



شبكة المعلومات الجامعية
التوثيق الإلكتروني والميكروفيلم

بسم الله الرحمن الرحيم



MONA MAGHRABY



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جامعة عين شمس

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**USE OF SOME *STREPTOMYCES* SPECIES AS
BIO-AGENTS TO CONTROL BEAN WHITE ROT
DISEASE CAUSED BY *Sclerotinia sclerotiorum***

By

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B.Sc. Agric. Sci. (Plant Pathology), Fac. Agric., Fayoum Univ., 2010
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ABSTRACT

White mold disease, caused by *Sclerotinia sclerotiorum* the devastating pathogen, attacks green bean (*Phaseolus vulgaris* L.) and several crops worldwide. The present investigation was conducted to introduce some antagonistic microorganisms as novel antifungal substances to be an alternative and secure method to effectively control the disease. Out of 24 isolates, three *Streptomyces* isolates were molecularly characterized. PCR amplification of the fungus pathogen and *Streptomyces* isolates 16S rDNA gene sequences exhibited amplicons of around 535bp and 1300bp, respectively. The characterized *Streptomyces* isolates were sequenced and submitted into Genbank under accession numbers i.e., *S. griseus* (MT210913 "DG5"), *S. rochei* (MN700192 "DG4") and *S. sampsonii* (MN700191 "DG1"). Phylogenetic tree of the nucleotide sequence analysis of the three *Streptomyces* spp. indicated that *S. griseus* MT210913 was closely related to *S. sampsonii* MN700191 (96%), secondly ranked by *S.rochei* MN700192 (93.1%). Afterward, the antifungal activity of *Streptomyces* spp. against *S. sclerotiorum* was evaluated *in vitro* and *in vivo* (in the greenhouse and field). *In vitro* tests, proved that the reduction percentages in mycelial growth of pathogen ranged between 31.4-60.17%, indicating that *S. rochei* gave the highest inhibition percent. Incorporations of *Streptomyces* spp culture filtrate components into culture media proved that *S. sampsonii* was more efficient as a bioagent in reducing mycelial growth pathogen by 84.50%. When the effectiveness of the bioagent volatile compounds was evaluated, the inhibition of the pathogen growth ranged between 54.50-72.54%, respectively, revealing that *S. rochei* was the highest inhibitor followed by *S. griseus*. Results of GC-Mass analysis revealed the presence of 44, 54 and 47 diverse secondary metabolites compounds produced by *S. sampsonii* DG1, *S. rochei* DG4, and *S. griseus* DG5, respectively. Examining parasitic activity of *Streptomyces* spp upon *S. sclerotiorum* was demonstrated by light and scanning electron (SEM) micrographs exhibited the interaction as deformation, contraction, and collapse in the mycelium of the pathogen. Viability and germination of pathogen sclerotia were reduced when they dipped into the *Streptomyces* culture broth for 10, 20, and 30 days. Application of the 3 *Streptomyces* spp. in the field proved a great potential to control the disease. The results suggested that the 3 *Streptomyces* spp. and their secondary metabolites can be biofertilizers as enhancers in plant growth and potential biocontrol agents for controlling bean white rot disease. Finally, the author suggests that the phenomenon of the mycoparasitism in case of *Streptomyces* could be named actinoparasitism.

Key words: *S. sclerotiorum*, *Streptomyces* spp., antifungal activity, green bean

DEDICATION

I dedicate this work to whom my heartfelt thanks; to my parents, my sister for their patience and help, as well as my family and friends for all the support they lovely offered along the period of my post-graduation.

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