ROTYLENCHULUS RENIFORMIS, THE NEW NEMATODE SPECIES CAUSING DAMAGE TO TEA IN SRI LANKA

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Nematode damage to tea was until recently confined to mostly elevations of 900 m and above and the species that was commonly encountered at such elevations was the root-lesion nematode or the meadow nematode, Pratylenchus loosi.

With the damage caused by the burrowing nematode, Radopholus similis becoming more and more obvious in the mid elevation tea areas, an intense quantitative survey was undertaken to study the pattern of distribution of this pest. During such surveys, we came across another distinct species in areas showing decline symptoms. The tea bushes in these areas were very weak and unthrifty with premature flowering and fruiting. The roots of the affected tea plants were decayed and large amounts of root fragments were observed in the root zone.

Although large numbers of males, larvae and females of this species were recovered from the soil collected in the rhizosphere of the weak plants, it was difficult to recover the nematodes from the roots of affected plants.

IDENTIFICATION

Samples of these nematodes species were killed and fixed by the method described by Golden (Hooper, 1970) and sent to the U.S. Department of

Agriculture at Beltsville, for identification. In April 1987, 83 out of 86 specimens sent were identified as the males, immature females and juveniles of Rotylenchulus reniformis.

Rotylenchulus reniformis is a semi endoparasite which was first described by Linford and Oliviera (1940), when observed by Francis Yap in cow pea roots in a pine apple field, in the island of Oahu, Hawai. They are bisexual and males and females are produced in the ratio of 1:1.

The life history of this nematode is highly specialised and unusual (Linford and Oliviera, 1940; Peacock, 1956; Birchfield, 1962; Sivakumar and Seshadri, 1971). The second stage juveniles hatch from eggs in soil and undergo three moults in succession without feeding in spite of having a well developed stylet. The young immature females penetrate the roots until they are partly or wholly embedded. Three days from feeding, the body widens and within 8 days time the female enlarges to form the characteristic kidney shape. Hence this nematode is often referred to as the reniform nematode. The immature females are open 'C' shaped. The female starts laying the eggs 9 days after penetrating the roots and the eggs are deposited into large mass of jellatinous egg sacs. Only the females of this species is parasitic.

This species of nematode is known to infest a very wide variety of cultivated crops in the tropical and sub-tropical countries (Linford and Yap, 1940; Martin 1955; Christie, 1959; Peacock, 1956).

It was first observed in tea areas in Java, in 1951 in a tea nursery, where it was found to cause several losses of young tea plants. However, in commercial plantations no damage was observed (Thorne, 1961). A survey for plant parasitic nematodes attacking tea carried out in Darjeeling in 1975 also revealed the

presence of this nematode, although the frequency of occurrence was found to be less than that for other species encountered in tea soils (Basu and Roy, 1976).

In Indonesia too this species was found to inflict severe damage in the tea plantations (Basu and Roy, 1975).

In Sri Lanka this particular species of nematode was first encountered in the tea soils in 1960, in a tea nursery at Aigburth Estate, Rakwana. Subsequently this nematode was recovered in 19 additional estates located at Low and Mid-country elevations below 1200 m (Hutchinson and Vythilingam, 1963). As in the case of the burrowing nematode, Radopholus similis, when it was first detected in the mid-elevation tea areas in 1967 (Sivapalan, 1968), this nematode too was found mostly in the root zone of TRI 2025 plants. Although large numbers of this nematode was found in the root zone, no mature females could be recovered. At Kirimetiya Estate, although in February, 1960, large numbers of this species of nematode were recovered (1393/100 g soil), in two years time no nematodes could be detected from this location. Such early observations seem to have led to the conclusion that this species was of little importance to tea and no concerted effort was made to study this nematode.

However, during our recent survey we have encountered several estates at elevations of 200-1200 m where decline symptoms were apparent and these specific areas were found infested with this species of nematode. Amongst 342 estates checked, 78 were found to be infested with this species and most of the affected plantations were in the elevation range of 200-1150 m.

In these locations, although there were estates with many fields showing symptoms of decline positively associated with this species of nematode, in several areas this species was encountered as a mixed population along with either Pratylenchus loosi (at higher elevations) or with Radopholus similis (at mid-elevations).

STUDIES ON PATHOGENICITY

In order to demonstrate positive pathogenicity in a given crop it is essential to have pure populations of the particular species of nematode.

Soil moderately infested with Rotylenchulus reniformis was planted to young plants of clone TRI 2025 (one year old) in specifically designed cement-lined planting beds, at the TRI Research and Extension Centre at Hantane.

Examinations made three months from inoculation revealed that the nematode population had built rapidly to very high levels. The soil had large populations of males, juveniles and immature females. The plants were all stunted with premature flowering and fruiting. Examination of the root system showed that most of the feeder roots had got clipped off due to nematode damage (Fig. 1). On staining the roots with acid fuchsin, we could not recover any mature females, even though in one plant only one empty egg sac was recovered. This situation is very likely due to the fact that when the nematodes feed on the finer roots, the roots tend to decay and the females drop into the soil. This may account for the large amount of root fragments seen in the rhizosphere area with high populations of juveniles.

In order to confirm, immature females collected from the root zone of the weak plants in the tank were inoculated onto 2 week old tomato seedlings

(50/pot), grown in fumigated soil. Four weeks from inoculation large numbers of mature females were recovered from these seedlings. Further detailed studies on this species of nematode are in progress.

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Fig. 1 — Young tea plant of Clone TRI 2025 infested with *Rotylenchulus reniformis*

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