



Research Article – Zoology

First report on four species of predatory nematodes, mononchids (Nematoda: Mononchida) from Nepal

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Abstract

A nematological survey was conducted for free and plant nematodes affecting economically important vegetable crops grown in Bhaktapur and Kavre, hilly districts of Nepal with altitudes ranging between 1315m to 1500m which revealed various plant parasitic nematodes along with four species of predatory nematodes belonging to the order Mononchida. These species were *Mononchus aquaticus* Coetzee, 1968, *Iotonchus indicus* Jairajpuri, 1969, *Mylonchulus contractus* Jairajpuri, 1970 and *Parahandronchus shakili* (Jairajpuri, 1969) Mulvey, 1978. The measurements, descriptions, remarks and illustrations along with habitat and locality of these predatory nematodes are provided. These species are the first report from Nepal.

Keywords: Taxonomy, *Mononchus*, *Iotonchus*, *Mylonchulus*, *Parahandronchus*, Nepal

Introduction

Predatory nematodes (commonly called mononchs) belonging to the order Mononchida are exclusively predaceous. They are microscopic, possessing strongly sclerotized buccal cavity which is armed with teeth or tooth as prominent feeding apparatus that can tear or bite different kinds of prey such as protozoa, rotifers, algae, fungal spores, nematodes, etc. (Bilgrami *et al.*, 1986). All the species of Mononchida feed exclusively by predation and hence this group is considered as agriculture importance in controlling other soil-inhabiting microorganisms, including plant-parasitic nematodes. No doubt that they reduce populations of phytophagous nematodes and other nematodes and hence can be used as agents in the biological control of plant-parasitic nematodes (Khan and Kim, 2007).

In Nepal, very limited taxonomic works on phytophagous nematodes have been done. However, the research on free living predaceous nematodes is still lacking despite a report by Zullini (1973) on *Mononchus truncatus*, *Clarkus papillatus* and *Prionchulus punctatus* from high altitude of Nepal. The present report is an attempt to study on the free living predaceous nematodes available in agricultural lands.

Material and methods

Soil samples collected from rhizospheres of major vegetable crops (brinjal, cauliflower, cucumber and tomato) of Bhaktapur and Kavre districts of Nepal lying at altitudes of 1319 m and 1439 respectively, with the help of a shovel from the depth of 6 – 12 cm were processed through Cobb's sieving and decantation method modified Baermann's funnel techniques for the isolation of nematodes (Southey, 1970). Nematodes were killed and fixed in hot FA (4:1) for 24 hours (Seinhorst, 1962) followed by transferring them to glycerine–alcohol (5 parts glycerine and 30% alcohol) and kept in a desiccator for slow dehydration for 3 weeks.

Permanent mounts were made in anhydrous glycerine by using wax ring technique. Nematodes were identified by using the key developed by Ahmad and Jairajpuri (2010). Measurements and morphological observations were made by an Olympus microscope. Microphotographs were taken using microscopic camera. The specimens on slides are deposited in Central Department of Zoology, Tribhuvan University, Kathmandu, Nepal.

Results and discussion

The analysis of soil samples yielded four genera of free living predatory nematodes viz. *Mononchus aquaticus* Coetzee, 1968, *Iotonchus indicus* Jairajpuri, 1969, *Mylonchulus contractus* Jairajpuri, 1970 and *Parahandronchus shakili* (Jairajpuri, 1969) Mulvey, 1978 belonging to three families *Mononchidae*, *Iotonchidae* and *Mylonchulidae* respectively. The measurements, descriptions, hosts, locality, remarks and illustrations are given below:

Mononchus aquaticus Coetzee, 1968 [Fig. 1 (A-D)]

Measurements

Females (n=6): L = 1.65-2.4 mm; a = 26-40; b = 3.3-4.3; c = 5.5-8.6; c' = 6-8; V = 48-56.

Diagnosis

Females: Medium sized body about 1.65-2.40 mm long. Lip region 18-22 μ m wide, 6-8 μ m, lips and labial papillae poorly developed. Buccal cavity elongated with 28-37 μ m long and 13-16 μ m wide. Dorsal tooth medium sized, situated in the anterior half of the buccal cavity, subventral walls without any denticles but with an indentation opposite dorsal tooth apex. Opposite to dorsal tooth, each subventral wall possessing thin transverse rib. Short and weak longitudinal rib may be present in anterior third of buccal cavity. Pharyngo-intestinal junction non-tuberculate. Female genital system amphidelphic. Vulva

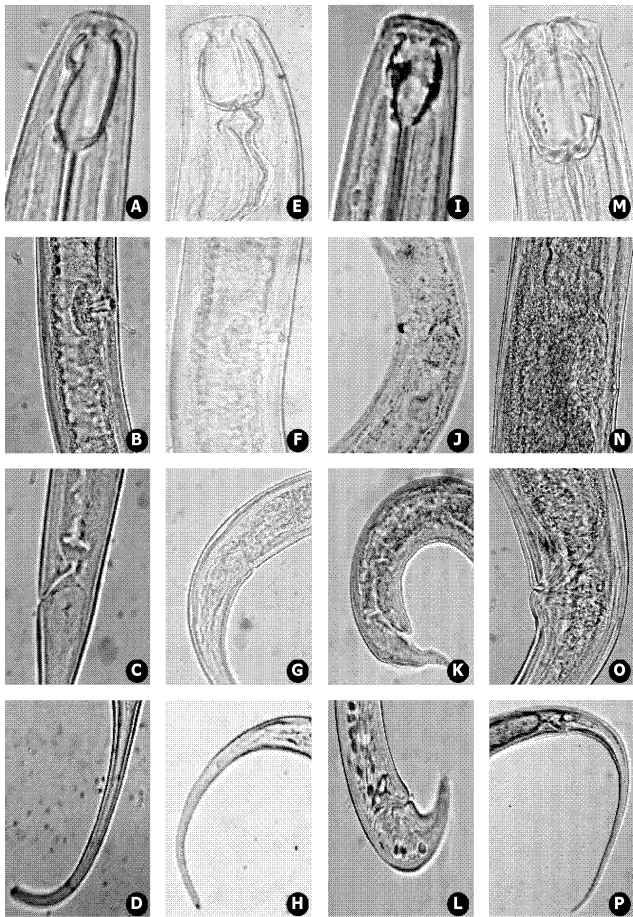


Fig. 1. A–D: *Mononchus aquaticus*. A: Anterior region; B: Vulval region; C: Posterior region; D: Female tail. E–H: *Iotonchus indicus*. E: Anterior region; F: Vulval region; G: Posterior region; H: Female tail. I–L: *Mylonchulus contractus*. I: Anterior region; J: Vulval region; K: Posterior region; L: Female tail. M–P: *Parahadronchus shakili*. M: Anterior region; N: Vulval region; O: Posterior region; P: Female tail. (Magnification - 400 X).

median, at about 46-62% of body length. Tail elongate, terminus rounded, tip rounded to clavate. Caudal glands and spinneret well developed with terminal opening.

Hosts and locality: Soil around the roots of cauliflower (*Brassica oleracea*) and brinjal (*Solanum melagena*) from Manahara, Bhaktapur, Nepal.

Remarks: The present species fit well with the measurements described by Jairajpuri and Khan (1982) and Andrassy (1993). It was earlier reported from India, Hungary, Italy, Russia, Nigeria and Mexico. This species is reported for the first time from Nepal.

Iotonchus indicus Jairajpuri, 1969 [Fig. 1 (E-H)]

Measurements

Females (n=7): L = 1.2-2.2 mm; a = 28-46; b = 3.5-5.4; c = 3.0-5.0; c' = 15-20; V = 52-65.

Diagnosis

Females: Body 1.2-2.2 mm long. Lip region offset, wider than adjoining body. Buccal cavity 40-47 μ m long and 28-32 μ m wide, dorsal tooth small and basal. Pharyngo-intestinal junction tuberculate. Female genital system amphidelphic. Posterior ovary rudimentary. Vulva located at mid of body.

Tail elongate, conoid and tapering regularly. Caudal glands and spinneret poorly developed and opening subventrally.

Hosts and locality: Soil around the roots of tomato (*Lycopersicum esculentum*) and cucumber (*Cucumis sativus*) from Manahara and Mulpani, Bhaktapur, Nepal.

Remarks: Specimens of *I. indicus* fit well with the specimen described by Jairajpuri and Khan (1982) from Kerala and Uttar Pradesh and the key provided by Andrassy (1994). This species is reported for the first time from Nepal. Apart from Nepal and India, the present species was reported from St Lucia, El Salvador and Malaysia.

Mylonchulus contractus Jairajpuri, 1970 [Fig. 1 (I-L)]

Measurements

Females (n=5): L = 0.82-1.20 mm; a = 18.6-32.2; b = 3.0-3.8; c = 30-47; c' = 0.7-0.9; V = 54.6-67.4.

Diagnosis

Females: Small body measuring 0.82-1.20 mm long with ventrally arcuate posture. Buccal cavity heavily sclerotized, twice of its width and bears a large dorsal tooth, claw like, obliquely directed anteriorly with sharply pointed apex, located in anterior half of the buccal cavity. Each subventral wall armed with several small rasp like denticles more or less arranged in regular transverse rows. Anterior or posterior margin of rasp-field provided with sclerotised refractive rings. Two small subventral teeth present opposite base of dorsal tooth. Pharyngo-intestinal junction non-tuberculate. Female genital system amphidelphic. Vulva located at the mid of the body. Tail generally short, conoid and arcuate. Three caudal glands and sub-dorsal spinneret present.

Hosts and locality: Soil around the roots of cauliflower (*Brassica oleracea*) from Banepa, Kavre and cucumber (*Cucumis sativus*) from Suryabinayak, Bhaktapur, Nepal.

Remarks: Females fit well with the description of Jairajpuri (1970) and Jairajpuri and Khan (1982). Andrassy (1992) reported this species from India and Dominica. *M. contractus* is reported for the first time from Nepal.

Parahadronchus shakili (Jairajpuri, 1969) Mulvey, 1978 [Fig. 1 (M-P)]

Measurements

Females (n=5): L = 2.2-3.2 mm; a = 30-41; b = 3.7-4.4; c = 5-13; c' = 8.0-10.0; V = 64-75.

Diagnosis

Females: Small sized body 2.2-3.2 mm long. Cuticle smooth. Lip region 42-62 μ m wide, 16-22 μ m high. Buccal cavity large 46-65 μ m long, 30-40 μ m wide. Dorsal tooth large, located in posterior half of buccal cavity, opposed by two or four short longitudinal ridges, each bearing 3-6 small denticles. Pharyngo-intestinal junction tuberculate. Female genital system amphidelphic. Vulva at 60% of body length, transverse, with cuticularised lips. Pre and post vulval papillae present. Tail elongate to filiform, as long as 6-18 anal body diam. Caudal gland three in number and spinneret opening terminal.

Hosts and locality: Soil around the roots of cauliflower (*Brassica oleracea*) from Suryabinayak, Bhaktapur and cucumber (*Cucumis sativus*) from Banepa, Kavre, Nepal.

Remarks: The specimens fit well to the description of Jairajpuri and Khan (1982) and Andrassy (1994). This species is reported for the first time from Nepal.

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