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FIELD APPLICATION OF *PAECILOMYCES LILACINUS* FOR THE CONTROL OF *MELOIDOGYNE INCOGNITA* ON BETELVINE, *PIPER BETLE*

by
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Summary. Experiments were conducted for two years to assess the field efficacy of *Paecilomyces lilacinus* for the management of *Meloidogyne incognita* infesting *Piper betle*. The efficacy of the fungus, multiplied on neem cake, was compared with that of carbofuran. A significant reduction in nematode infestation was observed with three applications of *P. lilacinus* inoculated neem cake at the rate of 10 g/vine at 60 day intervals. The treatment significantly increased vine growth and leaf yield.

Betelvine is one of the important commercial crops grown in India. Root-knot nematode *Meloidogyne incognita* commonly infests this crop and causes yield reduction (Sivakumar and Marimuthu 1984). *Paecilomyces lilacinus* is reported to control *Meloidogyne* (Jatala *et al.*, 1979; Hewlett *et al.*, 1990). Recent pot culture studies have proved the efficacy of *P. lilacinus* against *M. incognita* in betelvine (Jonathan *et al.*, 1995). In the present study the efficacy of the parasitic fungus was evaluated in the field.

Materials and methods

A pure culture of *P. lilacinus* (Thom) Samson was obtained from the Indian Agricultural Research Institute, New Delhi, India. Conical flasks of 1000 ml capacity were filled with 750 g of powdered neem cake and steam sterilized. *P. lilacinus* was inoculated to the neem cake and allowed to multiply for 15 days. The flasks were shaken at 48 h interval to accelarate growth.

Three months old betelvine (*Piper betle* L.) cv. Karpoori severely infested with *M. incognita* (Kofoid *et* White) Chitw. was selected for the study. Pre-treatment soil and root samples were collected. The nematode population in 250 ml soil, number of eggs/5 g root and gall index were recorded. A randomised block design was adopted with five treatments replicated seven times. The plot size was 5x1 m with 50 vines/-plot. The treatments were given at 60 days as indicated in Table I and II.

The plants were carefully uprooted 250 days after imposing the first treatment and measurements were made on shoot length and weight and root length and weight. The number of leaves per vine and weight of 100 leaves were also recorded. The root gall index was estimated on a 0-5 scale basis. Nematodes were extracted from soil samples using Cobb's sieving gravity method and Baermann funnel technique to calculate the final soil population.

Results and discussion

There were significant increases in vine growth as measured by estimates of shoot

length and weight and root length and weight in vines treated with *P. lilacinus* inoculated neem cake at 10 g/vine three times, at an interval of 60 days. This treatment was equally as effective as carbofuran treatment at 1.5 kg a.i./ha. These two treatments increased the number of leaves and weight of 100 leaves (Table I).

The treatments caused significant reductions in nematode infestation. The untreated control vines had the greatest soil population of 651 nematodes/250 ml soil, 35615 eggs/5 g root and registered the maximum gall index of 5. Significant reductions in soil population, number of eggs and gall index were observed in plants treated three times with *P. lilacinus* inoculated neem cake and also in the carbofuran treatment (Table II). The experiment was repeated during 1997 with results (Table III and IV) very similar to those obtained during 1996.

The present study has demonstrated the beneficial effect of *P. liacinus* multiplied in neem cake under field conditions. It is concluded that the parasitic fungus can be effectively used for the management of *M. incognita* on betelvine where the use of chemical nematicides is not advisable because the fresh leaves are used for chewing.

TABLE I - *Effect of* Paecilomyces lilacinus *on growth and leaf yield of betelvine in 1996 in soil infested with* Meloidogyne incognita.

Treatment	Shoot		Root		No. of leaves/ vine	Wt. of 100 leaves (g)
	length (cm)	weight (g)	length (cm)	weight (g)		
One application	195	107	18.3	14.9	1872	223
Two applications	207	110	26.3	15.3	2025	231
Three applications	220	118	30.9	16.5	2446	245
Carbofuran	220	120	29.5	16.3	2512	247
Control	172	86	16.0	11.3	1221	213
SE	2.9	2.2	0.4	0.2	43	1.5
CD at 5%	8.5	6.5	1.3	0.6	129	4.6

TABLE II - *Effect of* P. lilacinus *on an infestation of* M. incognita *in betelvine in 1996.*

Treatment	Pre-treatment nematode infestation			Final nematode infestation		
	Soil population (250 ml)	No. of eggs/5 g root	Gall index (0-5 scale) a)	Soil population (250 ml)	No. of eggs/5 g root	Gall index (0-5 scale) a)
One application	426	30215	4.5	239	11312	3.4
Two applications	431	30534	4.0	212	10117	3.0
Three applications	429	30721	4.2	140	9635	2.0
Carbofuran	416	31013	4.5	136	9914	2.2
Control	423	29984	4.2	651	35615	5.0
SE	–	–	–	3.2	98	0.1
CD at 5%	–	–	–	9.5	295	0.2

a) Gall index 0=0 galls, 1=1-2 galls, 2=3-10 galls, 3=11-30 galls, 4=31-100 galls, 5=more than 100 galls per root system.

TABLE III - *Effect of* P. lilacinus *on growth and leaf yield of betelvine in 1997 in soil infested with* M. incognita.

Treatment	Shoot		Root		No. of leaves/ vine	Wt. of 100 leaves (g)
	length (cm)	weight (g)	length (cm)	weight (g)		
One application	189	103	15.9	12.3	1816	217
Two applications	204	105	23.3	13.9	1996	220
Three applications	215	116	28.5	15.3	2391	239
Carbofuran	218	121	29.1	15.0	2435	243
Control	167	91	13.9	10.9	1142	197
SE	2.4	1.9	0.3	0.2	36	1.6
CD at 5%	7.2	5.6	0.8	0.5	105	4.8

TABLE IV - *Effect of* P. lilacinus *on an infestation of* M. incognita *in betelvine in 1997.*

Treatment	Pre-treatment nematode infestation			Final nematode infestation		
	Soil population (250 ml)	No. of eggs/5 g root	Gall index (0-5 scale) a)	Soil population (250 ml)	No. of eggs/5 g root	Gall index (0-5 scale) a)
One application	521	31145	4.5	262	12125	3.6
Two applications	498	31081	5.0	209	11637	3.2
Three applications	506	30934	4.2	175	9472	2.2
Carbofuran	536	31215	4.5	167	9139	2.2
Control	512	33101	5.0	802	41817	5.0
SE	–	–	–	3.9	106	0.1
CD at 5%	–	–	–	11.4	315	0.2

a) Gall index 0=0 galls, 1=1-2 galls, 2=3-10 galls, 3=11-30 galls, 4=31-100 galls, 5=more than 100 galls per root system.

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