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*Central Agricultural Research Institute, P.O. Box 11, Peradeniya, Sri Lanka and
**Faculty of Agriculture, University of Peradeniya, Sri Lanka

EFFECT OF *PAECILOMYCES LILACINUS* AND *BEAUVERIA BASSIANA* IN CONTROLLING *MELOIDOGYNE INCOGNITA* ON TOMATO IN SRI LANKA

by
H.M.R.K. EKANAYAKE* and N.J. JAYASUNDARA**

Summary. The efficacy of two nematophagous fungi, *Paecilomyces lilacinus* and *Beauveria bassiana* for use as biocontrol agents against *Meloidogyne incognita* on tomato was evaluated and compared with the nematicide carbofuran. Carbofuran and *P. lilacinus* controlled the root-knot nematode and increased the growth of plants; *B. bassiana* was less effective.

Tomato, *Lycopersicon esculentum* Mill., is an attractive cash crop and provides a potential source for rural development in the Central region of Sri Lanka. However, it is subject to attack by root-knot nematodes, *Meloidogyne* spp., with crop losses of up to 49% (Lamberti *et al.*, 1980). Nematicides have been effective for the control of root-knot nematodes on tomato but they are expensive, especially for small scale farmers. Biological control using fungal antagonists is a less expensive alternative.

Since the discovery of *Paecilomyces lilacinus* (Thom.) Samson for the control of root-knot nematodes (Jatala, 1981) several investigations have been undertaken to evaluate its use with economically important crops. *Beauveria bassiana* Bales is an entomophagous fungus, which produces toxins such as beauvericin and has been used for the control of larvae of some insect pests (Dingra and Sinclair, 1985).

The present study compared the two fungi, *P. lilacinus* and *B. bassiana*, with the chemical nematicide carbofuran for the control of *M. incognita* (Kofoid *et* White) Chitw. on tomato.

Materials and methods

A culture of *M. incognita* was maintained on tomato cv. Katugastota in a planthouse and eggs and juveniles were obtained by the NaOCL method (Hussey and Barker, 1973). The fungi, *P. lilacinus* and *B. bassiana* were otained from the International Potato Centre, Peru, and cultured in sterilized seed paddy at a room temperature of 25±2 °C for three weeks.

Fifty clay pots were filled with 800 ml of heat sterilized sandy soil. Forty of the pots were each inoculated with 2000 eggs and/or juveniles of *M. incognita*. Ten of these pots were then inoculated with *P. lilacinus* at the rate of 2g colonized seed paddy per pot; a further ten pots were similarly inoculated with *B. bassiana*; and ten of the pots each received 0.5 g of 3% carbofuran granules. All of the pots, including the untreated controls, were planted with a single 18 day old tomato cv. Katugastota seeding. The pots were arranged in a completely randomized design in a planthouse with a day temperature of 25±2 °C and a night temperature of 18±2 °C.

The heights of plants were measured at 30, 40, 50 and 60 days after inoculation with fungi and treatment with nematicide. The weights of the plant tops and the root galling index (Taylor and Sasser, 1978) were ascertained at the end of the experiment.

Results and discussion

At 30 days after the beginning of the experiment, the height of plants in pots treated with the fungi or carbofuran were significantly ($P = 0.05$) less than the uninoculated control or the treatment with nematodes only (Table I). However, at 40 days the height of plants in each of the treatments was similar and at 60 days (the end of the experiment) the height of the plants in the two fungal treatments was significantly greater than in the other treatments.

There was a significant effect of *M. incognita* on the top weight of plants, which was 63% of the uninoculated

TABLE I - *Effect of treatments on height of tomato plants grown in pots inoculated with* Meloidogyne incognita.

Treatment	Mean height of plants (cm)			
	Days after inoculation			
	30	40	50	60
Paecilomyces lilacinus + Nematode	45 a	70 a	87 a	95 a
Beauveria bassiana + Nematode	46 a	71 a	82 a	94 a
Carbofuran + Nematode	47 a	73 a	83 a	84 b
Nematode only	54 b	68 a	74 b	79 c
Uninoculated control	55 b	73 a	82 a	87 b

Values followed by the same letter in each column are not significantly different for P = 0.05 according to Duncan's multiple range test.

TABLE II - *Effect of treatments on plant top weight and root-knot index of tomato plants grown in pots inoculated with* Meloidogyne incognita.

Treatment	Mean top weight (g)	Mean root-knot index
Paecilomyces lilacinus + Nematode	88 a	2.8 b
Beauveria bassiana + Nematode	70 b	3.3 b
Carbofuran + Nematode	92 a	0.8 c
Nematode only	58 c	4.5 a
Uninoculated control	92 a	0 c

Values followed by the same letter in each column are not significantly different for P = 0.05 according to Duncan's multiple range test.

control (Table II). The top weights of plants treated with *P. lilacinus* or carbofuran were similar to those of the uninoculated control and all treatments were significantly greater than the treatment with nematodes alone. Carbofuran was the most effective treatment for the control of *M. incognita*, as measured by the root-knot index (Table II) but both fungi also had a significant effect.

The experiment indicates that *P. lilacinus* could be an effective means of controlling *M. incognita* on tomato and a substitute for nematicides such as carbofuran.

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