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BIOLOGICAL AND CHEMICAL CONTROL OF SOME PEPPER ROOT-ROT PATHOGENS

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Thesis
Submitted in Partial Fulfillment
of the Requirements for the Degree of Doctor of Philosophy

In

AGRICULTURAL SCIENCES
(Plant Pathology)

Department of Agricultural Botany
Faculty of Agriculture
Tanta University

2020

ABSTRACT

Title of Thesis : **Biological and chemical control of some pepper root-rot pathogens**

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Date : **2020**

Sweet pepper (*Capsicum annuum* L.), represents one of the most important and economic vegetable crops in the world including Egypt. Root rot disease caused by several pathogens is considered the most dangerous disease on pepper yield of the entire world. The main goal of this study was to minimize the use of synthetic fungicide by fungal and bacterial isolates bioagents such as *Trichoderma* sp., *Penicilium* spp., Chaetomium spp., *Bacillus* sp. and *Pseudomonas* sp.

Additionally, the ability of these bioagents to produce chitinase, protease enzymes and hydrogen cyanide, were studied. Thirty different isolates of root rot pathogens were isolated and identified from infected pepper root collected from Kafr El-Sheikh governorate during 2016 and 2017 growing seasons. Further, PCR amplification of ITS gene region in the ten isolates of root rot pathogens were performed using universal ITS primers. Then the selected virulent isolates of root rot pathogens were sequenced and submitted in NCBI database with the accession numbers. The root rot fungal pathogens of pepper were identified as *Fusarium solani, F. oxysporum, F. verticillioides, F. equiseti, F. incarnatum, F. chlamydosporum, F. equiseti* strain CZCU, *F. longipes, Macrophomina phaseolina* and *Lasiodiplodia theobromae* based on its cultural, morphological and molecular characteristics. In laboratory, greenhouse and field experiments, *T. harizianum* (TH1, TH2), *T.viride* (TV1, TV2), *B. subtilis* (B_1, B2), *P. fluoresens* (P1, P2), *Penicilium* spp. (Peni.) and *chaetomium* spp. (Ch.) isolates as well as chemical fungicide (Hatric 6%) recorded significant reduction in root-rot disease intensity and enhanced vegetative growth of pepper plants compared with the control. Furthermore, we evaluate the efficiency of three fungicides and with two nanoparticles for their *in vitro* and *in vivo* capability to control pepper root rot disease in two growing seasons (2019 and 2020). The highest efficacy was recorded by Hatric 6% fungicide in both seasons. On the other hand, nano Zinc Oxide enhanced vegetative growth of pepper plants in both seasons compared with the control.

Based on the findings of this study, there is a possibility that these bioagents could be utilized as natural, safe and environmentally friendly fungicides to control root-rot disease in pepper.

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