



شبكة المعلومات الجامعية

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



شبكة المعلومات الجامعية
@ ASUNET



شبكة المعلومات الجامعية التوثيق الالكتروني والميكروفيلم



شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الالكتروني والميكرو فيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأفلام قد أعدت دون أية تغيرات



يجب أن

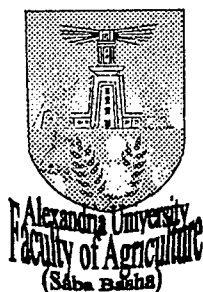
تحفظ هذه الأفلام بعيدا عن الغبار

في درجة حرارة من ١٥-٢٥ مئوية ورطوبة نسبية من ٢٠-٤٠%

To be Kept away from Dust in Dry Cool place of
15-25- c and relative humidity 20-40%

بعض الوثائق الأصلية تالفة

بالرسالة صفحات لم ترد بالاصل



CV 10

STRAWBERRY ROT DISEASES AND THEIR COTROL

BY

Abeer Abdel-Rahman EL-Sayed EL-Ghannam

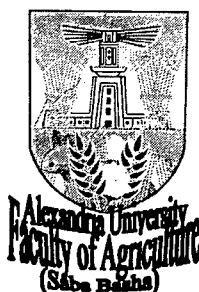
**A thesis submitted in partial fulfillment of the requirements governing
the award of the degree of**

**DOCTOR OF PHILOSOPHY IN AGRICULTURAL SCIENCES
(PLANT PATHOLOGY)**

From

Alexandria University

2010



STRAWBERRY ROT DISEASES AND THEIR COTROL

Presented by

Abeer Abdel-Rahman EL-Sayed EL-Ghannam

For the degree of

**DOCTOR OF PHILOSOPHY IN AGRICULTURAL SCIENCES
(PLANT PATHOLOGY)**

Examiner's Committee:

Prof. Dr. Farid Farid Abdel-Rahman Mehیار

Emeritus Prof. of Plant Pathology, Departement of
Agricultural Botany, Faculty of Agriculture Kafr El-
Sheikh, Kafr El-Sheikh University.

Approved

Prof. Dr. Ahmed El-sayed El-Korany

Prof. of Plant Pathology and Head of Agricultural
Botany Dept., Faculty of Agriculture, Damanhour,
Alexandria University.

Prof. Dr. Ibrahim A. El-Samra

Emeritus Prof. of Plant Pathology, Departement of
Agriculture Botany, Faculty of Agriculture (Saba-
Bacha), Alexandria University.

SUPERVISION'S COMMITTEE

Prof. Dr. Ibrahim A. El-Samra

I. El Samra
.....
/

**Emeritus Prof. of Plant Pathology
Faculty of Agriculture (Saba-Bacha)
Alexandria University**

Prof. Dr. Mostafa Abd-El-Azeem Amer

.....

**Prof. of Plant Pathology
Faculty of Agriculture (Saba-Bacha)
Alexandria University**

Prof. Dr. Omar Ezz El-Deen El-shemy

...Eli...

**Chief Researcher of Vegetable
Diseases, Pl. Path. Res. Inst.
Agricultural Research Center**

ACKNOWLEDGEMENT

First of all. I deeply indelibly thank "ALLAH" for helping me to accomplish this research and for providing me such very encouraging and supporting supervisors. I would like to express my sincere gratitude and appreciation to **Prof. Dr. I.A. El-Samra**, Prof. of Plant Pathology, Faculty of Agriculture, Saba-Bacha, Alexandria University, for his effective supervision, great continuous encouragement, continuous help and guidance throughout the investigation and preparation of the manuscript. that no words can be enough to express my deepest thanks for his close supervision during the study's work.

I kindly express my utmost appreciation and the deepest gratitude to **Dr. M. A. Amer**, Prof. of Plant Pathology, Faculty of Agriculture, Saba-Bacha, Alexandria University, for his willing supervision, his helpful suggestions, invaluable and, continuous help during the preparation of the final manuscript, continuous encouragement, constructive criticism and guidance throughout the investigation.

My thanks are also due to **Prof. Dr. Omar Ezz El-Deen El-shemy** Chief Researcher of Vegetable Diseases, for his kind help and highly appreciated support. And his cooperation with me until revising the manuscript of this thesis.

My thanks to **Prof. Dr. M. M. H. Rahhal** Chief Researcher Plant Pathology, Institute of Pl. Path. , Agricultural Research Center. for his kind help.

Many thanks to **Dr. S. M. A. Morsy** researcher of Plant Pathology, Institute of Pl. Path. , Agricultural Research Center.

Deep thanks are also due to **Dr. S. D. M. mekawy**, lecturer on Faculty of Agriculture, Damanhour, Alexandria University, for his help and valuable advice.

Special thanks are due to my father, mother, sister and brother for their valuable advice and patience and encouragement during this research work.

Formost deep gratitude is expressed to all the members of the Agriculture Botany Departement, Faculty of Agriculture, Saba-Bacha, Alexandria University and Agricultural Research Center, Deep gratitude is expressed to all the members tried to help me by direct or indirect way throughout my study.



CONTENTS

	Page No.
CHAPTER I: INTRODUCTION	1
CHAPTER II: REVIEW OF LITERATURE	3
1.Strawberry fruit rot agents.....	3
1.1.Introduction.....	3
1.2.Gray mold (<i>B.cinerea</i>).....	5
1.3. Soft rot or strawberry - fruit leak (<i>Rhizopus spp.</i>).....	5
2. Factors affecting incidence of strawberry fruit rots.....	6
2.1. Fruit wounds.....	6
2.2. Cultivars.....	6
2.3. Inoculum source and potential.....	7
2.4. Growth stage.....	7
2.5. Temperature and moisture.....	7
3. Enzymatic activities.....	9
4. Disease control.....	10
4.1. Salts.....	10
4.2. Antioxidants.....	11
4.3. Oils.....	12
4.4. Extracts.....	15
4.4.1. Keeping quality.....	20
4.5. Bioagents.....	22
4.6. Chemical control.....	25
CHAPTER III: MATERIALS AND METHODS.....	28
1. Pathogenicity experiments.....	28
1.1. Isolation, purification and identification.....	28
1.1.1. Isolation.....	28
1.1.2. Purification and identification.....	28
1.1.3. Pathogenicity tests.....	28
1.1.3.1. <i>In vitro</i>	28
1.1.3.2. <i>In vivo</i>	29
2. Factors affecting disease incidence.....	29
2.1. Virulence of the tested fungal isolates.....	29
2.2. Inoculum potential.....	29
2.3. Storage temperature.....	30
2.4. Storage relative humidity (RH).....	30
2.5. Interaction of temperature and humidity.....	30
3. Cellulolytic and pectolytic enzymes activities.....	31
3.1. In cultural supernatants.....	31
3.2. In inoculated strawberry fruits.....	31

4. Disease control.....	32
4.1. Salts.....	32
4.1.1. <i>In vitro</i>	32
4.1.2. <i>In vivo</i>	32
4.2. Antioxidants.....	32
4.2.1. <i>In vitro</i>	33
4.2.2. <i>In vivo</i>	33
4.3. Plant oils.....	33
4.3.1. <i>In vitro</i>	33
4.3.1.1. Effect on mycelial growth.....	33
4.3.1.2. Effect on spore production.....	34
4.3.1.3. Effect on strawberry fruit rots development.....	34
4.3.2. <i>In vivo</i>	34
4.4. Plant extracts.....	34
4.4.1. <i>In vitro</i>	35
4.4.1.1. Effect on mycelial growth.....	35
4.4.1.2. Effect on spore production.....	35
4.4.1.3. Effect on strawberry fruits rot.....	35
4.4.2. <i>In vivo</i>	35
4.4.3. Effect on of plants extracts and oils on sensory evaluation of strawberry fruits.....	35
4.5. Biocontrol agents.....	36
4.5.1. <i>In vitro</i>	36
4.5.1.1. Effect on mycelial growth.....	36
4.5.1.2. Effect on spore production.....	36
4.5.1.3. Effect on strawberry fruits rot incidence.....	36
4.5.2. <i>In vivo</i>	37
4.6. Chemical control.....	37
4.6.1. <i>In vitro</i>	37
4.6.1.1. Effect on mycelial growth.....	37
4.6.1.2. Effect on spores production.....	38
4.6.1.3. Effect on strawberry fruits rot.....	38
4.6.2. <i>In vivo</i>	38
5. Statistical analysis.....	38
CHAPTER IV: EXPERIMENTAL RESULTS.....	39
1. Pathogenicity.....	39
1.1. Isolation and frequency of fruit rot fungi.....	39
1.2. Pathogenicity of the tested fungi.....	39
1.2.1. <i>In Vitro</i>	39
1.2.1.1. <i>B.cinerea</i>	41
1.2.1.2. <i>R.stolonifer</i>	41
1.2.2. <i>In Vivo</i>	44
2. Factors affecting disease incidence.....	47