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Pathogenicity of *Meloidogyne incognita* (Kofoid & White) Chitwood on *Matricaria chamomilla* L.

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Abstract

Experiments conducted to ascertain the pathogenicity of *Meloidogyne incognita* and its effect on growth and flower yield of *Matricaria chamomilla* under glasshouse conditions indicated that an increase in the initial inoculum level of *M. incognita* reduced fresh and dry root and shoot weight and flower yield with corresponding decrease in nematode multiplication rate and increase in root-knot indices.

Key words : *Matricaria chamomilla, Meloidogyne incognita,* pathogenicity, root-knot nematode.

Matricaria chamomilla L. (Syn. *Chamomilla recutita* (L.) Raushert, Asteraceae) commonly known as German chamomile, is cultivated to a limited extent in India for its medicinal and flavouring properties. No information is available on the influence of root-knot nematode *Meloidogyne incognita* (Kofoid & White) Chitwood on *M. chamomilla.* The present studies were therefore carried out to investigate the influence of different inoculum levels of root-knot nematode on its development, plant root galling response and growth and flower yield.

Seeds of *M. chamomilla* were sown in autoclaved soil-compost mixture. Three week old seedlings of uniform size were transplanted singly in 15 cm clay pots containing autoclaved soil-compost mixture and were irrigated with sterile water. After 2 weeks of planting the seedlings were inoculated with 0, 10, 100, 1000 and 10,000 freshly hatched second stage larvae of *M. incognita* (the pure cultures of *M. incognita* were obtained from infested brinjal roots (*Solanum melongena* L., Pusa Purple Long) and maintained in glasshouse). Each treatment was replicated five times and five plants were left uninoculated to serve as control. The pots were arranged in a randomized pattern. Observations were recorded regularly to mark the development of symptoms. After 90 days of incoulation, the experiment was terminated and data on different growth parameters were recorded.

The root gall indices were calculated according to Krusberg & Nielson (1958) on a scale 0-4, where 0 = no infection or no root galling, 1 = slight infection (1-25%), 2 = moderate infection (26-50%), 3 = severe infection (51-75%) and 4 = very severe infection (76-100%). Nematode population in soil was isolated by Cobb's sieving and decanting technique along with Baermann funnel (Southey 1986) and its population in host root was recorded using sodium hypochlorite method (Hussey & Barker 1973).

The trials gave conclusive evidence of the destructive potential of *M. incognita* on *M. chamomilla* in terms of adverse effect on growth parameters and flower yield of the plant (Table 1). With an increase in initial population density (Pi) of *M. incognita,* there was a corresponding decrease in plant fresh/ dry weight and flower yield. Maximum reduction in fresh and dry weight (39.8 and 35.3%) was recorded at highest inoculum level (10,000) of *M. incognita,* while minimum at lowest inoculum level (10). The significant decrease in different growth parameters of plant and flower yield could be observed at or above 100 *M. incognita* larvae as initial inoculum density.

In general, the intensity of root galling was directly proportional to the increase in nematode population density and nematode reproduction rate was density dependent. Nematode reproduction was much higher with an initial inoculum density of 10 larvae and decreased with increase in population densities. However, the trend was completely reverse with root-knot indices. Root-knot indices increased with increase in population densities of *M. incognita* and were maximum (RKI = 4.00) at highest population densities (10,000) (Table 2).

A significant negative correlation was observed between Pi of *M. incognita* and fresh/dry weights as well as flower yield of *M. chamomilla*. The highest Pi tested (10,000 larvae/pot) induced about 39.5% reduction in flower yield of the plant. Similar trends were observed in fresh and dry weights of flowers as well as flower numbers (Table 1). The relationship between Pi of *M. incognita* and flower yield of *M. chamomilla* reported herein are in general agreement with

Table 1. Effect of inoculum levels of *Meloidogyne incognita* on growth and flower yield of *Matricaria chamomilla*

Inoculum	Fresh weight (g)			Dry weight (g)			Flower weight (g)		
level	Root	Shoot	Total	Root	Shoot	Total	No.	Fresh	Dry
0	15.9	77.1	93.0	4.0	12.7	16.7	248	33.8	5.1
10	14.2	72.5	86.7 (6.8)	3.6	12.5	16.1 (3.6)	233	32.3	3.8
100	13.8	65.4	79.2 (14.8)	3.4	10.0	13.4 (19.8)	170	27.3	3.1
1000	11.0	51.1	62.1 (33.2)	2.8	9.0	11.8 (29.3)	161	26.0	2.9
10,000	9.3	46.7	56.0 (39.8)	2.5	8.3	10.8 (35.3)	150	22.6	2.4
C. D (P=0.05)	1.2	2.4	3.4	0.04	0.7	1.0	7.5	2.2	0.5
C D (P=0.01)	2.8	3.5	3.7	0.64	1.1	1.8	12.4	3.2	0.9

Each value is an average of five replicates
Figures in parentheses are % age reduction over uninoculated control

Table 2. Effect of inoculum levels of *Meloidogyne incognita* on population development, nematode multiplication and root-knot indices in *Matricaria chamomilla*

Inoculum level	Nematode population in root	Nematode larvae in soil	Total nematode population (root+soil)	Root-knot Index
0	-	-	-	-
10	1136	450	1586	1.33
			(158.6)**	
100	3312	5100	8412	2.66
			(84.1)	
1000	2860	7300	10160	3.33
			(10.2)	
10,000	2790	7400	10190	4.00
			(01.2)	
C D (P=0.05)	963	984	1064	0.19
C D (P=0.01)	1048	1161	1628	0.23

Each value is an average of five replicates
** Reproduction Factor (Rf) = Pf/Pi
Pf = Final nematode population
Pi = Initial nematode population

previous reports concerning damage level of this nematode to other crops.

The reduction in final nematode population varied due to the destruction of root system as a result of competition for nutrition among the developing nematodes within the root system and also due to the inability of nematode larvae of subsequent generations to locate new infection sites (Ogunfowora 1977). Nematode damage and economic threshold densities are influenced by several environmental and biological factors which needs to be investigated on *M. chamomilla* under Indian conditions.

References

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