

Effect of culture filtrates of antagonistic organisms on cyst nematode, *Heterodera cajani* Koshy in blackgram

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ABSTRACT: Studies were conducted in a glasshouse to assess the biocontrol potential of the culture filtrates of the antagonists namely *Trichoderma viride* Pers. ex. Fr., *T. harzianum* Rifai, *Paecilomyces lilacinus* (Thom.) Samson, *Pseudomonas fluorescens* Migula and *Bacillus subtilis* (Cohn) as soil application against *Heterodera cajani* Koshy on blackgram. The culture filtrate of *B. subtilis* caused maximum reduction in cyst and juvenile population by 95.2 and 94.3 per cent, respectively followed by *P. fluorescens* and *P. lilacinus*.

KEY WORDS: Antagonists, blackgram, culture filtrate, *Heterodera cajani*

Blackgram (*Vigna mungo* L.) is one of the important pulse crops grown widely in many tropical countries of the globe. The crop is infected by several soil - borne pathogens. The pigeonpea cyst nematode, *Heterodera cajani* Koshy infects blackgram and causes severe yield loss (Darekar, *et al.*, 1985). Recently, incidence of high population of this nematode was reported from the soils collected in and around Coimbatore district, Tamil Nadu, India (Anon., 1993). There have been a number of attempts to identify the culture filtrates of antagonists with activity against plant

parasitic nematodes and some of them were successful. A study was, therefore, undertaken to find out the effect of culture filtrates of fungi and bacteria against the cyst nematode, *Heterodera cajani* Koshy in blackgram under pot culture condition.

MATERIALS AND METHODS

Pot culture experiments were conducted in a glasshouse at the Department of Plant Pathology, Tamil Nadu Agricultural University during 1997 to evaluate the culture filtrates of five

antagonists namely *T. viride*, *T. harzianum*, *P. lilacinus*, *P. fluorescens* and *B. subtilis* against *H. cajani* infecting blackgram (cv T-9). The fungal antagonists were maintained on Potato Dextrose Agar medium, then transferred to sterilized Potato Dextrose Broth and allowed to multiply for 15 days. The bacterial antagonists, namely *P. fluorescens* and *B. subtilis* were inoculated on King's B broth and Nutrient broth, respectively and incubated for five days at room temperature. After the incubation period, the cultures were filtered through Whatman No.42 filter paper and the filtrates were stored in amber coloured bottles at 5°C. For each treatment, 100ml of culture filtrate / kg of soil was used since there is no standard method for use of culture filtrate. The experiment consisted of six treatments, five constituting culture filtrates of antagonists added to the sterile soil with blackgram seeds sown where the cyst nematodes were added to the soil @ 150 cysts/kg of soil seven days before and the sixth treatment as control. The experiment was laid in completely randomized block design replicated four times.

In each pot five plants were maintained. Observations on plant growth parameters for each plant and nematode population in terms of cyst and juvenile numbers were

recorded at the time of plant maturity (75 days after sowing). The data were recorded and subjected to analysis of variance.

RESULTS AND DISCUSSION

The data on effect of cultural filtrates of fungal and bacterial antagonists have been presented in Table 1. The culture filtrates of *B. subtilis* caused maximum reduction in cyst and juvenile population namely 95.2 and 94.3 per cent, respectively over control. *P. fluorescens* and *P. lilacinus* were the next effective treatments in reducing the population. However, *T. viride* and *T. harzianum* also caused significant reduction in population compared to untreated control (Table 1). Earlier reports showed that non-cellular extracts of *B. subtilis*, *B. pumilis*, *Pseudomonas* sp.1 and 2 were most effective against the Nematodes, *H. cajani*, *H. zaeae*, *H. avenae* and *Meloidogyne incognita* under *in vitro* condition (Gokte and Swarup, 1988). The results show the effectiveness of *B. subtilis* as a potential biocontrol agent against *H. cajani*. The mechanism responsible for the reduction of nematode population may be related to the larvicidal property of the culture filtrate of the bacterium, *B. subtilis* (Gokte and Swarup, 1988).

Table 1. Effect of culture filtrates of fungal and bacterial antagonists on plant growth, and cyst nematode population

Treatment	Plant growth		Nematode population per 100g of soil	
	Shoot wt.	Root wt. (g)	Cyst (No.) (g)	Juvenile (No.)
<i>T. viride</i>	0.83	0.42	17.2 ^d	557.3 ^d
<i>T. harzianum</i>	0.83	0.42	19.8 ^e	653.5 ^e
<i>P. lilacinus</i>	0.83	0.42	6.5 ^e	193.5 ^e
<i>P. fluorescens</i>	0.83	0.42	3.0 ^b	101.5 ^b
<i>B. subtilis</i>	0.83	0.43	1.5 ^a	52.3 ^a
Control	0.83	0.42	31.3 ^f	922.8 ^f
	NS	NS		

Figures followed by different letters are significantly different from each other at $P < 0.05$

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