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<https://doi.org/10.29321/MAJ.10.A03741>

A Report on the Natural Occurrence of Root-knot Nematodes (*Meloidogyne* Spp.) on Some Plants in Madras State

by

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The root-knot nematodes are well known for their world wide occurrence and broad spectrum of host-range. Though specially designed surveys have been undertaken in other countries to assess the distribution and damage caused by *Meloidogyne* spp., only limited work has been done in India in this direction. Nadakal (1963) and Nadakal and Thomas (1964) surveyed plants attacked by root-knot nematodes in Kerala and similar work was carried out by Seshadri and Kumaraswami (1963) in Madras State. Sethi *et al.* (1964) conducted a survey to find out the prevalence of *Meloidogyne* spp., around New Delhi. In the present study, a survey for the occurrence of root-knot nematodes were made in and around Annamalainagar and the adjoining villages of South Arcot district, Madras State during different cropping seasons of 1962—1964. Of the thirty five plant species examined, twenty six species showed the presence of galls. Besides noting

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Received on 3—3—1966.

the external symptoms of nematode attack, the severity of galling was indexed following the formulations of Shibuya (1952). The results are summarized in Table 1.

TABLE 1: *The root-knot nematodes and the symptoms caused on 26 different hosts plants*

Sl. No.	Host Plant	Symptoms of attack	Severity of galling	Nematode involved
1 (a)	<i>Acalypha indica</i> L.	Stunted growth	+++	<i>M. incognita</i>
(b)	<i>Acalypha indica</i> L.	Stunted growth	++	<i>M. javanica</i>
2.	<i>Ageratum conyzoides</i> L.	Mild chlorosis and stunted growth	++	<i>M. incognita</i>
3.	<i>Allium cepa</i> (L) Willd.	No symptom in the foliage, infestation mild	++	<i>M. incognita</i>
4.	<i>Amaranthus gangeticus</i> L.	Reduced leaf size and stunted growth	++++	<i>M. javanica</i>
5.	<i>Benincasa hispida</i> cogn.	Chlorotic leaves and non-setting of fruits	+++++	<i>M. javanica</i>
6.	<i>Beta vulgaris</i> L.	Tuber with pustules; lateral roots also bear galls	+++	<i>M. incognita</i>
7.	<i>Brassica oleracea</i> var. <i>gongylodes</i> L.	Tuber free from infection; only lateral roots bear galls	+++	<i>M. javanica</i>
8.	<i>Canna indica</i> L.	...	++	<i>M. javanica</i>
9.	<i>Caucus carota</i> L.	Stunted growth; tuber curled and malformed due to pustule formation	++++	<i>M. incognita</i>
10.	<i>Eclipta alba</i> Hassk.	No symptom in the foliage; only lateral roots bear galls, while the tap root free from infection	++++	<i>M. incognita</i>

TABLE 1 (Contd.)

Sl. No.	Host Plant	Symptoms of attack	Severity of galling	Nematode involved
11 (a)	<i>Enterolobium saman</i> Prain	No external symptom in the foliage; roots heavily galled	++++	<i>M. javanica</i>
(b)	<i>E. saman</i> Prain	Galls are completely absent but partially extruded body of females with egg masses prominent	(—)	<i>M. species</i>
12 (a)	<i>Hibiscus esculentus</i> L.	Some of the infected plants killed; chlorosis and stunting in live plants	++	<i>M. incognita</i>
(b)	<i>H. esculentus</i> L.	Stunted growth and chlorosis	+++++	<i>M. javanica</i>
13.	<i>Impatiens balsamina</i> L.	-do-	+++	<i>M. javanica</i>
14.	<i>Iresine biemuelleri</i> Voss.	-do-	++++	<i>M. javanica</i>
15.	<i>Maranta arundinaceae</i> L.	-do-	++	<i>M. javanica</i>
16.	<i>Morinda tinctoria</i> Roxb.	-do-	++++	<i>M. javanica</i>
17.	<i>Nicotiana tabacum</i> L.	-do-	+++	<i>M. javanica</i>
18.	<i>Petunia hybrida</i> Vilm.	Severe stunting of leaves	+++++	<i>M. javanica</i>
19.	<i>Physalis minima</i> L.	Slight chlorosis	+++	<i>M. javanica</i>
20.	<i>Portulaca grandiflora</i> Hook.	-do-	+++	<i>M. javanica</i>

TABLE 1 (Contd.)

Sl. No.	Host Plant	Symptoms of attack	Severity of galling	Nematode involved
21.	<i>Raphanus sativus</i> L.	Stunted growth	++++	<i>M. incognita</i>
22.	<i>Solanum melongena</i> L.	Stunted growth	++++	<i>M. javanica</i>
23.	<i>S. nigrum</i> L.	-do-	++	<i>M. javanica</i>
24.	<i>S. trilobatum</i> L.	-do-	+	<i>M. javanica</i>
25.	<i>Tephrosia purpure</i> Pers.	-do-	++	<i>M. javanica</i>
26.	<i>Typhonium trilobatum</i> Schoff.	Mild chlorosis and stunted growth; the underground rhizomes bear pustule-like knots	++++	<i>M. javanica</i>

The following nine plants viz., *Arachis hypogaea* L., *Crotalaria juncea* L., *Croton sparsiflorus* Morang, *Gossypium aroboreum* L. (Agricultural variety K-6 (Pandian)), *Leucas aspera* spr., *Lippia nodiflora* Mich., *Mirabilis jalapa* L., *Sesamum orientale* L. and *Trianthema portulacastrum* L. which did not show visible galls were examined further after staining with cotton-blue-lactophenol, but they gave consistently negative results.

The identification of the parasites mentioned above was based on the perineal patterns of the adult females. In all the cases, the pathogenicity of the parasites was confirmed by artificial inoculation on their respective hosts under controlled conditions.

As evidenced from the present study, the host ranges of the root-knot nematodes include annuals and perennials, crop plants as well as weeds, field crops and vegetables, and also ornamentals and green manures. The susceptible weeds identified in the present studies may serve as "carrier hosts" from season to season, as suggested by Rangaswami *et al* (1961). The susceptible perennial plants and trees are of particular importance to commercial nursery men since they serve as "perennial source" of potential

inoculum for the entire garden. The nematode infection of rhizome of yam, and tubers of carrot and beet root indicates how these plant parts with the egg masses embedded inside their tissues serve as "distributors"; spreading the nematodes over a wide area during the transport. The malformations on the carrot and beet root tubers considerably reduce their market value. When the infected and healthy rhizomes were incubated in the room for a few days the infected specimens with pustules shrivelled and rotted quickly indicating the impaired keeping quality due to nematode infection. The reduction in the yield of ash gourd and stunted growth and chlorosis found in many cases are significant damages caused by the nematodes.

Summary: A survey for the occurrence of root-knot nematodes in various plants was made in and around Annamalainagar and other villages in South Arcot district, Madras State. Of the 35 plant species examined, 26 species showed galling. Of these 20 were formed by *Meloidogyne javanica* (Treub, 1885) Chitwood, 1949, seven by *M. incognita* (Kofoid and White, 1919) Chitwood, 1949, and by an unidentified species; *Acalypha indica*, *Enterlobium saman* and *Hibiscus esculentus* were affected by both the species of *Meloidogyne* mentioned above, the infection symptoms being quite distinct in each case.

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