

# THE BURROWING NEMATODE

—*Radopholus Similis*



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## The burrowing Nematode, *Radopholus similis*

The burrowing nematode, *Radopholus similis* is the most important nematode pathogen infesting coconut, arecanut, black pepper, banana and betelvine. This nematode is widely distributed in South India and is also reported from Lakshadweep Island. The nematode has a very wide host range covering more than 300 species of plants including trees, shrubs and herbs. Ginger, turmeric, sweet potato, sugarcane, groundnut, avacado, nutmeg, tea, coffee, cardamom are other important crops known to be susceptible to this nematode.

Burrowing nematode is a notorious pathogen for causing the pepper yellows in Indonesia, spreading decline of citrus in Florida and toppling disease of banana in all banana growing regions of the world except in Israel and Taiwan. Parasitization by *R. similis* causes gross reduction in the quality and quantity of yield. In Kerala, the slow wilt disease of black pepper caused by *R. similis* is known to cause an annual loss of 10 per cent vines.

### Symptoms of damage:

The burrowing nematode infested plants exhibit general yellowing and visible reduction in growth, vigour and yield. These above ground symptoms are non-specific and the only definite method to identify an infested plant is to look for symptoms on fresh roots. The nematodes produce small, elongate, orange coloured lesions on the creamy white to light orange coloured portion of the main tender roots of coconut and arecanut, but on tender roots of banana, black pepper, betelvine, avacado and other plants, lesions are brownish to black. These lesions coalesce and cause extensive root-rotting. Tender coconut roots on heavy infestation become spongy in texture. As high as 4000 nematodes are harboured by one gram (one inch length) of main coconut roots. Lesions and rotting are more on the tender portions of roots and do not normally occur on the hard, older red or brown coloured portions of roots.

**Biology:** The nematode takes three weeks to complete its life cycle from egg to adult at a temperature range of 24-32° C. All larval stages and females except males are infective. They enter into the tender roots and feed in the cortical region of coconut and arecanut roots. It is a migratory endoparasite causing maximum root damage and is capable of spending its entire life in the roots.

**Ecology:** Nematodes being moisture dependent, their population fluctuations are markedly affected during summer months. Maximum nematode populations occur during September to November and the minimum during April to June. The nematode is known to survive and increase best in deep, well drained sandy loam soils but less in shallow, poorly drained clayey soils. The coconut isolate of *R. similis* was found to survive in host free dry sandy soil for three months and in host free wet soil for 15 months under green house conditions. Active nematode populations could be recovered from roots of felled palms for a period of six months.

**Dissemination:** Nematode is disseminated mainly through the infested planting materials, floods, irrigation water, farm implements and bulk transport of soil.

**Control:** Cultural operations, field sanitations, organic amendments, resistant varieties, application of nematicides are the important components in preventing crop loss due to nematode infestation.

1. Spread of nematodes can easily be prevented through the supply of nematode free planting materials. In the case of coconut and arecanut seeds may be supplied instead of seedlings. Seedlings of coconut and arecanut and cuttings of black pepper may be raised in polybags containing soil fumigated with Methyl bromide and certified free of nematodes before release to farmers.

2. Sanitation methods such as burning of planting pits, avoiding running water from infested fields to uninfested fields, removing soil from agricultural implements while transporting from a nematode infested fields to non-infested field are helpful in preventing spread of the nematodes.

3. Organic amendments of soil help in suppressing nematode populations and increasing the yield. Application of neem oil cake to yellow leaf disease affected arecanut palms @ 1.5 Kg/palm, applied in June, September and January is known to reduce the disease indices, nematode populations and increase the yield. Similarly 30 per cent increase in yield and 5 to 10 per cent decrease in disease indices of coconut palms affected with root (wilt) disease occurred with the application of Marotti cake (*Hydnocarpus*) @ 4 Kg/palm in June and October.

4. Application of phorate @ 10 g a.i./palm to coconut and @ 3 g a.i. to arecanut, black pepper and banana in May-June and September-October is known to reduce nematode populations and increase yield significantly.

5. Effective control of *R. similis* in coconut nursery is possible with the application of phorate @ 2.5 g/ seedling during September, December and May.

6. Nematicides have to be applied on or very near to the root system by removing the top soil without causing damage to the root system in the basin and covering it back with the same soil immediately. In the absence of sufficient soil moisture at the time of application of nematicides, the crop should be irrigated. The treatment has to be continued for 3-4 years for achieving a satisfactory control of *R. similis* population in a severely affected perennial cropping systems.

7. One of the most economical and effective ways of controlling nematodes is by growing nematode resistant plant cultivars. In view of its importance, most of the available coconut and arecanut germplasm collections have been screened against *R. similis*. The results indicated that coconut hybrids, West Coast Tall × Gangabondam and Chandra Sankara (COD × WCT), and arecanut cultivars Hirehalli, Sumangala (VTL-11), and Sreemangala (VTL-17) are tolerant to the burrowing nematode. These varieties are recommended for planting in nematode infested areas.



Cover: Nematode damaged roots, *Inset*: adult nematode

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