POTENTIAL OF FLUORESCENT PSEUDOMONADS TO BIOCONTROL OF ROOT DISEASES OF SUGAR BEET

By

HEBA MOHAMED MOHAMED FATOUH

B.Sc. Agric. Sci. (Agricultural Production), Fac. Agric., Cairo Univ., Egypt, 2001
M.Sc. Agric. Sci. (Plant Pathology), Fac. Agric., Benha Univ., Egypt, 2012

THESIS

Submitted in Partial Fulfillment of the Requirements for the Degree of

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(Plant Pathology)

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Date: 20 /12/2018

SUPERVISION SHEET

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Name of the Candidate: Heba Mohamed Mohamed Fatouh **Degree:** Ph.D.

Title of Thesis: Potential of Fluorescent Pseudomonads to Biocontrol of Root Diseases of Sugar Beet

Supervisors: Dr. Mohamed Farouk Attia
Dr. Kamel Kamal Sabet
Dr. Elhamy Mohamed El-Assiuty

Department: Plant Pathology **Approval: 20 /12/2018**

ABSTRACT

Current study was executed from 2013 to 2017. The work was carried out in the Lab. and greenhouse of Maize, Sugar Crops and Cereal Crops Diseases Research Department, Plant Pathology Research Department, A.R.C., Giza. The whole number of fluorescent pseudomonads; recovered from the rhizosphere of sugar beet were subjected to screening for their effect against *Fusarium oxysporum*f. sp. *betae* in the Lab. A number of 53 isolates positively affected the fungal growth. Eleven bacterial isolates effectively managed the disease at seedling stage of plant growth. Seven out of these isolates affected the disease at later stages of plant growth. Five of the most efficient bacterial isolates were subjected to identification to the level of species. One isolate was identified as new strain of *Pseudomonas fluorescens,* one strain belonged to *P. aeruginosa* and three strains were identified as *P. putida.* Ability for production of secondary metabolites by the most efficient strains under study was done to explain the mode of action they act in. These strains differ in their activity to produce the extracellular enzymes, plant hormones and HCN antibiosis,*.etc. P. putida* strain No. PS23 was shown to be superior to other bioagents according to its ability to excrete most studied allelochemicals. Biochemicals produced by this strain were analyzed by the aid of GC/MSASS and found that several chemical compounds were produced. The efficacy of the mixture (copper sulphate or zinc sulphate)+*Pseudomonas* sp individually and / or in combination against the disease incidence and post emergence caused by *Fusarium oxysporum* f.sp.*betae* was evaluated . Soaking sugar beet before seed before six hours planting, was studied under greenhouse conditions, All tested treatments significantly decreased the percentage diseases reading. The mixture zinc sulphate + *Pseudomonas* sp was the most effective treatment for decreasing the percentages of disease followed by the other mixture treatments, while applying each of *Pseudomonas* sp and ps + copper sulphate individually recorded the lowest effect for decreasing percentage of disease assessment under green house condition compared to control . Also, the effect of *Pseudomonas sp* and the mixture (copper sulphate+ ps) or (zinc sulphate +ps) individually or mixed on the activity of oxidative reductive enzymes (polyphenoloxidase and peroxidase) as well as the change in growth yield (sucrose , T.S.S, fresh weight and dry weight) were determined in the roots of sugar beet plant. . Most of these chemicals were characterized as phenolics, which are well known to have the direct and indirect effects on the pathogen as well as the host itself?

Keywords: Sugar beet, *Fusarium oxysporum* f.sp. *betae*, *Pseudomonas* spp., biological control, phylogenetic analysis, mode of action, allelochemical, biochemical, copper sulphate, zinc sulphate, polyphenoloxidase, peroxidase, sucrose, T.S.S.

DEDICATION

I dedicate this work to my husband, parents, sisters and brothers for all the support they lovely offered during my post-graduate studies.

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CONTENTS