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Entitled

BIOLOGICAL CONTROL OF FUSARIUM WILT IN DATE PALM (Phoenix dactylifera L.) IN THE UNITED ARAB EMIRATES BY ENDOPHYTIC ACTINOBACTERIA

by

Aisha Abdalla Darwish Shambah Alblooshi

Faculty Advisor

Dr. Khaled Abbas El-Tarabily, Department of Biology

College of Science

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Abstract

Date palm trees suffer from very serious diseases, including sudden decline syndrome (SDS). External symptoms were characterized by whitening on one side of the rachis, progressing from the base to the apex of the leaf until the whole leaf dies; while the internal disease symptoms included reddish roots and highly colored vascular bundles causing wilting and death of the tree. Although three *Fusarium* spp. (*F. oxysporum*, *F. proliferatum* and *F. solani*) were isolated from diseased root samples, the fungal pathogen *F. solani* was associated with SDS on date palm in the United Arab Emirates (UAE). *Fusarium* spp. were identified based on their cultural and morphological characteristics. The internal transcribed spacer regions and large subunit of the ribosomal RNA (ITS/LSU rRNA) gene complex of the pathogens was further sequenced. Pathogenicity assays and disease severity indices confirm the main causal agent of SDS on date palm in the UAE is *F. solani*. The aim of the present study was also to compare the effectiveness of antagonistic endophytic actinobacteria capable of producing diffusible antifungal metabolites or cell wall degrading enzymes, on suppression and severity of SDS on date palm. To achieve this, endophytic actinobacteria were isolated from within the roots of date palm in the UAE and were evaluated for their potential to produce antifungal metabolites and cell-wall degrading enzymes that can inhibit the pathogens growth *in vitro*. The strongest two inhibitory endophytic isolates that produced diffusible antifungal metabolites or cell wall degrading enzymes and were able to lyse the hyphae of the pathogen *in vitro* were also tested under greenhouse conditions. The biocontrol agent BCA2 which produced only diffusible antifungal metabolites and without the production of cell wall degrading enzymes was significantly more effective in reducing the incidence and severity of SDS compared to biocontrol agent BCA1 which produced only cell wall degrading enzymes and without the production of diffusible antifungal metabolites. This study demonstrated the superiority of antagonistic endophytic actinobacteria capable of producing diffusible antifungal metabolites compared to antagonistic endophytic actinobacteria capable of producing cell wall degrading enzymes in reducing the severity of SDS on date palm under greenhouse conditions.

Keywords: Date palm, sudden decline syndrome, *Fusarium* wilt, biological control, endophytes, actinobacteria.