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To Evaluate *in vitro* Bio-efficiency of Different Bio-agents against *Colletotrichum gloeosporioides* Penz. and Sacc. causing Fruit Rot of Aonla

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A B S T R A C T

Colletotrichum gloeosporioides Penz. and Sacc. is associated with aonla, in that fruit rot of aonla is one of the contributing factors for this low productivity. Therefore, the ecofriendly and environmentally safe management of fruit rot disease with the use of bioagents is necessary. Different bioagents and plant extracts evaluated under *in vitro* condition against the mycelial growth of *Colletotrichum gloeosporioide* revealed that fungal bio agents *viz*., *Trichoderma viride* (85.03 %) *T. harzianum* (82.56 %) and *Trichodermah hamatum* (81.08 %) mycelial growth inhibition of *C. gloeosporioides* under laboratory dual culture technique.

Introduction

Aonla (*Emblica officinalis*.Gaertn.) is one of the major fruit crop in the State of Maharashtra. The anola is affected by number of fungal pathogens such as *Colletotricum gloesporioides.* Penz. and Sacc. (fruit rot) *Ravenelia emblicae* Styd. (rust), *Fusarium* spp. (wilt), *Penicillium citrinum* Thom. (fruit rot or blue mould), *Phomopsis phyllanthi* Punith (soft rot), *Phoma putaminum* Speg. (dry fruit rot), *Aspergillus terreus* (fruit rot) *etc*. Among them, the fruit rot caused by *Colletotricum gloesporioides.* Penz. and Sacc. is a major disease of aonla fruit and responsible for causing 2- 29 per cent yield loss (Sohi, 1975).

Keeping in view economic importance of aonla and losses incurred due to fruit rot disease, present investigations on the various aspects *viz.*, survey, symptomatology, pathogenicity test, morphological and cultural characteristics, efficacy of different fungicides, bio-agents, plant extracts were undertaken during the season of *Kharif* 2018-2019 at Department of Plant Pathology, College of Agriculture, Badnapur, V.N.M.K.V. Parbhani. The results obtained on the above aspects during the present

investigations are being interpreted and presented in the following paragraphs.

Shirshikar (2002) reported that, culture and culture filtrate of *Trichoderma viride* was more effective than *T. harzianum* in inhibiting the mycelial growth of *Botryodiplodia theobromae* and *Colletotrichum gloeosporioides*.

Gud and Raut (2008) reported that, the combination of *Trichoderma viride, T. harzianum* and *Gliocladium virens* were found to be potential antagonists against *Colletotrichum gloeosporioides* causing mango anthracnose (Gud and Raut, 2008).

Materials and Methods

In-vitro evaluation of bio-agents

The antagonistic potential of *Trichoderma harzianum, Trichoderma viride, Trichoderma koningii, Trichoderma hamatum, Gliocladium virens, Aspergillus niger and Aspergillus flavus* were assessed against *Colletotrichum gloeosporioides* by 'Dual Culture Technique' (Dennis and Webster, 1971) on PDA medium.

For this 20 ml sterilized and cooled medium (PDA) was poured in each petri plates (90 mm diameter) and was allowed to solidify. A 5 mm disc of *Colletotrichum gloeosporioides* was plated at one end of the medium with the help sterilized cork borer. Just opposite to it 5 mm disc of the (bio-agents) was placed at another end 0.5 to 1.0 cm away from edge of petri plates. For this one week old pure culture of *Colletotrichum gloeosporioides, Trichoderma* spp. and *Aspergillus* spp. on Petri plates on sterilized PDA medium were used. Three replication of *Colletotrichum gloeosporioides* Penz. and Sacc. and control *i.e.* without incubation of *Trichoderma* spp. were maintained in petri plates, were incubated at 27 $\pm$ 1^0 C temperature in inverted position.

Details of experiment

Design : CRD
Replications : Three
Treatments : Eight

Treat. No.	Name of Bio-agent
T_1	*Trichoderma harzianum*
T_2	*Trichoderma viride*
T_3	*Trichoderma koningii*
T_4	*Trichoderma hamatum*
T_5	*Gliocladium virens,*
T_6	*Aspergillus niger*
T_7	*Aspergillus flavus*
T_8	Control

Observations on linear mycelial growth of test pathogen and bio-control agents were measured and percent inhibition of test pathogen were calculated by applying as per the formula given by Arora and Upadhay (1978) as follows

$$\text{Percent growth inhibition} = \frac{\text{Growth of test pathogen in Controlled plate} - \text{Growth of test pathogen in treated plate}}{\text{Growth of test pathogen in controlled plate.}} \times 100$$

Results and Discussion

In-vitro evaluation of bio-agents against *C. gloeosporioides*

Results obtained on seven bio-control agents (*Trichoderma harzianum, Trichoderma viride, Trichoderma koningii, Trichoderma hamatum, Gliocladium virens, Aspergillus niger and Aspergillus flavus*.) were evaluated *in-vitro* for their efficacy against *C. gloeosporioides* by applying dual culture method on PDA as basal medium (Table 1, Fig. 1 and Plate 1).

Amongst the Seven fungal antagonists tested, *Trichoderma viride* was found most effective and recorded significantly least linear mycelial growth (13.23 mm) with highest percent mycelial inhibition (85.03 %) of the test pathogen. The second best antagonist found was *Trichoderma harzianum*, which recorded mycelial growth of (15.69 mm) and inhibition of (82.56 %), which was statistically at par with treatment *Trichoderma viride*. The next best treatment was *Trichoderma hamatum*, which recorded mycelial growth of (17.02 mm) with percent inhibition of (81.08 %). This was followed by *Gliocladium virense* having colony diameter (19.44 mm) and percent inhibition of (78.43 %), *Trichoderma koningii* with colony diameter (23.45 mm) and inhibition (73.94 %). The fungal antagonist, *Aspergillus niger* (T_6) was found less effective, which recorded (31.33 mm) linear mycelial growth and (65.18 %) mycelial inhibition. The antagonist, *Aspergillus flavus* (T_7) was also found least fungistatic and recorded (35.45 mm) colony diameter and (60.61 %) growth mycelial inhibition respectively (Table 1, Fig. 1 and Plate 1).

The results of present investigation resembling the findings of earlier workers *viz.*, Vinod *et al.,* (2009), Deshmukh *et al.,* (2010), Jagtap *et al.,* (2013), Ngullie *et al.,* (2010) and Devanshu *et al.,* (2016).

Table.1 *In-vitro* bio-efficacy of different bio-agents against radial mycelial growth and per cent inhibition of *C. gloeosporioides*

Tr. No.	Treatments	Colony dia. of bio-agents* (mm)	Colony dia. of test pathogen* (mm)	Inhibition of test pathogen (%)
T_1	*Trichoderma harzianum*	74.31	15.69	82.56 (65.31)
T_2	*Trichoderma viride*	76.77	13.23	85.03 (67.44)
T_3	*Trichoderma koningii*	66.55	23.45	73.94 (59.30)
T_4	*Trichoderma hamatum*	72.98	17.02	81.08 (64.21)
T_5	*Gliocladium virens,*	70.56	19.44	78.43 (62.32)
T_6	*Aspergillus niger*	58.67	31.33	65.18 (53.83)
T_7	*Aspergillus flavus*	54.55	35.45	60.61 (51.12)
T_8	Control	00.00	90.00	00.00 (00.00)
	SE ±	**0.62**	**0.62**	**1.26**
	C.D. @ 0.01	**1.76**	**1.76**	**3.54**

*Mean of three replications, Figures in parenthesis are arc sine transformed value.

Fig.1 *In-vitro*, effect of different bio-agents on radial mycelium growth and per cent inhibition of *C. gloeosprioides*

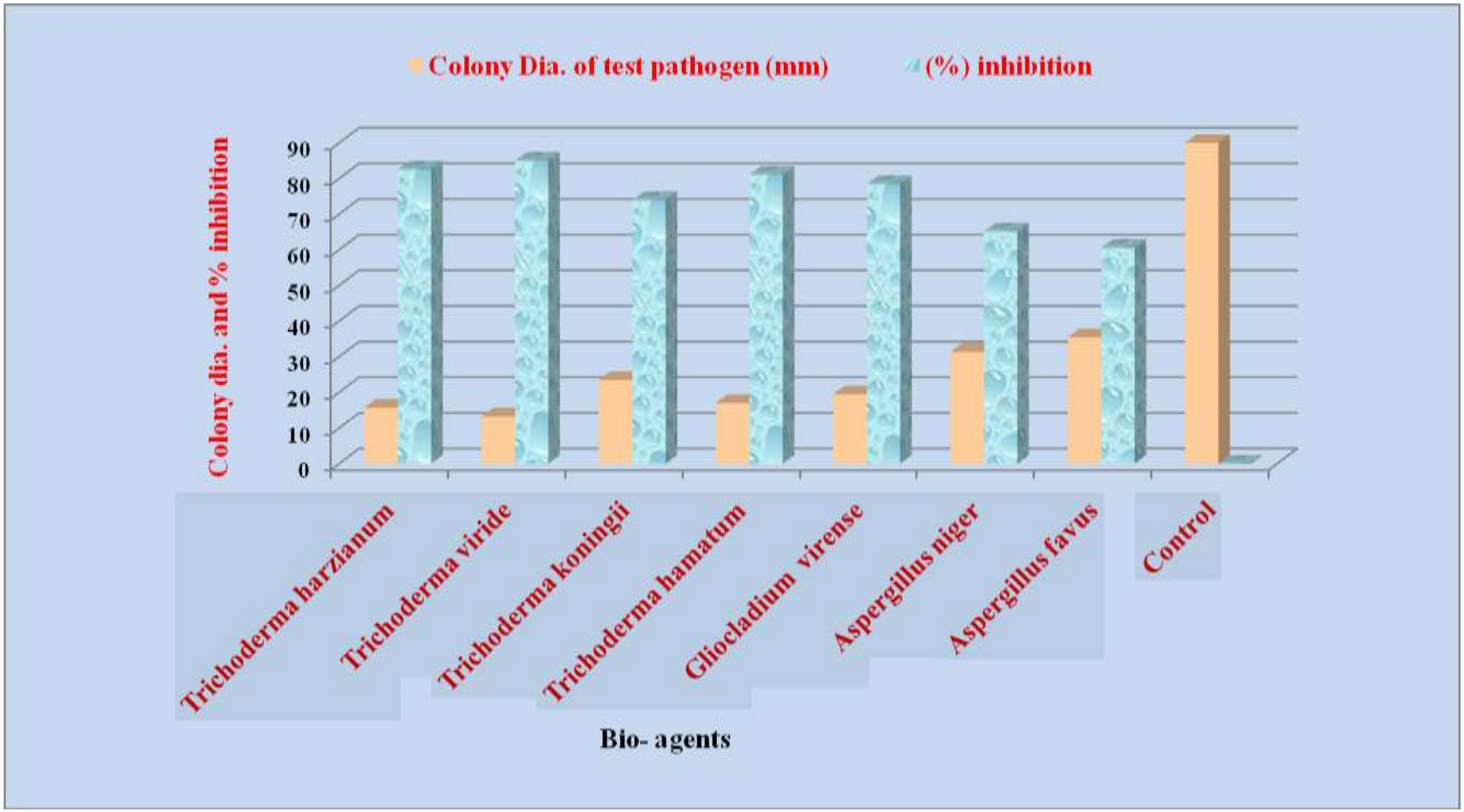

Plate 1

Bio-efficacy of different bio-agents on linear mycelial growth and inhibition of *C. gloeosporioides* Penz. and Sacc.

T_1: *Trichoderma harzianum*

T_2: *Trichoderma viride*

T_3: *Trichoderma koningii*

T_4: *Trichoderma hamatum*

T_5 : *Gliocladium virens*

T_6 : *Aspergillus niger*

T_7 : *Aspergillus flavus*

T_8 : Control

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