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## INFLUENCE OF *PRATYLENCHUS THORNEI* ON GROWTH, PHOTOSYNTHETIC RATE, CHLOROPHYLL, TOTAL SUGAR AND OIL YIELD OF *MENTHA CITRATA*

by

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**Summary.** Studies on the influence of *Pratylenchus thornei* on the growth, photosynthetic rate, chlorophyll, total sugar and oil yield of *Mentha citrata* indicate that with the increase in initial population levels (Pi) of the nematode, there was a corresponding decrease in all of the growth parameters. Largest reduction in all the growth parameters occurred at Pi of 30,000 per 7.5 kg soil. Revers was the trend for nematode multiplication.

There is only limited information on the pathogenicity of *Pratylenchus* sp. on various types of mint (*Mentha* spp.) (Haseeb, 1992, 1994). Haseeb and Shukla (1994) investigated the influence of *P. thornei* on the growth, physiology and oil yield of spear mint (*Mentha spicata*). The present investigation was undertaken to determine the effect of various initial population levels of *P. thornei* Sher et Allen on the growth, photosynthetic rate, leaf chlorophyll content, total sugar and oil yield of bergamot mint, *M. citrata* Ehrh.

### Materials and methods

Healthy suckers (5 cm long) of *M. citrata* cv. Kiran were transplanted singly into 30 cm diameter clay pots containing steam sterilized soil-sand-compost (7:2:1) mixture. At 4th leaf stage, groups of five pots were inoculated with 250, 500, 5000, 10000, 15000 or 30000 specimens of *P. thornei* obtained from a pure culture maintained in the glasshouse. Five pots were left uninoculated as a control. Various measurements were recorded 110 days after inoculation. Carbon-diox-

ide gas exchange rate was measured on a LICOR Model LI 6000 portable photosynthesis system. Chlorophyll content in leaves was measured according to the method of Arnon (1949). total sugar content was estimated colorimetrically using Nelson's modifications of Somogyi's method (Hodge and Hofreiter, 1962). Plant growth was determined by measuring suckers/stolon and herb length and dry weight. The final nematode population density in 250 g soil from each treatment was determined by Cobb's sieving and decanting technique with final separation in a Baermann funnel. Nematode numbers in 5 g root from each treatment were determined by macerating root tissues in a Waring blender. Oil from 100 g fresh tissue was extracted by Clevenger apparatus (Clevenger, 1928).

### Results and discussion

Growth of plants was significantly suppressed even at the lowest inoculum level (250 nematodes/pot) and losses increased significantly with the increase of the nematode initial population (Table I). Significant reductions in oil

TABLE I - Effect of different inoculum densities of *Pratylenchus thornei* on the growth and oil yield of *Mentha citrata*.

Initial inoculum level (Pi) / 7.5 kg soil	Plant length (cm)	Plant dry weight (g)	Oil yield ml/100 g fresh herb
0	197	62.2	0.60
250	169.4 (14.0)	54.2 (12.8)	0.55 (8.3)
500	154.8 (21.4)	49.8 (19.9)	0.49 (18.3)
2500	126.4 (35.8)	39.4 (36.6)	0.40 (33.3)
5000	112.8 (42.7)	34.6 (44.3)	0.37 (38.3)
10000	87.6 (55.5)	27.8 (55.3)	0.32 (46.6)
15000	74.8 (62.0)	24.8 (60.1)	0.29 (51.6)
30000	60.2 (69.4)	18.4 (70.4)	0.24 (60.0)
<i>L.S.D. at 5% level</i>	1.58	1.88	0.07
<i>L.S.D. at 1% level</i>	2.38	2.12	0.09

Figures in parentheses show per cent reduction over control.

TABLE II - Effect of different inoculum levels (Pi) on reproduction of *P. thornei* on *M. citrata*.

Initial inoculum level 7.5 kg soil (Pi)	Nematode population (Pf) in		Final nematode population (Pf)	Reproduction factor Rf = Pf/Pi
	Root system	7.5 kg soil		
0	—	—	—	—
250	11000	7000	18000	72.0
500	15100	14100	29200	58.4
2500	22400	31100	53500	21.4
5000	25500	40200	65700	13.1
10000	27100	52700	79800	7.9
15000	27400	56400	83800	5.5
30000	25800	60800	86600	2.8
<i>L.S.D. at 5% level</i>	26.22	28.04	30.24	2.26
<i>L.S.D. at 1% level</i>	31.82	45.96	39.80	6.22

yield occurred at Pi 500 and with further increase of Pi to 30,000, the reduction in oil yield reach to 60% (Table I). The highest reproduction rate of the nematode (Rf = 72.00) was observed at Pi 250 per 7.5 kg soil, whereas at Pi of 30,000 it was minimal (Table II). The suppressant effect of *P. thornei* on total chlorophyll content

was significant at Pi 500/pot and above, while total sugar content and the photosynthetic rate were significantly reduced at all inoculum levels (Table III).

The data obtained clearly indicate that *P. thornei* is highly pathogenic to *M. citrata* which is a good host for the nematode.

TABLE III - Chlorophyll content, total sugar content and photosynthetic rate of *M. citrata* at different inoculum levels of *P. thornei*.

Initial inoculum level / 7.5 kg soil	Chlorophyll content (mg/g Fresh Weight)			Total sugar content (mg/g fresh leaf)	Photosynthetic rate (mg CO <sub>2</sub> /dm <sup>2</sup> /hour)
	Chlorophyll a	Chlorophyll b	Total Chlorophyll		
0	0.90	0.51	1.43	49.60	12.29
250	0.83 (7.7)	0.47 (7.8)	1.32 (7.6)	45.50 (7.1)	11.06 (10.0)
500	0.77 (14.4)	0.43 (15.6)	1.23 (13.9)	43.00 (12.2)	10.45 (14.9)
2500	0.69 (23.3)	0.37 (27.4)	1.06 (25.8)	37.00 (24.4)	9.22 (24.9)
5000	0.61 (32.2)	0.32 (37.2)	0.95 (33.5)	33.00 (32.6)	8.61 (29.9)
10000	0.54 (40.0)	0.29 (43.1)	0.83 (41.9)	27.00 (44.9)	7.37 (40.0)
15000	0.48 (46.6)	0.26 (49.0)	0.75 (47.5)	25.00 (48.9)	6.14 (50.0)
30000	0.41 (54.4)	0.23 (54.9)	0.65 (54.5)	21.50 (56.1)	4.91 (60.0)
<i>L.S.D. at 5% level</i>	0.38	0.41	0.14	1.42	0.46
<i>L.S.D. at 1% level</i>	0.71	0.72	0.26	2.00	0.74

Figures in parentheses show percent reduction over control.

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