RESEARCH NOTES—NOTAS DE INVESTIGACION

INCIDENCE OF ROOT-KNOT NEMATODES IN MEDICINAL AND AROMATIC PLANTS—NEW HOST RECORDS[1]

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RESUMEN

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En un muestreo realizado en plantas medicinales y aromáticas, se identificaron 22 nuevos hospederos de *M. incognita* y 21 de *M. javanica.* De estos hospederos, 2 y 7 respectivamente son registrados por primera vez en la India. Se comenta acerca de la severidad causada por estos nematodos.

Palabras claves adicionales: Meloidogyne incognita, Meloidogyne javanica, plantas medicinales, plantas aromticas.

In recent years there has been an increased interest in the pathology of medicinal and aromatic plants. This holds true with respect to plant-parasitic nematodes. Root-knot nematodes (*Meloidogyne* species) have recently been recognized as a serious constraint to the productivity of medicinal and aromatic plants (1,2,4,5,6). Before embarking on any control program against plant-parasitic nematodes, it is imperative that one should know fully about the host-parasite relationship. Management of root-knot nematodes with nematicides cannot always be incorporated into control programs, because use of nematicides may not always be economically beneficial, and because environmental hazards may sometimes occur. Therefore, the ultimate objective of nematode management is to increase crop production by adapting integrated crop protection systems, including resistant cultivars, crop rotation, nematicides, sanitary and cultural practices. Before such control practices could be considered, it was first necessary to gather information regarding occurrence and level of infection of root-knot nematodes (*Meloidogyne* species) in various medicinal and aromatic plants.

A survey was conducted from July, 1983 through January, 1986 in the demonstration plots of the Central Institute of Medicinal and Aromatic Plants Headquarters, Lucknow, which were heavily infested with root-knot nematodes. The diseased material (galled roots) was collected and brought to the laboratory for examination and specific identification of nematodes, which was done by studying the perineal patterns of the mature females (9,10). The host response was rated as: light

(1-25%), moderate (26-50%), heavy (51-75%), or severe (76-100%) on the basis of root infection (8). Size of the root gall in comparison with normal roots was also recorded, ranging from small (0.1-0.4 cm), to medium (0.5-0.9 cm), to large (1.0 cm and above).

The root-knot species attacking the 38 medicinal and aromatic plants reported herein were found to be *Meloidogyne incognita* (Kofoid & White) Chitwood and *M. javanica* (Treub) Chitwood, which have not been previously reported on these hosts (3,4,5,6,7,9). Either one alone or both species of root-knot nematodes together were present on the root systems of the test plants. *Meloidogyne incognita* was found on 24 of the 38 test plants and *M. javanica* on 28 of 38. Multiple infections of both root-knot nematodes were recorded on 14 of the 38 test plants (Table 1).

Table 1. New host records of root-knot nematodes, *Meloidogyne* spp.[x]

Host plant	Family	Nematode species	Severity of infection[y]	Gall size[z]
Acorus calamus L.	Araceae	*Meloidogyne javanica*	+	S
Aloe barbadensis Mill.	Liliaceae	*M. incognia* *M. javanica*	+ +	SM
Aloe perryi Baker.	Liliaceae	*M. incognita* *M. javanica*	+ + +	S
Alpina galanga Willd.	Zingiberaceae	*M. javanica*	+ +	S
Andrographis paniculata Nees.	Acanthaceae	*M. incognita*	+	S
Argyreria speciosa Sweet	Convolvulaceae	*M. incognita*	+ + +	SM
Asclepias curassavica L.	Asclepiadaceae	*M. incognita* *M. javanica**	+ + +	SM
Barringtonia acutangula (L.) Gaertn.	Lecythidaceae	*M. incognita* *M. javanica*	+ +	S
Callistemon citrinus Skeel	Myrtaceae	*M. incognita**	+ +	SM
Callistemon lanceolata DC.	Myrtaceae	*M. incognita* *M. javanica*	+ + +	SM
Catharanthus roseus (L.) G. Don.	Apocynaceae	*M. incognita*	+ +	SM
Celastrus paniculatus Willd.	Celastraceae	*M. incognita*	+	S
Cissus quadrangularis L.	Vitaceae	*M. javanica*	+	S
Costus speciosus (Koen. ex Retz.) Sm.	Zingiberaceae	*M. incognia* *M. javanica*	+	S
Crataeva nurvala Ham.	Capparaceae	*M. incognia*	+	S
Digitalis lanata L.	Scrophulariaceae	*M. incognita* *M. javanica*	+ +	SM
Digitalis purpurea L.	Scrophulariaceae	*M. incognia*	+ +	SM
Elytraria acualis Lindau	Acanthaceae	*M. javanica*	+	S
Euphorbia thymifolia L.	Euphorbiaceae	*M. javanica*	+ + +	SM
Flacourtia indica Merr.	Flacourtiaceae	*M. javanica*	+ + +	SM
Gymnema sylvestre R.Br.	Asclepiadaceae	*M. javanica*	+ + +	SM
Hygrophila auriculata R.Br.	Asclepiadaceae	*M. incognita* *M. javanica*	+ +	SM
Ixora arborea Roxb. ex Sm.	Rubiaceae	*M. javanica*	+	S

Table 1. New host records of root-knot nematodes, *Meloidogyne* spp. (continued).[x]

Host plants	Family	Nematode species	Severity of infection[y]	Gall size[z]
Ixora coccinea L.	Rubiaceae	*M. incognita*	+	S
Jasminum humile L.	Oleaceae	*M. javanica*	+	S
Mellisa officinalis L.	Labiateae	*M. javanica**	+ + +	SM
Nicotiana plumbaginifolia Viv.	Solanaceae	*M. incognita**	+ +	S
Ocimum basilicum L. (Indian strain)	Lamiaceae	*M. javanica*	+ + +	SM
Ocimum basilicum L. (French strain)	Lamiaceae	*M. javanica**	+ + + +	SL
Ocimum canum Sims.	Lamiaceae	*M. incognia* *M. javanica**	+ +	SM
Ocimum gratissimum L.	Lamiaceae	*M. incognita* *M. javanica*	+ + +	ML
Ocimum kilmandescharicum Guerke	Lamiaceae	*M. incognita* *M. javanica*	+ + +	ML
Operculina turpenthum (L.) S. Menso	Convolvulaceae	*M. incognita*	+ +	SM
Plaederia scandans (Lour.) Merr.	Rubiaceae	*M. incognita* *M. javanica*	+	S
Scoparia dulcis L.	Scrophulariaceae	*M. javanica*	+	S
Tamarix gallica L.	Tamaricaceae	*M. javanica*	+ +	SM
Uraria picta Desv.	Leguminoseae	*M. incognita* *M. javanica*	+	SM
Woodfordia fruticosa	Lythraceae	*M. incognita* *M. javanica*	+	S

[x]Asterisk (*) indicates new host record for India only; previously reported elsewhere.
[y]+ = light (1-25%), + + = moderate (26-50%), + + + = heavy (51-75%), + + + + = severe (76-100%).
[z]S = small (0.1-0.4 cm), M = medium (0.5-0.9 cm), L = large (1.00 cm and above).

Several new hosts of root-knot nematodes were identified—22 for *M. incognita* and 21 for *M. javanica.* In addition to this there were 2 and 7 hosts respectively which have been recorded for the first time in India (Table 1), but which had previously been reported from other areas. Only *Ocimum basilicum* (French strain) was severely infested with root-knot nematodes, whereas *Aloe perryi, Argyreria speciosa, Asclepias curassavica, Callistemon lanceolata, Euphorbia thymifolia, Flacourtia indica, Gymnema sylvestre, Mellisa officinalis, O. basilicum* (Indian strain). *O. gratissimum,* and *O. kilmandescharicum* showed high infestations. The remaining plants were lightly to moderately galled. The demonstration plots had a natural heavy infestation of root-knot nematodes, and the test plants were grown in their respective beds continuously for more than three years. The data presented herein are based on continuous monitoring of the test plants for their maximal expression of the level of susceptibility.

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