١٩٩١٣٠٠ ١٣٤٨ ٢٠٢

ECOLOGICAL AND EPIDEMIOLOGICAL STUDIES ON BACTERIAL BLIGHT DISEASE OF PEAR

By

NAGY YASSIN ABD EL-GHAFAR

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

رسالة

Doctor of Philosophy

In

Agriculture Science

(Plant Pathology)

Department of Plant Pathology

Faculty of Agriculture

Ain Shams University

47951

632.32
N.4

1994

مكتبة

ECOLOGICAL AND EPIDEMIOLOGICAL STUDIES ON BACTERIAL BLIGHT DISEASE OF PEAR

By

NAGY YASSIN ABD EL-GHAFAR

B. Sc. in Aric. (Plant Pathology), Fac. of Agric.,
Ain Shams University, 1981

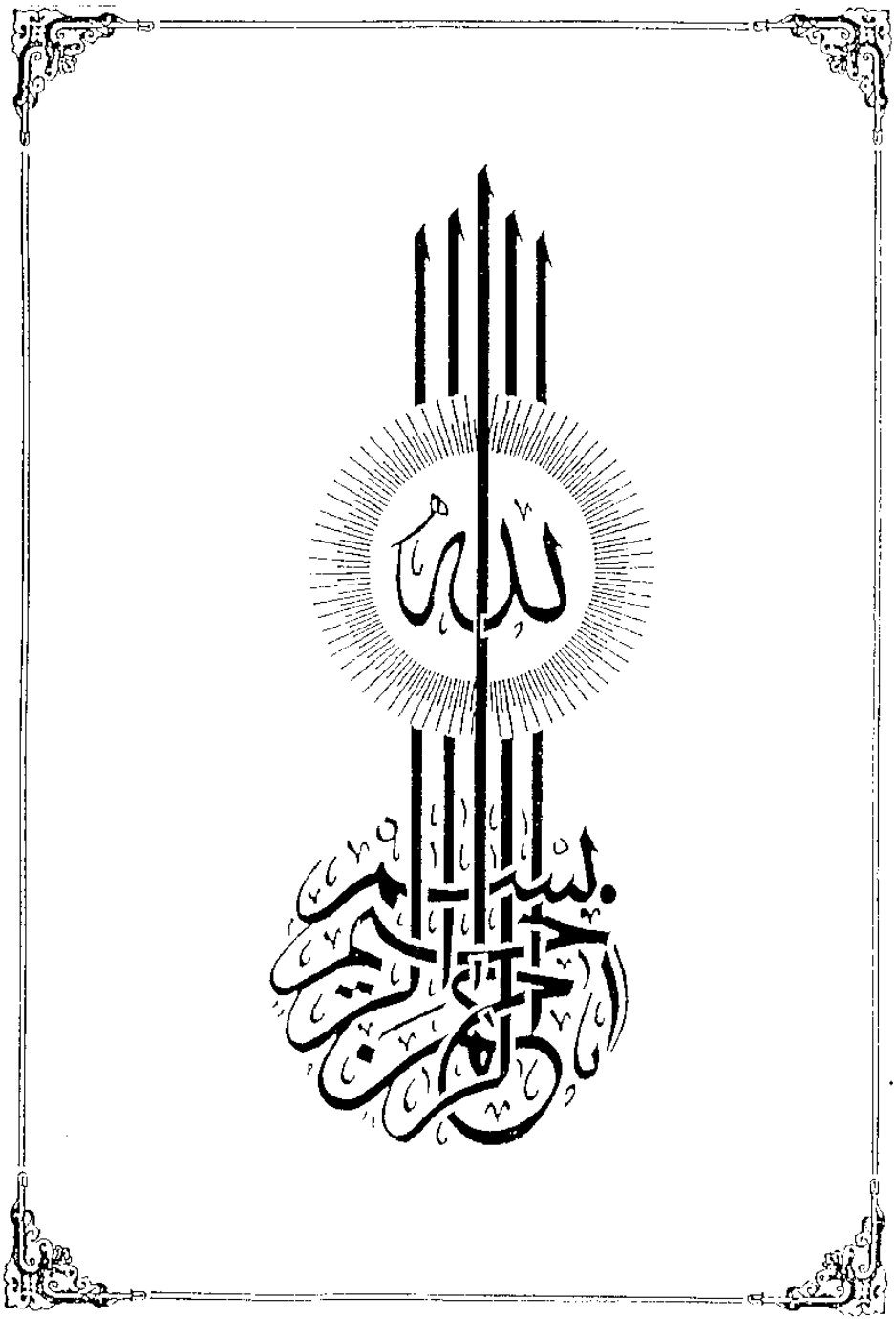
M.Sc. in Agric. (Plant Pathology), Fac. of Agric.,
Ain Shams University, 1988

Under the Supervision of:

1. **Prof. Dr. M.F. Hegazi**
   Professor and Head of the Department of Plant Pathology, Faculty of Agriculture, Ain Shams University.
2. **Prof. Dr. W.A. Mashhoor**
   Professor of Agricultural Microbiology, Faculty of Agriculture, Ain Shams University.
3. **Dr. Nagwa A.M. Gamil**
   Associate Professor of Plant Pathology, Faculty of Agriculture, Ain Shams University.

ABSTRACT

Pear bacterial blight disease caused by *Erwinia amylovora* (fire blight disease) and *Pseudomonas syringae* (pear blast



Central Library - Ain Shams University

disease). The disease was found in Alexandria, Beheara and Kafr El-Shiekh Governorates, while Dakahlia and Kalubia Governorates were free from the disease. The disease was found to be in just some regions at Gharbia Governorate.

Disease severity greatly increased and the yield decreased with increasing number of cankers and infected clusters per tree, during autumn period and late blooming, especially after 20th of March.

E. amylovora and *Ps. syringae* were detected in all tested samples, except cankers which were free from *Ps. syringae*. High percentages of infected samples and high population of *E. amylovora* were found in cankers, which could be considered as the main source of infection in the following season. Chemical control treatments (Kocide 101 with addition of streptomycin sulfate) significantly decreased the percentage of infected samples as well as populations of the two pathogens.

A definite relationship between weather conditions and occurrence of pear bacterial blight disease in Egypt was found. Temperature was the major factor for initiation of blight epidemic. High relative humidity and rainfall were important for initial infection and dissemination of the disease.

Population of both pathogens isolated from bees and wood minors insects were relatively high as compared with those from leaf hopper and ants insects.

There was a relationship between appearance of streptomycin-resistant isolates and the number of seasons where streptomycin was included in the spray program. Using Kocoide

101 with addition of streptomyhcin sulfate in the spray program greatly decreased the appearance of streptomycin-resistant isolates. Combination between chemical control treatments and fertilizers (organic and mineral) greatly decreased the severity of bacterial blight disease and increased yield of pear.

Total sugars and amino acids content of the infected tissues decreased, while total phenols increased as compared with healthy tissues. Flowers and immature fruits of pear were susceptible to bacterial blight disease, due to the high amounts of total amino acids and low amounts of total sugars and phenols. Meanwhile, mature fruits were resistant to the disease, due to the decreasing in amounts of total amino acids and the high amounts of total sugars and phenols.

Phenolic compounds inhibited the growth of both pathogens and capsule formation of *E. amylovora*. However, some sugars and amino acids increased the growth of both pathogens and stimulated capsule formation of *E. amylovora*.

KEY WORDS

- The theoretical development period (D)
- Potential bacterial blight activity (PBA)
- Potential doublings (PD)
- Extracellular polysaccharids (EPS)
- Colony forming unites (CFU)
- Nutrient agar meldium (NA)
- Nutrient broth medium (NB)
- Kado and Heskett medium (D3)
- King's medium B (KBA)
- Sterile distilled water (SDW)
- Streptomycin resistant strains (Str^r)
- Streptomycin sensitive strains (str^s)
- Ammonium niitrate (N)
- Calcium superphosphate (P)
- Potassium sulfate (K)
- NPK-mixture

ACKNOWLEDGEMENT

I wish to express my deep gratitude and many thanks to Professor Dr. M.F. Hegazi, Professor and Head of the Department of Plant Pathology, Faculty of Agriculture, Ain Shams University, Prof. Dr. W.A. Mashhoor, Prof. of Agricultural Microbiology, Fac. of Agrc., Ain Shams Univ. and Dr. Nagwa A.M. Gamil, Associate Prof. of Plant Pathology, Fac. of Agric., Ain Shams University for their supervision and valuable guidance during this investigation.

Sincere appreciation, many thanks and indebtedness would be expressed for Prof. Dr. M.M. El-Zayat Prof. of Plant Pathology, Fac. of Agric., Ain Shams Univ., for his kind help, unfailing encouragement, continuous advices during his supervision before leaving the department for his work in F.A.O.

It is my privilege to express my personal acknowledgements to all staff-members and colleagues at the Department of Plant Pathology, Fac. of Agric., Ain Shams University.

CONTENTS

Page

Page

Page

LIST OF TABLES

Page

Page

Page