STUDIES ON THE MECHANISM OF INDUCED RESISTANCE TO FUSARIUM WILT OF WATERMELON

By

EMAD EL-DEIN ALI MOSTAFA GADO

B.Sc. Agriculture (Plant Pathology)
Ain Shams University, 1991

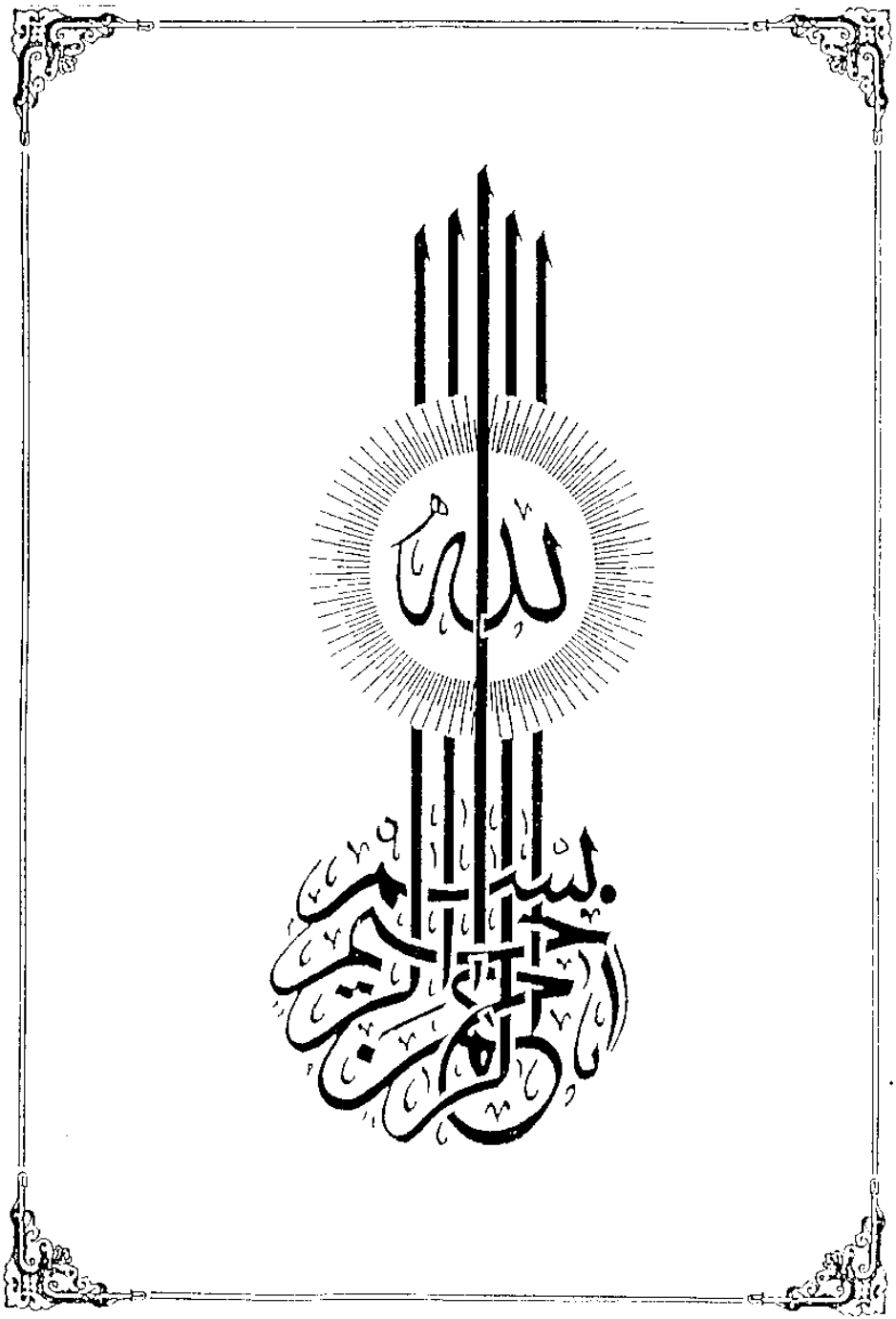
A thesis submitted in partial fulfilment
of
the requirements for the degree of

MASTER OF SCIENCE

In

Agriculture
(Plant Pathology)
Department of Plant Pathology
Faculty of Agriculture
Ain Shams University

1997



APPROVAL SHEET

STUDIES ON THE MECHANISM OF INDUCED RESISTANCE TO FUSARIUM WILT OF WATERMELON

By

EMAD EL-DEIN ALI MOSTAFA GADO

B.Sc. Agriculture (Plant Pathology)
Ain Shams University, 1991

This thesis for M.Sc. degree has been approved by :

Prof. Dr. Mahmoud Maher Ragab.....
Prof. of Plant Pathology, Fac. of Agric., Cairo University

Prof. Dr. Madih Mohamed Aly.....
Prof. of Plant Pathology, Fac. of Agric., Ain Shams University

Prof. Dr. Mostafa Helmy Mostafa.....
Prof. of Plant Pathology, Fac. of Agric., Ain Shams University

Date of examination 2 / 9 / 1997

STUDIES ON THE MECHANISM OF INDUCED RESISTANCE TO FUSARIUM WILT OF WATERMELON

By

EMAD EL-DEIN ALI MOSTAFA GADO

B.Sc. Agriculture (Plant Pathology)

Under the Supervision of :

Prof. Dr. M.H. Mostafa
Professor of Plant Pathology (Ain Shams Univ.)

Prof. Dr. Dorria I. Harfoush
Professor of Plant Pathology (Ain Shams Univ.)

Dr. A.A. Mosa
Assistant Prof. of Plant Pathology (Ain Shams Univ.)

ACKNOWLEDGMENT

All praises are due to God, who blessed me with kind professors and colleagues, and gave me the support to produce this thesis.

I wish to express my deepest gratitude to **Prof. Dr. M.H. Mostafa,** Professor of Plant Pathology Faculty of Agricultur, Ain Shams University for his supervision, help, valuable suggestions and continuous encouragement during this study. Thanks are also due to **Prof. Dr. Dorria I. Harfoush,** Professor of Plant Pathology, Faculty of Agriculture, Ain Shams University for her supervision, encouragement and sincere support. Thanks are also and my sincere appreciations to **Dr. A.A. Mosa,** Assistant Prof. of Plant Pathology, Faculty of Agriculture, Ain Shams University for supervising this work, kind attention, and make through the course of the implementation of this thesis. Thank also extended to all staff members of Plant Pathology Department, Faculty of Agriculture, Ain Shams University. Specially, **Prof. Dr. M.M. Aly** and **Dr. S.H. El-Deeb.**

My deepest thanks and gratitude are also due to **Prof. Dr. M.A. Rashed** Prof. of Genetics, **Dr. F.M. El-Domyaty** Associate Prof. of Genetics, Department of Genetic, Faculty of Agriculture, Ain Shams University for their valuable help during electrophoretical studies .

Thanks are also due to **Prof. Dr. S.A. Habib,** Prof. of Botany, Faculty of Agriculture, Ain Shams University for kind attention and sincere support.

Thanks are also due to **Dr. Larisa, Ananieva,** Ph.D. Biology. Expert of Electron microscopy Ain Shams University Specialized Hospital and all members of the EM lab.

Emad El-Dein Ali Mostafa Gado : Studies on the mechanism of induced resistance to fusarium wilt of watermelon

Unpublished Master of Science, University of Ain Shams, Faculty of Agriculture, Department of Plant Pathology, (1997)

ABSTRACT

This investigation was aimed to select some biotic and abiotic agents for inducing resistance in watermelon plants against wilt fungus *Fusarium oxysporum* f.sp *niveum*. Among tested agents, *Pseudomonas fluorescens*, salicylic acid (SA), hydrogen peroxide (H_2O_2) and Co^{++} as a cobalt sulphate were effective in controlling wilt incidence as seed treatments. Abiotic agents increased seedling growth and formation of lateral roots on the main axis of root. These seedlings were highly tolerant to the pathogen when they set over the fungal growth.

Anatomical features of plants from treated seeds by these abiotic agents were greatly affected. Cortex area, number of xylum vessels and xylem diameter were increased due to the treatment by SA, H_2O_2, Co^{++}. Intrabundles cambium (intervascicular) was regenerated produced from 3 to 4 layers. Transmission electron microscopy showed that these abiotic factors, strongly activated cell metabolism and in the presence of fungal cells, the defence reactions were stimulated caused a remarkable effect on pathogen cell. Peroxidase activity was found to be increased in plant tissues as the result of treatment by these abiotic agents. In immunized plants such activity was highly increased, except in case of *P. fluorescens* treatment. Isozyme pattern of peroxidase gave the same picture. SDS-

PAGE of soluble protein showed a great modification as the results of treatment. Cobalt ions superior all other treatments followed by SA then H_2O_2 and *P. fluorescens* in this respect.

Key words : Acquired resistance, Anatomical studies, Biotic inducers, Abiotic inducers, H_2O_2,Co^{++}, Salicylic acid, *Pseudomonas fluorescens,* Ultrastructure, Protein Pattern, Peroxidase isozyme, Regeneration, Fusarium wilt of watermelon, *Fusarium oxysporum* f. sp. *niveum, Citrulus lanatus*.

CONTENTS