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Mechanisms underlying the protective effects of beneficial fungi against plant diseases

Mansour Ghorbanpour^{1,*}, Mahtab Omidvari², Payman Abbaszadeh-Dahaji³, Reza Omidvar⁴, and Khalil Kariman^{5,*}

¹Department of Medicinal Plants, Faculty of Agriculture and Natural Resources, Arak University, 38156-8-8349, Arak, Iran (m-ghorbanpour@araku.ac.ir)

²Department of Plant Pathology, University of Tehran, Karaj, Iran

³Department of Soil Science, Vali-e-Asr University of Rafsanjan, Rafsanjan, Iran

⁴Institute for Biotechnology in Plant Production, Department of Agrobiotechnology, IFA-Tulln, University of Natural Resources and Life Sciences, Vienna, 3430 Tulln, Austria

⁵School of Agriculture and Environment M087, The University of Western Australia, Crawley, WA, 6009, Australia (khalil.kariman@gmail.com)

*Corresponding author

Abstract

Plant diseases are a serious threat to the health and functionality of both natural and man-made ecosystems. Diverse methods and strategies are being employed to prevent, ameliorate or control plant diseases. Unsustainable practices such as use and misuse of synthetic fungicides have caused severe harm to human health, wildlife and the environment. However, sustainable and eco-friendly approaches such as use of beneficial fungi have gained significant attention worldwide due to their remarkable antagonistic properties against plant pathogens and copious successful applications. *Trichoderma* species, arbuscular mycorrhizas, ectomycorrhizas, endophytes, yeasts, and avirulent/hypovirulent strains of certain pathogens are among the main beneficial fungi with biocontrol capacity, some of which have been mass-produced and extensively applied. Understanding the mechanisms linked with the protective effects of beneficial fungi are essential for achieving favorable outcomes and development of novel strategies. The biocontrol properties of beneficial fungi can be categorized into five classes: i)

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