

Biocontrol potential of *Trichoderma* spp. isolated from rice (*Oryza sativa*) fields against some postharvest pathogens of banana

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Introduction and Objectives: Banana is a highly popular fruit among consumers. However, postharvest diseases caused by pathogenic fungi contribute to significant quality and yield losses in banana (*Musa* spp.). Harvested banana is susceptible to several fungal diseases such as anthracnose, crown rot, and cigar-end rot. *Colletotrichum*, *Lasiodiplodia*, and *Fusarium* are some common postharvest fungal pathogenic genera in banana. The use of biocontrol methods to manage postharvest pathogens is becoming popular. *Trichoderma* spp. are well-known for their role in plant protection and are recognized as an effective biocontrol agent of various plant diseases. These fungi can colonise the rhizoplane and rhizosphere and produce a variety of antimicrobial metabolites. The antagonistic effects of *Trichoderma* from rice microbiomes of Sri Lankan agricultural fields remain underexplored. The objective of this study was to screen the biocontrol potential of *Trichoderma* spp. isolated from rice fields against banana postharvest pathogens.

Methods: Soil samples were randomly collected from selected paddy fields in the Kandy and Matale districts. *Trichoderma* isolates were obtained using serial dilution, followed by spread plate technique. Banana pathogenic fungi (*Colletotrichum* and *Fusarium*) were isolated and characterised based on colony and spore morphology. Dual culture assays and slide culture techniques were conducted on Potato Dextrose Agar medium to evaluate the *in vitro* biocontrol activity and mode of action of *Trichoderma* isolates.

Results: A total of 10 different *Trichoderma* isolates (TPS001-TPS010) were obtained. All isolates exhibited significantly higher inhibition percentage against *Colletotrichum* sp. compared to *Fusarium* sp. in the dual culture assay. A similar 100% significant inhibitory effect was shown by TPS001-TPS004, TPS007 and TPS009 against *Colletotrichum* sp. Further, TPS003 showed a significantly higher inhibitory effect against *Fusarium* sp. as well. Therefore, TPS003 exhibited a significant biocontrol activity against both pathogens ($p < 0.05$). The *Trichoderma* isolates demonstrated multiple modes of action, including competition for nutrients and space, metabolites production and mycoparasitism.

Conclusion: The *Trichoderma* spp. isolated from selected rice fields demonstrated strong inhibitory activity against *Colletotrichum* sp. indicating their potential as effective biocontrol agents for managing postharvest diseases in bananas. Future studies will focus on assessing antifungal compound production by these isolates.

Keywords: Banana, Biocontrol, *Colletotrichum*, *Fusarium*, Postharvest, Rice fields, *Trichoderma* spp.

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