CONTROL OF POTATO DRY ROT DISEASE CAUSED BY *Fusarium* spp.

By

KHALIL IBRAHIM ALSAIDI

B.Sc. Agric. Sci. (Plant Protection), Fac. Agric., Aleppo Univ., Syria, 2007
M.Sc. Agric. Sci. (Plant Pathology), Fac. Agric., Cairo Univ., Egypt, 2013

THESIS

Submitted in Partial Fulfillment of the Requirements for the Degree of

DOCTOR OF PHILOSOPHY

In

Agricultural Sciences

(Plant Pathology)

Department of Plant Pathology
Faculty of Agriculture
Cairo University
EGYPT

2017

APPROVAL SHEET

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Date: 20/6/ 2017

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Title of Thesis: Control of potato dry rot diseases caused by *Fusarium* spp.

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Department: Plant Pathology **Approval: 20 / 6 / 2017**

ABSTRACT

Dry rot of potato caused by *Fusarium* species is a serious potato disease and causes significant losses all over the world. Twenty-eight isolates were isolated and identified from potato tubers with typical symptoms of dry rot collected from four regions in Egypt, where they belonged to five *Fusarium* spp. *i.e. F. culmorum, F. oxysporum F. sambucinum, F. semitectum* and *F. solani***.** Morphological, pathological and toxicological diversities among *Fusarium* isolates were studied. Clear differences among *Fusarium* isolates with respect to their mycelial growth, where isolates of *F. culmorum* and *F. semitectum* were very fast grow in comparison with the rest of isolates. Many different in colors and nature of growth were observed among *Fusarium* isolates, where each *Fusarium* sp. has a distinct color. Apparent variations among sporulation rate of *Fusarium* isolates were noticed, the highest number of spores/ml were observed in *F. semitectum* isolate, followed by *F. oxysporum* isolates**.** On the other hand**,** the isolates of *F. solani* were the lowest in sporulation rate**.** Significant differences among *Fusarium* cultures grown on PDA were found in their pathogenicity, results showed that 18 isolates were pathogenic and 10 isolates where non-pathogenic, the most pathogenic isolate was *F. culmorum* (FCU8) isolated from Giza governorate. Genetic diversity between eleven isolates of *Fusarium* spp. was done using eight RAPD primers showed that three of them resulted distinct bands of tested isolates, and gel analyzing showed that ten isolates belonged to two linage and single isolate to third one. Twelve isolates of *Fusarium* spp. were chosen to study their ability to produce mycotoxins using *Bacillus megaterium* as a bioassay agent. Results showed that all tested *Fusarium* spp. able to produce mycotoxic substances that inhibit the growth of *B. megaterium*. TLC showed that 6 out of 12 isolates were able to secrete fusaric acid and FOX10 was the most ability of them. *In vitro* tests were conducted in Petri dishes to evaluate twelve antagonistic bioagents, a fungicide, three abiotic agents (*i.e*. chitosan, salicylic acid and catechol) and compost tea against *F. culmorum* growth. Obtained results revealed that *T. viride* 1 and *T. harzianum* caused the highest reduction in mycelial growth of the tested *F. culmorum* isolate. On the other hand, chitosan and salicylic acid were more effective than catechol which had no effect against the mycelial growth of tested fungus. In addition to, different concentrations of thiabendazole were tested to evaluate their effect on mycelial growth of the tested fungus, the results appeared that concentrations 50 and 100 ppm completely inhibited the mycelial growth of the tested fungus. Whereas, 40 and 45 ppm concentrations showed highest inhibition of mycelial growth, being 86.7 and 88.7% respectively. An experiment was conducted to test five biological agents and three concentrations of the tecto fungicide and three induced abiotic inducers under greenhouse conditions. Results showed that there is no significant differences in percentage of germination and plant height. On the other hand, clear differences in dry weight of foliage growth and tuber weight were noticed, where chitosan 1g/L treatment showed high dry weight and tuber weight with significant differences compared to the other treatments. On the base of the above-mentioned results, *in vivo* experiment in storage condition was conducted to evaluate the antagonistic effects of six bioagents and three abiotic agents against dry rot disease on potato tubers cv. Spunta. Results showed that the abiotic agents have high ability to reduce dry rot disease compared with bioagents which show a moderate ability. Field assay using eight treatments with check treatment, showed that bio-compost and bio-compost with chitosan showed in general best parameters which decreased the disease incidence of potato dry rot.

Keywords: Dry rot, *Fusarium* spp., bioagents, thiabendazole, potato, compost and salts.

DEDICATION

This work is dedicated to my wife Marwa, my son Ibrahim, and my daughter Leen for their patience and help, as well as to my father, Mother and brothers for all the support they lovely offered along the period of my post-graduation. Also, this work is dedicated to my beloved home country Syria and my second country Egypt.

ACKNOWLEDGEMENT

I wish to express my sincere thanks, deepest gratitude and appreciation to ***Dr. Magdy Mohamed Saber*** *and* ***Dr. Ahmad Mohamed Ashour,*** *Professors of Plant Pathology, Faculty of Agriculture, Cairo University, for their valuable advice, continuous encouragement, cooperation, and kind assistance, supervision, critical reading and correction of the manuscript, constructive criticism and efforts to fulfill this work.*

I would like to express my sincere appreciation and gratitude to ***Dr. Tomader Gomaa Abdel Rahman****, Head Researcher, Plant Pathology, Res. Inst., ARC, Giza, Egypt for her continuous guidance, supervision and constructive criticism. her assistance facilitated the accomplishment of this work.*

Grateful appreciation is also extended to all staff members of the Plant Pathology, Faculty of Agriculture, Cairo University.

All my obedience, devotion, deepest thanks and praise are due and fully extended-as always to Allah, who has created us and bestowed upon us a lot of blessings which we cannot enumerate and thank enough.

CONTENTS