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## PATHOGENIC POTENTIAL OF *PRATYLENCHUS THORNEI* ON SOME MEDICINAL AND AROMATIC PLANTS

by

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**Summary.** Studies were undertaken to evaluate the pathogenic potential of *Pratylenchus thornei* on fifteen medicinal and aromatic plants in a glasshouse ( $25 \pm 3$  °C) pot experiment. The results indicate that all the tested species inoculated with 5000 nematodes per plant suffered a significant ( $P \leq 0.01$ ) reduction in plant length and fresh weight as compared to uninoculated controls. Greatest reduction in root length, shoot height and fresh root-shoot weights occurred in *Trigonella foenum-graecum* and the least in *Apium graveolens*. None of the plants was resistant to *P. thornei*.

Among the root lesion nematodes, *Pratylenchus* spp., *P. thornei* in particular is a potential pest which limits the production of crops (Sitaramaiah, 1984; Pinochet *et al.*, 1991; Di Vito *et al.*, 1992; Haseeb, 1994). However, very little is known about the association/incidence of this nematode on medicinal and aromatic plants. Therefore, studies were undertaken to evaluate 15 medicinal and aromatic plants (Table I) for their reaction to *P. thornei*.

### Materials and methods

The experiment was carried out in an air conditioned glasshouse at  $25 \pm 3$  °C. Seeds were surface sterilized with 0.01 per cent mercuric chloride solution and sown (5/pot) in 20 cm diameter clay pots containing 2.5 kg of steam sterilized soil (sand 72%, silt 12%, clay 16%, pH 7.2) and composted farm yard manure (9:1) mixture. One week after germination one seedling only was

left to grow in each pot. Twenty day old seedlings of each plant were inoculated separately with 5000 specimens of *Pratylenchus thornei* Sher *et* Allen obtained from a pure culture maintained on ornamental *Chrysanthemum* in a glasshouse. Five pots of each test species (Table I) were inoculated and five were left to serve as controls. Plant growth was determined 60 days after inoculation by measuring root length, shoot height, fresh and dry weight of root and shoot. The final nematode population in 250 g of soil from the rhizosphere of each plant was determined by using Cobb's sieving and decanting technique with final separation in Baermann funnel. The nematode population in fresh roots from each inoculated plant was determined by a maceration technique (Pinochet *et al.*, 1995).

The experimental design was a completely randomized block. The data were analyzed by analysis of variance (Cochran and Cox, 1957). Means of treatments were separated using L.S.D. test at ( $P \leq 0.05$ ) and ( $P \leq 0.01$ ).

TABLE I - Relationship between reproduction of *Pratylenchus thornei* and growth of some medicinal and aromatic plants.

Plant species	Initial inoculum densities (Pi)	a Root length (cm)	a Shoot height (cm)	a Fresh wt (g)		b Nematode population per g of root	b Final nematode population (Pf)		b Reproduction factor (Rf=Pf/Pi)
				Root	Shoot		Total root	2.5 kg soil	
<i>Apium graveolens</i> L. (Apiaceae)	0 5000	43.0 38.7 (10)	70.2 62.4 (11)	22.2 20.2 (9)	57.4 51.0 (11)	0 160	0 3232	0 6200	0 1.88
<i>Matricaria chamomilla</i> L. (Asteraceae)	0 5000	40.5 34.8 (14)	55.6 47.2 (15)	15.2 13.0 (14)	68.8 43.5 (15)	0 186	0 2418	0 7600	0 2.00
<i>Cichorium intybus</i> L. (Asteraceae)	0 5000	29.2 22.4 (23)	102.4 79.8 (22)	8.2 6.2 (24)	49.4 38.0 (23)	0 275	0 1705	0 8800	0 2.10
<i>Malva rotundifolia</i> L. (Malvaceae)	0 5000	56.4 38.4 (32)	65.0 44.8 (31)	10.4 7.2 (31)	23.8 16.2 (32)	0 682	0 4910	0 16200	0 4.22
<i>Malva sylvestris</i> (L.) Mill. (Malvaceae)	0 5000	29.6 19.5 (34)	60.2 40.4 (33)	11.6 7.8 (33)	30.2 19.6 (35)	0 740	0 5772	0 17000	0 4.55
<i>Hyoscyamus muticus</i> L. (Solanaceae)	0 5000	45.0 28.8 (36)	48.6 33.2 (32)	9.2 6.0 (35)	120.4 81.8 (32)	0 852	0 5112	0 21600	0 5.34
<i>Trachyspermum ammi</i> Sprague (Apiaceae)	0 5000	25.6 16.6 (35)	60.4 39.2 (35)	8.2 5.2 (36)	10.6 7.0 (34)	0 920	0 4784	0 23800	0 5.71
<i>Hyoscyamus niger</i> L. (Solanaceae)	0 5000	29.0 18.2 (37)	59.8 40.0 (33)	9.6 6.0 (37)	96.4 65.5 (32)	0 980	0 5880	0 28400	0 6.85
<i>Plantago ovata</i> L. (Plantagenaceae)	0 5000	20.2 12.8 (37)	25.5 16.4 (36)	3.6 2.3 (38)	16.6 10.4 (37)	0 1230	0 2829	0 31200	0 6.80
<i>Anethum graveolens</i> L. (Apiaceae)	0 5000	34.8 21.2 (39)	47.4 29.4 (38)	5.2 3.2 (39)	12.5 7.5 (40)	0 1743	0 5578	0 31400	0 7.39
<i>Coriandrum sativum</i> L. (Apiaceae)	0 5000	21.2 12.3 (42)	83.5 50.0 (40)	4.6 2.7 (41)	14.2 8.4 (41)	0 1925	0 5198	0 36800	0 8.39
<i>Foeniculum vulgare</i> Mill. (Apiaceae)	0 5000	22.0 12.6 (43)	74.6 41.0 (45)	4.6 2.6 (44)	6.8 3.8 (44)	0 2415	0 6279	0 36800	0 8.61
<i>Ammi visnaga</i> L. (Apiaceae)	0 5000	33.0 17.5 (47)	47.2 25.5 (46)	6.6 3.5 (47)	16.4 9.0 (45)	0 3325	0 11637	0 41600	0 10.64

TABLE I - Continued.

Plant species	Initial inoculum densities (Pi)	<sup>a</sup> Root length (cm)	<sup>a</sup> Shoot height (cm)	<sup>a</sup> Fresh wt (g)		<sup>b</sup> Nematode population per g of root	<sup>b</sup> Final nematode population (Pf)		<sup>b</sup> Reproduction factor (Rf= Pf/Pi)
				Root	Shoot		Total root	2.5 kg soil	
<i>Lipidium sativum</i> L. (Cruciferae)	0 5000	14.5 7.5 (48)	66.0 33.0 (50)	4.2 2.1 (50)	18.6 9.7 (48)	0 3913	0 8217	0 35600	0 8.76
<i>Trigonella foenum-graecum</i> L. (Fabaceae)	0 5000	38.0 13.2 (65)	74.6 35.2 (53)	6.6 2.8 (58)	19.8 9.6 (52)	0 4890	0 13692	0 39400	0 10.61
L.S.D. 0.05	-	1.16	1.64	0.62	1.08	132.5	265.1	1048.7	0.228
L.S.D. 0.01	-	1.53	2.17	0.81	1.43	176.4	352.6	1394.8	0.304

<sup>a</sup>Each value is an average of five replicates. <sup>b</sup>Each value is an average of three replicates. Figures in parenthesis are per cent reduction over uninoculated control.

## Results and discussion

Data presented in Table I show that all the tested species of medicinal and aromatic plants inoculated with *P. thornei* suffered a yield loss between 9 to 65% in plant length and fresh weight. The greatest reduction in root length, shoot height, fresh root and shoot weight was 65, 53, 58, and 52%, respectively, of *Trigonella foenum-graecum* and lowest (10, 11, 9 and 11% respectively) of *Apium graveolens*.

The suppressive effect of *P. thornei* on the growth of all the plant species was highly significant ( $P \leq 0.01$ ) as compared to plants without nematodes. Reduction in growth was directly proportional to the final population of *P. thornei* in the roots. However, the relation between per cent reduction and the reproduction factor (Rf) was not always directly proportional. The final population (Pf) of *P. thornei* was always more than Pi. The greatest number of *P. thornei* per g of root (4890) was observed in roots of *T. foenum-graecum* and the lowest (160) in the roots of *A. graveolens*. Stunting of plants due to nematode infection was visible at and above 275 *P. thornei*/g root but chlorosis was observed only above 3000 *P. thornei*/g root. However, lesions were visible on the roots at all the levels of infection.

Influence of various hosts on the reproduction of *P. thornei* was significant ( $P \leq 0.05$ ). However, differences in root population as well as Rf of *P. thornei* under *A. graveolens*, *Matricaria chamomilla* and *Cichorium intybus* were non significant ( $P \leq 0.05$ ). Similarly, differences in Rf between *Hyoscyamus niger/Plantago ovata*, *Foeniculum vulgare/Lipidium sativum*, and *Ammi visnaga/T. foenum-graecum* were non significant ( $P \leq 0.05$ ). These non significant differences show similar response of these hosts to *P. thornei*.

In this study, none of the plant species was found to be resistant to *P. thornei*. Based on our results *A. graveolens* and *M. chamomilla* are considered to be poor hosts for *P. thornei*, *C. sativum*, *F. vulgare*, *A. visnaga*, *L. sativum* and *T. foenum-graecum* are considered to be good hosts, and the remaining plant species are moderate hosts (Table II).

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TABLE II - Evaluation of host status of some medicinal and aromatic plants infested with *P. thornei*.

Host rating	Decrease in root growth (%)	Nematode population (per g of root)	Reproduction factor (Rf = Pf/Pi)
Poor	0-20	0-200	0-2.00
Moderate	21-40	201-1900	2.01-8.00
Good	41-above	1901-above	8.01-above

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