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Tolerance to Abiotic Stresses of the *Trichoderma viride* and its Antagonistic Effects on the *Alternaria alternata*, Which Causes Leaf Spot Disease in Date Palms

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Abstract. This study was conducted with the aim of testing the ability of the *T. viride*, which is tolerant to the highest pH and temperature, in inhibiting the growth of the pathogenic *A. alternata*, which causes leaf spot disease in date palms. The results of the study showed that the best temperature for the growth of the *T. viride* was at 30 °C, as the radial growth rate of the fungus reached 9.0 cm, and the lowest radial growth rate of the fungus was at 70 °C, as it reached 3.2 cm. The best pH for fungus growth was pH 8, as the radial growth rate of the fungus reached 9 cm, and the lowest radial growth rate of the fungus was at pH 4, which reached 3.1 cm. The study also showed that there were significant differences in inhibition depending on the pH and temperature levels studied, and that the highest rate of inhibition of the pathogenic fungus *A. alternata* was at pH 8 and a temperature of 30 °C, as the rate of inhibition reached 7.600%, and the lowest rate of inhibition was at pH 4 and a temperature of 70 °C, reaching 2.967. %.

Keywords. Date palms, *Alternaria alternata*, *Trichoderma viride*.

1. Introduction

Iraq was the original home of the date palm (*Phoenix dactylifera* L.), and it is the ideal place to cultivate it because of its tropical climate, rainfall, high humidity, and growth-friendly yearly temperature change pattern. The foundation of Iraq's orchards is the date palm, which provides enough shade and protective cover for the crops it supports, particularly the citrus trees in the center. And in the southern region of the nation, the date palm is one of the most significant trees in the Arab world. Its significance stems from the high nutritional content of its fruits, which include a percentage of proteins, minerals, salts, and carbohydrates. The dates are. Another distinctive feature of dates is that they are high in calories and have a long shelf life [1,2].

Up to 280 agricultural pests, such as bacterial and fungal diseases, phytoplasmas, insects, mites, rodents, and birds, can affect palm trees [3]. Since date palm trees in Iraq have experienced a sharp fall