

## STUDIES ON THE DYNAMICS OF ROOT-KNOT NEMATODE ASSOCIATED WITH VEGETABLE CROPS IN SOME DISTRICTS OF WESTERN UTTAR PRADESH, INDIA

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### ABSTRACT

The studies were undertaken to assess the incidence and intensity of root-knot disease and to establish the identity of species of root-knot nematode associated with vegetable in order to understand their pattern of distribution in the study area comprises four districts of Western region of the state of U.P., an area with long history of agriculture. *M. incognita*, *M. javanica* and *M. arenaria* were identified to be present in the study area associated with vegetable crops. *M. incognita* and *M. javanica* were present in all four districts where as distribution of *M. arenaria* was limited to Bareilly and Moradabad districts.

**KEYWORDS :** *Meloidogyne*, Root-knot, nematode, vegetables

Root-Knot disease is a serious problem in vegetable growing areas of world including India *Meloidogyne* species attack an array of economically important plants affects both quantitatively and qualitatively. Among these vegetables are most affected by root-knot disease on world-wide basis. Estimated crop losses due to *Meloidogyne* sp. range from 5 to 43% (Sasser, 1980 ; Sasser and Carter, 1982).

Root-knot nematode is economically important in India as well. Ninety species of *Meloidogyne* have been reported from different countries of the world. Eleven species of *Meloidogyne* have been reported from different states of India. (Sitaramaiah, 1984) Out of them five species have been observed in U.P. Out of these species reported from India, only three *M. incognita*, *M. javanica* and *M. graminicola* are predominant in India. *M. incognita* and *M. javanica* have been found to attack mostly vegetables, where as *M. graminicola* is confined to rice (Krishnappa, 1985). This information on occurrence and dominance of the species is based on a relatively few studies. Haider et al. (1988) were identified *M. incognita* as causal organism of root-knot disease from Bihar. Sharma et al., (1989) were reported *M. incognita* and *M. javanica* as the species infected vegetable in Assam. Bhatt and Dehiya, (1977) recorded *M. javanica* and *M. incognita* form the state of Haryana. Occurrence of *M. incognita* and *M. javanica* was reported form Himachal Pradesh by Bhardwaj et al., (1972). Krishnappa and Setty, (1983) was noted the existance of *M. incognita* in Karnataka. Waliullah and Kaul, (1986) was reported *Meloidogyne* species from Kashmir.

In the state of U.P. order of occurrence of species of root-knot nematode very few reports are available only from Aligarh and neighbouring districts of U.P. Apparently no attempt was made to ascertain the identity of *Meloidogyne* on vegetable in cultivated fields in other districts of Western U.P. So considering this aspect present papers gives the pattern of distribution, identity of species and their relative dominance in some districts of Western U.P.

### MATERIALS AND METHODS

Surveys were conducted in localities of extensive vegetable cultivation in four districts (ie. Moradabad, Bareilly, Meerut and Saharanpur) of Western Uttar Pradesh in India to assess the incidence and intensity of root-knot disease of vegetable crops, to establish the identity of species of root-knot nematode and to understand their pattern of distribution. Eggplant (*Solanum melongena* L.), tomato (*Lycopersicon esculentum* Mill.), paper (*Capsicum annuum* L.), okra (*Abelmoschus esculentus* (L.) Moen) were included in the survey which are commonly grown in the area.

Surveys were conducted in both the seasons (Summer and winter) of vegetable cultivation area from 2009 to 2011. Five to ten root samples of above mentioned vegetable crops were collected at random from each of the available cultivation units in the locality under survey in polythene bags. Samples were properly labeled and slightly moistened when necessary and brought to laboratory for further examination. Then ten to twenty perineal patterns

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were prepared from each of the root samples and their characteristics were microscopically examined for identification of the species (Eisenback et al., 1981).

## RESULTS AND DISCUSSION

The study area included four districts of Western region of the state of the U.P. Root samples of vegetables were collected from all the localities of Bareilly city area, Aonla, Fatehganj and Nawabganj except Faridpur where no extensive vegetables cultivation was found. The incidence of the disease in vegetable fields were highest (66-76%) in Bareilly city area followed by Aonla (49%). Disease incidence was more or equal in Fatehganj (42%) and Nawabganj (41.2%).

Four localities of the Meerut districts viz. Sardhana, Mawana, Kithaur and Jani were surveyed. The incidence of root-knot disease in vegetable fields was highest the in Kithaur (65%) followed by Mawana (55%). In Sardhana, it was (38%) and in Jani incidence was (33%). Around the Meerut city area fields were apparently free from infestation as no sample contained root-knot nematode infection.

Moradabad city area, Bilari, Kanth, Pakwara and Takurdwara were surveyed in Moradabad district. Extensive vegetable cultivation was not found in Takurdwara, so very few samples were collected from this locality. The incidence of disease was 50% in Moradabad city area, 46 % in Pakwara, 40% in Kanth, 35% in Bilari and 21% in Takurdwara.

Deoband, Nakur, Sarsawa, Nanauta of Saharanpur district were surveyed. The incidence of the disease in vegetable fields were highest (68%) in Deoband followed by Nanauta (57%) . The incidence was (42%) in Sarsawa and (38%) in Nanauta.

*M. incognita*, *M. javanica* and *M. arenaria* was identified to be present in the study area. *M. incognita* and *M. javanica* were encountered in all four districts of the study area *M. arenaria* was found only in Bareilly and Meerut districts. It was noticed in Aonla of Bareilly district and locality of Moradabad city area in table 1.

Root-knot nematode, *Meloidogyne* species are parasites of global significance. In the present study three

**Table1: Identity of root-knot nematodes associated with vegetables in some districts of Western Uttar Pradesh (India)**

Districts	Survey Area	Root-Knot Nematode
Bareilly	Aonla	<i>M. incognita</i> , <i>M. javanica</i> , <i>M. arenaria</i>
	Bareilly City	<i>M. incognita</i> , <i>M. javanica</i>
	Fatehganj West	<i>M. incognita</i> , <i>M. javanica</i>
	Nawabganj	<i>M. javanica</i> , <i>M. arenaria</i>
Meerut	Sardhana	<i>M. incognita</i> , <i>M. javanica</i>
	Mawana	<i>M. javanica</i> , <i>M. javanica</i>
	Kithaur	<i>M. javanica</i>
	Jani	<i>M. incognita</i>
Moradabad	Moradabad City	<i>M. incognita</i> , <i>M. javanica</i> , <i>M. arenaria</i>
	Bilari	<i>M. incognita</i> , <i>M. javanica</i>
	Kanth	<i>M. incognita</i> , <i>M. javanica</i>
	Pakwara	<i>M. incognita</i>
	Takurdwara	<i>M. javanica</i>
Saharanpur	Deoband	<i>M. javanica</i>
	Nakur	<i>M. javanica</i>
	Sarsawa	<i>M. incognita</i> , <i>M. javanica</i>
	Nanauta	<i>M. javanica</i>

species of *Meloidogyne* were recorded. These species are *M. incognita*, *M. javanica* and *M. arenaria*. *M. incognita* is regarded as most important species of root-knot nematode as world wise basis. It constitutes a large portion of root-knot population in tropics. *M. javanica* ranks second in terms of frequency and relative least common in tropics (Sasser, 1980 ;Sharma et al. , 1989).

Thus *M. incognita* and *M. javanica* is also quite frequent and potentially damaging species of the area. More ever *M. arenaria* is also present in the area with low frequency. *M. incognita* and *M. javanica* the two common species of the area should call for attention of management nematologists and growers. Even though *M. arenaria* is not recognized very potentially damaging as *M. incognita* and *M. javanica* (Lamberti, 1979 and Sasser, 1980), its significance in crop damages in the region needs to be worked out. It may look two conjectural but the species

content of on area or region may have some relationship with agriculture history. India is a predominantly an agriculture country and indo gangetic plains are one of the most fertile land area of the world.

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