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NEMATODES ASSOCIATED WITH VEGETABLE CROPS IN THE KASHMIR VALLEY, INDIA

by
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Summary. A total of 267 soil and root samples were collected from 14 vegetable crops in the Kashmir Valley. Species of *Tylenchus*, *Cephalenchus*, *Basiria*, *Tylenchorhynchus*, *Nothotylenchus*, *Helicotylenchus*, *Hirschmanniella*, *Basirolaimus*, *Hoplolaimus*, *Meloidogyne*, *Globodera*, *Rotylenchulus* and *Pratylenchus* were found in 98% of the samples while *Aphelenchus* and *Aphelenchoides* were encountered in 20% of the samples though numbers varied. Individuals of *Xiphinema basiri*, *Longidorus* and *Trichodorus* were also found. The vegetable crops were found throughout the year thus depending on the crop, month, season and locality the nematodes density fluctuated.

A total of 267 soil and root samples were collected during September, 1985 to December, 1986 from various vegetable crops growing in the Kashmir valley. Nematodes were extracted from soil samples by Cobb's decanting technique and improved Baermann funnel method (Schindler, 1961). Root samples were comminuted and incubated for 16 hrs at 32 °C to obtain endoparasitic nematodes which were stained with cotton blue lactophenol (Franklin and Goodey, 1959) and slides were made by the rapid method.

The samples from the vegetable crops contained several species of tylenchids, aphelenchids and dorylaimids (Table I) as well as some free-living and predacious forms. Tylenchids were present in about 98% of the samples and aphelenchids in 20% of them. *Helicotylenchus* spp. occurred in almost all of the samples; the frequency of *Tylenchorhynchus*, *Tylenchus* and *Basirolaimus* / *Hoplolaimus* species varied (Table I). In vegetable crops at Shalimar, Tailbal, Lal Bazar, Kangan, Shopion, Patten and Sopore severe infestations of *Meloidogyne incognita* were observed on chillies (55%), brinjals (40%) and cauliflowers (15%). In a few localities the young brinjals were infested with *M. incognita* in association with a fungus. In some fields at Ganderbal, Zakura and Bandipur, *M. javanica* was the dominant endoparasitic species.

Every potato field of the valley was infested with more than one species of *Pratylenchus* and the fields at Nishat near Chashma Shahi and outskirts of Sopore and Barahmulla with *Globodera rostochiensis*. It is interesting to note here that the juveniles and cysts were isolated from such samples which had 10-15% of sand in soil. High numbers of *Tylenchorhynchus*, *Basirolaimus/Hoplolaimus*, and *Helicotylenchus* species (i.e., 750, 960 and 1050/250 g of soil, respectively) were recovered from around the roots of cabbage, turnip and hak grown at Sopore, Tailbal and

Chara-re-Shareef. Some individuals of *Xiphinema basiri*, *Longidorus*, *Dorylaimus* and *Trichodorus* were also found in cabbage, radish, spinach, cauliflower, hak, pea, onion and pumpkin crops.

It has been further noted that the nematode infestations are aggravated if vegetables like okra, brinjal, cucurbits and tomato are grown as intercrops in the orchards or as a rotational crop in the nurseries. The mixed populations of nematodes species were found in the samples from the fields nearby to the Dal and the Nageen lakes and those from across the irrigation canals (Waliullah, 1989). All the fields which had good amounts of moisture, cow dung, natural manures and the vegetable crops almost throughout the year had offered a congenial environment to the nematodes as well as to some other soil invertebrates of agricultural importance.

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TABLE I - Incidence of nematodes infestation on vegetable crops in the Kashmir valley, India

	VEGETAL CROPS													
	Potato (<i>Solanum tuberosum</i> L.)	Tomato (<i>Lycopersicon esculentum</i> Mill)	Brinjal (<i>S. melongena</i> L.)	Chilly (<i> Capsicum annuum</i> L.)	Okra (<i> Abelmoschus esculentus</i> (L.) Moench)	Hak (Brassica <i>oleracea acephala</i> L.)	Cabbage (<i>B. oleracea capitata</i> L.)	Cauliflower (<i>B. oleracea botrytis</i> L.)	Radish (<i>Raphanus sativus</i> L.)	Spinach (<i>Spinacia oleracea</i> L.)	Turnip (<i>B. rapa</i> L.)	Onion (<i>Allium cepa</i> L.)	Pea (<i>Pisum sativum</i> L.)	Pumpkin (<i>Cucurbita</i> spp.)
No. of fields	8	11	11	10	5	20	8	6	4	8	10	5	6	3
No. of Samples collected	40	36	30	24	5	35	12	12	12	16	20	10	9	6
Nematode species / genera	Number of samples infested													
<i>Tylenchus andrassyi</i>														
Fotedar et Kaul	1	10	18	11	—	5	—	8	—	—	—	—	2	—
<i>T. filiformis</i> Micoletzky	5	19	3	2	1	3	3	—	—	1	2	—	—	—
<i>Tylenchorhynchus baki</i>														
Fotedar et Mahajan	—	1	2	—	—	7	—	—	—	—	—	—	—	—
<i>T. kashmeriensis</i> Mahajan	2	—	6	5	2	—	—	2	2	—	6	—	—	—
<i>T. mashhoodi</i> Siddiqi et Basir	17	3	10	2	2	—	2	—	5	—	—	—	2	—
<i>T. brassicae</i> Siddiqi	—	—	—	1	1	—	7	11	6	1	—	—	—	1
<i>Basiria kashmeriensis</i>														
Jairajpuri	6	—	3	—	2	—	—	1	4	—	—	1	—	—
<i>Nothotylenchus basiri</i>														
Khan	—	1	5	—	2	1	—	1	3	—	1	1	—	—
<i>Basiolaimus indicus</i>														
Shamsi	6	—	8	2	4	2	5	—	1	—	8	—	2	4
<i>Hoplolaimus</i> spp.	3	2	2	—	1	—	2	1	—	3	—	1	—	2
<i>Helicotylenchus baki</i>														
Fotedar et Mahajan	—	—	3	2	—	5	—	—	—	—	—	—	—	—
<i>H. indicus</i> Siddiqi	1	9	—	—	—	—	2	—	—	—	3	—	—	—
<i>H. dybistera</i> (Cobb) Sher	—	10	—	—	—	1	—	—	2	—	—	1	1	1
<i>H. mucronatus</i> Siddiqi	—	—	15	—	3	—	—	4	—	—	—	—	—	1
<i>H. silvaticus</i> Lal et Khan	—	—	2	—	—	—	1	—	—	1	—	—	—	—
<i>Helicotylenchus</i> spp.	16	11	2	12	3	2	6	—	1	10	—	2	—	3
<i>Pratylenchus zaeae</i> Graham	5	—	2	—	—	1	—	—	2	—	—	—	—	—
<i>P. brakati</i> Das et Sultana	—	—	—	—	1	—	—	—	—	—	1	—	—	—
<i>P. brachyurus</i> Filipjev et Scht. Stek.	1	—	—	—	—	—	—	2	—	—	—	—	2	—
<i>P. similis</i> Khan et Singh	3	—	—	—	1	—	—	1	—	—	1	—	—	—
<i>Pratylenchus</i> spp.	17	2	7	10	—	2	—	—	2	—	—	—	—	2
<i>Hirschmanniella gracilis</i>														
Luc et Goodey	—	1	2	6	—	3	—	2	3	—	—	—	—	1
<i>Meloidogyne incognita</i>														
(Kofoid et white) Chitw.	2	1	18	10	—	—	1	1	—	1	—	—	—	2
<i>M. javanica</i> Chitw.	—	—	6	—	—	—	—	—	—	—	—	—	—	—
<i>Globodera rostochiensis</i>														
(Woll.) Behrens	5	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>Aphelenchus avenae</i>														
Bastian	2	1	2	—	1	—	—	1	—	1	—	4	2	2
<i>Aphelenchoides sanwali</i>														
Kumar	5	—	2	—	—	1	—	—	2	4	2	—	1	3
<i>A. composticola</i>														
Franklin	—	2	—	—	—	3	—	—	—	—	1	—	—	—
<i>A. sapprobillus</i>														
Franklin	2	—	—	3	3	—	2	—	1	—	—	4	—	—
<i>Rotylenchulus reniformis</i>														
Linford et Oliveira	—	—	—	—	2	—	—	—	2	—	1	—	—	1
<i>Xiphinema basiri</i> Siddiqi	—	1	2	—	—	2	—	4	1	—	2	—	—	—
<i>Longidorus</i> sp.	—	—	1	—	—	2	1	—	—	1	—	—	2	—
<i>Trichodorus</i> sp.	—	1	—	—	—	—	1	—	—	—	—	1	—	1