

## Management of the Citrus Nematode, *Tylenchulus Semipenetrans* Cobb 1913, by Integration of *Trichoderma Viride* with Oil Cakes

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**ABSTRACT:** *Trichoderma viride* in combination with neem, karanj and castor oil cakes was effective in increasing the growth of acid lime seedlings and reducing the population of *Tylenchulus semipenetrans* both in soil and roots. The parasitization of citrus nematode females with *T. viride* increased in the presence of oil cakes.

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### INTRODUCTION

The citrus nematode, *Tylenchulus semipenetrans* Cobb, is responsible for 19 to 69 per cent loss of fruit yield in Haryana, India (Mukhopadhyaya and Suryanarayana, 1969) and affects most of the commercial citrus rootstocks (Parvatha Reddy and Singh, 1979). The use of antagonistic fungi and organic amendments is gaining importance in the management of nematode pests in horticultural crops. Increase in the efficacy of antagonistic fungi appears possible when these biocontrol agents are integrated with organic amendments such as oil cakes. Hence, investigations were undertaken on the integrated management of the citrus nematode infecting acid lime (*Citrus aurantifolia* L.) by combined application of the antagonistic fungus *Trichoderma viride* Ri-fai with oil cakes of castor (*Ricinus communis* L.), karanj (*Pongamia pinnata* Merr.) and neem (*Azadirachta indica* A. Juss).

### Materials and methods

Earthen pots (15 cm diameter) were filled with 2 kg autoclaved soil mixed with an optimum dose of fertilizer. Finely powdered castor, karanj or neem cake was thoroughly mixed in to the soil at the rate

of 20 or 40 g per pot. The pots were regularly watered for two weeks to decompose the oil cakes. Two month-old acid lime seedlings raised in autoclaved soil were transplanted singly in each pot. One week after transplanting, each pot was inoculated with 2 or 4 g of *T. viride* grown on sorghum seeds for 21 days (containing  $4 \times 10^8$  spores per g) by making holes around the seedlings. At the same time, each seedling was inoculated with 2000 juveniles of *T. semipenetrans*. Each treatment was replicated five times (Table I).

Six months after nematode inoculation, measurements of plant growth parameters and nematode population in 10 g roots and 200 cc soil were recorded. The roots were stained with acid fuchsin-lactophenol and the females of *T. semipenetrans* were collected by carefully teasing them from the roots. The number of females parasitized with *T. viride* and nematode population in 10 g roots and 200 cc soil were recorded. The roots were stained with acid fuchsin-lactophenol and the females of *T. semipenetrans* were collected by carefully teasing them from the roots. The number of females parasitized with *T. viride* and healthy females were counted separately and the per cent parasitization was calculated.

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**TABLE I. Effect of *Trichoderma viride* and oil cakes on plant growth parameters of acid lime infected with *Tylenchulus semipenetrans***

Treatment	Dose/ plant	Plant height (cm)	Dry shoot weight (g)	Root length (cm)
<i>T. viride</i>	4g	22.0	4.7	17.9
Castor cake	40g	23.0	5.5	18.3
Karanj cake	40g	22.5	5.3	18.5
Neem cake	40g	25.4	5.8	20.0
<i>T. viride</i> + Castor cake	2g+20g	28.8	6.8	22.3
<i>T. viride</i> + Karanj cake	2g +20g	26.8	6.5	23.6
<i>T. viride</i> + Neem cake	2g+20g	34.6	8.0	26.0
Control		19.5	3.5	15.3
S.Em.±		0.64	0.30	0.82
C.D. at 5%		1.85	0.88	2.38

### Results and discussion

The results show that neem cake in combination with *T. viride* gave a significant ( $P = 0.05$ ) increase in plant height, dry shoot weight and root length when compared with other treatments. However, all the treatments were effective in increasing the plant

growth parameters when compared to control (Table I).

The data presented in Table II indicate that integration of all the three oil cakes with *T. viride* gave maximum reduction in *T. semipenetrans* population both in roots and soil.

**Table II. Effect of *Trichoderma viride* and oil cakes on *Tylenchulus semipenetrans* population on acid lime**

Treatment	Dose/ plant	Nematodes in 10g roots	Nematodes in 200 cc soil	% Parasitization of females
<i>T. viride</i>	4g	228	184	22
Castor cake	40g	246	170	
Karanj cake	40g	274	180	
Neem cake	40g	196	166	
<i>T. viride</i> + Castor cake	2g+20g	140	132	34
<i>T. viride</i> + Karanj cake	2g+20g	184	142	30
<i>T. viride</i> + Neem cake	2g+20g	128	108	
Control		1520	1180	42
S.Em.±		19.5	18.6	0.7
C.D. at 5%		56.3	53.8	2.3

Maximum parasitization of *T. semipenetrans* females with antagonistic fungus *T. viride* was recorded when combined with neem cake and this treatment differed significantly from the others. It is suggested that the neem cake acts as a substrate for the growth and multiplication of *T. viride*.

### REFERENCES

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