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CONTROL OF *MELOIDOGYNE INCOGNITA* ON CORN, TOMATO AND OKRA WITH *PAECILOMYCES LILACINUS* AND THE NEMATICIDE ALDICARB

by
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The growing environmental problems associated with the use of chemical nematicides have encouraged interest in biological method of nematode control. Several reports have been published on biocontrol agents of root-knot nematodes (Al-Hazmi *et al.*, 1982; Stirling and Mankau, 1978 and Stirling *et al.*, 1979). These authors have shown that the nematophagus fungi *Arthrobotrys conoides* and *Dactyllela oviparasitica* were effective as biological control agents of *Meloidogyne* spp. However, the most practical and promising results are claimed for the fungus *Paecilomyces lilacinus* (Jatala *et al.*, 1979). Jatala *et al.* (1980 and 1981) reported that *P. lilacinus* successfully controlled *M. incognita* under potato field conditions. Cabanillas and Barker (1986) studied the effect of *P. lilacinus* on *M. incognita* race 1 on tomato and showed that there was no root galling or giant cell formation in tomato roots inoculated with nematode eggs infested with the fungus. Rodriguez-Kabana and Morgan - Jones (1986) reported the effectiveness of *P. lilacinus* against *M. incognita* on squash and indicated that the number of galls decreased in the presence of rice grains colonized with the fungus.

The present study examined the effectiveness of the fungus *P. lilacinus* and the nematicide aldicarb (Temik 10G) against *M. incognita* (Kofoid *et* White) Chitw. on corn, tomato and okra.

Materials and Methods

Three greenhouse experiments were conducted to determine the efficacy of the fungus *P. lilacinus* and the granular nematicide aldicarb as control

measures for *M. incognita* race 1 on corn cv. Alexandria and okra cv. Baladi and *M. incognita* race 3 on tomato cv. Prichard. Two seedlings of corn cv. Alexandria, okra cv. Baladi or tomato cv. Prichard were planted in 25 cm diam clay pots containing autoclaved sandy clay soil. The two-week - old seedlings were inoculated with 2,500 nematode eggs/ seedling, singly or in combination with the fungus, aldicarb or sterilized wheat grains (10g/ pot). *M. incognita* race 1 was used for corn and okra and race 3 for tomato. The fungus *P. lilacinus* was allowed to grow on PDA medium for 10 days then on sterilized wheat grains for 14 days, and added to the soil as 10 g of fungus-infested wheat grains / pot (Jatala, 1981). Aldicarb was applied at the rate of 0.2 g a.i./pot. Non-inoculated plants were served as control. Treatments of corn and tomato experiments were replicated 8 times and those of okra experiment were replicated 5 times. Corn and tomato plants were harvested 60 days after nematode inoculation; one half of the okra plants were harvested at 60 days and the other half at 90 days after nematode inoculation. The numbers of root galls and egg masses and dry weight of roots and shoots of harvested plants were determined.

Results and Discussion

In the corn experiment treatment with *P. lilacinus* resulted in 71% reduction of root galling and 90% reduction of egg masses. The aldicarb treatment reduced the number of nematode galls and egg masses by 58% and 83%, respectively (Table I).

Data from the tomato experiment are presented in Table II. Treatment with *P. lilacinus* reduced root galling and egg masses by 66% and 81%, respectively, whereas aldicarb reduced root galling and egg masses by 68% and 60%, respectively. The root and shoot dry weights and fruit weight were significantly decreased by nematode infestation. On the other hand, the growth and yield of plants in the fungal and aldicarb treatments showed no significant differences from the control.

In the okra experiment the fungal treatment reduced the nematode egg masses by 91% after 60 days and by 96% after 90 days. Aldicarb reduced egg masses by 90-91% after 60 and 90 days following nematode inoculation (Table III).

All three cultivars were good hosts for *M. incognita*. Nematode infection alone or in combination with wheat grains resulted in large numbers of root galls and egg masses and significantly reduced the root and shoot dry weights of the infected plants. The fungal or aldicarb treatments

Table I - *Effect of the fungus* Paecilomyces lilacinus *and the nematicide aldicarb on number of galls and egg masses of* Meloidogyne incognita *race 1 (MI-1) on corn cv. Alexandria.*

Treatment	No. of galls*	No. of egg masses	Dry wt. (g)	
			Root	Shoot
MI-1	201***	148***	8.5***	14.8***
Fungus	0	0	11.7	23.6
MI-1 + Fungus	59***	15	13.8	26.7
MI-1 + aldicarb	31**	26**	10.8	23.6
MI-1 + wheat grains	221***	167***	8.0***	13.0***
Control	0	0	13.6	28.0

* Data are average of 8 replicates.
** Significant at P=0.05 from comparable control.
*** Significant at P=0.01 from comparable control.

Table II - *Effect of the fungus* Paecilomyces lilacinus *and the nematicide aldicarb on number of galls and egg masses of* Meloidogyne incognita *race 3 (MI-3) on tomato cv. Prichard.*

Treatment	No. of galls*	No. of egg masses	Dry wt. (g)		Fruit wt. (g)
			Root	Shoot	
MI-3	310**	242**	4.7**	5.0**	73.4**
Fungus	0	0	11.2	17.0	144.7
MI-3 − Fungus	105**	47**	11.3	17.1	143.2
MI-3 − aldicarb	99**	96**	10.1	16.0	148.8
MI-3 − wheat grains	379**	282**	4.3**	6.0**	66.8**
Control	0	0	10.7	16.1	130.6

* Data are average of 8 replicates.
** Significant at P=0.01 from comparable control.

Table III - *Effect of the fungus* Paecilomyces lilacinus *and the nematicide aldicarb on number of galls and egg masses of* Meloidogyne incognita *race 1 (MI-1) on okra cv. Baladi.*

Treatment	No. of galls*		No. of egg masses		Dry wt. (g)			
					Root		Shoot	
	60**	90	60	90	60	90	60	90
MI-1	980***	1480***	950***	1250***	2.0***	2.1***	4.3***	7.8***
Fungus	0	0	0	0	9.3	13.8	16.6	30.2
Wheat grains	0	0	0	0	9.4	15.2	18.9	31.1
MI-1 − Fungus	390***	210***	85***	51***	9.2	14.4	18.3	30.6
MI-1 − Aldicarb	291***	340***	82***	125***	10.2	15.2	18.8	32.2
Control	0	0	0	0	8.1	13.2	15.9	25.2

* Data are average of 5 replicates.
** Days after treatment.
*** Significant at P=0.01 from comparable control.

greatly suppressed galling and the number of egg masses; the fungal treatment was more effective in reducing egg masses than aldicarb. The results confirm that the fungus *P. lilacinus* is efficient in controlling root-knot nematodes in pot tests as found by others (Cabanillas and Barker, 1986; Jatala *et al.*, 1979, 1980; Rodriguez-Kabana and Morgan-Jones, 1986).

SUMMARY

The effects of the fungus *Paecilomyces lilacinus* or aldicarb (Temik 10G) against *Meloidogyne incognita* race 1 on corn cv. Alexandria and okra cv. Baladi and *M. incognita* race 3 on tomato cv. Prichard were investigated in greenhouse tests. Fungal and aldicarb treatments greatly suppressed the numbers of galls and egg masses on all of the cultivars. Treatment with *P. lilacinus* was more effective in reducing the nematode egg masses than the aldicarb treatments.

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