Emerging Nematode Problems in India

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OPEN ACCESS

Keywords

Root knot nematodes, Golden cyst nematodes

How to cite this article:

Roy, J. R. A., Dhanasri, V., and Raj, A. 2025. Emerging Nematode Problems in India. *Vigyan Varta* 6(4): 12- 14.

ABSTRACT

Phytonematodes are parasites of plants that mostly affect the roots and a few on the aerial parts. These plant-parasitic nematodes are gaining essential economic importance as they are a threat in the fields of agriculture, horticulture, forestry and their respective allied sectors. They are comparatively easy to be managed with minimum infestation and nearly impossible to completely eradicate once they occur in a field. Recent research has been reporting the emerging threat of nematode infection on various crops throughout the country. Root knot nematodes are expanding their host range and occurrence of new *Meloidogyne* species in citrus plantations and prevalence of adverse effects and complete crop failure in protected cultivation are being reported. Other nematodes, like potato golden cyst nematodes, nematodes affecting flower crops, and mushroom cultivation, are becoming a major threat.

INTRODUCTION

Nematodes are wormlike organisms belonging to the phylum Nematoda of the animal kingdom. They are free-living (saprophytic) or parasitic in nature, whose study is collectively known as Nematology. Their parasitism has been recorded in a wide range of animals, and plants, and those that affect the plants are called plant-parasitic nematodes. Most plant-parasitic nematodes colonize and complete their life cycle in the roots and few on aerial plant parts. These plant-parasitic nematodes

are gaining essential economic importance as they are a threat in the fields of agriculture, horticulture, forestry and their respective allied sectors. Though they are less prevalent and comparatively easy to be managed on minimum occurrence, they are getting widespread throughout India, which in upcoming years would be a major issue causing severe economic loss to the crops. In addition to their own damage, nematodes in association with various pathogens and insects would lead to various disease complexes that are lethal to the crops.

Table 1: The losses caused by the plant parasitic nematodes to economically important crops of India

Sl. No.	Crops	Infecting Nematode	% yield loss	Loss (Rs in Million)
1.	Banana	*Meloidogyne incognita*	15	9710.46
2.	Guava	*Meloidogyne spp.*	28	2350.88
3.	Citrus	*Tylenchulus semipenetrans*	27	9828.22
4.	Pomegranate	*Meloidogyne spp.*	23	3023.44
5.	Brinjal	*Meloidogyne incognita*	21	3499.12
6.	Chilli	*Meloidogyne incognita*	15	744.90
7.	Cucumber	*Meloidogyne spp.*	12	110.46
8.	Okra	*Meloidogyne spp.*	19.5	2480.86
9.	Tomato	*Meloidogyne spp.*	23	6035.20
10.	Capsicum	*Meloidogyne spp.*	10	52.92

Source: Kumar et al. 2020

Emerging Nematodes of Economic Importance:

Root Knot Nematodes:

Root Knot Nematodes (*Meloidogyne spp.*) are the common phyto-nematodes especially infecting the vegetable crops throughout India. In the last few years, the infection by the root-knot nematode (*Meloidogyne incognita*) attacking new crops like gherkin, crossendra, carrot, coleus, gerbera, tuberose, cabbage & carnation in poly houses, pomegranate, mulberry, Olive, castor, groundnut, cotton, lac, potato tubers, etc., has been reported. Infection by *M. graminicola* in rice is becoming persistent and has been reported to attack new hosts like onion and garlic in the Shimoga area of Karnataka. *M. incognita* has been reported becoming a potential threat to the rice-wheat Cropping system in Punjab, Haryana, Western UP, Bihar, etc. (Patel. D. J., 2022).

In controlled protected cultivation structures like polyhouses, the occurrence and establishment of the root-knot nematode (*Meloidogyne spp.*) are increased. Sole cropping of the susceptible host throughout the year with minimum cultural practices leads to the establishment of the nematode, which is impossible to eradicate (Yadav and Patil, 2021).

A new species of root-knot nematode, *M. enterolobii*, is observed attacking guava trees in Tamil Nadu, Karnataka, Gujarat, etc., which has so far not been encountered in India and might be spread through the infected saplings from other countries. Similarly, *M. indica* commonly called the Asian citrus root-knot nematode has been reported to infect the citrus plantations in Gujarat for the first time (Patel. D J., 2022).

Figures showing the symptoms of *M. enterolobii* in Citrus, *Source: TNAU Agri-tech portal*

Golden Cyst Nematode:

Globodera rostochiensis & G. pallida are the common golden cyst nematodes affecting potatoes. It was first reported in the Nilgiri hills during 1961, and severe quarantine laws were enforced under the Destructive Insect Pest Act of 1914 to control the widespread of the nematode. However recently it was reported that the occurrence of golden cyst nematode on potato cultivating areas of Himachal Pradesh, Uttarakhand and Jammu & Kashmir (Yadav and Patil, 2021).

Nematodes affecting mushroom cultivation:

Saprophytic nematodes, which also feed on fungi, can cause a destructive loss in mushroom cultivation. Recent records show that the incidence of mushroom nematodes is becoming an essential threat and which once occurred cannot be eradicated, which would completely turn down the cultivation of mushroom fungi. These nematodes are stylet-bearing which multiply very fast, completing their life cycle within 8-10 days. They suck the sap from the fungal hyphae and leading to damage. In addition to the destruction quantitatively, the quality of the mushroom is also affected, leading to the reduced value and least preference by the consumers (Yadav and Patil, 2021).

Nematodes in flowers:

Aerial plant-feeding nematode incidence has shown an alarming increase, affecting especially the floral parts. The foliar nematode *Aphelenchoides besseyi* has emerged as a new threat in the field of floriculture. *A. besseyi* has been reported to affect Tuberose (*Polianthes tuberosa* L.), which is a typical single flower having a vast global market. Infection leads to the symptoms of stunting, hardened stalks and spikes, prickling, etc (Yadav and Patil, 2021).

CONCLUSION:

Nematodes in the present scenario are comparatively less established in our country. But due to changing climatic conditions, field practices, and depletion of soil fertility, increasing the chances of minor pests emerging as major. Excessive usage of chemical inputs is of course, paving the way for developing resistance in the pests in the long run. Therefore, the implementation of various integrated management strategies on crop production and eco-friendly approaches would be vital for our near future in crop production.

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