PAPERS PUBLISHED
SPECIES OF FILENCHUS ANDRASSY, 1954 FROM MANIPUR WITH DESCRIPTION OF FILENCHUS NEOLONGICAUDATUS SP. NOV.

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KEY WORDS
Mulberry, nematode, Filenchus neolongicaudatus New species

ABSTRACT
During a survey carried out in the valley districts of Manipur in order to find out the plant parasitic nematodes associated with mulberry plants, Morus spp. and pine trees, three species of Filenchus Andrassy, 1954 were discovered. Among them, one is recorded as a species new to science, Filenchus neolongicaudatus sp. nov. is characterized by having a long body of 0.49-0.71 mm, a long tail of 144.5-248.2 mm length and spear of 17-18.7 mm length. The genus Filenchus is reported for the first time from Manipur.

INTRODUCTION
The genus Filenchus Andrassy, 1954 as revised by Raski and Geraert, 1987 is characterized by the presence of lateral fields each with four incisures, moderately developed stylet, conus solid appearing anteriorly, sharply pointed, about 1/3 of total stylet length, knobs distinct, rounded and basal bulb offset from intestine which is generally pyriform. A number of workers (Dhanachand, 1983; Gambhir and Dhanachand, 1996; Anandi and Dhanachand 1993; Dhanachand and Ronabati, 1994; Mohilal et al., 2001 and 2009) had carried out survey on plant parasitic nematodes associated with different host plants from the state of Manipur show no record of the species of Filenchus. So a survey for this group of nematode was taken up. During the present survey for soil and plant parasitic nematodes associated with mulberry plants and pine trees, the presence of three species of Filenchus Andrassy, 1954 was encountered among which Filenchus neolongicaudatus associated with mulberry plants from Imphal east District was reported as a new species. Other species encountered were Filenchus brevis Lai and Khan, 1987 and F. nakasonoi Mizukubo, 1991. Illustrations supported with morphometric details are provided.

RESULTS AND DISCUSSION
Filenchus brevis Lai and Khan, 1987
Dimensions: Table 1

Descriptions
Female: Body almost straight to slightly arcuate upon fixation, narrowing towards both extremities, maximum body width 1.7 mm in mid-body. Cuticle with fine striation. Lateral field with four incisures. Labial region slightly set off from body contour, 5.9 ± 0.8 (5.1-6.8) mm wide, 3.4 mm high, with indistinct 4 annuli. Stylet 13.6 mm long, with small knobs. Orifice of dorsal oesophageal gland at 2.5 ± 0.8 (1.7-3.4) mm from the stylet knobs. Median bulb oval with lightly developed cuticular thickenings. Isthmus narrow and longer than procorpus. Nerve ring situated at 56.1 ± 1.7 (54.4-57.8) mm from anterior end. Excretory pore at 61.2 mm from anterior end. Basal bulb pyriform, containing 3g land nuclei. Cardia present. Vulva a transverse slit, without lateral vulval membranes. Vagina at right angle to body axis. Gonad monoprodalphic and outstretched. Sperrmatheca rounded without sperrms. Post-vulval uterine sac well-developed. Tail long filiform, 137.7 ± 18.7 (119-156.4) mm in length, ending in an unhooked pointed terminus.

Male: Not found.

Habitat and Locality

MATERIALS AND METHODS
The collected soil samples were processed through Cobb (1918) sieving and decanting method followed by modified Baermann's funnel technique. The extracted nematodes were killed in warm F.A (4:1) and dehydrated under the rapid glycerin method of Seinhorst (1959). After slide preparation, measurements were taken using an ocular micrometer and diagrams were drawn using a camera lucida.
Table 1: Morphometric data of female species of *Filenchus brevis* and *F. nakasonoi*

<table>
<thead>
<tr>
<th>Characters</th>
<th><em>F. brevis</em> from Manipur</th>
<th><em>F. nakasonoi</em> from Mizukubo, 1991</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>4</td>
<td>0.47-0.58 (0.52 ± 0.56)</td>
</tr>
<tr>
<td>a</td>
<td>0.40-0.49 (0.44 ± 0.04)</td>
<td>252-284 (268 ± 10.7)</td>
</tr>
<tr>
<td>b</td>
<td>24.29-26.4 (24.3 ± 2.5)</td>
<td>23.5-30.4 (26.9 ± 2.02)</td>
</tr>
<tr>
<td>c</td>
<td>5.1-6.3 (5.7 ± 0.60)</td>
<td>4.0-4.6 (4.2 ± 0.12)</td>
</tr>
<tr>
<td>c’</td>
<td>14.0-15.1 (14.6 ± 0.64)</td>
<td>5.1-6.2 (5.4 ± 0.38)</td>
</tr>
<tr>
<td>d</td>
<td>55.5-78.6 (56.4 ± 1.4)</td>
<td>6.5-9.5 (8.3 ± 0.78)</td>
</tr>
<tr>
<td>e</td>
<td>24.1-36.2 (23.1 ± 6.05)</td>
<td>6.4-6.8 (6.6 ± 1.0)</td>
</tr>
<tr>
<td>Tail / V-a</td>
<td>-</td>
<td>24.4-43.2 (31.8 ± 4.8)</td>
</tr>
<tr>
<td>Max. body width</td>
<td>-</td>
<td>1.3-1.4 (1.3 ± 0.13)</td>
</tr>
<tr>
<td>Lateral field</td>
<td>4 No.</td>
<td>9.2-10.1 (10.0 ± 0.52)</td>
</tr>
<tr>
<td>Vulval body diameter</td>
<td>-</td>
<td>4 Nos.</td>
</tr>
<tr>
<td>ABD</td>
<td>8.3-10.2 (9.3 ± 0.85)</td>
<td>8.6-10.2 (9.5 ± 0.6)</td>
</tr>
<tr>
<td>Centre of median bulb from</td>
<td>-</td>
<td>5.6-6.6 (5.4 ± 0.39)</td>
</tr>
<tr>
<td>anterior body end</td>
<td>-</td>
<td>24.4-36.3 (30.8 ± 3.0)</td>
</tr>
<tr>
<td>Excretory pore</td>
<td>61.2</td>
<td>42.4-46.2 (45.7 ± 3.7)</td>
</tr>
<tr>
<td>Metacorpus V/R</td>
<td>-</td>
<td>3.6-6.0 (3.5 ± 0.3)</td>
</tr>
<tr>
<td>Isthmus</td>
<td>-</td>
<td>4.1-4.8 (4.0 ± 0.4)</td>
</tr>
<tr>
<td>Bursal bulb</td>
<td>-</td>
<td>0.6-1.0 (0.7 ± 0.1)</td>
</tr>
<tr>
<td>Oesophagus</td>
<td>75.3-99.7 (87.2 ± 1.7)</td>
<td>4.6-7.5 (5.3 ± 1.3)</td>
</tr>
<tr>
<td>VL</td>
<td>-</td>
<td>172-191 (179 ± 7.1)</td>
</tr>
<tr>
<td>Vulva – anus</td>
<td>-</td>
<td>34-42 (39 ± 4.2)</td>
</tr>
<tr>
<td>Tail</td>
<td>119.156.4 (137.7 ± 18.7)</td>
<td>41-54 (46 ± 2.4)</td>
</tr>
<tr>
<td>Post – uterine sac</td>
<td>-</td>
<td>6.8-13.2 (7.1 ± 1.5)</td>
</tr>
<tr>
<td>Spermatheca</td>
<td>-</td>
<td>4.0-6.6 (5.5 ± 1.3)</td>
</tr>
</tbody>
</table>

*Note*: Measurements in micrometres except L in mm.

Collected on June, 2008 from soil around the rhizosphere of *Pinus roxburghii* Sarg., Nongpok Sekmai, Thoubal District, Manipur.

**Remarks**

The present specimen is the first report of the species from the state of Manipur. On comparison with the morphological characters and measurements of other workers, the present specimens conform well with those described by Lai and Khan (1987). However, slightly shorter body length, longer oesophageal length and stylet length, which can be considered as intraspecific variation are found in the present specimens.

*Filenchus nakasonoi* Mizukubo, 1991

**Dimensions:** Table 1

**Descriptions**

**Female:** Body slightly ventrally curved, open "C" shaped when killed and stout with a total length of 0.47-0.58 mm. Body annules fine and distinct, 1.7 μm apart at mid-body. Lateral fields with 4 incisures, outer incisures dimmed, occupying 1/4th -1/3rd of the corresponding body. Deirids distinct at the level of excretory pore. Phasmid not seen.

Lip region convex conoid, continuous with body contour, 1.7 μm high and 3.4 μm wide. Labial sclerotisation absent, without transverse lamellae for attachment of spear muscle. Spear 2.5 times as long as lip width, conus shorter than shaft, knobs smoothly rounded, 0.8 μm across. Dorsal oesophageal gland opening at 6.8 μm behind spear base. Total oesophageal length 57.8-100.3 μm from the base of cephalic frame-work. Median oesophageal bulb oval, 10.2 μm high and 5.1 μm across. Basal oesophageal bulb pyriform, 15.3-17 μm long or less than half of the isthmus in length. Isthmus enveloped by nerve ring at the level of neck of basal bulb. Excretory pore located at 64.6-78.8 μm from the anterior base. Cardia small.

Vulva a depressed transverse slit with a part of vulval lips. Vagina perpendicular to body axis, extending half way into body. Ovary single, anteriorly oesotrectomized having oocytes arranged in a single file. Spermastheca distinct, offset, ovoid containing many sperms. Post uterine sac 6.8-8.5 μm long or about one quarter to two times the vulval body width long. Distance between vulva and anus 90.1-130.9 μm long. Rectum ventrally arcuate and a simple tube 8.5 μm long. Tail 64.6-115.9 μm or 7.6-11.3 times anal body width long, ventrally arcuate, gradually tapering to a rounded terminus towards the dorsal side.

**Male:** Not found.

**Habitat and locality**

Collected in March, 2009 from soil around the rhizospheric regions of mulberry plants, *Morus* spp. from Mayang Imphal, Konchak Makha Leikai, Thoubal District, Manipur, India.

**Remarks**

The morphological details of the present specimens agree well with the original descriptions of *Filenchus nakasonoi* Mizukubo, 1991. A vast variations in body length, tail length, oesophageal lengths etc. were encountered. But their morphological details could not be distinguished from those of original descriptions. These variations might be due to intraspecific variations brought about by geographical gradients and environmental differences.

The species is also reported for the first time from Manipur.

*Filenchus neolongicaudatus* sp. nov. (Fig. 1)

**Dimensions:** Table 2

**Descriptions**

**Female:** Body slightly ventrally curved, open "C" shaped when killed and stout with a total length of 0.47-0.58 mm. Body annules fine and distinct, 1.7 μm apart at mid-body. Lateral fields with 4 incisures, outer incisures dimmed, occupying 1/4th -1/3rd of the corresponding body. Deirids distinct at the level of excretory pore. Phasmid not seen.

Lip region convex conoid, continuous with body contour, 1.7 μm high and 3.4 μm wide. Labial sclerotisation absent, without transverse lamellae for attachment of spear muscle. Spear 2.5 times as long as lip width, conus shorter than shaft, knobs smoothly rounded, 0.8 μm across. Dorsal oesophageal gland opening at 6.8 μm behind spear base. Total oesophageal length 57.8-100.3 μm from the base of cephalic frame-work. Median oesophageal bulb oval, 10.2 μm high and 5.1 μm across. Basal oesophageal bulb pyriform, 15.3-17 μm long or less than half of the isthmus in length. Isthmus enveloped by nerve ring at the level of neck of basal bulb. Excretory pore located at 64.6-78.8 μm from the anterior base. Cardia small.

Vulva a depressed transverse slit with a part of vulval lips. Vagina perpendicular to body axis, extending half way into body. Ovary single, anteriorly oesotrectomized having oocytes arranged in a single file. Spermastheca distinct, offset, ovoid containing many sperms. Post uterine sac 6.8-8.5 μm long or about one quarter to two times the vulval body width long. Distance between vulva and anus 90.1-130.9 μm long. Rectum ventrally arcuate and a simple tube 8.5 μm long. Tail 64.6-115.9 μm or 7.6-11.3 times anal body width long, ventrally arcuate, gradually tapering to a rounded terminus towards the dorsal side.

**Male:** Not found.

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The species is also reported for the first time from Manipur.
Figure 1: *Filenchus neolongicaudatus* sp. nov.

- **A.** Entire length of the body; **B.** Anterior part of body; **C.** Reproductive system; **D.** Tail length and **E.** Lateral lines curve upon fixation with the greatest body diameter of 11.9 – 15.3 μm. Posterior body length is similar to anterior body length or slightly longer. Body tapers towards both extremities. Cuticle finely striated 1.7 μm wide at mid body. Lateral fields marked by 4 incisions, outer lines non - crenate, measuring 1/4,h of body width at mid-body. Hemizonid 57.8 - 68 μm from anterior end of the body, just about 2 annuli behind the excretory pore. Lip region finely annulated, offset and flattened, 3.4 μm across and 2.5 μm high. Stylet 17-18.7 μm long with strongly developed basal knobs. Anterior spear longer than the posterior spear. Basal knobs well developed, rounded, 2.5-3.4 μm wide and 1.4–1.7 μm long. Dorsal oesophageal gland opening at 2.5-5.1 μm from the base of cephalic framework. Median bulb oval with weakly developed cuticular thickenings, 8–11.9 μm high and 5.1 – 6.8 μm wide. Isthmus slender, 17 – 39.1 μm long, with elongated pyriform basal bulb, 5.1 – 8.5 μm across and 15.3 – 25.5 μm long. Intestine with relatively narrow lumen joining oesophagus over indistinct cardial cells. Nerve ring located at 47.6 – 57.8 μm from anterior base and excretory pore at 59.5 – 86.7 μm encircling the isthmus at the anterior part.

**Table 2: Morphometric data of female species of *Filenchus neolongicaudatus* sp. nov.**

<table>
<thead>
<tr>
<th>Characters</th>
<th>Holotype</th>
<th>Paratypes</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>4</td>
<td>20</td>
</tr>
<tr>
<td>L</td>
<td>0.72</td>
<td>0.49 – 0.72 (0.59 ± 0.06)</td>
</tr>
<tr>
<td>a</td>
<td>60.5</td>
<td>32.3 – 60.5 (43.2 ± 7.3)</td>
</tr>
<tr>
<td>b</td>
<td>7.0</td>
<td>5.2 – 8.3 (6.7 ± 0.9)</td>
</tr>
<tr>
<td>c</td>
<td>3.2</td>
<td>2.6 – 3.6 (3.02 ± 0.3)</td>
</tr>
<tr>
<td>c’</td>
<td>25.8</td>
<td>17 – 40.4 (27.0 ± 6.3)</td>
</tr>
<tr>
<td>V</td>
<td>46.7</td>
<td>46.7 – 63.7 (55.0 ± 4.1)</td>
</tr>
<tr>
<td>V2</td>
<td>21.2</td>
<td>17.4 – 42.2 (25.7 ± 8.2)</td>
</tr>
<tr>
<td>Uterine sac</td>
<td>8.5</td>
<td>8.5 – 17.0 (10.8 ± 2.9)</td>
</tr>
<tr>
<td>VL</td>
<td>40.6</td>
<td>17 – 87.1 (10 ± 0.0)</td>
</tr>
<tr>
<td>DGO</td>
<td>5.1</td>
<td>2.5 – 3.4 (2.8 ± 0.4)</td>
</tr>
<tr>
<td>Knob width</td>
<td>2.5</td>
<td>2.5 – 3.4 (2.8 ± 0.4)</td>
</tr>
<tr>
<td>Knob height</td>
<td>1.7</td>
<td>1.4 – 1.71 ± 0.69</td>
</tr>
<tr>
<td>dB</td>
<td>40.6</td>
<td>35.9 – 51.043 (3 ± 4.7)</td>
</tr>
<tr>
<td>Oesophagus</td>
<td>102.3</td>
<td>61.2 – 108.8 (95 ± 13.3)</td>
</tr>
<tr>
<td>Lip width</td>
<td>3.4</td>
<td>3.4 (3.4 ± 0.0)</td>
</tr>
<tr>
<td>Lip height</td>
<td>2.5</td>
<td>2.5 (2.5 ± 0.0)</td>
</tr>
<tr>
<td>Nerve ring</td>
<td>56.1</td>
<td>47.6 – 57.8 (52.7 ± 3.6)</td>
</tr>
<tr>
<td>Excretory pore</td>
<td>59.5</td>
<td>59.5 – 66.7 (62 ± 6.1)</td>
</tr>
<tr>
<td>Vulva to anus</td>
<td>64.6</td>
<td>56.1 – 76.0 (43 ± 6.1)</td>
</tr>
<tr>
<td>Maximum body width</td>
<td>119</td>
<td>11.9 – 15.1 (14 ± 1.3)</td>
</tr>
<tr>
<td>Tail</td>
<td>219.3</td>
<td>144.5 – 248.2 (198 ± 31.1)</td>
</tr>
<tr>
<td>Tail / vulva – anus</td>
<td>3.3</td>
<td>5.1 – 10.2 (7 ± 1.7)</td>
</tr>
<tr>
<td>distance</td>
<td>3.3</td>
<td>2.3 – 4.03 ± 0.5</td>
</tr>
</tbody>
</table>

(Vall measurements in μm except L in mm).

Vulva closed type, vagina a transverse slit, right angled to the body and slightly rounded at the middle. Ovary single, prodelphic and outstretched, spermatheca elongated and packed with sperms. Post-utereine sac well developed, 8.5 –17 μm or slightly longer than the maximum body length.

Tail elongated, filiform ending into a sharply pointed terminus, 144.5 – 248.2 μm long or 21.8 – 40.4 times anal body widths long.

**Male:** Not found.

**Type Specimen**

Holotype female mounted on the slide PBF,1/5 and paratypes on the slides PBF,1 –12, deposited at the Nematode collection of Parasitology Section, Life Sciences Department, Manipur University, Canchipur, Manipur, India.

**Type habitat and locality**

Soil around the rhizospheric region of mulberry plants, *Morus* spp. from Chingkhu, Pangei, Imphal East District, Manipur, India.

**Differential Diagnosis and Relationship**

*Filenchus neolongicaudatus* sp. nov. differed from all other related species in having longer stylet, oesophagus and tail. The present specimen, in the presence of the continuous finely annulated lip region, is close to *F. magnus* (Hussain and Khan, 1976) Raski and Geraert, 1987 but a wide difference occurs in the stylet length and body length. The present specimen has also differences in the values of a, oesophagus and c (l = 0.32 – 0.40, a = 31–37, c = 5–6, stylet = 5–6 and oesophagus = 50 in *F. magnus*).
When compared with *F. equisetus* (Husain and Khan, 1967) Raski and Geraert, 1987, the present specimen has greater body length, a, c', stylet, oesophagus and smaller value of c, V and different lip shape (L = 0.38-0.47, a = 27-28, c = 4.4-4.6, c' = 12-14, V = 56-62, stylet = 12-14, oesophagus = 50 and slightly offset flat rounded lip region in *F. equisetus*).

The specimen also comes close to *Filenchus concisatus* Siddiqi and Khan, 1983 and *F. longicaudatus* Sultan et al., 1991. From the former species, it differs in having larger value of a, longer stylet, smaller value of c, V and markedly longer tail (a = 24-34.5, c = 4.5-5.7, V = 62.8-64.8, spear = 12-17 and tail = 140 μm in *F. concisatus*). From the later specimen, it differs in having greater body length, larger value of a, b, c', variation in V value, longer stylet, and finely annulated, offset and flattened lip region (L = 0.35-0.39, a = 31-34, b = 5.8-6.9, c' = 13-15, V = 50-55, stylet = 10-11, and continuous rounded smooth lip region in *F. longicaudatus*).

ACKNOWLEDGEMENTS

The authors are thankful to the Head, Department of Life Sciences, Manipur University, Canchipur for providing necessary laboratory facilities and University Grant Commission and Manipur University for the financial support in the form of Ph. D fellowship to the first author.

REFERENCES


TWO NEW SPECIES OF ORIVERUTUS (NEMATODA: DORYLAIMIDA) FROM MANIPUR

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ABSTRACT

Two new species of Onverutus sp., Oriverutus kalikus sp.n and Oriverutus morus sp.n extracted from the soils around the rhizosphere of mulberry plants Morus sp. are described and illustrated. O. kalikus sp.n has a slightly ventrally curved 0.85-1.02 mm long body with a stylet 48.00 µm long. Presence of dorylaimoid oesophagus and cardia with three distinct glandular organs, ophisthodelphic reproductive system without anterior uterine sac and a conoid tail 57.60-62.40 µm long. O. morus sp.n is characterized by having 0.77-0.84 µm long body, with distinct labial papillae, attenuated odontostyle 22.40 µm and elongated conoid tail 57.60-62.40 µm long.

Table : 00 Figures : 13 References : 08

KEY WORDS. Mulberry, Nematode, Oriverutus, New species.

Introduction

Siddiqi7 proposed Oriverutus with O. sundarasi as its type. He also described a new species O. lobatus from Nigeria and transferred two species of Eudorylaimus and one of Longidorella to Oriverutus. Ban- described O. arcuatus and Ahmad and Jairajpuri1 added O. hastus Ahmad and Jairajpuri2 transferred Enchodelium asacatus, Dhanachand and Jairajpuri5 into Oriverutus and also described four more new species of Oriverutus. Survey of soil around the roots of mulberry plants in Manipur revealed the presence of a few species of Oriverutus. Two species which are new to science are described. Descriptions supported with dimensions and illustrations are provided.

Materials and Method

The soil samples collected were processed for the extraction of nematodes by Cobb's4 sieving and decanting method followed by modified Baermann's funnel technique. Extracted nematodes were fixed in warm FA(4:1) and dehydrated under the slow glycerine method. Measurements were done using an ocular micrometer and diagrams were drawn by using Camera lucida.

Results and Discussion

Oriverutus kalikus sp.n (Fig:1-6)

Dimensions:

Para./pe female (n = 6): L = 0.85 - 1.02 (0.96 ± 0.06) mm, a = 21.43 - 7.13 (25.64 ± 2.37)µm, b = 2.89 - 3.72 (3.35 ± 0.29), c = 14.46 - 17.38 (16.25 ± 1.16), V = 40.13 - 96.0 (44.85 ± 25.24)µm, Cardia = 9.6 - 12.8 (10.77 ± 3.43) pm, Odontostyle = 22.4 (22.40 ± 0.00)µm, Odontophore = 25.6 (25.60 ± 0.00)µm, ABD = 19 2-22.4 (20.8 ± 1.01)µm, Rectum = 24.0-32.0 (27. ± 2.86)µm, Prerectum = 32.0-38.4 (33.92 ± 2.56) µm.

ACKNOWLEDGEMENT: The authors are grateful to the Head of Department of Life Sciences, Manipur University, for providing necessary laboratory facilities.
ABSTRACT

Considering the potential of predatory mononchids, a survey conducted in the valley districts of Manipur covering Imphal East, Imphal West, Bishnupur and Thoubal districts of Manipur around the rhizospheric region of mulberry plants yielded 15 mononchid species under 6 genera. Community analysis show that Mylonchulus mulveyi had the highest relative frequency and Lotonchus parabasidontus had the highest relative biomass. The highest prominence value was shown by Coomansus venezolanus.

Introduction

The species of Mononchs were first reported under the name Oncholaimus muscorum, O. fovearum and Enophus crassiusculus. Genus Mononchus described five new species, three of them were from the previous worker. The order Mononchida can easily be identified from other group of nematodes by their comparatively bigger bodies, in having buccal cavity of strong sclerotisation, a long and cylindroid highly muscular oesophagus, a different mechanism of oesophageo-intestinal junction, complete absence of pre-rectum and presence of well-developed gubernaculums and caudal glands, sometimes poorly developed or absent. All members of order Mononchida appear to be carnivorous in habit. They live in both soil and freshwater feeding on protozoa, rotifiers, tardigrades, small oligochaets, and different nematode species. Plant parasitic nematodes are a major hurdle in the growth of mulberry plants and production of quality leaves. They cause poor growth of mulberry plants. The Mononchs, on the other hand play a vital role in maintaining the microbial balance of the soil nematode population. So, in view of locating mononchid nematodes in natural soil nematode of mulberry farms and taking the importance of mulberry leaves in sericulture, a survey was conducted on diversity of Mononchid nematodes around the rhizospheric parts of mulberry plants in valley districts of Manipur.

Materials and Methods

The collected soil samples were processed through sieving and decanting method followed by modified Baermann's funnel technique. The nematodes were killed in warm F.A (4:1), dehydrated under slow glycerin method. After slide preparation, measurements were taken using an ocular micrometer.

Results and discussion

During the survey of mononchid nematodes around the roots of mulberry plants of valley districts of Manipur, altogether 15 mononchid species were identified under 6 genera. The species encountered were Mononchus aquaticus, M. truncatus;
Plant and soil nematodes from Lokchao Yangoupokpi Wildlife Sanctuary, Manipur, India

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The Lokcho Yangoupokpi Wildlife Sanctuary, renowned for its rich biodiversity, is situated in Chandel District of Manipur (9°43'51" N & 94°15'54" E) and covers an area of 184,549 ha. The eastern side of the Sanctuary borders with Myanmar.

There is little information available on invertebrate fauna of the sanctuary, particularly on nematodes. In the present study, soil samples were collected from the sanctuary to investigate about what nematode species are associated with different plant hosts. Nematodes are round, microscopic, un-segmented, transparent, thread-like animals, found in almost every kind of environment. These nematodes may be plant-parasitic, predaceous, or freeliving feeding on bacteria and other detritus food. Each nematode trophic group plays a significant role in the energy cycle of the habitat.

Nematodes were extracted from soil by sieving and decantation methods using Baermann’s funnel filled in warm 0.9% sodium chloride and stinted for 48 hours. The analysis yielded to species of plant-parasites, 12 of predators and nine of freeliving nematodes which belonged to 12 families under three orders. Table 1

The present study shows rich nematode diversity in Lokcho Yangoupokpi Wildlife Sanctuary. Twenty-five genera of nematodes were encountered. Of these 12 genera consisting of 18 species belong to the phytonematode group, six genera consisting of nine species belong to the freeliving group while seven genera consisting of 12 species belong to the preditory group. The parasitic nematodes encountered were endoparasites. No significant external symptoms due to the parasitic nematodes could be found. More intense surveys in the deep mesic areas of the sanctuary will yield more species of nematodes.

References


A survey on the plant parasitic nematodes of the sub-family Tylenchinae under the family Trylenchidae in Manipur was conducted. Altogether 8 species of the nematodes under the present sub-family were encountered associated with different plant species. The survey revealed *Aglenchus muktii* Phukan & Sanwal, 1980 as the most abundant species and *Coslenchus brevis* Siddiqui & Khan, 1983 as the least abundant species of nematodes under the sub-family.

**Key words :** *Aglenchus*, *Coslenchus*, Tylenchinae, Nematode.

**INTRODUCTION**

In Maggenti *et al*.'s classification (1988) of the suborder Tylenchina the genera *Aglenchus* and *Coslenchus* have been included in the sub family Atylenchinae Skarbilovich, 1959 but Siddiqi (2000) placed them under the subfamily Tylenchinae Orley, 1880. Andrassy (1954) proposed *Aglenchus* as a subgenus under the genus *Tylenchus* Bastian, 1865. Meyl (1961) gave it full generic status. However, Goodey (1963) regarded *Aglenchus* as a subgenus of *Tylenchus*. Andrassy (1963) revalidated *Aglenchus* as a genus with some amending and addition of one more species. Siddiqi (1978) proposed the genus *Coslenchus* for *Aglenchus costatus* De Man, 1921 which possessed longitudinal cuticular ridges on the body and vagina at right angles to its body axis. During the present survey altogether eight different nematode species belonging to subfamily Tylenchinae of the family Trylenchidae were encountered and accordingly described with their morphometric datas and localities.

**MATERIALS AND METHODS**

The soil samples collected were processed for the extraction of nematodes by Cobb’s (1918) sieving and decanting method followed by modified Baermann’s funnel technique. The extracted nematodes were fixed in warm F.A. (4:1) and dehydrated under the slow glycerine method of Seinhorst (1959). Specimens were mounted in dehydrated glycerine, after slide preparation, morphological details were studied and diagrams were drawn using a camera lucida.

**RESULTS AND DISCUSSION**

*Aglenchus muktii* Phukan and Sanwal, 1980

**Dimensions :** Table I and II

**Descriptions :** Female body slightly curved ventrally upon fixation, body cuticle marked with coarse transverse striations, 1-2 (1.5±0.5) μm apart at mid body. Lateral fields with 3 incisures occupying about one-third of body width. Cephalic striation...
Population fluctuation of soil and plant parasitic nematodes at Khangabok Wangbal Government silkfarm, Wangbal, Thoubal district, Manipur, India

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Abstract. The population fluctuation of nematodes around the rhizospheric regions of mulberry plants at Khangabok Wangbal Government Silk farm, Wangbal, Thoubal District, Manipur, India was studied in relation to environmental factors like soil moisture content, soil pH, soil temperature, rainfall and moisture content of air for a consecutive period of three years, 2006-2008. During 2006, nematode population was highest in the month of May with very high rainfall (174.2 mm). Positive correlation of nematode population was found with soil temperature, soil pH, rainfall and relative humidity and negative correlation with soil moisture. During 2007, nematode population was highest in the month of May with least soil moisture and highest rainfall (165.1 per cent and 190.6 mm). Nematode population had positive correlations with soil moisture, temperature, pH, rainfall and relative humidity of air. During 2008, nematode population was highest in the month of April with highest soil temperature of 24.8°C, 66.0 per cent moderate relative humidity and 210 mm rainfall. There were positive correlation with soil temperature and pH and negative correlation with soil moisture, rainfall and relative humidity. Lowest nematode population was found during January (2006) and during December (2007, 2008) there were negligible rain and sometimes no rainfall at all. Among the dorylaimids, tylenchids, apherenchids and mononchids, *Helicotylenchus* sp. proved to be the most numerous nematode species in all the three years and seasons.

Understanding life cycles and the factors governing changes in nematode populations is basic to understanding nematode distribution and plant disease. In many respects, nematodes are no different from other organisms in that their populations fluctuate during the year and in different environments. As expected, population fluctuations vary with the geographical location. The least recovery of nematodes in cultivated fields is often in winter or early spring in the northern latitudes where cold temperatures prevail are limiting. Fluctuations within the main growth curve occur during a growing season and often are correlated with major divergences in temperature and moisture. Populations may differ in a season depending on the degree of host susceptibility as demonstrated by Johnson et al. (1974) and Minton et al. (1960).

The population fluctuation of nematodes around the rhizospheric regions of mulberry plants, one of the major plants for sericulture was studied with relation to five main environmental factors, i.e. soil moisture content, soil pH, soil temperature, rainfall and moisture content of air. The site of study, Khangabok Wangbal Government Silk farm, Wangbal lies in Thoubal District with an altitude of 23°45'N to 24°45'N, longitude 93°45'E to 94°15'E and altitude of 781.0 (above MSL). Since no defined and precise work on mulberry plants from the state of Manipur, a particular area was selected to find out more precise information which will be useful to further effective control measures.

Such type of works was also carried out on coconut and arecanut by Koshy and Sosama (1978), on jute by Chaturvedi and Khera (1979), on cabbage and cauliflower by Siddiqui et al. (1973), on strawberry and cherry by Lowenshary and Mappenti (1965), Krishnamurthy and Ellis (1971) on root knot nematodes, Khan et al. (1971) on mango, Salih and Shahia (1987) on the effect of pH on growth and reproduction of free living nematodes, on Black pepper by Mohandas and Ramana (1988) and on grass pasture by Armi (1990).

From the state Manipur, such work had carried out by Dhanachand et al. (1997) on sugarcane, Selitza et al. (1997) on *Dioscorea kalulu* and Mohilal and Dhanachand (1998) on comparison between nematode fauna of two hilly districts.

Materials and method

Collection of soil samples

In the locality 40 subareas are selected where mulberry plants were growing in a zigzag manner. Discarding the top layers of the soils, the subareas were digged up to a depth of 20 cm. Soil samples were collected from those areas in equal quantity, which served as the subsample of the area. The polythene bags were brought to the laboratories and kept undisturbed for at least 5 days before further processing.