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The Potential of Antagonistic organisms for Bio-control of *Neovossia indica* causing Karnal Bunt of Wheat

RASHMI AGGARWAL, D.V. SINGH and K.D.SRIVASTAVA

Division of Plant Pathology
Indian Agricultural Research Institute
New Delhi - 110 012

Neovossia indica (Mitra) Mundkur, causing Karnal bunt of wheat is mainly a soil-borne pathogen, whose teliospores germinate and produce a crop of allantoid secondary sporidia, which become air-borne and cause infection (Dhaliwal and Singh, 1986). Seed treatment and foliar spray fungicides have been tested to control the disease (Singh *et al.*, 1985, 1991). Chemical control in addition to creating environmental pollution, is ineffective in completely controlling the disease. Biological control using antagonistic organisms is an ecologically sound alternative to chemical control (Cook and Baker, 1983). Hence, a few fungal and a bacterial antagonists were screened against *N.indica in vitro* on potato dextrose agar as well as under glass house conditions for selection of the most effective bioagent.

Species of *Trichoderma* and *Gliocladium* (Table 1) were multiplied on presoaked and sterilised wheat seeds taken in 250 ml flasks for 15 days. *Bacillus subtilis* Cuhn was multiplied in Petri plates on yeast - glucose - carbonate agar medium. Fungal culture from one 250 ml flask was added to four 4" plastic pots mixed with sterilized soil. A suspension of *B.subtilis* prepared from one Petri plate was added to sterilized soil used to fill two 4" plastic pots. Karnal bunt infected grains kept in nylon net bags were placed in the pots, 2-3 cm below the soil surface and subsequently the pots were watered. Four pots were kept for each antagonist in the glass house and were kept moist by repeated watering. These bags containing infected seeds were taken out after 15 and 30 days and teliospore germination was assessed.

Teliospores were scraped off from the grains and were placed in a drop of water taken on a sterilized cavity slide. The slides placed in moist chamber were incubated at 18°C for 15 days and observations on teliospore germination were recorded.

The results showed that teliospore germination was significantly reduced by *T.viride*, *T.harzianum*, and *G.deliquescens* after 15 days whereas, after 30 days of treatment, *G.deliquescens* was found to be the most effective in reducing teliospore germination. *Bacillus subtilis* was not found to be effective in reducing the teliospore germination after 30 days of treatment (Table 1).

A dual culture test on potato dextrose agar was conducted with *Trichoderma harzianum* Rifai and *Gliocladium deliquescens* Sopp, since these reduced the teliospore germination most significantly in the glass house experiment.

Table 1. Effect of bio-control agents on *N.indica* teliospore germination

Antagonists	% germination days after	
	15	30
Trichoderma viride Pers:ex.Fr.	27.4	22.1
T. harzianum Rifai	9.9	18.
T. koningii Oud	21.8	17.6
Gliocladium virens Miller *et al*	35.5	16.6
G. roseum Bainier	31.9	17.2
G. catenulatum Gillman & Abbott	31.8	25.4
G. deliquescens Sopp	6.4	12.7
G. penicilloides Corda	56.8	41.1
Bacillus subtilis Cuhn	34.0	45.5
Control	43.4	29.7
CD at 5%	4.3	3.4

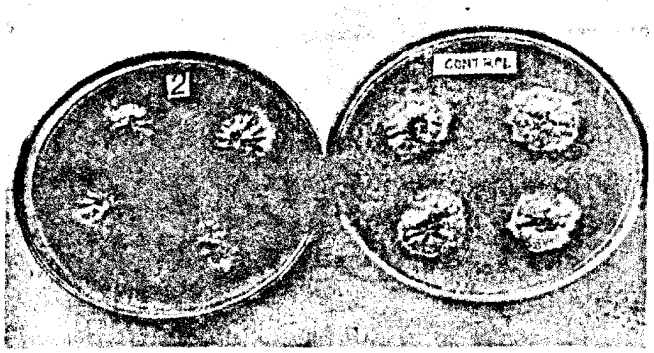

Fig. 1. Interaction of *N.indica* with *T.harzianum* (Plate No.2)

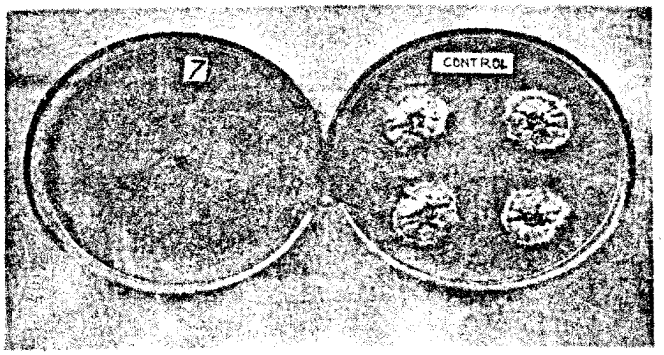

Fig. 2 Interaction of *N.indica* with *G.deliquescens* (Plate No.7)

Petriplates with potato dextrose agar (PDA) were inoculated with *N.indica* at four corners and incubated at 18^0C. After one week, these Petri plates were inoculated with the antagonistic organisms. The plates were incubated at 22° C and observation on hyphal interactions were recorded after one week.

The results showed that *T.harzianum* and *G.deliquescens* started growing towards *N.indica* and spread over the pathogen's colony without forming a continuous growth of zone of continuous growth of zone of inhibition (Fig. 1&2). Initially the antagonists started sporulating over the pathogen colony and subsequently caused lysis of *N.indica. T. harzianum* has been successful in the biological control of *Sclerotium rolfsii* Sacc and *Rhizoctonia solani* Kuhn (Elad *et al.*, 1980). It produces lytic enzymes that digest the wall components, laminarin and chitin (Elad *et al.*, 1983). In the present studies also, lysis of *N.indica* mycelium was observed.

KEY WORDS : Wheat, Karnal bunt, biological control, *Trichoderma* spp., *Gliocladium* spp., *Bacillus subtilis*

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