شبكة المعلومات الجامعية

بسم الله الرحمن الرحيم

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الالكتروني والميكروفيلم

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 الاصلية تالفة

بالرسالة صفحات لم ترد بالاصل

Physiological Studies on Chemically Induced Systemic Resistance against Charcoal Rot Disease in Sunflower Plant

Presented by

Ahmed Mahmoud Saleh Mohamed

A Thesis Submitted
to
Faculty of Science

In Fulfillment of the Requirement for the Degree of Doctor of Philosophy of Science (Plant Physiology)

Botany Department
Faculty of Science
Cairo University

(2010)

APROVAL SHEET FOR SUBMISSION

Thesis Title: **Physiological Studies on Chemically Induced Systemic Resistance against Charcoal Rot Disease in Sunflower Plant**

Name of Candidate: Ahmed Mahmoud Saleh Mohamed

This thesis has been approved for submission by the supervisors:

Prof. Dr. Mahmoud M. A. Gabr
Professor of Plant Physiology, Faculty of Science, Cairo University

Signature: 14.14.A

Prof. Dr. Shahnaz A. M. Al - Wakeel
Professor of Plant Physiology, Faculty of Science, Cairo University

Signature: Shahnaz Al-Wakeel

Dr. Walid M. Abu-El-Soud
Lecturer of Plant Physiology, Faculty of Science, Cairo University

Signature: Walid Abu-El-Soud

Prof. Dr. Mimona A. Kord

Chairman of Botany Department
Faculty of Science- Cairo University

LIST OF EXAMINERS

1) **Prof. Dr. María Victoria Gómez Rodríguez**
Department of Animal Biology, Plant Biology and Ecology
Faculty of Science, University of Jaén (Spain)

Address: Building B-3. Paraje Las Lagunillas S /N. 23 071
Jaén, Spain

Tel: 953-21 27 85
Fax: +34 953 211 873
Email: mvgomez@ujaen.es

2) **Prof. Dr. Manuel Reigosa Roger**
Department of Plant Biology and Soil Science
Univeristy of Vigo (Spain)
Address: As Lagoas, Marcosende S / N E-36310 Vigo , Spain
Tel: +34 986 812 616
Fax: +34 986 812 556
Email: mreigosa@uvigo.es

3) **a- Prof. Dr. Mahmoud M. A. Gabr**
Botany Department, Faculty of Science, Cairo University

b- Prof. Dr. Shahnaz A.M. Al-Wakeel
Botany Department, Faculty of Science, Cairo University

Acknowledgment

First of all, Praise God almighty, the most merciful, for his countless blessing, help and generosity.

Second I would also like to thank my supervisor Prof. Dr. Mahmoud Gabr, Professor of Plant Physiology, Botany Department Faculty of Science, Cairo University, for his supervision and continuous encouragement.

I would like to express my deep gratitude to my supervisor Prof. Dr. Shahnaz Al-Wakeel, Professor of Plant Physiology, Botany Department Faculty of Science, Cairo University, for her supervision, continuous caring and guidance discussion. I am very indebted to her for her continuous encouragement, unforgettable help and kind feeling throughout the course of this study.

My thanks also go to my supervisor Dr. Walid Abu-El-Soud, Lecturer of Plant Physiology, Botany Department Faculty of Science, Cairo University, for his supervision and helpful cooperation.

I would like to thank the administrative leaders of Faculty of Science, Cairo University on the financial support for this study by the Graduate Research Challenge Fund (GRCF).

Finally, thanks extend to all my colleagues who helped me during this work.

CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF PHOTOS

ABSTRACT

Induction of systemic resistance to charcoal rot disease caused by *Macrophomina phaseolina* (Tassi) Goidanich in sunflower (*Helianthus annuus* L.) was studied after priming the seeds with salicylic acid (SA) and coumarin (COU) at three different levels (0.3, 1.0 and 3.0 mM) , under greenhouse conditions. Treatments of sunflower seeds with SA or COU significantly decreased disease severity and improved the host plant growth. The protective effect of these treatments is due to their ability to stimulate the induction of pathogenesis related proteins (β-1,3-glucanase, chitinase, phenylalanin ammonia lyase and peroxidase), polyphenol oxidase and phytoalexins (ayapin, scopoletin and scopolin), as well as soluble sugars, proline, phenolic glycosides, flavonoids and anthocyanins. The isozyme pattern of peroxidase revealed the induction of two novel isoforms by both 0.3 mM COU and 1.0 mM SA treatments in healthy or infected plants. Semi-quantitative RT-PCR analysis indicated that COU-induced resistance is associated with the activation of the *Ha-Def* gene, while the expression of the *Ha-hsr* gene was only detected under SA treatment.