



Plant parasitic nematodes associated with Indian Pennywort *Centella asiatica* (L.) Urban in Manipur

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The most common nematode species associated with medicinal plants have been recorded from the Silviculture Farm at Kalinga in the district of Phulbani, Orissa (Routaray & Das 1982), southern Districts (Madurai, Ramanathapuram, Tirunelveli and Kanyakumari) of Tamil Nadu (Samathanam & Chawla 1982), and Imphal District, Manipur (Romabati et al. 1992). This study reports plant parasitic nematode species associated with *Centella asiatica* (L.) Urban in Manipur. Their absolute and relative frequencies and absolute and relative densities are also reported.

Methods: Seventy soil samples including a portion of root-system were collected from the rhizosphere of *C. asiatica* from different localities of Manipur. The nematodes were isolated from the soil using Cobb's (1918) sieving and decanting methods and Baermann's funnel technique (Thorne 1961). The nematodes thus, collected were killed and fixed in warm formalin – glacial acetic acid [F: A (4:1)]. The nematodes were identified up to species level and their populations were counted with the help of a Syracuse counting disc. The roots were examined for gall formation by root-knot nematodes. The number of adult root knot nematode females and larvae were counted. Absolute and relative frequencies, and absolute and relative densities of each nematode species was calculated (Norton 1978).

Results: Twenty-one nematode species belonging to 12 genera were identified. Commonly encountered nematode species were *Basiria varians*, *B. graminophila*, *Tylenchorhynchus mashhoodi*, *Aphelenchus avenae*, *T. leviterminalis*, *Helicotylenchus dihystra*, *H. exallus*, *H. rotundicauda*, *Cephalenchus lobus* and *H. digonicus*. The most prevalent species of plant parasitic

nematodes associated with *C. asiatica* were *T. mashhoodi*, *A. avenae* and *H. dihystra* with absolute densities 498, 382,338 per 500g soil respectively. *Basiria varians* had highest absolute (100.00%) and relative frequencies (7.36%). However, its density was low as compared to its frequency (Table 1).

The absolute and relative frequencies *Scutellonema brachyurus*, *Psilenchus elegans*, *Pratylenchus thornei* and *Basiria assarensis* were 57.14% and 4.21% respectively. The frequency of occurrence of *Coslenchus bisexualis*, *C. tausifi*, *Criconemella oblongata*, *C. ornata*, *C. serrata* and *Hirschmanneilla oryzae* was less as compared to other nematode species. *M. incognita* was recorded only in 5 samples with very high population.

The relative densities of *T. mashhoodi*, *A. avenae* and *H. dihystra* were 10.82, 8.30 and 7.34% respectively. The frequency of *B. graminophila*, *Cephalenchus lobus*, *H. digonicus*, *Pratylenchus thornei* and *B. assarensis* was high but their populations were very low. Other nematode species *Coslenchus bisexualis*, *C. tausifi*, *Criconemella serrata*, *C. ornata* and *Hirschmanneilla oryzae* were also recorded at low densities.

Discussion: Samathanam & Chawla (1982) reported that *Helicotylenchus* sp. and *Meloidogyne* sp. were most prevalent nematode genera associated with field crops, medicinal plants and trees in the hilly areas of a southern Districts (Madurai, Ramanathapuram, Tirunelveli and Kanyakumari) of Tamil Nadu. *Helicotylenchus abunaamai* was most common nematode species associated with a number of medicinal plants grown in a Silviculture Farm at Kalinga in the district of Phulbani, Orissa (Routaray & Das 1982). The most prevalent and commonly occurring plant parasitic nematodes associated with certain medicinal plants in Imphal were *Helicotylenchus* sp. and *Tylenchorhynchus* sp. (Romabati et al. 1992). These results also show species belonging to *Helicotylenchus*, *Meloidogyne* and *Tylenchorhynchus* were prevalent and commonly associated with medicinal plants. Based on the above findings, the most abundantly found nematode species associated with *Centella asiatica* were *Tylenchorhynchus mashhoodi*, *Aphelenchus avenae*, and *Helicotylenchus dihystra* while *Basiria vaians* was found to be highest in terms of absolute frequency.

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Table 1. Nematode species identified with their absolute frequency, relative frequency, absolute density and relative density.

	Nematode species	Absolute frequency(%)	Relative frequency(%)	Absolute density(%)	Relative density(%)
1.	<i>Basiria varians</i>	100.00	7.36	198	4.30
2.	<i>B. graminophila</i>	92.95	6.84	158	3.43
3.	<i>Tylenchorhynchus mashhoodi</i>	91.42	6.73	498	10.82
4.	<i>Aphelenchus avenae</i>	91.42	6.73	382	8.30
5.	<i>T. leviterminalis</i>	88.57	6.52	302	6.56
6.	<i>Helicotylenchus dihystra</i>	87.14	6.42	338	7.34
7.	<i>H. exallus</i>	85.71	6.31	303	6.58
8.	<i>H. rotundicauda</i>	85.71	6.31	237	5.15
9.	<i>Cephalenchus lobus</i>	75.71	5.57	71	1.54
10.	<i>H. digonicus</i>	71.42	5.26	100	2.17
11.	<i>Scutellonma brachyurus</i>	57.14	4.21	150	3.26
12.	<i>Psilenchus elegans</i>	57.14	4.21	100	2.17
13.	<i>Pratylenchus thornei</i>	57.14	4.21	98	2.13
14.	<i>B. assarensis</i>	57.14	4.21	68	1.47
15.	<i>Coslenchus bisexualis</i>	35.71	2.63	46	1.47
16.	<i>C. tausifi</i>	32.85	2.42	28	0.60
17.	<i>Criconemella oblongata</i>	28.57	2.10	108	2.34
18.	<i>C. ornata</i>	28.57	2.10	68	1.47
19.	<i>C. serrata</i>	25.71	1.89	45	0.97
20.	<i>Hirshmannella orzyae</i>	14.28	1.05	53	1.15
21.	<i>Meloidogyne incognita</i>	7.14	0.52	207	4.50

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