

Bitki Koruma Bülteni / Plant Protection Bulletin

<http://dergipark.gov.tr/bitkorb>

Original article

Determination of the efficacy of *Trichoderma koningii* and *Rhizophagus irregularis* against Fusarium wilt disease in tomato

Trichoderma koningii ve *Rhizophagus irregularis*'in domateste Fusarium solgunluk hastalığına karşı etkinliğinin belirlenmesi

Abdelhak RHOUMA^a, Abdalnabi Abdul Ameer MATROOD^b, Lobna HAJJI-HEDFI^a

<https://orcid.org/0000-0001-6074-0076>, <https://orcid.org/0000-0002-3474-2876>, <https://orcid.org/0000-0002-3587-4790>

^aResearch Laboratory of Agricultural Production Systems and Sustainable Development LR03AGR02, Regional Centre of Agricultural Research of Sidi Bouzid, CRRRA, Gafsa Road Km 6, B.P. 357, Sidi Bouzid, 9100, Tunisia

^bUniversity of Basrah, College of Agriculture, Department of Plant Protection, Iraq

ARTICLE INFO

Article history:

DOI: [10.16955/bitkorb.1561086](https://doi.org/10.16955/bitkorb.1561086)

Received : 04-10-2024

Accepted : 24-03-2025

Keywords:

arbuscular mycorrhizal fungi, *Solanum lycopersicum*, *Fusarium oxysporum* f.sp. *lycopersici*, greenhouse assay

* Corresponding author: Abdelhak RHOUMA

 abdelhak.rhouma@gmail.com

ABSTRACT

This study investigated the potential of *Trichoderma koningii* and *Rhizophagus irregularis* as environmentally friendly as an alternative to chemical control for Fusarium wilt disease in tomato under greenhouse conditions. The research focused on how these *T. koningii* and *R. irregularis* interacted and their impact on plant growth and disease resistance. *T. koningii* alone significantly reduced disease severity (DS = 0.83; DSI = 29.33%) compared to the control group infected with *Fusarium oxysporum* f. sp. *lycopersici* (FOL). However, the most effective protection came from combining both *T. koningii* and *R. irregularis* (DS = 0.33; DSI = 14.33%), achieving a level comparable to healthy controls. This combined treatment not only displayed superior disease resistance but also showed the highest chlorophyll content (Chl a = 5.62 mg g⁻¹ Fresh Weight; Chl b = 3.11 mg g⁻¹ Fresh Weight; Chl T = 8.74 mg g⁻¹ Fresh Weight), indicating a stronger ability to counteract the chlorophyll degradation caused by FOL infection. Furthermore, tomato plants co-inoculated with *T. koningii* and *R. irregularis* exhibited the most robust antioxidant response, evident in significantly higher activities of antioxidant enzymes (superoxide dismutase = 46.17 units g⁻¹ ml⁻¹ min⁻¹, peroxidase activity = 5.66 units g⁻¹ ml⁻¹ min⁻¹, and catalase activity = 104.42 units g⁻¹ ml⁻¹ min⁻¹) and total phenolic content (3.14 mg g⁻¹). These findings suggest that the combined application of *T. koningii* and *R. irregularis* has the potential to be a more effective and environmentally friendly strategy for managing Fusarium wilt disease and promoting overall plant health in tomato compared to using either *T. koningii* or *R. irregularis* alone.

INTRODUCTION

Tomato (*Solanum lycopersicum* L.), a Solanaceae cultivated in North Africa for over 4000 years (Robinson and Decker-Walters 1997), is a major global crop (reached nearly 45.8

million metric tonnes in 2024). In Tunisia, it is a major agricultural product, with annual production estimated at 980000 tonnes (FAO 2024). Cultivation thrives across