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Original article

Evaluation of pathogenic variation among *Rhizoctonia solani* isolates infecting different crops and potential biocontrol agents

Farklı ürün türlerini enfekte eden *Rhizoctonia solani* izolatları arasındaki patojenik varyasyonun ve potansiyel biyokontrol ajanlarının değerlendirilmesi

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ABSTRACT

Rhizoctonia solani is an important broad-spectrum fungal pathogen that infects over 200 plant species including tomato, melon, and watermelon. This study evaluated the pathogenicity of various *R. solani* isolates (Rs26, Rs94, Rs13, Rs57, and Rs123) and the efficacy of biological agents (*Trichoderma harzianum*, *T. viride*, *Metarhizium* sp., *Gliricladium* sp.) under laboratory and greenhouse conditions for eco-friendly disease management. The results of the pathogenicity assay confirmed the varying aggressiveness of the isolates, with Rs94 and Rs13 causing the most severe disease in watermelon (disease severity (DS) = 3.80 and 3.83, disease severity index (DSI) = 90.43% and 95.75%, respectively). Similarly, isolate Rs26 displayed the highest pathogenicity in tomatoes (DS = 3.84; DSI = 94.86%). Melon exhibited high susceptibility across all isolates, with consistently high DS and DSI values exceeding 2.59 and 80.97%, respectively. Subsequent *in vitro* and *in vivo* assays demonstrated the antifungal potential of all tested agents against *R. solani* isolates. Notably, *Trichoderma* spp. displayed the most consistent and significant inhibition (mycelial growth reduction 82.97%-94.67%), with *T. harzianum* demonstrating superior performance. Greenhouse trials confirmed the effectiveness of *T. harzianum* as a preventative treatment, enhancing plant enzyme activity [peroxidase = 4.97-5.29 units g⁻¹ ml⁻¹ min⁻¹ for tomato and watermelon, respectively; catalase = 99.93-101.22 units g⁻¹ ml⁻¹ min⁻¹ for watermelon and melon, respectively] and significantly reducing disease severity index (DSI < 12.43%). These findings highlight the potential of *T. harzianum* as a sustainable and eco-friendly strategy for managing *R. solani* damping-off disease in tomato, melon, and watermelon crops.