Fundam. appl. Nematol., 1996, **19** (3), 305-308

Greenhouse studies comparing strains of the fungus *Verticillium lecanii* for activity against the nematode *Heterodera glycines*

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Accepted for publication 11 April 1996.

Summary – In a greenhouse experiment, five strains of the fungus *Verticillium lecanii* were compared for their effects on soybean cyst nematode population densities. Four strains were mutants selected for increased tolerance to benomyl; the fifth strain was a wild type (ATCC 58909). Alginate prills containing fungus were applied at 0.5 g and 5.0 g prills per pot (each pot contained 530 g soil mixture). At the 5.0 g prills per pot application rate, all four mutant strains caused significant reductions in cyst numbers compared to controls without fungus. No strains were effective against the nematode when the prills were applied at 0.5 g per pot.

Résumé – ***Études comparatives en serre du champignon* Verticillium lecanii *pour son activité contre le nématode* Heterodera glycines** – Lors d'une expérimentation en serre, cinq souches du champignon *Verticillium lecanii* ont été comparées pour leurs effets sur les densités de population du nématode à kyste du soja. Quatre de ces souches étaient des mutants sélectionnés pour l'augmentation de la tolérance au benomyl; la cinquième souche était une souche sauvage (ATCC 58909). Des billes d'alginate renfermant le champignon ont été appliquées au taux de 0,5 et 5,0 g de billes par pot (chaque pot contenant 530 g de sol). Au taux de 5,0 g de billes par pot, les quatre souches mutantes entraînaient des réductions significatives du nombre de kyste par rapport au témoin sans champignon. Aucune souche n'a eu d'effet sur le nématode au taux de 0,5 g par pot.

Key-words : benomyl tolerance, biological control, fungus, *Heterodera glycines,* mutant, nematode, soybean cyst nematode, *Verticillium lecanii.*

The fungus *Verticillium lecanii* (A. Zimmermann) Viégas is an antagonist against some species of plant-parasitic nematodes (Hänssler & Hermanns, 1981; Gintis *et al.,* 1983; Hänssler, 1990). One isolate of *V. lecanii* significantly decreased percentages of live *Heterodera glycines* Ichinohe eggs in a Petri dish assay (Meyer *et al.,* 1990). This decrease in egg viability occurred without a concomitant colonization of live eggs, indicating that the fungus acted through production of deleterious compounds. Conidia of that strain were subsequently irradiated with ultraviolet light (Meyer, 1992), and four resulting mutant strains were selected for increased tolerance to the fungicide benomyl. In a previous greenhouse study, the efficacy of the wild type strain against *H. glycines* was compared with that of mutant strain M2S1 (Meyer & Meyer, 1995). The two strains were tested in different soil types, and at various nematode and fungus application rates. In some of those tests, the mutant strain was more efficacious than the wild type strain at reducing *H. glycines* population densities (Meyer & Meyer, 1995). The objective of the current study was to test the activity of all four benomyl mutants against *H. glycines* in greenhouse pots, and to identify the most efficacious strain. Because the wild type strain did not decrease *H. glycines* population levels at a high nematode application rate (Meyer & Meyer, 1995), a similar inoculum level was applied. This was done to determine whether all of the mutant strains would show activity at nematode population levels where the wild type strain was ineffective. Additionally, in the current study, the efficacy of all five strains was determined after the first (35 days) and second (65 days) nematode generations.

Materials and methods

The *V. lecanii* isolates used were the wild type strain (American Type Culture Collection 58909) and the mutant strains deposited as Agricultural Research Service Culture Collection, NRRL 18725, 18726, 18727, and 18728 (Meyer, 1992), equivalent to Beltsville Nematology Laboratory strains M1S1, M2S1, M9S1, and M10S1, respectively. The strains were maintained on potato dextrose agar (PDA), transferred periodically, and stored in a refrigerator (4 °C). For inoculation of greenhouse pots, the fungi were grown in Erlenmeyer

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