Trichoderma Asperellum MMR-01: A Novel Marine Isolate Combating Fusarium Wilt in Banana Plants

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ABSTRACT

Introduction: Banana, a crucial food crop and source of livelihood for millions of farmers globally, faces multifaceted challenges including compromised soil health, nutrient imbalances, and diseases such as Fusarium wilt caused by the fungus *Fusariumoxysporum f. sp. cubense tropical race 4*.

Objective: This study aimed to isolate *Fusariumoxysporum f. sp. cubense tropical race 4*, identify it both macroscopically and microscopically, and evaluate the antifungal potential of select marine microbes against it.

Methodology: For this purpose, 31 Fusarium samples were collected from banana fields in Sindh, Pakistan. Among these, strain FOC-2P was chosen as the representative for subsequent investigations. Additionally, 21 marine microbial isolates were gathered from seven locations along the mangrove-rich coastal area of Makran, Baluchistan, and assessed for their antagonistic activity against FOC-2P.

Result: Four isolates, namely MMR-05, MMR-07, MMR-15, and MMR-01, exhibited potent antifungal effects against the chosen Fusarium strain. The antifungal strain MMR-01, identified as *Trichodermaasperellum*, demonstrated remarkable potential and was selected as the biocontrol agent for further exploration due to its effective suppression of FOC-2P growth. Both the isolated fungal strain FOC-2P and the antifungal strain MMR-01 were subsequently confirmed through ITS sequencing.

Conclusion: This investigation presents a promising avenue for controlling Fusarium wilt disease in banana plants by utilizing marine microbial biocontrol agents, which could hold substantial implications for the banana industry's sustainability."

Keywords: Banana; Fusarium wilt disease; Marine microbes; Biocontrol agents