



Research Paper

**PLANT PARASITIC NEMATODES ASSOCIATED WITH IMPORTANT
FRUIT CROPS OF INDIA**

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Abstract

India is the second largest fruit producer in the world. As per National Horticulture Database published by National Horticulture Board, during 2016-17, India produced 92.846 MT of fruits. Wide varieties of fruits are grown in different agro climatic zones of India. Plant parasitic nematodes are one of the major threats to the fruit crops grown in India. Along with causing direct damage to the crops ; nematodes also act as aggravator and vector to the other microorganisms. This leads to a greater yield loss and quality deterioration. In this study attempt is made to compile the information on major plant parasitic nematode species associated with important fruit crops grown in India. Among various nematodes identified the most devastating nematode genera affecting fruits are *Meloidogyne*, *Pratylenchus*, *Helicotylenchus*, *Radopholus*, *Tylenchulus* and *Xiphinema*. There is an urgent need to study the host pathogen relationship, epidemiology and the management practices to meet the domestic as well as the international market of fruit.

Key words: Fruits, Plant parasitic nematodes, Yield loss.

INTRODUCTION

India has diverse climatic and soil condition for fruit production. Fruits are part of regular Indian diet list. Fruit cultivation has become a lucrative choice among the small and marginal farmers of India. Fruit crops are estimated to cover around 6.48 MHa area with the production 92.846 MT of in India (2016-17, National Horticultural Board,). The major fruit producing states of India are- Andhra Pradesh, Maharashtra, Karnataka, Tamil Nadu, UP, Gujarat and Bihar.

Plant parasitic nematodes are one of the major pests of fruit crops. Many biotic and abiotic factors play an important role in distribution these nematodes. The first report of nematode damage to fruit crops was reported on citrus by *Meloidogyne sp.* (Thirumala Rao, 1956). The infestation of *Radopholus similis* on banana was reported

from Kerela (Nair *et al.*, 1966). These were some earlier record of plant parasitic nematode infestation on fruit crops in India.

Table1: Nematodes pest and yield loss caused by some important plant parasitic nematodes

Fruit	Nematode	Yield loss (%)	Reference(s)
Banana	<i>R. similis</i> <i>M. incognita</i>	38.00% 30.90%	Rajagopalan & Naganathan, 1977b (Jonathan & Rajendran, 2000)
Lemon	<i>Tylenchulus semipenetrans</i>	29.00%	Mukhopadhyaya & Surayanarayana, 1969
Sweet lime	<i>T. semipenetrans</i>	19.00%	Mukhopadhyaya & Dalal, 1971
Papaya	<i>Rotylenchulus reniformis</i>	28.00%	Rajendaran & Naganathan, 1981
Guava	<i>M. enterolobii</i>	60-80%	National Institute of Plant Health Management (NIPHM) data
Pomegranate	<i>Meloidogyne sp.</i>	24.64-27.45%	Singh <i>et al.</i> , 2003

Most of the fruit crops are grown as monocrop which provides a congenial environment to the nematodes. If the nematode population is unchecked then it increases to an alarming level and may finally wipe out the whole crop. Nematode management is therefore important for high yields and quality that are required by the high cost of modern crop production. The major fruit growing states are facing remarkable loss due to nematode infestation.

Table2: Diversity of plant parasitic nematodes associated with fruit crops

Crop	Nematode species	Reference(s)
Banana	<i>R. similis</i> <i>Helicotylenchus multicinctus</i> <i>M. incognita</i>	Nair <i>et al.</i> , 1966 Vadivelu <i>et al.</i> , 1987 Cobb, 1893
Citrus	<i>T. semipenetrans</i> <i>Pratylenchus coffeae</i> <i>Meloidogyne sp.</i> <i>R. citrophilus</i>	Siddiqi, 1961 Siddiqi, 1964 Thirumala Rao, 1956 Suit and DuCharme, 1953
Papaya	<i>Meloidogyne sp.</i> <i>R. reniformis</i> <i>Xiphinema basiri</i>	Ponte, 1980 Prasad <i>et al.</i> , 1964 Sundarababu and Muthukrishnan, 1990

Pineapple	<i>Meloidogyne sp.</i> <i>R. reniformis</i>	-
Mango	<i>Hemicriconemoides mangiferae</i> <i>M. incognita</i>	Siddiqi, 1977; McSorley, 1992 Mani and Al Hinani, 1995
Grape vine	<i>Xiphinema sp.</i>	-

Typical symptoms of nematode infested fruit crops

1) Root-knot nematode, *Meloidogyne sp.*

Symptoms:

- a) Generally infected plants show stunted growth and yellowing.
- b) Chlorotic leaves.
- c) Galls are developed on the underground parts.
- d) Size of gall varies from crop to crop.

2) Root lesion nematode, *Pratylenchus sp.*

Symptoms:

- a) In Apple, young trees show poor growth.
- b) Yields of infected trees may be significantly lower than non-infected trees.
- c) Infected roots have discoloured and necrotic (black) areas
- d) Patchy growth is visible in affected trees.

3) Dagger nematode, *Xiphinema sp.*

Symptoms:

- a) Above-ground symptoms of nematode damage can be hard to detect and easily confused with other plant stresses resulting from water or nutrient deficiencies.
- b) Plant symptoms resulting from viral infection commonly include: chlorotic mottling and defoliation.
- c) Bright yellow discoloration of foliage.
- d) Yellowing along main leaf veins.
- e) Spots, blotches and crinkling of leaves; and stunting.

4) Spiral Nematode, *Helicotylenchus sp.*

Symptoms:

- a) Banana plants show yellowing of leaf, growth retarded, deep lesions on rhizomes and roots, destruction of feeder roots and Reduction in fruit yield, (Singh and Prasad).
- b) In citrus show slow decline, dieback, rootlets shortened, swollen and irregular, soil adhere to gelatinous matrix of the egg mass, galls on roots

5) *Tylenchulus semipenetrans*

Symptoms:

- a) *T. semipenetrans* is an important pest responsible for slow decline disease of citrus.
- b) Infestation level depends on the age of trees and time of infection, susceptible rootstock and the population density of nematode.
- c) Leaf and fruit size get reduce.
- d) Canopy becomes thin.

6) *Rotylenchulus reniformis*

Symptoms:

- a) Shedding of leaves.
- b) Formation of malformed fruit and seeds.
- c) Plant growth stunted.
- d) Roots system becomes impaired.
- e) Discoloration and necrotic (dead) with areas of decay is more visible.

DISCUSSION

Currently nematodes have become a major problem to the commercial fruit growers of India. It is clear from the above information that there is adequate information available on nematode infestation in fruit crops. This has necessitated an urgent need to develop integrated packages for nematodes along with other disease of fruit crops. Further there is an urgent need to do further studies on host parasite relationship and epidemiology of the diseases in order to have a sound integrated management approach. Concerned authorities should also take initiative to make the farming community aware about the damage caused by the nematodes.

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