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Entitled

*IDENTIFICATION OF PATHOGENS ASSOCIATED WITH MANGO DIEBACK DISEASE ON MANGO
IN THE UNITED ARAB EMIRATES*

by

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Abstract

Dieback caused by the fungus *Lasiodiplodia theobromae* is an important disease on mango plantations in the United Arab Emirates (UAE). In this study, 53 actinobacterial isolates were obtained from mango rhizosphere soil in the UAE, of which 35 (66%) were classified as streptomycetes (SA) and 18 (34%) as non-streptomycetes (NSA). Among these isolates, 19 (12 SA and 7 NSA) showed antagonistic activities against *L. theobromae* associated with either the production of diffusible antifungal metabolites, extracellular cell-wall-degrading enzymes (CWDEs), or both. Using a “novel” mango fruit bioassay, all isolates were screened *in vivo* for their abilities to reduce lesion severity on fruits inoculated with *L. theobromae*. Three isolates, two belonging to *Streptomyces* and one to *Micromonospora* spp., showed the strongest inhibitory effect against this pathogen *in vitro* and were therefore selected for tests on mango seedlings. Our results revealed that the antifungal action of *S. samsunensis* UAE1 was related to antibiosis and the production of CWDEs (i.e., chitinase) and siderophores; whilst *S. cavourensis* UAE1 and *M. tulbaghia* UAE1 were considered to be associated with antibiotic- and CWDE-production, respectively. Pre-inoculation in greenhouse experiments with the most promising actinobacterial isolates resulted in very high levels of disease protection in mango seedlings subsequently inoculated with the pathogen. This was evident by the dramatic reduction in the estimated disease severity indices of the mango dieback of individual biocontrol agent (BCA) applications compared with the pathogen alone, confirming their potential in the management of mango dieback disease. *L. theobromae*-infected mango seedlings treated with *S. samsunensis* showed significantly reduced number of defoliated leaves and conidia counts of *L. theobromae* by 2- and 4-fold, respectively, in comparison to the other two BCA applications. This indicates that the synergistic antifungal effects of *S. samsunensis* using multiple modes of action retarded the *in planta* invasion of *L. theobromae*. This is the first report of BCA effects against *L. theobromae* on mango seedlings by microbial antagonists. It is also the first report of actinobacteria naturally existing in the soils of the UAE or elsewhere that show the ability to suppress the mango dieback disease.

Keywords: actinobacteria, antibiosis, biocontrol, chitinase, dieback, mango, *Lasiodiplodia theobromae*, UAE