*Nematol. medit.* (1988), *16*: 113-115

## *NOTE BREVI - SHORT COMMUNICATIONS*

*Division of Entomology and Nematology, Indian Institute of Horticultural Research, Bangalore 560 089, India*

# EVALUATION OF *PAECILOMYCES LILACINUS* FOR THE BIOLOGICAL CONTROL OF *ROTYLENCHULUS RENIFORMIS* INFECTING TOMATO, COMPARED WITH CARBOFURAN

by
P. PARVATHA REDDY and R.M. KHAN

The parasitic fungus, *Paecilomyces lilacinus* (Thom.) Samson is one of the most promising and practicable biological control agents for the management of plant parasitic nematodes. The organism adapts to diverse environmental conditions and is compatible with many fungicides and nematicides (Villanueva and Davide, 1983). Its effectiveness in managing *Meloidogyne* (Jatala *et al.*, 1980), *Globodera* (Franco *et al.*, 1981), *Tylenchulus* (Herrera *et al.*, 1985) and *Nacobbus* (de Sisler *et al.*, 1985) species affecting important crops has been determined. No work has so far been undertaken to evaluate its efficacy for the control of the reniform nematode, *Rotylenchulus reniformis* Linford *et* Oliveira. Hence, the present glasshouse studies were undertaken to evaluate *P. lilacinus* for the biological control of *R. reniformis* infecting tomato, as compared with carbofuran.

Seedlings of tomato *Lycopersicon lycopersicum* L. cv. Pusa Ruby were grown in sterilized soil contained in 30 cm seed pans. Three-week-old seedlings were transplanted individually in 15 cm diameter pots containing 2 kg sterilized soil. Each seedling was inoculated with 1000 juveniles of *R. reniformis*. The fungus *P. lilacinus*, obtained from the International Potato Centre, Lima, Peru, was grown on potato-dextrose agar and later multiplied on sterile, moist rice for three weeks. The fungus-rice mixture at 0.5, 1 and 2 g (containing approximately 60, 120 and 240 million spores, respectively), carbofuran at 2 kg a.i. per ha and carbofuran + fungus at 2 g were incorporated into the soil of the potted tomatoes inoculated with the reniform nematode. Each treatment was replicated four times. After 60 days, observations on plant growth (shoot and root length, dry weight of shoot and root) and nematode population both in the soil and roots were recorded using modified Baermann funnel and mechanical maceration techniques, respectively. The data obtained were analysed statistically by Fisher's method of analysis of variance.

Carbofuran at 2 kg a.i. per ha was the only treatment that significantly increased shoot length compared with the control (Table I). Root length was significantly increased with *P. lilacinus* at 2 g per plant and with carbofuran at 2 kg a.i. per ha. All the treatments were significantly superior over the control in increasing the dry shoot and root weight. However, carbofuran gave maximum dry weight of shoot and root which differed significantly over other treatments.

All the treatments were significantly superior over control in reducing the reniform nematode population both in the soil and on the roots, except *P. lilacinus* at 0.5 g which was equal to control with respect to soil population of males (Table II). However, carbofuran gave the maximum reduction in nematode numbers, although it did not differ significantly from *P. lilacinus* (2g) alone or in combination with carbofuran. The reduction in total nematode numbers in the different treatments ranged from 42 to 83 per cent over the control. Carbofuran significantly increased the percentage of males (53 per cent over control) compared with the control and was equal to *P. lilacinus* (1g) alone and in combination with carbofuran. Haq *et al.* (1984) have also reported increase in the percent males of *Meloidogyne incognita* in tomato treated with fensulfothion and aldicarb. Carbofuran gave the least reproduction factor (1.2) followed by *P. lilacinus* + carbofuran (1.5) and *P. lilacinus* (2g) (2.2).

The parasitic fungus was observed to infect both eggs and females of the reniform nematode. Infection of eggs

by *P. lilacinus* has been reported in *Meloidogyne, Globodera, Tylenchulus* and *Nacobbus* (Jatala, 1986) but infection of females has been reported only in *Meloidogyne incognita* (Jatala *et al.*, 1979). Inoculation of *P. lilacinus* in combination with carbofuran did not exhibit any added advantage over the nematicide alone in increasing the plant growth or in reducing the nematode populations.

TABLE I - *Effect of* Paecilomyces lilacinus *and carbofuran on the growth of tomato plants infected by* Rotylenchulus reniformis.

| Treatment | Dose | Shoot | | Root | |
|---|---|---|---|---|---|
| | | Length (cm) | Dry weight (g) | Length (cm) | Dry weight (g) |
| 1. *P. lilacinus* | 0.5 g/plant | 59.7 | 5.7 | 36.2 | 1.8 |
| 2. *P. lilacinus* | 1.0 g/plant | 61.7 | 6.7 | 35.0 | 2.1 |
| 3. *P. lilacinus* | 2.0 g/plant | 61.9 | 6.8 | 39.7 | 2.4 |
| 4. *P. lilacinus* + carbofuran | 2.0 g/plant + 2.0 kg a.i./ha | 62.7 | 6.0 | 32.3 | 2.5 |
| 5. Carbofuran | 2.0 kg a.i./ha | 65.0 | 7.4 | 38.3 | 2.8 |
| 6. Control | — | 55.3 | 4.5 | 31.7 | 1.3 |
| C.D. at 5% | — | 8.18 | 0.10 | 7.06 | 0.18 |

TABLE II - *Effect of* Paecilomyces lilacinus *and carbofuran on the population of* Rotylenchulus reniformis *infecting tomato.*

| Treatment | Dose | Nema pop in soil/plant | | | Mature females in root/plant | Total nematode population/ plant[1] | Reproduction factor[1] | % males[2] |
|---|---|---|---|---|---|---|---|---|
| | | Larvae | Males | Immature females | | | | |
| 1. *P. lilacinus* | 0.5g/plant | 2321 | 710 | 833 | 29 | 3893 (41.6) | 3.8 (41.6) | 45.2 (5.6) |
| 2. *P. lilacinus* | 1.0 g/plant | 2343 | 484 | 420 | 9 | 3257 (51.2) | 3.3 (51.2) | 53.1 (24.0) |
| 3. *P. lilacinus* | 2.0 g/plant | 1344 | 448 | 448 | 14 | 2232 (66.5) | 2.2 (66.5) | 49.2 (15.1) |
| 4. *P. lilacinus* + carbofuran | 2.0 g/plant + 2.0 kg a.i./ha | 905 | 354 | 268 | 9 | 1537 (76.9) | 1.5 (77.0) | 56.1 (31.0) |
| 5. Carbofuran | 2.0 kg a.i./ha | 744 | 272 | 136 | 8 | 1160 (62.6) | 1.2 (82.6) | 65.3 (52.7) |
| 6. Control | — | 4275 | 1024 | 312 | 57 | 6669 | 6.7 | 42.8 |
| C.D. at 5% | — | 1460.6 | 442.5 | 469.7 | 5.8 | 2011 | — | 15.9 |

[1] Figures in parentheses are the percentage reduction over control.
[2] Figures in parentheses are the percentage increase control.

## Literature cited


De Sisler G.M., Silvestri L. and Acita J.O., 1985 - Utilizacion de *Paecilomyces lilacinus* para el control de *Nacobbus aberrans* (Nematoda, Nacobbidae) en campo. *Fitopatologia, 20*: 17-20.

Franco J., Jatala P. and Bocangel M., 1981 - Efficacy of *Paecilomyces lilacinus* as a biocontrol agent of *Globodera pallida*. *J. Nematol., 13*: 438-439.

Haq S., Saxena S.K. and Khan M.W., 1984 - Effect of certain nematicides on the sex ratio of *Meloidogyne incognita* on tomato and *Tylenchorhynchus brassicae* on cauliflower. *Indian J. Nematol., 14*: 22-24.

Herrera E., Jatala P. and Canicoba R., 1985 - *Respuesta al control quimico y biologico del nematode de los citricos*. Inst. Nac. Invest. Promoc. Agropecu. (INIPA). Informe Especial, year 4.2: 16 pp.

Jatala P., 1986 - Biological control of plant-parasitic nematodes. *Ann. Rev. Phytopathol., 24*: 453-490.

Jatala P., Kaltenbach R. and Bocangel M., 1979 - Biological control of *Meloidogyne incognita acrita* and *Globodera pallida* on potatoes (Abstr.). *J. Nematol., 11*: 303.

Jatala P., Kaltenbach R., Bocangel M., Devaux A.J. and Campos R., 1980 - Field application of *Paecilomyces lilacinus* in controlling *Meloidogyne incognita* on potatoes. *J. Nematol., 12*: 226-227.

Villanueva L.M. and Davide R.G., 1983 - Effects of fungicides, nematicides and herbicides on the growth of nematophagous fungi, *Paecilomyces lilacinus* and *Arthrobotrys cladodes*. *Phil. phytopathol., 19*: 24-27.


Accepted for publication on 3 October 1987.