

STATUS OF PLANT PARASITIC NEMATODES IN GINGER FIELDS OF HIMACHAL PRDESH

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Abstract: Ginger (*Zingiber officinales* Roscoe) is grown as an important cash crop in the mid hill region of Himachal Pradesh. Plant parasitic nematodes are known to be among the major limiting factors in its production. To work out the status of phyto-parasitic nematodes in the rhizosphere of the crop, soil samples were collected from the major ginger growing localities. Although, number of nematode species have been found associated with the crop, the species of lesion nematode (*Pratylenchus coffeae*), root-knot nematode (*Meloidogyne incognita*), spiral nematode (*Helicotylenchus* spp), stunt nematode (*Tylenchorhynchus ewingi*) and ring nematode (*Mesocriconema xenoplax*) were the predominating in the descending order, respectively.

Keywords: Ginger, nematodes status, lesion nematode, root-knot nematode, spiral nematode.

Introduction

Ginger (*Zingiber officinales* Roscoe) is among the spice crops of global importance. It is grown as cash crop in the North - East and North- West Himalayan States of India. Among the various limiting factors in its production, plant parasitic nematodes do play a vital role and are known to cause yield losses between 11-80 per cent (Anonymous, 1993; Mohapatra *et al.*, 1986). Nematodes have also been found associated with root rot disease in ginger, where they enhance the severity of the problem by facilitating the entry and subsequent multiplication of fungal pathogens (*Fusarium oxysporum*/ *Pythium* spp.), responsible for the disease (Kaur and Sharma, 1988). In India, the State of Himachal Pradesh is one of the pioneer producers of ginger. Among the various phytoparasitic nematodes found prevalent in the ginger fields of the State, root-knot nematode (*Meloidogyne incognita*) and lesion nematode (*Pratylenchus* spp) are of major economic importance (Makhnotra, 1994; Dohroo, 1990; Kaur and Sharma, 1988). Keeping in view the economic importance of nematodes in ginger cultivation, major ginger growing districts of the State were surveyed to work out the status of plant parasitic nematodes in Himachal Pradesh.

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Material and Methods

About 900 soil samples were collected from about 60 localities of five districts (Sirmour, Solan, Shimla, Bilaspur and Mandi). Each sample collected was a composite sample (made of 3-5 sub-samples). From each composite soil sample, only 200 cc soil was processed (after its thorough mixing) for nematode extraction. The extraction was made through Cobb's sieving and decanting technique (Cobb, 1918). The isolated nematodes were counted in counting dish. They were killed and fixed in hot F.A. (4:1) and stored in nematode specimen tubes as wet collection. The fixed nematodes were transferred in glycerin alcohol (5 parts glycerin and 95 parts alcohol) for dehydration and permanent slides were prepared for their species identification. Identification of nematode genera was done by using the key provided by Siddiqi 2000, while species identification was done with the help of keys given by different authors.

Results and Discussion

Seventeen plant parasitic nematode species belonging to 15 genera were found present in the ginger rhizosphere and were identified as *Pratylenchus coffeae*, *Meloidogyne incognita*, *Tylenchorhynchus ewingi*, *Quinisulcius indicus*, *Helicotylenchus indicus*, *H. egyptiensis*, *Hoplolaimus citri*, *Paratylenchus curvatus*, *Mesocriconema xenoplax*, *Xiphinema radiculicola*, *X. bacaniboia*, *Aphelenchoides parietinus*, *Aphelenchus avenae*, *Filenchus sheri*, *Psilenchus iranicus*, *Paralongidorus* sp. and *Trichodorus* sp. Some non parasitic forms like *Dorylaimus*, *Belanodera*, *Iotonchus species* and *Mononchids* were also found. The nematodes viz., *Paralongidorus* sp, *Trichodorus* sp, *H. egyptiensis*, *A. parietinus*, *X. radiculicola* and *X. bacaniboia* were recorded for the first time from ginger crops in H.P. India.

Among all these nematodes, nine were of considerable importance (Table 2). Results showed the predominance of *P. coffeae* (lesion nematode) in terms of its frequency of occurrence, as it was extracted from 89 per cent samples with its relative frequency of 36.32. In different localities surveyed, population density of the nematode ranged between 60-2160/200 cc soil. Although, 2nd most predominant nematode in terms of per cent frequency of occurrence (75.5) and relative frequency (30.61) was *Helicotylenchus* spp. (*H. indicus* and *H. egyptiensis*), population density was highest for *M. incognita* (5000 J2 per 200 cc soil). However, populations of the two nematodes ranged between 40-780 and 40-5000, respectively. Root-knot nematode (*M. incognita*) J2 (an infective stage of the nematode present in the soil) was isolated from 20 per cent soil samples (relative frequency 8.16). The

same two nematodes have also been reported from the ginger fields by Kaur and Sharma, 1988 and Makhnotra, 1994. Stunt nematode (*T. ewingi*) was another important nematode in the ginger fields of the State, as it was found with relative frequency of 14.28 (prevalent in about 35 per cent samples) with varying populations of 95-835 in different localities. Another nematode of importance in ginger fields was *M. xenoplax*, followed by *Xiphinema* spp (*X. bacanibioa* and *X. radicolica*) which were observed in 11 and 6 per cent soil samples with their highest populations of 400 and 260/ 200 cc soil, respectively. The remaining three nematodes (*P. curvatus*, *L. pisi* and *Q. indicus*) showed their appearance in minimum number of soil samples (2-4 %), with negligible relative frequency (0.81-1.63). However maximum population densities recorded for the three nematodes were 200, 140 and 100-/ 200 cc soil, respectively.

Table 1. Major plant parasitic nematodes associated with ginger in HP

Sr. No.	Nematodes	Nematode population range value*	% frequency of occurrence	Relative frequency
1	<i>Pratylenchus coffeae</i>	60- 2160	89	36.32
2	<i>Tylenchorhynchus ewingi</i> .	95- 835	35	14.28
3	<i>Helicotylenchus</i> spp. (<i>H. indicus</i> & <i>H. egyptiensis</i>)	40- 780	75	30.61
4	<i>Meloidogyne incognita</i> (J2)	40- 5000	20	8.16
5	<i>Paratylenchus curvatus</i>	20- 200	2	0.81
6	<i>Quinisulcius indicus</i>	20- 100	3	1.22
7	<i>Longidorus pisi</i>	30-140	4	1.63
8	<i>Xiphinema</i> spp. (<i>X. bacanibioa</i> & <i>X. radicolica</i>)	40-260	6	2.44
9	<i>Mesocriconema xenoplax</i>	20-400	11	4.48

*per 200 cc of soil

From the results it can be concluded that although, no. of plant parasitic nematodes have been found harbouring the rhizosphere of ginger, lesion nematode (*Pratylenchus coffeae*) and root-knot nematode (*Meloidogyne incognita*) may be rated as most predominating/ damaging nematodes on the basis of their highest population buildup. However, spiral nematode (*Helicotylenchus* spp) and stunt nematode (*Tylenchorhynchus* spp) may also be enlisted among the important nematodes of ginger in the state of Himachal Pradesh, as they

showed their frequency of occurrence in considerable no. of samples and localities surveyed.

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