnagar.

Remarks : This species is being reported new record from the state.

Subfamily LORDELLONEMATIDAE Siddiqi, 1969

Genus ***Moshajia*** Siddiqi, 1982

56. ***Moshajia cultristyla*** Siddiqi, 1982

Material Examined : 4 females.

Host : Wheat.

Locality : Kalol, district Panchmahal, Amreli and Bhavnagar.

Remarks : This species is being reported first time from the state.

57. ***Moshajia idiofora*** Siddiqi, 1982

Material Examined : 4 females.

Host : Groundnut.

Locality : Kalol, district Panchmahal, Amreli and Bhavnagar.

Remarks : This species is being reported first time from the state.

Family NORDIIDAE Jairajpuri & A.H. Siddiqi, 1964

Subfamily NORDIINAE Jairajpuri & A.H. Siddiqi, 1964

Genus ***Longidorella*** Thorne, 1939

58. ***Longidorella xenura*** Khan & Siddiqi, 1963

Material Examined : 1 female.

Host : Wheat.

Locality : Jakhana, district Dang.

Elsewhere : Himachal Pradesh, Maharashtra.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

Subfamily PUNGENTINAE Siddiqi, 1969

Genus ***Kochinema*** Heyns, 1963

59. ***Kochinema farodai*** Baqri & Bohra, 2001

Material Examined : 10 females.

Host : Maize, Sugarcane, Groundnut.

Locality : Junagarh, Jamnagar, Sabarkantha, Rajkot, Bhavnagar, Amreli, Kheda and Panchmahal.

Elsewhere : Rajasthan.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

60. ***Kochinema caudatum*** Baqri & Bohra, 2001

Material Examined : 5 females.

Host : Maize.

Locality : Godhara, district Panchmahal.

Elsewhere : Rajasthan.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

Subfamily ACTINOLAIMOIDINAE Jairajpuri & Ahmad 1992

Genus ***Oriverutus*** Siddiqi, 1971

61. ***Oriverutus labiatus*** Ahmad & Jairajpuri, 1987

Material Examined : 2 females.

Host : Wheat.

Locality : Rajpipla, district Narmada.

Elsewhere : Uttaranchal.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

Superfamily LONGIDOROIDEA Thorne, 1935

Family LONGIDORIDAE Thorne, 1935

Subfamily LONGIDORINAE Thorne, 1935

Genus ***Longidorus*** Micoletzky, 1922 (Filipjev, 1934)

62. ***Longidorus elongates*** (de Man, 1876) Micoletzky, 1922

Material Examined : 4 females.

Host : Jawar and Rizka.

Locality : Motivanagar and Falla village, district Jamnagar.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

63. ***Longidorus sylphus*** Thorne, 1939

Material Examined : 10 females.

Host : Cotton.

Locality : Kera, Mundra, district Kutch.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

Genus ***Paralongidorus*** Siddiqi, Hooper & Khan, 1963

64. ***Paralongidorus beryllus*** (Siddiqi, Husain, 1965) Hunt 1993

Material Examined 2 female.

Host : Castor.

Locality : Dharol, district Jamnagar.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

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

Material Examined : 5 female.

Host : Cotton.

Locality : Hadmata, district Rajkot.

Elsewhere : Rajasthan, West Bengal, Bihar and Punjab.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

66. ***Paralongidorus major*** Verma, 1973

Material Examined : 2 females.

Host : Millet.

Locality : Rambhas farm, district Dang.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

67. ***Paralongidorus microlaimus*** Siddiqi, 1964

Material Examined : 1 female.

Host : Jawar.

Locality : Dharol, district Jamnagar.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

Family XIPHINEMATIDAE Dalmasso, 1969
Subfamily XIPHINEMATINAE Dalmasso, 1969

Genus ***Xiphinema*** Cobb, 1913

68. ***Xiphinema americamum*** Cobb, 1913

Material Examined : 2 females.

Host : Chilli.

Locality : Kalipat, district Rajkot.

Elsewhere : West Bengal, U.P. and Punjab.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

69. ***Xiphinema basiri*** Siddiqi, 1959

Material Examined : 10 females.

Host : Castor, Groundnut.

Locality : Bhojpur, district Rajkot, Bhandaria, Bhavnagar.

Elsewhere : Rajasthan, Tamilnadu and Maharashtra.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

70. ***Xiphinema elongatum*** Sch. Stekhoven & Teunissen, 1938

Material Examined : 11 females.

Host : Castor, Brinjal and Barley.

Locality : Rajpipla, district Narmada, Bhojpur, district Rajkot, Sabarkantha, Babra, Amreli.

Elsewhere : Karnataka.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

71. ***Xiphinema insigne*** Loos, 1949

Material Examined : 4 females.

Host : Brinjal, Jawar and Til.

Locality : Rajpipla, district Valsad, Marendra district, Junagarh, Dharol, district Jamnagar, Ishwaria, district Amreli.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

72. ***Xiphinema orbum*** Siddiqi, 1964

Material Examined : 2 females.

Host : Jawar.

Locality : Sasan Gir, district Junagarh.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

Superfamily BELONDIROIDEA Thorne, 1939

Family BELONDIRIDAE Thorne, 1939

Subfamily BELONDIRINAE Thorne, 1939

Genus ***Belondira*** Thorne, 1939

73. ***Belondira bulbosa*** Siddiqi, 1966

Material Examined : 2 females, 1 male.

Host : Groundnut.

Locality : Paidi, district Rajkot.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

74. ***Belondira porta*** Thorne, 1964

Material Examined : 1 female, 1 male.

Host : Jawar.

Locality : Hadmata, district Rajkot.

Remarks : Bohra & Baqri (2004) reported this speceis for the first time from the state.

75. ***Belondira tenuidens*** Thorne, 1964

Material Examined : 4 females.

Host : Unidentified grasses.

Locality : Sasan Gir, district, Junagarh.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

Genus ***Axonchium***, Cobb, 1920

76. ***Axonchium (Axonchium) bulbosum*** Williams, 1958

Material Examined : 4 females.

Host : Banana.

Locality : Jhakhana, district Dang.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

77. ***Axonchium (Axonchium) nitidum*** Jairajpuri, 1964

Material Examined : 1 female.

Host : Lady's finger.

Locality : Jahangirpur, district Surat.

Elsewhere : Manipur.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

Subfamily DORYLAIMELLINAE Jairajpuri, 1964

Genus ***Dorylaimellus*** Cobb, 1913

78. ***Dorylaimellus (Dorylaimellus) demani*** Goodey, 1963

Material Examined : 2 females.

Host : Coconut.

Locality : Khojra, district Kutch.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

79. ***Dorylaimellus (Axodorylaimellus) parvulus*** Thorne, 1939

Material Examined : 7 females.

Host : Chilli, Wheat and Garlic.

Locality : Bhojpura, district Rajkot, Babri, district Narmada and Jamla, district Dang.

Elsewhere : West Bengal.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

80. ***Dorylaimellus (Belondorylaimellus) discocephalus*** Siddiqi, 1964

Material Examined : 5 females.

Host : Unidentified grasses.

Locality : Sasan Gir, district Junagarh.

Elsewhere : Rajasthan, West Bengal and U.P.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

Superfamily TYLENCHOLAIMOIDEA Filipjev, 1934

Family TYLENCHOLAIMIDAE Filipjev, 1934

Subfamily TYLENCHOLAIMINAE Filipjev, 1934

Genus ***Tylencholaimus*** de Man, 1876

81. ***Tylencholaimus nagauriensis*** Baqri & Bohra, 2001

Material Examined : 4 females.

Host : Barley.

Locality : Sabarkantha, district.

Elsewhere : Rajasthan.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

82. ***Tylencholaimus leptonchoides*** Loof, 1964

Material Examined : 2 females.

Host : Brinjal.

Locality : Sagbara, district Narmada.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

83. ***Tylencholaimus gertii*** Kruger, 1965

Material Examined : 2 females.

Host : Unidentified grasses and Cotton.

Locality : Sasan Gir, district Junagarh and Kera, Kundra, district Kutch.

Elsewhere : Rajasthan, West Bengal and Bihar and Maharashtra.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

84. ***Tylencholaimus annulatus*** Baqri & Bohra, 2001

Material Examined : 5 females.

Host : Til.

Locality : Sabarkantha, district.

Elsewhere : Rajasthan.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

85. ***Tylencholaimus obscurus*** Jairajpuri, 1969

Material Examined : 1 female.

Host : Sugarcane.

Locality : Bujadi, district Kutch.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

Genus ***Utahnema*** Thorne, 1939

86. ***Utahnema tenuidens*** Thorne, 1939

Material Examined : 1 female.

Host : Cotton.

Locality : Motiwada, district Surendernagar.

Elsewhere : Rajasthan.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the India.

Subfamily VANDERLINDIINAE, Siddiqi, 1969

Genus ***Metadorylaimus*** Andrassy, 1966

87. ***Metadorylaimus pachylaimus*** Jairajpuri & Goodey, 1966

Material Examined : 3 females.

Host : Cotton.

Locality : Chavand, district Amreli.

Remarks : This genus is being reported for the first time from India.

Family LEPTONCHIDAE Thorne, 1935

Subfamily LEPTONCHINAE Thorne, 1935

Genus ***Leptonchus*** Cobb, 1920

88. ***Leptonchus granulosus*** Cobb, 1920

Material Examined : 5 females.

Host : Maize and Unidentified grasses.

Locality : Sasan Gir, district Junagarh and Godhara, district Panchmahal.

Elsewhere : Rajasthan and U.P.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

Genus ***Proleptonchus*** Lordello, 1955

89. ***Proleptonchus clarus*** Timm, 1964

Material Examined : 2 females.

Host : Cotton.

Locality : Hadmata, district Rajkot.

Elsewhere : West bengal and Sikkim.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

Subfamily TYLEPTINAE Jairajpuri, 1964

Genus ***Tyleptus*** Thorne, 1939

90. ***Tyleptus projectus*** Thorne, 1939

Material Examined : 1 female.

Host : Groundnut.

Locality : Sasan Gir, district Junagarh.

Elsewhere : Rajasthan.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

Family MYDONOMIDAE Thorne, 1964

Subfamily MYDONOMINAE (Thorne, 1964), Jairajpuri & Ahmad 1992

Genus ***Dorylaimoides*** Thorne & Swanger, 1936

91. ***Dorylaimoides (Digidorylaimoides) micoletzkyi*** (de Man, 1921) Thorne & Swanger,

Material Examined : 10 females, 5 males.

Host Jawar.

Locality : Lakhtar, district Surendernagar and Kutch.

Elsewhere : Rajasthan, West Bengal and Sikkim.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

92. ***Dorylaimoides (Longidorylaimoides) leptura*** Siddiqi, 1965

Material Examined : 4 females.

Host : Lobia, Cotton and Wheat.

Locality : Pipri, district Dang, Surat and Bharuch.

Elsewhere : West Bengal and Maharashtra.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

93. ***Dorylaimoides (Dorylaimoides) parateres*** Siddiqi, 1964

Material Examined : 1 female.

Host : Guava.

Locality : Godal, district Navsari.

Elsewhere : U.P.

Remarks : Bohra & Baqri (2004) reported this speies for the first time from the state.

94. ***Dorylaimoides (Tarjania) constrictoides*** Goseco, Ferris & Ferris, 1976

Material Examined : 2 females.

Host : Banana.

Locality : Jhakana, district Dang.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

Suborder NYGOLAIMINA Ahmad & Jairajpuri, 1979

Superfamily NYGOLAIMOIDEA Thorne, 1935

Family NYGOLAIMIDAE Thorne, 1935

Subfamily NYGOLAIMINAE Thorne, 1935

Genus ***Nygolaimus*** Cobb, 1913

95. ***Nygolaimus anneckei*** Heyns, 1969

Material Examined : 5 females.

Host : Brinjal.

Locality : Ranpura Kherlu, district Mehsana.

Elsewhere : Rajasthan.

Remarks : This species is being reported first time from the state.

96. ***Nygolaimus harishi*** Ahmad & Jairajpuri, 1980

Material Examined : 6 females.

Host : Wheat.

Locality : Shibalia, district Kheda.

Remarks : This species is being reported first time from the state.

Genus ***Aquatides*** Heyns, 1968

97. ***Aquatides aquaticus*** (Thorne, 1930) Thorne, 1974

Material Examined : 10 females, 3 males.

Host : Maize.

Locality : Godhara, district Panchmahal.

Elsewhere Himachal Pradesh.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

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

Material Examined : 5 females, 2 males.

Host : Cotton, Jawar.

Locality : Lakhtar, district Surendernagar.

Elsewhere : Bihar.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

99. ***Aquatides*** sp. n.

Material Examined : 3 females, 2 males.

Host : Cotton.

Locality : Badala, Balasinor, district Kheda.

Remarks : This species is new to science will be named and illustrated in separate publication.

Order MONONCHIDA Jairajpuri, 1969

Suborder MONONCHINA Kirjanova & Krall, 1969

Superfamily MONONCHOIDEA Chitwood, 1939

Family MONONCHIDAE Chitwood, 1937

Genus ***Mononchus*** Bastian, 1865

100. ***Mononchus aquaticus*** Coetzee, 1968

Material Examined : 1 female.

Host : Cotton.

Locality Nanikotta, district Surendernagar.

Elsewhere : West Bengal.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

Family MYLONCHULIDAE Jairajpuri, 1969
Subfamily MYLONCHULINAE Jairajpuri, 1969

Genus ***Mylonchulus*** (Cobb, 1916) Altherr, 1953

101. ***Mylonchulus contractus*** Jairajpuri, 1970

Material Examined : 5 females.

Host : Unidentified grasses.

Locality : Sasan Gir, district Junagarh.

Elsewhere : Rajasthan, Sikkim, Kerla, Assam, Himanchal Pradesh and U.P.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

102. ***Mylonchulus hawaiiensis*** (Cassidy, 1931) Andrassy, 1958

Material Examined : 5 females.

Host : Brinjal.

Locality : Nagrol, district Valsad and Chakkergurh, district Amreli.

Elsewhere : Andaman Nicobar, Sikkim, Jammu and Kashmir, Himanchal Pradesh.

Remarks : Bohra & Baqri (2004) reported this species for the first time form the state.

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

Material Examined : 5 females.

Host : Cotton.

Locality : Samoid, district Ahmadabad.

Elsewhere : West Bengal, Rajasthan, Uttaranchal and U.P.

Rekarks : Bohra & Baqri (2004) reported this species fror the first time from the state.

104. ***Mylonchulus minor*** (Cobb, 1893) Andrassy, 1958

Material Examined : 3 females.

Host : Til.

Locality : Bagdu, district Junagarh and Amreli.

Elsewhere : Rajasthan, Maharashtra, Andhra Pradesh and U.P.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

105. ***Mylonchulus subsimilis*** (Cobb, 1917) Meyl, 1957

Material Examined : 1 female.

Host : Unidentified grasses.

Locality : Bagdu, district Junagarh.

Eelsewhere : U.P.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

Genus ***Sporonchulus*** (Cobb, 1917) Andrassy, 1958

106. ***Sporonchulus vagabundus*** Jairajpuri, 1971

Material Examined : 1 female.

Host : Unidentified grasses.

Locality : Sasan Gir, district Junagarh.

Elsewhere : U.P.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

Family IOTONCHIDAE Jairajpuri, 1969

Genus ***Iotonchus*** (Cobb, 1916) Altherr, 1950

107. ***Iotonchus jairi*** (Lordello, 1958) Clark, 1960

Material Examined : 1 female.

Host : Chilli.

Locality : Sagbara, district Narmada.

Elsewhere : Uttaranchal.

Remarks : Bohra & Baqri (2004) reported this species for the first time from the state.

Distribution of Nematodes in Gujrat

Order Family & species	District
TYLENCHIDA	
TYLENCHIDAE	
Basiria brevistylus (Khera, 1970) Ebsary, 1991	20
HOPLOLAIMIDAE	
Hoplolaimus indicus Sher, 1963	2,6,7,10,11,20,22,25,25
Helicotylenchus dihystera (Cobb, 1893) Sher, 1961	2,11,20
Helicotylenchus anehelicus Sher, 1966	20
Helicotylenchus erythrinae (Zimmermann, 1904) Golden, 1956	11,20
Helicotylenchus exallus Sher, 1966	11
Helicotylenchus multicinctus (Cobb, 1893) Golden, 1956	6,11
Helicotylenchus orthosomaticus Siddiqi, 1972	11
Helicotylenchus retusus Siddiqi & Brown, 1964	11
Helicotylenchus rotundicauda Sher, 1966	11
Helicotylenchus truncatus Roman, 1965	11
ROTYLENCHULIDAE	
Rotylenchulus reniformis Linford & Oliveira, 1940	17

PRATYLENCHIDAE	
Pratylenchus loosi Loof, 1960	16
Pratylenchus thonei Sher & Allen, 1953	20
Pratylenchus zeae Graham, 1951	20
Hirschmamiella gracilis (de Man, 1880) Luc & Goodey, 1964	17
TELOTYLENCHIDAE	
Telotylenchus paaloofi Tikyani & Khera, 1970	21
Tylenchorhynchus divittatus Siddiqi, 1961	22
Tylenchorhynchus latus Allen, 1955	12
Tylenchorhynchus mashhoodi Siddiqi & Basir, 1959	8,12
Tylenchorhynchus nudus Allen, 1955	15
APHELENCHIDA	
APHELENCHIDAE	
Aphelenchus avenae Bastian, 1865	1-25
DORYLAIMIDA	
DORYLAIMIDAE	
Dorylaimus stagnalis Dujardin, 1845	3,12,21
Dorylaimus sp. n.	3

Laimydorus baldus Baqri & Jana, 1982	3,7,10,11,13,17,20,23
Laimydorus finalis Thorne, 1975	17
Laimydorus kherai Baqri,. 1985	17
Calodorylaimus wasimi Baqri & Bohra, 2003	16
Mesodorylaimus adalbarti Andrassy, 1963	20
Mesodorylaimus brassicus Soni & Nama, 1981	17
Mesodorylaimus margeritus Basson & Heyns, 1974	11
Mesodorylaimus mesonyctius (Kreis, 1930) Andrassy, 1959	20
Mesodorylaimus szunyoghyi Andrassy, 1968	21
Thornenema mauritianum(Williams,1959)Baqri & Jairajpuri,1969	2,6,5,7,10,11,20,23,24,25
*Thornenema baldum** (Thorne, 1939) Andrassy, 1959	13
Prothornenema capitatum Baqri & Bohra, 2003	13,16,22
Sicaguttur sartum Siddiqi, 1971	5,7,10,11,15,20,23
APORCELAIMIDAE	
Makaitinus sp. n.	11
Aporcelaimellus heynsi Baqri & Jairajpuri, 1968	2,5,6,7,10,11,20,23
Tubixaba parva Pretorius, Kruger & Heyns, 1987	2,5,6,7,10,11,20,23,24
QUDSIANEMATIDAE	
Labronema confusum (Jana & Baqri, 1983) Andrassy, 1991	2,6,7,10,11,15,20,23

Eudorylaimus sp. n.	12
*Eudorylaimus chauhani** (Baqri & Khera, 1975) Andrassy, 1986	21
Ecumenicus monohystera (de Man, 1880) Thorne, 1974	2,6,7,10,11,20,22,23
Discolaimus major Thorne, 1939	10,11,16,20,21,22,23,24
*Discolaimus texanus** Cobb, 1913	12,13
*Discolaimus tenax** Siddiqi, 1964	13
Discolaimium mukhtarpuriense Baqri & Jairajpuri, 1969	11
*Discolaimium simplex** Siddiqi, 1965	12
Discolaimoides bulbiferus (Cobb, 1906) Heyns, 1963	10,11
*Discolaimoides intrastraitus** (Loos, 1945) Loof, 1964	2
Latocephalus gracile Patil & Khan, 1982	21
*Latocephalus smithi** (Heyns, 1963) Patil & Khan, 1982	21
Poronemella shamimi Baqri & Bohra, 2003	6,16,22
*Poronemella amimi** Siddiqi, 1969	2,6,11
*Moshajia cullristyla** Siddiqi, 1982	2,6,17
*Moshajia idiofora** Siddiqi, 1982	11
NORDIIDAE	
Longidorella xenura Khan & Siddiqi, 1963	8

Kochinema farodai Baqri & Bohra, 2001	2,6,10,11,13,17,20,21
Kochinema caudatum Baqri & Bohra, 2001	17
Oriverutus labiatus Ahmad & Jairajpuri, 1987	15
LONGIDORIDAE	
Longidorus elongates (de Man, 1876) Micoletzky, 1922	10
*Longidorus sylphus** Thorne, 1939	12
Paralongidorus beryllus (Siddiqi, Husain, 1965) Hunt, 1993	10
Paralongidorus citri (Siddiqi, 1959) Siddiqi, Hooper & Khan, 1963	20
Paralongidorus major Verma, 1973	8
Paralongidorus microlaimus Siddiqi, 1964	10
XIPHINEMATIDAE	
Xiphinema americanum Cobb, 1913	20
Xiphinema basiri Siddiqi, 1959	6,20
Xiphinema elongatum Sch. Stekhoven & Teunissen, 1938	2,15,20,21
Xiphinema insigne Loos, 1949	2,10,11,25
Xiphinema orbum Siddiqi, 1964	11
BELONDIRIDAE	
Belondira bulbosa Siddiqi, 1966	20

Belondira porta Thorne, 1964	20
Belondira tenuidens Thorne, 1964	11
Axonchium (Axonchium) bulbosum Williams, 1958	8
Axonchium (Axonchium) nitidum Jairajpuri, 1964	22
Dorylaimellus (Dorylaimellus) demani Goodey, 1963	12
Dorylaimellus (Axodorylaimellus) parvulus Thorne, 1939	8,15,20
Dorylaimellus (Belondorylaimellus) discocephalus Siddiqi, 1964	11
TYLENCHOLAIMIDAE	
Tylencholaimus nagauriensis Baqri & Bohra, 2001	21
Tylencholaimus obuscurus* Jairajpuri, 1965	12
Tylencholaimus leptonchoides Loof, 1964	15
Tylencholaimus gertii Kruger, 1965	11,12
Tylencholaimus annulatus Baqri & Bohra, 2001	21
Utahnema tenuidens Thorne, 1939	23
Metadorylaimus pachylaimus* Jairajpuri & Goodey, 1966	2
LEPTONCHIDAE	
Leptonchus granulosus Cobb, 1920	11,17
Proleptonchus clarus Timm, 1964	20

Tyleptus projectus Thorne, 1939	11
MYDONOMIDAE	
Dorylaimoides(Digidorylaimoides)micoletzkyi (deMan,1921)Thorne & Swanger, 1936	23
Dorylaimoides (Longidorylaimoides) leptura Siddiqi, 1965	5,8,22
Dorylaimoides (Dorylaimoides) parateres Siddiqi, 1964	16
Dorylaimoides (Tarjania) constrictoides Goseco, Ferris & Ferris, 1976	8
NYGOLAIMIDAE	
*Nygolaimus anneckei** Heyns, 1935	14
*Nygolaimus harishi** Ahmad & Jairajpuri, 1980	13
Aquatides aquaticus (Thorne, 1930) Thorne, 1974	17
Aquatides thornei (Schneider, 1937) Ahmad & Jairajpuri, 1982	23
Aquatides sp. n.	12
MONONCHIDA	
MONONCHIDAE	
Mononchus aquaticus Coetzee, 1968	23
MYLONCHULIDAE	
Mylonchulus contractus Jairajpuri, 1970	11
Mylonchulus hawaiiensis (Cassidy, 1931) Andrassy, 1958	2,25

Mylonchulus lacustris (N.A.Cobb in M.V. Cobb, 1915) Andrassy, 1958	1
Mylonchulus minor (Cobb, 1893) Andrassy, 1958	2,11
Mylonchulus subsimilis (Cobb, 1917) Meyl, 1957	11
Sporonchulus vagabundus Jairajpuri, 1971	11
IOTONCHIDAE	
Iotonchus jairi (Lordello, 1958) Clark, 1960	15

The number (1-25) stand for the districts given.

1. Ahmadabad	2. Amerli	3. Anand	4. Banaskantha	5. Bharuch
6. Bhavanagar	7. Dahod	8. Dangs	9. Gandhinagar	10. Jamnagar
11. Junagarh	12. Kheda	13. Kuchchh	14. Mahesana	15. Narmada
16. Navsari	17. Panchmahal	18. Patan	19. Porebandar	20. Rajkot
21. Sabarkantha	22. Surat	23. Surendranagar	24. Vadodara	25. Valsad

CONCLUSION

In all 107 species identified, belonging to 49 genera spread over to 20 families of the following four orders have been identified during the study period; Tylenchida (21 spp.), Aphelenchida (1 sp.), Dorylaimida (77 spp.) and Mononchida (8 spp.).

Out of 107 species identified during study 93 species have been recorded for the first time from the state while seven as new record from India. Interrestingly, one genus and seven species belonging to order Dorylaimida have been found as new to science. However, Baqri & Bohra (2003) and Bohra & Baqri (2004) have already been published one new genus and four new species and 78 species as new records from the Gujarat state. The manuscript of the paper providing the description of the remaining four new species is under preparation and will be submitted for publication as early as possible. In view of all the new records (Nos. 93) from the state and seven from India) besides the description of one new genus and seven new species to science, the final report of the project may be considered a significant contribution in Nematology of India.

On the basis of the observation made during the study, the following species may be considered as potential pest of economically important crops in Gujarat : *Hoplolaimus indicus, Helicotylenchus dihystera, Rotylenchulus reniformis, Pratylenchus loosi, Pratylenchus thornei, Pratylenchus zeae, Hisrschmanniella gracilis, Telotylenchus paaloofi, Longidorus sylphus,Paralongidorus citri, Paralongidorus major, Paralongidorus microlaimus, Xiphinema americanum, Xiphinema basiri, Xiphinema elongatum and Xiphinema insigne.*

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