

STUDIES ON SOIL NEMATODES OF SELECTED AREAS IN AND AROUND JODHPUR, RAJASTHAN

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Abstract

*Nematodes are found in a wide variety of habitats, from the Antarctic to the hot springs in New Zealand. In soil they are important component of nutrient turnover. Soil dwelling nematodes are usually quite close to the surface, roughly between 15 to 25 cm. deep soil. The greatest population of nematodes are located in the rich organic soils, where decomposition occurs the fastest. A field study throughout the year was under taken (from Jan 2012 to Dec 2012) in and around Jodhpur (Pal, Mandore and Osian village). Nematodes were detected from soil around the roots of rape seed (*Brassica juncea*), have been deal with taxonmoic categories, along with morphological details, discussions and ecological notes.*

Key words: Habitats, nutrient turnover, rape seed (*Brassica juncea*).

Introduction

Nematodes are among the most abundant and wide spread of all organisms inhabiting the soil which constitute one of the important group of living beings. these slender, active, vermiform creature are found not only in the soil and roots but also in fresh and salt-waters; where ever organic matter exists, from the arctic to the tropics and from the ocean to the tops of high mountains.

Zoological analysis indicate that nematodes being the most ubiquitous group of the animal kingdom, constitute more than 80% of all multicellular animals (Stockli, 1946) which is mainly due to their great density in soil. It is Borellus (1656) who has discovered the first freeliving nematode. however, Tiwari and Mitra (1974) have reported that these worms were known to Indians as early as thirteenth century.

In 2012, ecological and population studies of soil nematodes associated with the seasonal agriculture crops in and around

Jodhpur was studied by Mamta Gehlot and Pankaj Nama.

In the present work several nematodes have been collected from soil around the roots of Rape seed, *Brassica juncea* from Jodhpur and its Surroundings.

Material and Methods

Soil samples were collected from soil around the roots of Rape seed (*Brassica juncea*) from different areas of agricultural fields, located in the around Jodhpur city.

Samples were taken all sides of agricultural field at a depth of 15-25 cm. with the help of scooping hand-shovel and stored in polythene bags.

Goodey's (1963) sieving and decantation method was followed for processing.

Nematodes were collected and observed under the Binocular microscope.

Temporary slides were prepared for immediate examination by fixing and mounting the specimen in 4% neutral formalin. These slides showed details with greater clarity than some of the permanent ones.

Goodey's (1959, 1963) advice was followed for making drawings and measurements and for writing descriptions in greater details. De Man's (1884) formula has been used for denoting the dimensions of the nematodes. All the measurements were taken with the help of an ocular micrometer. The illustrations of fine representative specimens were made with the help of a camera lucida (prism type).

Observation and Discussion

Order: Tylenchida (Filipjev, 1934) Thorne, 1949

Super family: Tylenchoidea (Filipjev, 1934) Chitwood and Chitwood, 1937

Family: Tylenchidae Filipjev, 1934

Subfamily: Ditylenchinae Golden, 1971

Genus: Dity Enchus Filipjev, 1936

Four female nematodes were recovered from soil, procured from Pal, Jodhpur, Rajasthan.

Ditylenchus Clarus Thorne and Malek, 1968

Measurements:

Females (4) : L = 0.56 – 0.98 mm; a = 18.66 – 32.66; b = 4.90 – 5.76; c = 11.66 – 13.20.

Body coiled upon fixation, cuticle finely annulated, annules about 1 μ apart. Head without striae, hardly offset from the body. Lip region some what truncate, twice as wide as high. Spear 12 μ long with small rounded knobs. Procorpus cylindrical, tapering slightly as it joins the rounded, fusiform, valvular median bulb; basal bulb pyriform. Nerve ring forward near median bulb, situated at about 100 μ from anterior and, lying around isthmus just where it

begins to expand. An obscure valve junction of oesophagus and intestine. Intestine broad, granular and thin walled. Encretory pore opposite middle of isthmus. Rectum 30 μ about 1½ anal body diameter long. Tail conoid, blunt, rounded, 80 μ long.

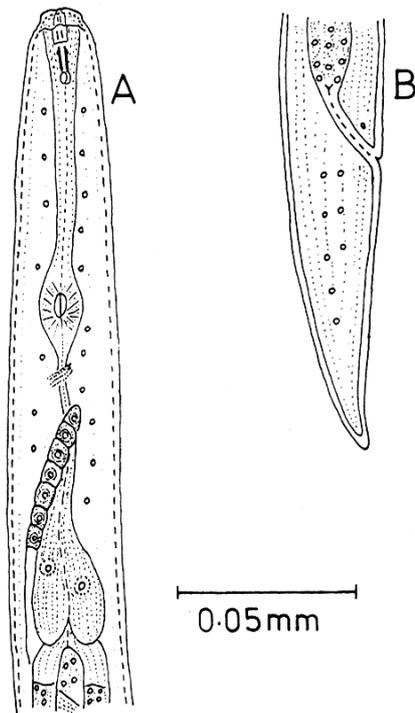
Ovary outstretched, extending close to the oesophago-intestinal junction. Oocytes arranged in a single row. Uterus long, muscular and thick walled, posterior uterine branch extending slightly more than half way to anus, a few degenerated cells at its terminus. Terminus bluntly rounded, slightly arcuate. Vulva not distinct.

Discussion:

The specimens described fir in closely with *Ditylenchus clarus* Thorne and Malek, 1968. Fotedar and Handoo (1975) have raised the subfamily Ditylenchinae to family rank but the same has not been accepted by other workers viz. Anderson and Mulvey (1980) and Anderson (1983).

Ecology:

The nematodes were present only in one of the two soil samples. They were never present in large number. The soil was sandy with pH 8.6, available calcium and potassium low; phosphorus and also nitrogen contents medium. Carbon was 0.1% and soil conductivity 0.24.



Ditylenchus clarus Thorne and Malek, 1968

A. Anterior end of female

B. Tail end of female

Order: Rhabditida (Oerley, 1880)
Chitwood, 1933

Suborder: Rhabditina (Oerley, 1880)
Chitwood, 1933

Superfamily: Rhabditoidea (Oerley, 1880)
Travassos, 1920

Family: Cephalobidae (Filipjev, 1934)
Chitwood and Chitwood, 1934

Subfamily: Cephalobinae Filipjev, 1934

Genus: Eucephalobus Steiner, 1936

Two male nematodes were recovered from soil. Procured from Mandore, Jodhpur, Rajasthan.

Eucephalobus Arcticus Loof, 1971

Measurements :

Males (2): L = 0.87 – 0.91mm; a = 22.00 – 23.75; b = 3.90 – 4.55; c = 15 – 17

Body rather stout, curved slightly to ventral side in death, cuticle thick. Lateral

field one sixth of body width. Lips six, each with one large, well offset; forward pointing papilla. Prophabdions slightly constricted near middle; meso, meta and telorhabdions of about equal length, forming an elongate glottid apparatus. Corpus of oesophogus cylindrical, nearly three and half time as long as isthmus, corpus of oesophagus off set by isthmus with a sharp alteration in tissue. Corpus is slightly thicker than isthmus. The nerve ring surrounds the oesophagus just before the base of the corpus. The terminal bulb occupies three-fifth of the corresponding body width and possesses a well developed valve, the cardia conoid. Excretory pore nearly opposite to nerve ring and Hemizonid juxtaposition of excretory pore.

Tail conoid tapering regularly to the rounded terminus, curved about 90° to ventral side. Spicule measuring 27μ and gubernaculum 15 μ, both being of normal cephaloboid shape. Two pairs of pre and subventral papillae located correspondingly at 1.6 and 2.6 anal body width from the anus. A pair of adanal papillae; a subventral pair nearly half way the tail, a subventral pair just before the terminus.

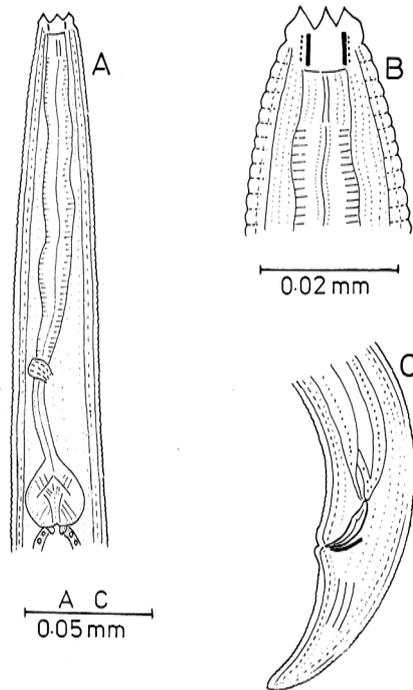
Discussion:

The specimens described fit in closely with Eucephalobus arcticus Loof, 1971 in general topography and measurements of different body parts.

Ecology:

The nematodes were present only in two of the three soil samples. They were never present in large number. The soil was sandy, with pH 8.6, available calcium and potassium low, phosphorus and also

nitrogen contents medium, carbon was 0.1% and soil conductivity 0.24.



Eucephalobus arcticus Loof, 1971

A. Anterior end of male

B. Head end of male

C. Tail end of male

Order: Dorylaimida (De Man 1876)

Pearse, 1942

Suborder: Dorylaimina (De Man 1876)

Pearse, 1936

Super Family: Dorylaimoidea (De Man, 1876) Thorne, 1934

Family : Aporcelaimidae Heyns, 1965

Genus : Aporcelaimellus Heyns, 1965
Emended Thorne, 1974

Only a single female nematode was recovered from soil. Procured from Osian village, Jodhpur, Rajasthan.

Aporcelaimellus Obtusicaudatus (Bastian, 1865) Alther, 1968

Measurements:

Female (1) : L = 2.00mm; a = 33.33; b = 4.00; c = 50.00; v = 53.10

Body robust, ventrally curved in posterior half. Cuticle finely striated transversely. Head narrower than adjoining body. Lip region low and narrow, well offset by a constriction. Amphids stirrup-shaped, aperture occupying more than half of the corresponding body width. Guiding ring irregular in outline, about $\frac{3}{4}$ of the region width from anterior extremity. Stylet well developed about 25μ long and 2.5μ in maximum width. Basal expanded portion of oesophagus occupying about 60% of neck region. The anterior portion of oesophagus is about half the diameter of posterior portion in width. Cardia short, hemispheroid, about $\frac{1}{4}$ of the corresponding body width, enveloped by intestinal tissue. A narrow oesophago-intestinal disc present. Intestine broad, becoming narrow in the vaginal region and again widening after the region of reproductive system; with granular walls and moderately wide lumen. Boundaries of intestinal cells indistinct. Prerectum about 2.5 anal body width long. Rectum more than one anal body width long. Tail convex-conoid with rounded terminus and two caudal pores on each side, measuring about 40μ in length.

Vulva a transverse slit, vagina less than half of the corresponding body width; with sclerotized distal part. Gonads amphidelphic, short. Uterus and oviduct nearly equally long.

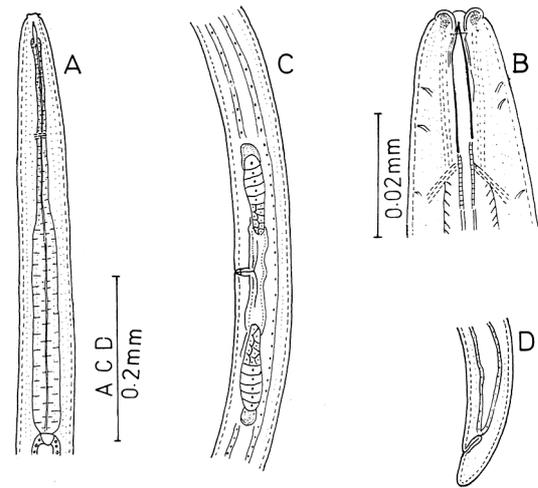
Discussion:

The present specimen closely resembles *Aporcelaimellus obtusicaudatus* (Bastian, 1865) Alther, 1968, as described by Baqri and Coomans (1973), except in value of 'a' (33.33 vs 21-26) and 'c' (50 vs 67-105). It was Alther (1968) who transferred

Dorylaimus obtusicaudatus to the genus *Aporcelaimellus* as *A. obtusicaudatus*.

Ecology:

Only one nematode was present in one out of the two soil samples. The soil was sandy with pH 8.6, available calcium and potassium low; phosphorus and also nitrogen contents medium. Carbon was 0.1% and soil conductivity 0.24.



Aporcelaimellus obtusicaudatus (Bastian, 1865) Altherr, 1968

A. Anterior end of female

B. Head end of female

C. Vulvar region of female

D. Tail end of female

References

- Anderson, R.V. (1983).** An emended description of *Ditylenchus valveus* Thorne and Malek, 1968 and description of *D. filimus* n. sp. (Nematoda : Tylenchidae) from mushroom compost in Canada. Canadian J. Zool., 61(10): 2319-2323.
- Borellus, P. (1656).** Observationum microscopicarum centuria. Hagae Comitum, 45 p.
- DeMan, (1884).** Die frie in der reinen Erde aund in sussen wasser lebenden Nematoden der niederiandi schem fauna Eine systematischetaunistische Monographic Leiden, Brill., 206 pp.
- Fotedar, D.N. and Handoo, Z.A. (1975 Publ. 1978).** A revised scheme of classification to order Tylenchida Thorne, 1949 (Nematoda). Jour. Sci. Univ. Kashmir, 3 (1/2) : 55-82.
- Goodey, J.B. (1958).** *Ditylenchus myceliophogus* n. sp. (Nematoda : Tylenchidae). Nematologica, 3 : 91-96.
- Goodey, J.B. (1959).** Data to be considered, observing description of new species. Nematologica, 4 : 211-216.
- Loof, P.A.A. (1971).** Free living and plant parasitic nematodes from spitzbergen colleted by Mr. H. Van Rossen. Meded. Landbouwhogeschool Wageningen, 71 : 1-86.
- Gehlot, M. and Nama, P. (2013).** Ecological and Population Studies of Soil Nematodes (order: Mononchida) Associated with the Seasonal Agriculture Crops in & around Jodhpur (Rajasthan), Ph.D. Thesis, J.N.V. University, Jodhpur.
- Thorne, G. and Malek, R.B. (1968).** Nematodes of the Northern Great Plains. Part I, Tylenchida (Nematoda : Secrenentea) Tech. Bull., 31 : 111 pp.