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# Antagonism of some Well-known Bioagents against *Colletotrichum gloeosporioides* Penz. and Sacc. - An Incitant of Castor Anthracnose

**S.K. Chawda*, B.P. Mehta and A.N. Sabalpara**

Department of Entomology, N.M. College of Agriculture,
Navsari Agricultural University, Navsari-396 450, India.

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**Investigation on anthracnose (*Colletotrichum gloeosporioides* Penz. and Sacc.) of castor (*Ricinus communis* L.) under south Gujarat conditions was carried out to find out suitable management strategies. Due to hazardous effect of chemical fungicides, search for safer alternative to control the pathogen is better choice. This led to trials on the use of bioagents to control the pathogen. The bioagents such as *T. viride, T. harzianum, T. longibrachyatum, T. virens, Chaetomium globosum, Aspergillus niger,* and *A. flavus* were evaluated by dual culture, pathogen at periphery and pathogen at the centre technique respectively to monitor antagonistic effect. The results revealed that out of all the eight bioagents used, three bioagents *viz., T. viride*, *T. harzianum* and *A. niger* showed strong antagonistic effect to inhibit the mycelia growth of the pathogen significantly.**

**Key words:** Anthracnose, Castor, *Trichoderma* spp., *Aspergillus* spp.

Castor (*Ricinus communis* L.) is one of the important oil seed crops grown extensively in Gujarat. The occurrence of anthracnose disease in castor was observed in serious proportion in Gujarat. Considering the seriousness of the problem, the present investigation was carried out. The hazardous effects of chemicals used in plant disease management have diverted plant pathologists to find out the alternative techniques of plant disease control which may cause little or no adverse effect on environment. Notable success of disease management through the use of antagonistic bioagents in the laboratory, glass house and field has been achieved during past several years. On the basis of this information, there is possibility of development of biological control for plant diseases. Now a days, the commercial formulation of some of the biocontrol agents has already become available in the market. In the present study, attempts have been made to identify antagonistic bioagents against *C. gloeosporioides in vitro.*

## MATERIALS AND METHODS

Eight known antagonists *viz., Trichoderma viride* (TV), *Trichoderma harzianum* (TH), *Trichoderma longibrachyatum* (TL), *Aspergillus niger* (AN), *Aspergillus flavus* (AF), *Trichoderma virens* (TVi), *Chaetomium globosum* (CG), and *Bacillus subtilis* (BS) were tested *in vitro* against *C. gloeosporioides*. The culture discs measuring 5 mm of test organism and pathogen were cut aseptically from the colony of pure culture grown on PDA medium and kept at different

* To whom all correspondence should be addressed.
E-mail: sk_pathology@yahoo.com

positions according to different techniques employed in the present investigation. In dual culture technique (Dennis & Webster, 1971), culture discs of test organisms and the pathogen were placed opposite to each other at 4 cm apart in the Petri plate containing 20 ml PDA aseptically and real antagonistic properties of the test bioagents were exhibited. In Pathogen at the periphery technique (Asalmol & Awasthi, 1990), the culture disc of the pathogen placed aseptically 4 cm away radially at four corners keeping one disc of test organism at centre in the plate containing 20 ml PDA aseptically. In Pathogen at the centre the culture disc of the pathogen was placed in the center and four similar discs of the test organisms were placed 4 cm away from the pathogen at the periphery in the Petri plate containing 20 ml PDA aseptically. The culture discs of the pathogens were kept at respective places of pathogen in each technique without bioagent served as control. All the treatments were incubated at room temperature (27 ± 2°C) and after 6 days the radial growth of the test organism and pathogen was measured. CRD design with three repetitions of each treatment was employed in the present experiment. The percent growth inhibition (PGI) was calculated by using formula as suggested by Vincent (1927):

$$PGI = \frac{100\,(DC-DT)}{DC}$$

where,

PGI = Per cent growth inhibition

DC = Average diameter of mycelial colony of control set (mm)

DT = Average diameter of mycelial colony of treated set (mm)

## RESULTS

All the antagonists under test were significantly superior over control in all the techniques against *C. gloeosporioides* however in Dual culture technique, Out of eight antagonists tested, *T. viride* produced maximum inhibition (68.39 %) which was statistically at par with *T. harzianum* (65.45 %). The next best in the order of merit was *A. niger* (52.94 %), which was also at par with *A. flavus* (55.87 %). *T. longibrachyatum* (44.12 %), *T. virens* (38.98 %), *C. globobosum* (30.09 %) and *B. subtilis* (50.01 %) showed comparatively least growth inhibition (Fig. 1). In Pathogen at the periphery technique, *T. viride* showed maximum growth inhibition (62.53%) of the pathogen and appeared to be the most superior over all the antagonists tested. Next best in order of merit was

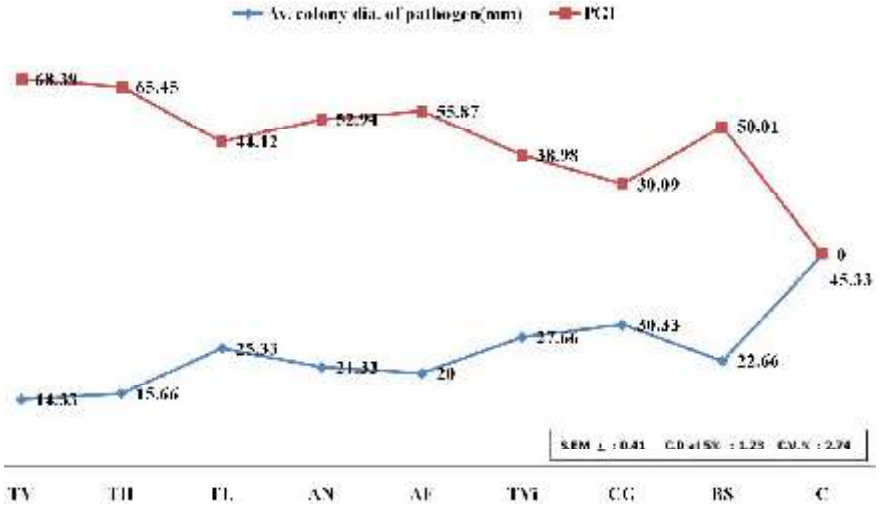


**Fig. 1.** Inhibition of antagons againts *C.gloeosporioodes* (Dual culture technique)

TV: *Trichoderma viride*; TH: *Trichoderma harzianum*; TL: *Trichoderma longibrachyatum*; AN: *Aspergillus niger*; AF: *Aspergillus flavus*; TVi: *Trichoderma* virens; CG: *Chaetomium globosum*; BS: *Bacillus subtilis*

*T. harzianum* (59.06%) followed by *A. niger* (42.97%), *A. flavus* (39.92%) *B. subtilis* (39.30%), *T. longibrachyatum* (24.08%),*T. virens* (13.44%), *C. globobosum* (-5.50 %) (Fig. 2). In Pathogen at the centre, *T. viride* produced maximum inhibition (65.76 %). Next best was *T. harzianum* (62.75 %) followed by *A. niger* (52.45%), *A. flavus* (48.91%) *B. subtilis* (47.28%), *T. longibrachyatum* (44.84%), *T. virens* (33.15%) and *C. globobosum* (26.36 %) (Fig. 3).

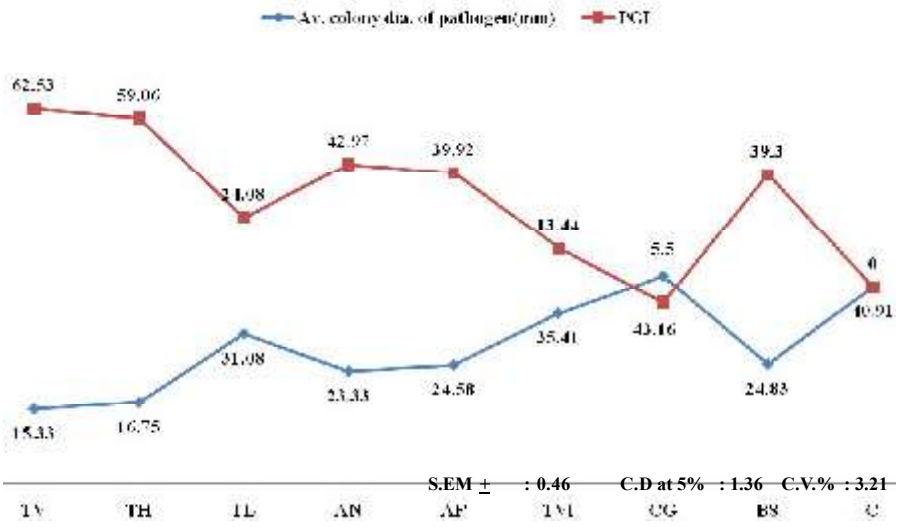


**Fig. 2.** Inhibition of antagons againts *C.gloeosporioodes* (Pathogen at periphery)

TV: *Trichoderma viride*; TH: *Trichoderma harzianum*; TL: *Trichoderma longibrachyatum*; AN: *Aspergillus niger*; AF: *Aspergillus flavus*; TVi: *Trichoderma* virens; CG: *Chaetomium globosum*; BS: *Bacillus subtilis*

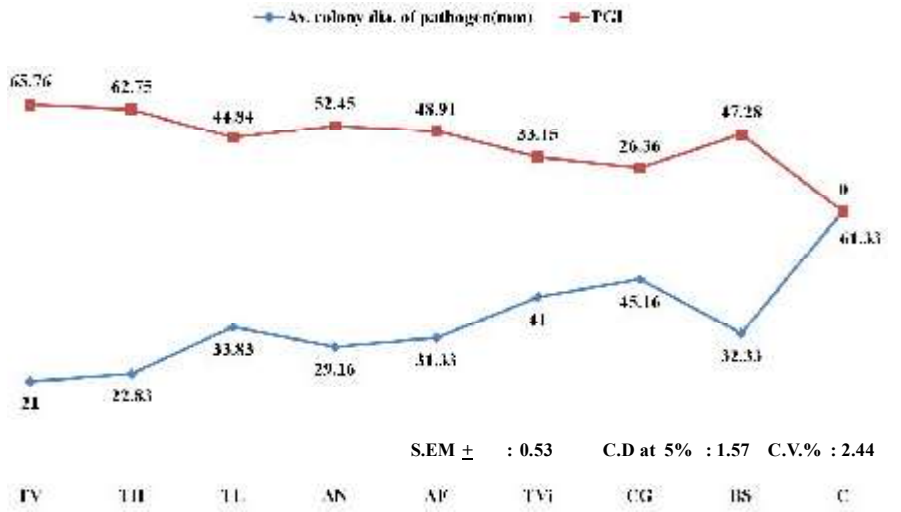


**Fig. 3.** Inhibition of antagons againts *C.gloeosporioodes* (Pathogen at center)

TV: *Trichoderma viride*; TH: *Trichoderma harzianum*; TL: *Trichoderma longibrachyatum*; AN: *Aspergillus niger*; AF: *Aspergillus flavus*; TVi: *Trichoderma* virens; CG: *Chaetomium globosum*; BS: *Bacillus subtilis*

## DISCUSSION

It is appeared from the results that all the antagonists tested by three different methods were effective against *C. gloeosporioides* and may be very useful as potential biological control agents. Among them, *T. viride* proved highly antagonistic followed by *T. harzianum, A. niger* and *A. flavus*. This may be due to undeniably its mode of action like competition, antibiosis and mycoparasitim and it possess some important secondary metabolites and antibiotics like viridin, harzianiol and so many. The results of the present investigation are analogous to the previous findings published by several workers. Medeiros & Menezes (1994) found that *C. gloeosporioides* showed high degree of sensitivity to *T. harzianum*, *T. tolyposporium* and *T. pseudokoningii*. Bankole and Adebanjo (1996) reported that *T. viride*, isolated from cowpea phylloplane hyper parasitised the mycelium of *C. truncatum*. Antagonistic effect of *T. viride, T. harzianum* and *A. niger* against *C. gloeosporioides* was reported by Patel (2000). Bhuvneswari & Rao (2001) reported that *T. viride* inhibited the growth of *C. gloeosporioides* isolated from mango. Patel (2004) reported that *A. niger*, *T. viride*, *T. harzianum*, *T. longibrachyatum*, *B. subtilis* and *P.fluorescens* were strong and potent antagonists against *C. gloeosporioides*.

## CONCLUSION

Thus, overall results and discussion proved *T. viride* as advanced inhibitor to affect the growth of *C. gloeosporioids* as well as exceptionally a good model of biocontrol agent. Hence, it can be recommended after rigorous testing in the pot and field conditions against the pathogen for management of castor anthracnose.

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