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EFFECT OF THE FUNGUS, *PAECILOMYCES LILACINUS* ON THE BURROWING NEMATODE, *RADOPHOLUS SIMILIS* INFESTING BETEL VINE

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Abstract : The effect of the fungus, *Paecilomyces lilacinus* on multiplication of the burrowing nematode, *Radopholus similis* infesting betel vine was studied. *R. similis* alone (100/plant) caused maximum damage to plant growth and recorded maximum multiplication of nematodes. *P. lilacinus* reduced the damaging effect of *R. similis* on inoculation. Simultaneous inoculation of both the organisms or inoculation of the fungus 25 days after nematode inoculation were not effective in reducing the damage.

Key words: ***Radopholus similis, Paecilomyces lilacinus, betel vine, damage***

The betel vine (*Piper betle* L.) is an important cash crop of India. It is widely cultivated in Karnataka as an intercrop trailed on areca palms in the arecanut based farming system. The burrowing nematode, *Radopholus similis* (Cobb, 1893) Thorne, 1949 has been found associated with betel vine (D'Souza *et al.*, 1970; Sundararaju & Suja, 1986. and Eapen *et al.*, 1987). The symptoms observed on *R. similis* infested betel vines have been found to be similar to those found on infested black pepper vines (Koshy & Sosamma, 1975).

The fungus, *Paecilomyces lilacinus* (Thom) Samson, 1974 has been found to be a potential biocontrol agent for reducing root-knot nematode population on various crops (Jatala *et al.*, 1980; Jatala, 1983; Roman & Rodriguez-Marcano, 1985; Dube & Smart, 1987; Cabanillas & Barker, 1989; Cabanillas *et al.*, 1989 and Sharma & Trivedi, 1989) and *Globodera rostochiensis* on potato (Davide & Zorilla, 1983; Anonymous, 1988 and Saifullah *et al.*, 1988). In view of the damage potential of *R. similis* on betel vine, an experiment was conducted to study the effect of *P. lilacinus* on the nematode.

MATERIALS AND METHODS

Uniform sized two node cuttings of betel vine var. local were raised in 20 cm earthen pots containing fumigated sandy loam soil in the greenhouse. Thirty five rooted cuttings having uniform growth were selected. The betel vine isolate of *Radopholus similis* axenically multiplied on carrot discs was used. *Paecilomyces lilacinus* was multiplied on autoclaved wheat grains. There were seven treatments viz. T1-uninoculated control, T2-sterile wheat grains, T3-*P. lilacinus* alone, T4-*R. similis* alone, T5-*R. similis* plus *P. lilacinus*, T6-*P. lilacinus* followed by *R. similis* after 25 days and T7-*R. similis* followed by *P. lilacinus* after 25 days. Nematode inoculum consisted of 100 (females and larvae) *R. similis* per replicate. Fungal inoculum was prepared by inoculating the autoclaved sterile wheat grains with *P. lilacinus* from stock culture. Twenty one days after inoculation the wheat grains were mixed thoroughly and 100 grains each formed the inoculum. The plants were kept in the greenhouse with even sunlight and watered daily with boiled and cooled water. The temperature in the greenhouse varied from 27 to 34°C.

Table 1: Effect of *P. lilacinus and R. similis* alone and in combination on rooted betel vine cuttings (mean of five replications).

Treatment	Shoot characters						Root characters	
	Shoot length (cm)	Per cent reduction over control	Shoot weight (g)	Per cent reduction over control	No. of nodes/leaves	Per cent reduction over control	Root weight (g)	Per cent reduction over control
Cl	873.8	—	92.14	—	183.6	—	14.92	—
CK	880.4	—	110.9	—	225.2	—	15.93	—
F	780.8	10.04	91.96	0.2	171.8	6.43	14.26	4.42
F-f-N	668.8	23.46	66.25	28.1	140.8	23.31	9.45	36.66
F+N	647.2	25.93	65.07	29.38	134.8	26.58	5.2	65.15
N-f-F	622.4	28.77	63.58	31.0	130.0	29.19	4.84	67.56
N	613.8	29.76	62.87	31.77	112.6	38.67	4.09	72.59
C.D.	34.61	—	14.66	—	13.08	—	1.33	—

Cl-uninoculated control; CK- *Ster' ile* wheat grains, F-Fungus, F-f-N-Fungus followed by Nematode, F+N-Fungus+Nemadoes, N.f-F-Nematode followed by Fungus, N-Nematode.

Eighteen months after inoculation the plants were carefully depotted and washed thoroughly to remove the adhering soil particles. Plant growth parameters such as shoot length, shoot weight, number of nodes/leaves and root weight were recorded. Nematode population from 200 cm^3 soil from each pot was assessed. The root system was weighed, cut into small pieces mixed well stained for 30 seconds in boiling acid fuchsin lactophenol, cleared, blended for 30 seconds and population assessed.

RESULTS AND DISCUSSION

The fungus *P. lilacinus* did not cause any damage to the plant. Inoculation of the plants with the fungus 25 days prior to nematode inoculation was effective in reducing plant damage and nematode multiplication compared to plants which received nematode and fungus in other different combinations and also to those which received nematode alone. Per cent reduction in growth parameters over control and multiplication of nematodes was slightly lesser in plants which received nematode 25 days prior to fungal inoculation. Plants which received nematode alone caused maximum damage and recorded highest nematode population (Tables 1 & 2).

P. lilacinus has been found to be effective in reducing populations of *Meloidogyne* spp., *Globodera* spp., *Tylenchulus semipenetrans*, *Nacobbus* sp., *Rotylenchulus reniformis* and *Pratylenchus* sp. on various crops (Jatala, 1986; Reddy & Khan, 1988; Maheswari & Mani, 1988 and Novaretti *et al.*, 1986) and in bettering plant growth compared to plants inoculated with nematodes alone. The same trend was observed in the present study also. Reduction in nematode population could be the result of rapid colonization of the root tissues by the fungus thereby reducing feeding sites for *R. similis*. This needs to be investigated thoroughly by further intensive studies. A similar role has been described in root rot of bulbs (Slootweg, 1956) and strawberry (Wilhem, 1959).

TABLE 2. Effect of *P. lilacinus* on multiplication of *R. similis* infesting rooted betel vine cuttings (mean of five replications)

Sl.No.	Treatment	Total nematode population
1.	F-f-N	403.6
2.	F+N	556.0
3.	N-f-F	739.8
4.	N	740.6
	C.D.	52.44

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REFERENCES

Anonymous (1988). Potato research and on-farm research activities in Kalam Valley (Swat.). Pakistan Agricultural Research Council Crop Science Division, Pakistan. P.57.

Davide, R.G. & Zorilia, R.A. (1983). Evaluation of a fungus *Paecilomyces lilacinus* (Thom.) Sampson, for the biological control of the potato cyst nematode. *Globodera rostochiensis* Woll. as compared with some nematicides. *Philippine Agriculturist* **6** : 397-404.

Dube, B. & Smart, G.C., Jr. (1987). Biological control of *Meloidogyne incognita* by *Paecilomyces lilacinus* and *Pasteuria penetrans*. *J. Nematol.* **19** : 222-227.

D'Souza, G.I., Kumar, A.C., Viswanathan, P.R.K. & Shamanna, H.V. (1970). Relative distribution and prevalance of plant parasitic nematodes in the coffee tracts of South Western India. *Indian Coffee* **34** : 329-342.

Eapen, S.J., Geetha, S.M. & Leemol, M. (1987). A note on the association of *Radopholus similis* with the yellow disease of betel vine. *Indian J. Nematol.* **17** : 137-138.

Cabanillas, E. & Barker, K.R. (1989). Impact of *Paecilomyces lilacinus* inoculum level and application time on control of *Meloidogyne incognita* on tomato. *J. Nematol.* **21** : 115-120.

Cabanillas, E. Barker, K.R. & Nelson, L.A. (1989). Growth of isolates of *Paecilomyces lilacinus* and their efficacy in biocontrol of *Meloidogyne incognita* on tomato. *J. Nematol.* **21** : 164-172.

Jatala, P. (1983). Biological control with the fungus, *Paecilomyces lilacinus. Proc. 3rd Research and Planning Conference on root-knot nematodes, Meloidogyne* spp. pp 183-187.

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

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

Koshy, P.K. & Sosamma, V.K. (1975) Host-range of *Radopholus similis* (Cobb, 1893) Thorne, 1949). *Indian J. Nematol.* **5** : 255-257.

Maheswari, T.U. & Mani, A. (1988). Combined efficacy of *Pasteuria penetrans* and *Paecilomyces lilacinus* on the biocontrol of *Meloidogyne javanica* on tomato. *Inter. Nematol. Netw. Newsl.* **5** : 10-11.

Novaretti, W.R.T., Dinardo, L.L., Totino, L.C. & Strabelli, J. (1986). Effect of the application of both the fungus *Paecilomyces lilacinus* and the nematicide Furadan 5G on the control of nematodes on sugarcane. *Nematologia Brasileira* **10** : 133-144.

Reddy, P.P. & Khan, R.M. (1988). Evaluation of *Paecilomyces lilacinus* for the biological control of *Rotylenchulus reniformis* infecting tomato compared with carbofuran. *Nematol. medit* **16** : 113-115.

Roman, J. & Rodriguez-Marcano, A. (1985). Effect of the fungus *Paceilomyces lilacinus* on the larval populations and root-knot formation of *Meloidogyne incognita* in tomato. *J. Agric. Univ. Puerto Rico* **69** : 159-167.

Saifullah Gul, A. & Saeed, M. (1988). Efficacy of *Paecilomyces lilacinus* against golden nematode (*Globodera rostochiensis*) in Pakistan, *Int. Nematol Netw. Newsl.* **5** : 20-22.

Sharma, A. & Trivedi, P.C. (1989). Influence of inoculum levels of fungus *Paecilomyces lilacinus* (Thom.) Samson on the biocontrol of root-knot nematode, *Meloidogyne incognita* (Chitwood). *Int. Nematol. Netw. Newsl.* **6** : 27-29.

Slootweg, A.I.G. (1956). Root rot of bulbs caused by *Pratylenchus* and *Hoplolaimus* spp. *Nematologica* **1** : 192-201.

Sundararaju, P. & Suja, C.P. (1986). Occurrence of *Radopholus similis* on betel vine (*Piper betle* L.) in Karnataka. *Indian J. Nematol.* **16** : 279.

Wilhem, S. (1959). Parasitism and pathogenisis of root disease fungi. In : *Plant pathology, problems and progress 1905-1958.* (Holton, C.S., Fischer, G.W., Fulton, R.W., Hart, H. and McCallan, S.E.A.). University of Wisconsin Press. pp. 356-366.

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