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Verticillium lecanii (Zimm.) - A Potential Biocontrol Agent for the Potato Cyst Nematodes

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In laboratory screening of some entomopathogenic fungi against the potato cyst nematodes, *Globodera* spp., the white halo fungus, *Verticillium lecanii* (Zimm.) was observed parasitizing the eggs. Experiments were conducted in the laboratory to assess the virulence of this fungal parasite against the eggs of *G. rostochiensis* and *G. pallida*, and its potential as a biocontrol agent.

Cysts of *Globodera* sp. were recovered from a potato soil having a mixed infestation of *G. rostochiensis* and *G. pallida*, after harvest of a crop in August, 1987. Cysts with contents were selected, surface sterilized (0.1% mercuric chloride for 1 min), and then transferred to five-day-old cultures of *V. lecanii* on potato - dextrose - agar (PDA) containing 100μg streptomycin per ml in Petriplates, at the rate of 25 cysts to each plate. In another treatment which served as control, surface-sterilized cysts were transferred to PDA without the fungus. The Petriplates from these two treatments, were maintained either at 16 $\pm$ 1°C or at room temperature (24-32°C), with six replicates under each sub-treatment. The percentage of parasitized eggs was assessed one and two weeks after exposure to the fungus. Ten cysts from each sub-treatment were crushed to release the eggs and the percentage of parasitism determined. Eggs which showed brown necrosis and those with fungal hyphae were counted as parasitized and the unaffected ones and the hatched juveniles as non-parasitized.

In a second experiment, *V. lecanii* was introduced in potato soil and its virulence tested against the cyst nematodes. The fungus *Paecilomyces lilacinus* (Thom.) Samson, a known biocontrol agent for the potato cyst nematodes, was also included in this experiment for comparison. A loamy soil (pH = 5) collected from a cyst-nematode-infested potato field was air-dried for about two months. The cyst population in air-dried soil was adjusted to about 100 per 100 g of soil, by addition of cysts recovered from the same field soil. The soil was then transferred to 2 kg plastic bins and water added to moisten the contents to the extent of 10%.

The fungi were cultured on PDA and 50 g of the medium containing either fungus was added to the soils contained in each plastic bin and thoroughly mixed. A control which received 50 g of PDA without any fungal culture was also maintained. The soils in these three treatments with seven replicates under each, were kept covered with polythene sheets held tightly over the bins with rubber bands and incubated at 16 $\pm$ 1°C. One month after treatment, the soils were thoroughly mixed and a sample of 100 g taken from each replicate and the cysts recovered. A sample of 50

cysts from each replicate, was crushed and the percentage of parasitized eggs determined, as decribed earlier.

In the first experiment, no parasitization of eggs by any fungus was observed in the controls incubated at either room temperature or 16°C. The level of parasitism by *V. lecanii* was 73.5% at room temperature and 5.4% at 16°C, at one week of exposure ($t > 0.31$) and 86.3 and 68.5%, respectively, at two weeks of exposure. Both *V. lecanii* and *P. lilacinus* parasitized eggs of *Globodera* spp. in the soil in which they were introduced. The extent of parasitism of eggs in soil was 73.5 and 70.9%, by *V. lecanii* and *P. lilacinus*, respectively, one month after treatment, at 16°C. The mode of entry of *V. lecanii* into the cysts and parasitism of eggs, appeared similar to that described for *P. lilacinus* (Jatala, 1986). The ability of *V. lecanii* to thrive in potato soil at a low temperature (16°C) and cause a high degree of egg necrosis indicate its potential as a good candidate biocontrol agent for the potato cyst nematodes.

Key words : *Verticillium lecanii, Paecilomyces lilacinus, globodera* spp.

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Evaluation of Substrates for Enhanced Growth of *Trichoderma* spp.

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Use of *Trichoderma* species as a biological control agent for various fungal diseases has been reported in literature (Thomas, 1939; Baker and Cook, 1974; Dohroo and Sharma, 1984). *In vitro* inhibition of fungal pathogens causing rhizome rot of ginger by using three species of *Trichoderma viz., T. viride* (ITCC 1433), *T. harzianum* (ITCC 1894) and *T. hamatum* (ITCC 2084) as antagonists, has also been demonstrated by Bhardwaj and Gupta (1987). However, these antagonists were found comparatively less efficient when tried for the control of the same disease under storage conditions (Bhardwaj *et. al.*, 1988) which may be due to the non-availability of suitable substrate for enhanced growth and multiplication of *Trichoderma*. Keeping this in view, the present investigations were carried out to find out an easily available and cheap substrate which could sustain rapid colonization of these antagonistic species so as to enhance their efficiency in biocontrol of rhizome rot of ginger.

Five substrates, *viz.*, shelled cobs, ginger scales, saw dust, wheat straw and farm yard manure were separately crushed to powder and evaluated for