In vitro Efficacy of Fungicides and Bioagents Against *Colletotrichum* Blight of Betalvine

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SUMMARY

A severe incidence of blight (*Colletotrichum gloeosporioides*) was noticed at Akot and Anjangaon area during August to December, 2007. Efficacy of fungicides *in vitro* revealed that mancozeb + carbendazim (0.2%) and propiconazole (0.1%) were most effective as they completely inhibited the growth of *C.gloeosporioides*. Mancozeb + triacyclozole (0.2%) was the next best treatment which inhibited 85.40 per cent growth of the fungus followed by tridemorph (0.1%), zineb + hexaconazole (0.2%) and carbendazim (0.1%) giving 76.66, 76.61 and 71.46 per cent inhibition, respectively. Chlorothalonil (0.1%), copper oxychloride (0.3%) and mancozeb (0.25%) alone were found less effective in inhibiting the pathogen. Among the bioagents tested, *Trichoderma viride* was observed most effective antagonist against *C.gloeosporioides*. The least inhibition (15.01%) was found due to *Pseudomonas fluorsescens*.

Key words : Fungicides, Bioagents, *C. gloeosporioides*, *Piper betle*

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A number of diseases have been reported from betelvine growing areas of India but bight is one of the most serious diseases and under favourable weather conditions the disease may cause 25-90 per cent loss in consumable leaves. Lacking appropriate management strategies, these diseases continue to pose a serious threat to betel vine cultivation. Several workers have tested on the efficacy of different fungicides and bioagents against blight (*Colletotrichum gloeosporioides* Penz.). At present, chemical fungicides such as mancozeb + carbendazim (0.2%) and propiconazole (0.1%) and bioagents like *Trichoderma viride* are used to combat the disease (Haralpatil, 2006; Prashanth, 2007 and Venkataravanappa *et al*., 2006).

MATERIALS AND METHODS

The study was undertaken in the Department of Plant Pathology Dr. P.D.K.V., Akola and Betelvine Research Station, Diwthana during August to December, 2007.

Nine fungicides and three bioagents were tested. The fungicides were mancozeb, chlorothalonil, copper oxychloride, carbendazim, propiconazole, tridemorph, mancozeb + carbendazim, mancozeb + tricyclozole and zineb + hexaconazole, while bioagents were *Trichoderma harzianum,T. viride* and *Pseudomonas fluorescens*. *C.gloeosporioides* was isolated from the affected leaf and stem samples of *P. betle* on Potato dextrose agar (PDA) medium at 20 ± 1^0C. Efficacy of these fungicides and bioagents against pathogens were tested in the laboratory (*in vitro*). Methods adopted for these experiments related to the efficacy were as follows:

Efficacy of chemicals by poisoned food technique:

Poisoned food technique was used to evaluate the above mentioned fungicides *in vitro* against *Colletotrichum gloeosporioides*. Potato dextrose agar medium was prepared and distributed at the rate of 100 ml in 250 ml conical flask, autoclaved at 1.05 kg/cm^2 for 15 min. Then before solidification of media, different fungicides with desired concentration were incorporated aseptically in different flasks. These flasks shaken thoroughly and poured in Petri plates 20 ml/plate like wise, three plates for each treatment were poured. One set of three plates was poured without any fungicide to serve as control. After solidification of medium, the plates inoculated with eight days old pathogen separately. The 6 mm diameter mycelial disc selected from peripheral growth of the plate by sterilized cork borer were used for inoculating the plates by keeping one disc per plate in the centre in inverted position, so as to make the mycelial growth touch the surface medium. The inoculated plates were incubated at room temperature for seven days.

The colony diameter of the fungal pathogen on medium was recorded and per cent

inhibition in each treatment was calculated (Vincent, 1927) by using following formula:

$$I = \frac{C = T}{C} \times 100$$

where,

I = Growth inhibition percentage

C = Growth of the fungus in control plates

T = Growth of the fungus in treated plates

Efficacy of bioagents by dual culture technique:

Autoclaved medium was poured into the sterilized glass Petri plates and allowed to solidify. The 6 mm diameter discs of the above bioagents were cut from peripheral growth of the plate using sterilized cork borer under aseptic condition and put three discs at equidistance from centre on the Petri plate of solidified medium and disc of pathogen separately were kept at the centre. Control plates, containing only pathogen were also maintained. The treatments were replicated thrice. The radial mycelial growth of pathogen was measured on 5th day and inhibition per cent was calculated by using formula of Vincent (1927).

RESULTS AND DISCUSSION

In vitro study showed that propiconazole (0.1%) and mancozeb + carbendazim (0.2%) were significantly superior over all other treatments in inhibiting the pathogen. It is found that, these two chemicals completely inhibited the growth of pathogen (Table 1). Mancozeb + triacyclozole (0.2%) was the next best treatment which inhibited 85.40 per cent growth of the fungus followed by tridemorph (0.1%), zineb + hexaconazole (0.2%) and carbendazim (0.1%) giving 76.66, 76.61 and 71.46 per cent inhibition, respectively. Chlorothalonil (0.1%), copper oxychloride (0.3%) and mancozeb (0.25%) alone were found less effective inhibiting the growth of the pathogen.

Nandoskar (2001), Patel and Joshi (2002) and Haralpatil (2006) also reported that propiconazole totally inhibited the mycelial growth of *C.gloeosporioides* in leaf spot of turmeric and anthracnose of *Piper betle*. These findings are in uniformity with the results of Prashanth (2007) and Venkataravanappa *et al*. (2006) stated that mancozeb + carbendazim was superior in inhibiting the mycelial growth of the *C.gloeosporioides* in anthracnose of pomegranate and mango. The present results thus are in concurrent with the results of these workers.

Efficacy of bioagents against C. gloeosporioides (Dual culture techniques) in vitro:

In dual culture technique, different bioagents *viz.*, *T.viride*, *T.harzianium* and *Pseudomonas fluorescens* were tested against *Colletotrichum gloeosporioides*. *Trichoderma viride* could significantly reduce the mycelial growth (66.29%) of *Colletotrichum gloeosporioides* and was followed by *Trichoderma harzianum* (58.06%). The least inhibition (15.01%) was found due to *Pseudomonas fluorsescens* (Table 2).

Table 1 : Efficacy of different fungicides against *Colletotrichum gloeosporioides* (poisoned food technique) *in vitro*

Tr. No.	Treatments	Conc. (%)	Radial mycelial growth (mm)*	Per cent growth inhibition
T_1	Mancozeb	0.25	57.11	35.83
T_2	Chlorothalonil	0.1	46.58	47.69
T_3	Copper oxychloride	0.3	56.44	36.58
T_4	Carbendazim	0.1	25.40	71.46
T_5	Propiconazole	0.1	0	100
T_6	Tridemorph	0.1	20.77	76.66
T_7	Mancozeb + Carbendazim	0.2	0	100
T_8	Mancozeb + Tricyclozole	0.2	12.99	85.40
T_9	Zineb + Hexaconazole	0.2	20.81	76.61
T_{10}	Control	-	89	-
	'F' test	-	Sig.	-
	S.E. ±	-	2.26	-
	C.D. (P=0.01)	-	9.10	-

*Mean of three replications

Table 2 : Efficacy of different bioagents against *Colletotrichum gloeosporioides* (Dual culture technique) *in vitro*

Tr. No.	Treatments	Radial mycelial growth (mm)*	Per cent growth inhibition
T_1	*Trichoderma viride*	16.84	66.29
T_2	*Trichoderma harzianum*	20.95	58.06
T_3	*Pseudomonas fluorescens*	42.47	15.01
T_4	Control	49.99	-
	'F' test	Sig.	-
	S.E. ±	0.52	-
	C.D. (P=0.01)	2.10	-

*Mean of three replications

The maximum per cent inhibition of *C. gloeosporioides* was achieved due to *T.viride* as earlier observed by Haralpatil (2005) for anthracnose of *Piper betle*. Patel and Joshi (2001) for leaf spot of turmeric and Bhave (2005) for leaf spot of black pepper. These results thus support the present findings.

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