



Tanta University
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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* (B₁, B₂), *P. fluorescens* (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.

CONTENTS

	Page
I. INTRODUCTION.....	1
II. REVIEW OF LITERATURE.....	5
III. MATERIALS AND METHODS.....	31
IV. RESULTS AND DISCUSSION.....	57
IV.1.The frequency of fungi associated with pepper plants showed root rot symptoms during favorable environmental conditions.....	57
IV.2. Response of pepper cultivars to root-rot fungal pathogens under greenhouse conditions.....	60
IV.3.The response of pepper plants to infection by some root-rot pathogens under greenhouse conditions (Pathogenicity test)	63
IV.4. Molecular characterization of highly pathogenic isolates....	65
IV.5. Biological control	
IV.5.1. In vitro antagonistic effect of bio-agents against root-rot pathogens.....	68
IV. 5. 2. The efficiency of selected fungal and bacterial isolates on root-rot disease in vivo.....	68
IV.5.2.1. Greenhouse experiment.....	76
IV.5.2.1.1. Effect of some bio-agents on pepper root-rot pathogens under greenhouse conditions.....	76
IV.5.2.1.2. Effect of bio-agents on root and shoot length of pepper plants infested with root-rot pathogens under greenhouse conditions.....	80
IV.5.2.1.3. Effect of bio-agents on the root and shoot dry weight of pepper plants infected with root-rot pathogens under greenhouse conditions.....	84

IV.5.2.2. Field experiments	
IV.5.2.2.1. Effect of bio-agents on disease severity of pepper root rot under field conditions.....	87
IV.5.2.2.2. Effect of bio-agents on vegetative growth traits of pepper under field conditions.....	90
IV.5.2.2.3. Effect of bio-agents on fruit fresh weight/plant under field conditions.....	92
IV.6. Enzymes activity of the tested bio-agents.....	94
IV.7. Chemical control	
IV.7.1. Effect of three fungicides on the linear growth of 10 isolates caused root rot disease in vitro tested at different concentrations.....	99
IV.7.2. Fungicide sensitivity and 50% inhibitory concentration of mycelium growth (IC ₅₀) of ten pathogenic root-rot isolates.....	107
IV.7.3. Greenhouse experiment.....	110
IV.7.3.1. Effect of three fungicides at their IC ₅₀ on pepper root-rot pathogens under greenhouse conditions.....	110
IV.7.3.2. Effect of tested fungicides on root and shoot length (cm) of pepper infected with root-rot pathogens under greenhouse conditions.....	113
IV.7.3.3. Effect of tested fungicides on root and shoot dry weight (g) of pepper infected with root-rot pathogens under greenhouse conditions.....	117
IV.8. Effect of two nanoparticles on the linear growth of 10 isolates caused root rot disease in vitro at different concentrations.....	121
IV.8.1. Nanoparticles sensitivity and 50% inhibitory concentration of mycelium growth (IC ₅₀) of ten pathogenic root-rot isolates.....	129
IV.8.2. Greenhouse experiment	
IV.8.2.1. Effect of two nanoparticles at their IC ₅₀ on pepper root-rot pathogens under greenhouse conditions.....	131

IV.8.2.2. Effect of tested nanoparticles on root and shoot length (cm) of pepper infected with root-rot pathogens under greenhouse conditions.....	134
IV.8.2.3. Effect of the tested nanoparticles on root and shoot dry weight (g) of pepper infected with root-rot pathogens under greenhouse conditions.....	137
IV.9. Field experiments.....	140
IV.9.1. Effect of three fungicides and two nanoparticles with the highest IC ₅₀ on disease severity under field conditions.....	140
IV.9.2. Effect of three fungicides and two nanoparticles with the highest IC ₅₀ on vegetative growth traits of pepper under field conditions.....	142
IV.9.3. Effect of three fungicides and two nanoparticles with the highest IC ₅₀ on fruit fresh weight/plant under field conditions.....	145
V. SUMMARY.....	149
VI. REFERENCES.....	160
ARABIC SUMMARY.....	

LIST OF TABLES

No.		Page
1	Description of disease scale (0-4).....	34
2	Nucleotide Sequence of the universal primers.....	36
3	Bio-agent isolates.....	38
4	The investigated fungicides, trade name, formula, common name, chemical group, chemical structure and IUPAC name used in the current study.....	50
5	Number and frequency percentage of incidence fungi from rotted roots of pepper plants cv. (California, Dolma and Top Star) during growing seasons (2016 and 2017) from Kafr El-Sheikh governorate.....	59
6	Reaction of ten pepper genotypes as severity index to root rot fungal pathogens after 45 days from transplanting under greenhouse conditions.....	62
7	Response of pepper plants cv. Top Star to infection by some of root rot isolated fungi after 45 of transplanting under greenhouse conditions.....	64
8	List of 10 highly pathogenic fungal isolates from rotted root of pepper plants collected from Kafr El-Sheikh Governorate.....	65
9	<i>In vitro</i> antagonistic effect (%inhibition) of bio-agents against root-rot pathogens.....	70
10	Effect of some bio-agents on % disease severity of pepper root-rot fungal pathogens under greenhouse conditions....	78
11	Efficacy of some bio-agents on pepper root-rot pathogens under greenhouse conditions.....	79
12	Effect of bio-agents on root length of pepper plants infected with root-rot pathogens under greenhouse conditions.....	82
13	Effect of bio-agents on shoot length of pepper infected with root-rot pathogens under greenhouse conditions.....	83

List of Tables

14	Effect of bio-agents on root dry weight (g) of pepper infected with root-rot pathogens under greenhouse conditions.....	85
15	Effect of bio-agents on shoot dry weight (g) of pepper infected with root-rot pathogens under greenhouse conditions.....	86
16	Effect of bio-agents on disease severity of root rot under field conditions.....	89
17	Effect of bio-agents on length, fresh and dry weight of root and shoot of pepper under field conditions.....	91
18	Effect of bio-agents on fruit fresh weight/plant and increase over control (%) under field conditions.....	94
19	Enzymes activity of tested bio-agents.....	97
20	Effect of three fungicides on the linear growth of 10 isolates caused root rot disease in vitro tested at different concentrations.....	101
21	IC ₅₀ values of tested fungicides against different isolates caused root-rot disease of pepper plant.....	109
22	Effect of three fungicides at their IC ₅₀ on pepper root-rot pathogens under greenhouse conditions.....	112
23	Effect of tested fungicides on root length (cm) of pepper infected with root-rot pathogens under greenhouse conditions.....	115
24	Effect of tested fungicides on Shoot length (cm) of pepper infected with root-rot pathogens under greenhouse conditions.....	116
25	Effect of tested fungicides on root dry weight (g) of pepper infected with root-rot pathogens under greenhouse conditions.....	119
26	Effect of tested fungicides on Shoot dry weight (g) of pepper infected with root-rot pathogens under greenhouse conditions.....	120

List of Tables

27	Effect of two nanoparticles on the linear growth of 10 isolate caused root rot disease <i>in vitro</i> tested at different concentrations.....	123
28	IC ₅₀ values of tested nanoparticles against different isolates caused root rot disease of the pepper plant.....	130
29	Effect of two nanoparticles at their IC ₅₀ on pepper root-rot pathogens under greenhouse conditions.....	133
30	Effect of tested nanoparticles on root length (cm) of pepper infected with root-rot pathogens under greenhouse conditions.....	135
31	Effect of tested nanoparticles on Shoot length (cm) of pepper infected with root-rot pathogens under greenhouse conditions.....	136
32	Effect of tested nanoparticles on root dry weight (g) of pepper infected with root-rot pathogens under greenhouse conditions.....	138
33	Effect of tested nanoparticles on Shoot dry weight (g) of pepper infected with root-rot pathogens under greenhouse conditions.....	139
34	Effect of three fungicides and two nanoparticles with the highest IC ₅₀ on disease severity and efficacy under field conditions.....	142
35	Effect of three fungicides and two nanoparticles with the highest IC ₅₀ on length, fresh and dry weight of root and shoot of pepper under field conditions.....	144
36	Effect of three fungicides and two nanoparticles with the highest IC ₅₀ on fruit fresh weight/plant and increase over control (%) under field conditions.....	147

LIST OF FIGURES

No.	Page
1. Maximum likelihood phylogenetic Tree 10 highly pathogenic fungal isolates from the rotted root of pepper plants collected from Kafr El-Sheikh governorate.....	67
2. Similarity 10 highly pathogenic fungal isolates from rotted root of pepper plants collected from Kafr El-Sheikh governorate.....	67
3. Inhibition of <i>Fusarium solani</i> growth by biological control agents {Control (Co.), <i>Trichoderma harzianum</i> (TH1,TH2), <i>T. viride</i> (TV1,TV2), <i>Chaetomium</i> spp. (Ch.), <i>Penicilium</i> spp. (Peni.), <i>Pseudomonas fluorescens</i> (P1,P2) and <i>Bacillus subtilis</i> (B1,B2)} and Hatric 6% (F).....	71
4. Inhibition of <i>L. theobromae</i> growth by biological control agents {Control (Co.), <i>Trichoderma harzianum</i> (TH1,TH2), <i>T. viride</i> (TV1,TV2), <i>Chaetomium</i> spp. (Ch.), <i>Penicilium</i> spp. (Peni.), <i>Pseudomonas fluorescens</i> (P1,P2) and <i>Bacillus subtilis</i> (B1,B2)} and Hatric 6% (F).....	71
5. Inhibition of <i>F. equiesti</i> growth by biological control agents{Control (Co.), <i>Trichoderma harzianum</i> (TH1,TH2), <i>T. viride</i> (TV1,TV2), <i>Chaetomium</i> spp. (Ch.), <i>Penicilium</i> spp. (Peni.), <i>Pseudomonas fluorescens</i> (P1,P2) and <i>Bacillus subtilis</i> (B1,B2)} and Hatric 6% (F).....	72
6. Inhibition of <i>F. oxysporum</i> growth by biological control agents {Control (Co.), <i>Trichoderma harzianum</i> (TH1,TH2), <i>T. viride</i> (TV1,TV2), <i>Chaetomium</i> spp. (Ch.), <i>Penicilium</i> spp. (Peni.), <i>Pseudomonas fluorescens</i> (P1,P2) and <i>Bacillus subtilis</i> (B1,B2)} and Hatric 6% (F).....	72
7. Inhibition of <i>F. verticillioides</i> growth by biological control agents {Control (Co.), <i>Trichoderma harzianum</i> (TH1,TH2), <i>T. viride</i> (TV1,TV2), <i>Chaetomium</i> spp. (Ch.), <i>Penicilium</i> spp. (Peni.), <i>Pseudomonas fluorescens</i> (P1,P2) and <i>Bacillus subtilis</i> (B1,B2)} and Hatric 6% (F).....	73

8.	Inhibition of <i>F. incaratum</i> growth by biological control agents {Control (Co.), <i>Trichoderma harzianum</i> (TH1,TH2), <i>T. viride</i> (TV1,TV2), <i>Chaetomium</i> spp. (Ch.), <i>Penicilium</i> spp. (Peni.), <i>Pseudomonas fluorescens</i> (P1,P2) and <i>Bacillus subtilis</i> (B1,B2)} and Hatric 6% (F).....	73
9.	Inhibition of <i>M. phaseolina</i> growth by biological control agents {Control (Co.), <i>Trichoderma harzianum</i> (TH1,TH2), <i>T. viride</i> (TV1,TV2), <i>Chaetomium</i> spp. (Ch.), <i>Penicilium</i> spp. (Peni.), <i>Pseudomonas fluorescens</i> (P1,P2) and <i>Bacillus subtilis</i> (B1,B2)} and Hatric 6% (F).....	74
10.	Inhibition of <i>F.chlamydosporum</i> growth by biological control agents {Control (Co.), <i>Trichoderma harzianum</i> (TH1,TH2), <i>T. viride</i> (TV1,TV2), <i>Chaetomium</i> spp. (Ch.), <i>Penicilium</i> spp. (Peni.), <i>Pseudomonas fluorescens</i> (P1,P2) and <i>Bacillus subtilis</i> (B1,B2)} and Hatric 6% (F).....	74
11.	Inhibition of <i>Fusarium equiseti</i> strain CZCU growth by biological control agents.{Control (C), <i>Trichoderma harzianum</i> (TH1,TH2), <i>T. viride</i> (TV1,TV2), <i>Chaetomium</i> spp. (Ch.), <i>Penicilium</i> spp. (Peni.), <i>Pseudomonas fluorescens</i> (P1,P2) and <i>Bacillus subtilis</i> (B1,B2)} and Hatric 6% (F).....	75
12.	Inhibition of <i>F. longipes</i> growth by biological control agents {Control (Co.), <i>Trichoderma harzianum</i> (TH1,TH2), <i>T. viride</i> (TV1,TV2), <i>Chaetomium</i> spp. (Ch.), <i>Penicilium</i> spp. (Peni.), <i>Pseudomonas fluorescens</i> (P1,P2) and <i>Bacillus subtilis</i> (B1,B2)} and Hatric 6% (F).....	75
13.	Production of HCN from fungal and bacterial antagonists.....	98
14.	Inhibition of <i>F. solani</i> mycelial growth by fungicides (Control (Co.), Hatric (H), Metalaxyle (M) and Captan(K) with 40(A) ,80(B) and 160 mgL ⁻¹ (C)).....	102
15.	Inhibition of <i>L. theobromae</i> mycelial growth by fungicides (Control (Co.), Hatric (H), Metalaxyle (M) and Captan (K) with 40 (A) ,80 (B) and 160 mgL ⁻¹ (C)).	102

16.	Inhibition of <i>F. equiesti</i> mycelial growth by fungicides (Control (Co.), Hatric (H), Metalaxyle (M) and Captan (K) with 40 (A) ,80 (B) and 160 mgL ⁻¹ (C).....	103
17.	Inhibition of <i>F. oxysporum</i> mycelial growth by fungicides (Control (Co.), Hatric (H), Metalaxyle (M) and Captan (K) with 40 (A) ,80 (B) and 160 mgL ⁻¹ (C).	103
18.	Inhibition of <i>F. verticillioides</i> mycelial growth by fungicides (Control (Co.), Hatric (H), Metalaxyle (M) and Captan (K) with 40 (A) ,80 (B) and 160 mgL ⁻¹ (C).	104
19.	Inhibition of <i>F. incarnatum</i> mycelial growth by fungicides (Control (Co.), Hatric (H), Metalaxyle (M) and Captan (K) with 40 (A) ,80 (B) and 160 mgL ⁻¹ (C).	104
20.	Inhibition of <i>M. phaseolina</i> mycelial growth by fungicides (Control (Co.), Hatric (H), Metalaxyle (M) and Captan (K) with 40 (A) ,80 (B) and 160 mgL ⁻¹ (C).	105
21.	Inhibition of <i>F. chlamydosporum</i> mycelial growth by fungicides (Control (Co.), Hatric (H), Metalaxyle (M) and Captan (K) with 40 (A) ,80 (B) and 160 mgL ⁻¹ (C).	105
22.	Inhibition of <i>F. equiseti</i> strain CZCU mycelial growth by fungicides (Control (Co.), Hatric (H), Metalaxyle (M) and Captan (K) with 40 (A) ,80 (B) and 160 mgL ⁻¹ (C).	106
23.	Inhibition of <i>F. longipes</i> mycelial growth by fungicides (Control (Co.), Hatric (H), Metalaxyle (M) and Captan (K) with 40 (A) ,80 (B) and 160 mgL ⁻¹ (C).....	106
24.	Inhibition of <i>F. solani</i> mycelial growth by nanoparticles (Control (Co.), Nano-Zinc Oxide (ZnO) and Nano-silver (Ag) with 40 (A) ,80 (B) and 160 (C) mgL ⁻¹).....	124
25.	Inhibition of <i>L. theobromae</i> mycelial growth by nanoparticles (Control (Co.), Nano-Zinc Oxide (ZnO) and Nano-silver (Ag) with 40 (A) ,80 (B) and 160 (C) mgL ⁻¹).....	124
26.	Inhibition of <i>F. equiseti</i> mycelial growth by nanoparticles (Control (Co.), Nano-Zinc Oxide (ZnO) and Nano-silver (Ag) with 40 (A) ,80 (B) and 160 (C) mgL ⁻¹).....	125
27.	Inhibition of <i>F. oxysporum</i> mycelial growth by nanoparticles (Control (Co.), Nano-Zinc Oxide(ZnO) and Nano-silver (Ag) with 40(A), 80(B) and 160 (C)mgL ⁻¹)...	125

28.	Inhibition of <i>F. verticillioides</i> mycelial growth by nanoparticles (Control (Co.), Nano-Zinc Oxide (ZnO) and Nano-silver (Ag) with 40 (A) ,80 (B) and 160 (C) mgL ⁻¹).....	126
29.	Inhibition of <i>F. incarnatum</i> mycelial growth by nanoparticles (Control (Co.), Nano-Zinc Oxide (ZnO) and Nano-silver (Ag) with 40 (A) ,80 (B) and 160 (C) mgL ⁻¹).....	126
30.	Inhibition of <i>M. phaseolina</i> mycelial growth by nanoparticles (Control (Co.), Nano-Zinc Oxide (ZnO) and Nano-silver (Ag) with 40 (A) ,80 (B) and 160 (C) mgL ⁻¹).....	127
31.	Inhibition of <i>F. chlamydosporum</i> mycelial growth by nanoparticles (Control (Co.), Nano-Zinc Oxide (ZnO) and Nano-silver (Ag) with 40 (A) ,80 (B) and 160 (C) mgL ⁻¹).....	127
32.	Inhibition of <i>F. equiseti</i> strain CZCU mycelial growth by nanoparticles (Control (Co.), Nano-Zinc Oxide (ZnO) and Nano-silver (Ag) with 40 (A) ,80 (B) and 160 (C) mgL ⁻¹).....	128
33.	Inhibition of <i>F. longipes</i> mycelial growth by nanoparticles (Control (Co.), Nano-Zinc Oxide (ZnO) and Nano-silver (Ag) with 40 (A) ,80 (B) and 160 (C) mgL ⁻¹).....	128