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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 rootsystem 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 dihystera, H. exallus, H. rotundicauda, Cephalenchus lobus and H. digonicus. The most prevalent species of plant parasitic

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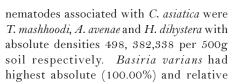
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frequencies (7.36%). However, its density was low as compared to its frequency (Table 1).

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

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