

PARASITIC NEMATODES ASSOCIATED WITH BETELVINE (*Piper betle*) IN TAMIL NADU

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A survey conducted to identify various parasitic nematode species affecting betelvine in Tamil Nadu reveals the occurrence of Root knot nematode, *Meloidogyne incognita* and *Helicotylenchus* spp. through out Tamil Nadu and *Rotylenchulus reniformis* and *Radopholus similis* in isolated areas. Other ectoparasitic nematodes like Dorylaimids, *Hoplolaimus seinhorsti*, *Tylenchorynchus brascicae* etc., were found in large numbers in betelvine growing areas of Tamil Nadu with varying frequencies and densities.

Betelvine (*Piper betle* L.) is cultivated in 1,25,000 acres in India and in 15,000 acres in Tamil Nadu. In recent years a marked decline in the cultivation of this crop has been noticed because of the losses due to pest and diseases. Association of root-knot nematode, *Meloidogyne incognita* in betelvine has been reported by many workers (Dhande and Sulaiman, 1961; Narasimhan, 1964; Venkata Rao *et al.*, 1973; Mammen, 1974). The parasitic nematodes attack the betelvine roots and interferes with the normal uptake of nutrients. Ectoparasitic nematodes predisposes the plant roots for the entry of plant pathogenic fungi. A survey has been conducted in betelvine growing areas of Tamil Nadu with a view to identify

various species of plant parasitic nematodes affecting betelvine.

MATERIAL AND METHODS

Soil samples were taken randomly in the rhizosphere region, along with root samples. Modified Baermann funnel (Christie and Perry, 1951) was followed for the extraction of nematodes. Sieves of 60, 100, 200 and 325 mesh were used for the extraction. The nematodes were fixed in 4 percent formaldehyde. A zero to five scale was followed for root gall indexing. Absolute frequency, relative frequency and density of various nematode species were calculated using the following formulae :

$$\text{Absolute frequency} = \frac{\text{Number of samples containing a species}}{\text{Number of collected samples}} \times 100$$

$$\text{Relative frequency} = \frac{\text{Frequency of a species}}{\text{Sum of frequencies of all the species}} \times 100$$

$$\text{Density} = \frac{\text{Number of individuals of a species in a sample}}{\text{Total number of individuals in a sample}} \times 100$$

RESULTS AND DISCUSSION:

The root-knot nematode, *Meloidogyne incognita* was observed in

betelvine growing areas of all the districts with a gall index ranging from 0 to 3. The size of the galls.

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range from 2 to 10mm. On an average 5 to 6 adult females were present along with immature stages in a single gall. The absence of egg masses outside the gall, is a common phenomenon in betel roots. Among the commonly occurring varieties viz., Karpoori, Vellai Pachaikkodi and Karuppu Pachaikkodi; the variety Vellai Pachaikkodi was found to be least infested by root-knot nematode while Karpoori was highly susceptible. No significant growth reduction was observed in vines affected by *M. incognita*. The reniform nematode *Rotylenchulus reniformis* is confined only to some areas like Pothanur of Salem district and Mallapuram and Marandahalli of Dharmapuri district. Among the ectoparasites the predominant species were *Helicotylenchus incisus*, *Hoplolaimus seinhorsti*, *Hirschmanniella mucronata*, *Creconemoides* spp, *Tylenchorynchus brassicae* and Dorylaimids. The occurrence of *Radopholus similis* and *Pratylenchus coffeae* was noticed in some parts of Thanjavur district. *Helicotylenchus incisus* and *Hoplolaimus seinhorsti* were also observed to feed as migratory endoparasites to some extent. The absolute frequency relative frequency and density of the nematode species are given in Table-1.

The spiral nematode *Helicotylenchus incisus* was observed for the first time in betelvine along with *H. crenacauda* and *H. multicinctus*. Dorylaimids were observed in all the betelvine growing areas of Tamil Nadu with maximum absolute and relative frequencies of 85.00 and 21.02 per cent respectively. The absolute and relative frequencies and density of *M. incognita*,

were, 75.00, 18.62 and 32.75 per cents respectively. Though the absolute and relative frequencies are taken into account, the density is the factor which throws more light on the damage potentiality of a species and the crop loss due to them. In case of *Helicotylenchus incisus* and *Hoplolaimus seinhorsti* the absolute frequency was high but the relative frequency and density were low. The density of *Creconemoides* Spp. and *Radopholus similis* were fairly high but the relative frequencies was low. The population density and frequencies of *Coenorhabditis* spp. which is an anerobic bacterial feeder were found to be high in places where trench type of cultivation is followed.

The high densities of *M. incognita*, *R. reniformis*, *Creconemoides* spp., *Radopholus similis*, *Pratylenchus coffeae*, *Helicotylenchus* spp., *Hoplolaimus* spp, and Dorylaimids might predispose the betelroots for the entry of *Phytophthora* spp. the fungus causing betelvine wilt. Venkata Rao *et al.* (1973) has indicated the possibility of nematode-fungus association in the wilt syndrome. However, the nematode-fungus association in the causation of wilt in betelvine warrants investigation.

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Table 1. Frequency and density of parasitic nematodes affecting betelvine

Nematode species	Absolute frequency (percent)	Relative frequency (percent)	Density (percent)
<i>Meloidogyne incognita</i>	75.0	18.6	32.8
<i>Botrylenchulus reniformis</i>	15.0	3.7	25.1
<i>Pratylenchus coffeae</i>	17.5	4.3	17.0
<i>Radopholus similis</i>	6.3	1.6	34.9
<i>Helicotylenchus incisus</i>	56.3	15.0	18.2
<i>H. crenicauda</i>	8.8	2.1	34.7
<i>H. multicinctus</i>	3.8	0.9	36.8
<i>Hoplolaimus seinhorsti</i>	41.3	10.2	8.0
<i>Hirschmanniella mucronata</i>	13.8	3.3	8.7
<i>Tylenchorhynchus brassicae</i>	20.0	4.7	11.7
<i>Graconamoides spp</i>	11.3	2.8	35.2
<i>Rotylenchus spp.</i>	7.5	1.8	10.2
<i>Dorylaimids</i>	85.0	21.0	30.3
<i>Xiphinema spp.</i>	27.5	6.8	9.5
<i>Quinsulcius acti.</i>	1.3	0.3	15.1
<i>Scutellonema brachyrura</i>	1.3	0.3	20.4
<i>Hemicycliophora penetrans</i>	1.3	0.3	17.3
<i>Aphelenchoides spp.</i>	2.5	0.6	12.7
<i>Ecphyadophoroïdes spp.</i>	2.5	0.6	16.7
<i>Longidorus spp.</i>	2.5	0.6	1.3