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Promising biocontrol agents isolated from medicinal plants rhizosphere against root-rot fungi

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Abstract

Among of the collection of 104 fungal isolates from the rhizosphere of the medicinal plants basil (*Ocimum basilicum*), peppermint (*Mentha piperita*) and (*Aloe vera*), 59 of them were assessed for *in vitro* antagonistic activity against phytopathogenic fungi; *Fusarium solani*, *Rhizoctonia solani*, *Sclerotium rolfsii* and *Verticillium dahliae*. The most active antagonistic isolates were identified using molecular tools based on 18S rDNA. The sequence data of *Aspergillus pseudocaelatus* and *Trichoderma gamsii* have been submitted to GenBank given the accession no. MG772677 & KX685665, respectively. The antagonistic mechanisms were evaluated using confrontation method and scanning electron microscopy. The volatile organic compounds (VOCs) were analyzed using GC/MS. Biological investigation on the ethyl acetate extract of *A. pseudocaelatus* MG772677 and *T. gamsii* KX685665 isolates was evaluated. The greenhouse application with the selected isolates on basil seedlings was performed. *In vitro* antagonistic results indicated that the highest percentage of inhibition was observed with *A. pseudocaelatus*, 77.90 % and *T. gamsii*, 77.98%. The average emergence rate in the treatments with *T. gamsii* and *A. pseudocaelatus* reached up to 100%, much more than that in the control (average 40%). The results indicated that *A. pseudocaelatus* MG772677 and *T. gamsii* KX685665, displayed antagonistic activities against the pathogenic fungi and presented appreciable biocontrol efficacy. Also the two isolates could enhance the plant growth and improve the seedlings' emergence.

Keywords: *Aspergillus pseudocaelatus*; *Trichoderma gamsii*; mycoparasitism; VOC; biocontrol; phytopathogenic fungi

1. Introduction

Microorganisms have been proved to be sources of natural compounds for many industries including pharmacy and agriculture. Microorganisms as biocontrol agents have high potential application to control phytopathogens with no adverse effect on the environment or other non-target organisms (Khamna et al., 2009).

Soil-borne pathogens cause economical losses in agricultural products, fungi being the most aggressive. The distribution of several phytopathogenic fungi, as

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