

Nematophagous fungi associated with the potato cyst nematodes, *Globodera* spp. in the Nilgiris, Tamil Nadu

S. RAJESWARI and C. V. SIVAKUMAR

Department of Nematology
Tamil Nadu Agricultural University
Coimbatore 641 003, Tamil Nadu, India

ABSTRACT: Five native nematophagous fungi viz., *Penicillium* sp., *Aspergillus* sp., *Paecilomyces lilacinus* (Thompson), *Verticillium suchlasporium* var. *suchlasporium*, (Gams and Dackman) and *Exophiala pisciphila* (McGinnis and Ajello) were found to parasitize the eggs of *Globodera* spp. and their frequency of occurrence varied from 0.47 to 24.17 per cent. Natural suppression of the cyst nematodes by *P. lilacinus* to an extent of 79.6 per cent was observed. However, this did not reflect any significant increase in potato yield because the nematode population remained high (>39 cysts/100 ml soil) inspite of suppression by the fungus. *Paecilomyces lilacinus*, *V. suchlasporium* var. *suchlasporium* and *E. pisciphila* are reported for the first time on the potato cyst nematode in India.

KEY WORDS: *Globodera* spp., nematophagous fungi, natural suppression

Nematophagous fungi comprise those fungi that attack living nematodes or their eggs and utilize them as a source of nutrients. Depending upon the mode of attack, these fungi have been categorized into, (a) predators which develop special nematode trapping structures on the mycelium by which the nematodes are efficiently captured, (b) endoparasites which produce adhesive or non adhesive spores either to adhere to the surface of

the nematodes or get ingested by them, and (c) parasites of root-knot and cyst nematodes which attack the eggs or females of these nematodes (Mittal *et al.*, 1997). The distribution of nematophagous fungi in soil have been reported mostly from terrestrial and very few from aquatic habitats. A survey was undertaken to study the occurrence of nematode egg-parasitic fungi in potato soil of the Nilgiris, Tamil Nadu, and the suppressive effect of the egg-

parasitic fungus, *Paecilomyces lilacinus* on the potato cyst nematodes (*Globodera* spp.).

In a random survey conducted, 211 soil samples were collected and the cysts recovered by the Fenwick cane method (Fenwick, 1940). Full cysts of the nematodes were picked at random, surface sterilized by ethanol (96%) for five minutes, rinsed in sterile water and transferred to standard Potato Dextrose Agar (PDA) medium, and incubated at $25 \pm 1^\circ\text{C}$ for one week (Riker and Riker, 1936). The fungal growth was then subcultured for identification and observations were recorded on the number of cysts and number of eggs parasitized by different fungi (Uziel and Sikora, 1992).

Natural suppression of the potato cyst nematode, *Globodera* spp. by the native nematode-egg-parasitic fungus *Paecilomyces lilacinus* (Thompson) was assessed under field condition. Six locations

were selected in Kodappamund, Nilgiris District, in a farmer's holding with or without the natural occurrence of *P. lilacinus*.

From each location, three plots (each of 10 m^2) were marked and samples collected. The cyst population, extent of parasitization by the fungus, and the yield were recorded.

Five nematode-egg-parasitic fungi viz., *Penicillium* sp., *Aspergillus* sp., *Paecilomyces lilacinus* (Thompson), *Verticillium suchlasporium* var. *suchlasporium* (Gams and Dackman) and *Exophiala pisciphila* (McGinnis and Ajello) were found parasitizing the eggs of the potato cyst nematode. Their frequency of occurrence varied from 0.47 to 24.17 per cent (Table 1). The percentage of parasitism of cyst was maximum by *P. lilacinus*, while the percentage egg parasitism was highest by *E. pisciphila*.

Table 1. Occurrence of the nematophagous fungi on *Globodera* spp. in the Nilgiris

| Fungi identified | Frequency of occurrence (%) | Per cent parasitism | |
|---|-----------------------------|---------------------|-------|
| | | Cysts | Eggs |
| <i>Penicillium</i> sp. | 24.17 | 12.29 | 8.30 |
| <i>Aspergillus</i> sp. | 1.90 | 5.40 | 1.35 |
| <i>Paecilomyces lilacinus</i> | 7.11 | 21.67 | 8.68 |
| <i>E. pisciphila</i> | 0.47 | 7.10 | 51.00 |
| <i>Verticillium suchlasporium</i> var. <i>suchlasporium</i> | 0.47 | 3.10 | 39.14 |
| CD (P=0.05) | - | 4.00 | 3.30 |

Natural suppression of potato cyst nematode by the fungus *P. lilacinus* under field condition showed that the number of viable cysts in areas having *P. lilacinus* was 48 while it was 84 in those without the fungus. The difference in cyst population

REFERENCES

Fenwick, D. W. 1940. Methods for the recovery and counting of cysts of *Heterodera schachtii* from soil. *Journal of Helminthology*, **18**:155-172.

Table 2. Effect of natural suppression of potato cyst nematodes by *P. lilacinus* in the Nilgiris

| Location | No. of cysts/200 ml soil at planting | Yield (t/ha) |
|------------------------------|--------------------------------------|--------------|
| With <i>P. lilacinus</i> | 48.1 | 8.4 |
| With out <i>P. lilacinus</i> | 83.7 | 8.0 |
| C.D.(P=0.05) | 22.7 | 0.9 |

due to natural suppression by the fungus is 42.5 per cent.

The yield of potato ranged between 7 to 10 t/ha in the field where the study was undertaken and an increased yield of 4.8 per cent was observed in patches where *P. lilacinus* was found, which was not statistically significant (Table 2). Since, the cyst population was far above the economic threshold level of 10 cysts/100g soil, both in the presence and absence of *P. lilacinus*, the benefit of natural suppression did not reflect on the yield.

Paecilomyces lilacinus, *E. pisciphila* and *V. suchlasporium* var. *suchlasporium* are being recorded for the first time on the potato cyst nematodes in India.

Mittal, N., Saxena, G., Mukerji, K. G. and Upadhyay, R. K. 1997. Biocontrol of nematodes by nematode destroying fungi, pp.453-502. In: Upadhyay, R. , Mukerji, K. G. and Rajak, R. C (Eds.). *IPM System in Agriculture: Biocontrol in emerging Biotechnology*. Vol. II. Aditya Books (P) Ltd., New Delhi.

Riker, A. J. and Riker, A. S. 1936. Introduction to research on plant diseases. John's Swilt.C.Mc, New York, pp. 117.

Uziel, A. and Sikora, R. A. 1992. Use of non-target isolates of the entomopathogen *Verticillium lecanii* (Zimm.) Viegas to control the potato cyst nematode *Globodera pallida* (Stone). *Nematologica*, **38**: 123-130.