



Research Note

Bioefficacy of antagonistic fungi *Trichoderma hammatum* and *Trichoderma harzianum* against *Alternaria alternata* (Fr.) Keissler causing fruit rot in bottle gourd

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ABSTRACT: The bioefficacy of two species of antagonistic fungi *Trichoderma*, viz., *T. hammatum* and *T. harzianum* was tested against black fruit rot of bottle gourd caused by *Alternaria alternata* (Fr.) Keissler. Both *T. hammatum* and *T. harzianum* significantly inhibited the growth and sporulation of *A. alternata* under *in vitro* conditions, however, *T. hammatum* (87.77 %) was more promising than *T. harzianum* (77.77%).

KEY WORDS: Antagonistic fungi, biocontrol, bottle gourd, fruit rot, *Trichoderma sp*

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The bottle gourd (*Lagenaria siceraria* Standl., F: Cucurbitaceae), commonly known as 'Lauki' or 'Dudhi', is a popular domestic vegetable grown for its young and tender fruits. In India bottle gourd is grown on around 9000 hectares with a productivity of 28.9 tonnes per hectare (Harika *et al.*, 2012). The black fruit rot caused by *Alternaria alternata* (Fr.) Keissler is the most destructive disease of bottle gourd, that causes rotting of fruits at blossom end stage. The rot disease in bottle gourd is a serious destroyer and disease development is so fast that whole crop is lost in a few days (Singh and Majumdar, 2004; Singh *et al.*, 2006, Pawar *et al.*, 2014). The antagonistic fungi such as *Trichoderma sp.* offers best economical and eco-friendly solution to the management of serious plant diseases (Pandey, 2010; Gveroska and Ziberoski, 2011; Kumar *et al.*, 2012). The present study was planned to evaluate the biocontrol potential of two antagonistic fungi *T. hammatum* and *T. harzianum* against *A. alternata* under *in vitro* conditions.

The samples of infected bottle gourd fruits (variety: *Samrat*) were collected from experimental field of Regional Fruits and Vegetable Research Station (Mahatma Phule Krishi Vidyapeeth), Ganeshkhind, Pune. The collected disease samples were brought to the laboratory of Department of Plant Pathology, College of Agriculture, Pune in separate sterile polythene bags to avoid any contamination. The samples were washed thoroughly under tap water and air dried. The isolation of pathogen associated with bottle gourd fruit-rot was carried out by following a detached tissue method

(Loladze *et al.*, 2005; Park *et al.*, 2008). The infected tissues were cut into small bits (size: 2-3 mm) using sterilised scalpel and disinfected with mercuric chloride solution (HgCl₂, 0.001%) for one minute followed by washing with sterile water for three times in order to remove traces of corrosive sublimate of mercuric chloride. Using sterilised forceps, the bits of disease infected tissues were transferred aseptically on solidified potato dextrose agar medium (composition for 1 litre medium: peeled potatoes 200 g; dextrose 20 g; agar agar 15 g; double distilled sterile water 1000 ml; pH adjusted to 7.0) in sterilised Petriplates. The inoculated Petriplates were then incubated in an incubator at 27 ± 1°C temperature and 65-70% RH for one week. The plates were regularly monitored for typical growth of the fungus and to observe for contamination, if any. The plates with contamination were discarded promptly without opening, so as to avoid further contamination. After incubation for a week, the growth of the fungus obtained on culture medium was purified by repeated subculturing on slants of PDA medium. The purified culture was held in refrigerator at 10-15°C for further studies. To maintain viability of the culture, it was revived by periodical subculturing.

The mother cultures of the bioagents *T. hammatum* and *T. harzianum* were obtained from Biofertilier Production Unit (Biological Control Laboratory), Department of Plant Pathology, College of Agriculture, Pune and were grown on PDA medium. Seven days old cultures of the bioagents were used for bioefficacy studies. The discs of 5

mm diameter were cut from seven days old cultures of the bioagents and the test pathogen using sterilized cork borer. The sterilised petriplates containing solidified PDA medium were inoculated each with one disc of bioagent and one disc of test pathogen placed at opposite corner of the plates in such a way that both the test pathogen as well as the bioagents will get an equal opportunity for growth. Four replications were maintained for each bioagents. The petriplates inoculated with only test pathogen were kept as control for comparison. The inoculated plates were then incubated at $27 \pm 1^\circ\text{C}$ in an incubator for one week. The observations were recorded on colony diameter of bioagents and the test pathogen. Percent inhibition in growth of the test pathogen due to bioagents treatment was calculated according to Vincent (1947).

$$I = \frac{C - T_b}{C} \times 100 \dots\dots(1)$$

Where, I is the per cent growth inhibition of test pathogen due to treatment of antagonistic fungi, C is the diameter of fungal colony growth in control (mm), T_b is diameter of fungal colony growth in respective treatment of bioagent (mm).

Table 1. Biocontrol potential of the antagonistic fungi against *Alternaria alternata*

S. No.	Bioagents	Mean colony diameter (mm)*		Growth inhibition (%)	
		7 DAT*	10 DAT	7 DAT	10 DAT
1	<i>Trichoderma harzianum</i>	25.00	20.00	72.22	77.77
2	<i>Trichoderma hamatum</i>	15.00	11.00	83.33	87.77
3	Control	90.00	90.00	0.00	0.00

*Days after treatment

Both the antagonistic fungi tested against *A. alternata* were effective in restricting the growth and sporulation of the test pathogen (Table 1). There was progressive increase in growth inhibition from seven to 10 days after treatment. *T. hammatum* with 87.77 % growth inhibition was more promising compared to *T. harzianum* (77.77 %). *Trichoderma* sp. has been reported as potential biocontrol agent for managing destructive plant pathogens. Pandey (2010) reported 67.07 and 66.67% growth inhibition by *T. harzianum* and *T. viride*, respectively of *A. alternata*, a destructive pathogen of *Capsicum frutescens*. Gveroska and Ziberoski (2011) reported a strong reducing effect of *T. harzianum* on the development of *A. alternata* with some

abnormalities in pathogen morphology. *T. viride* was found as potential biocontrol agent against *A. alternata* causing tomato leaf blight (Kumar *et al.*, 2012). The studies indicate the potential of using *T. hammatum* and *T. harzianum* on economically important crops like bottle gourd, tomato, mango, chrysanthemum after extensive field studies.

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