STUDIES ON LEAF SPOTS OF FIELD BEAN (VICIA FABA L.)

BY

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B. Sc. Agricultural Science, 1976

(Plant Pathology)

Fac. Agric., Ain Shams Univ.

رسالة

THESIS

Submitted in partial fulfillment

of the requirements for the degree

OF

MASTER OF AGRICULTURAL SCIENCE .

IN

(PLANT PATHOLOGY)

Department Of Agricultural Botany

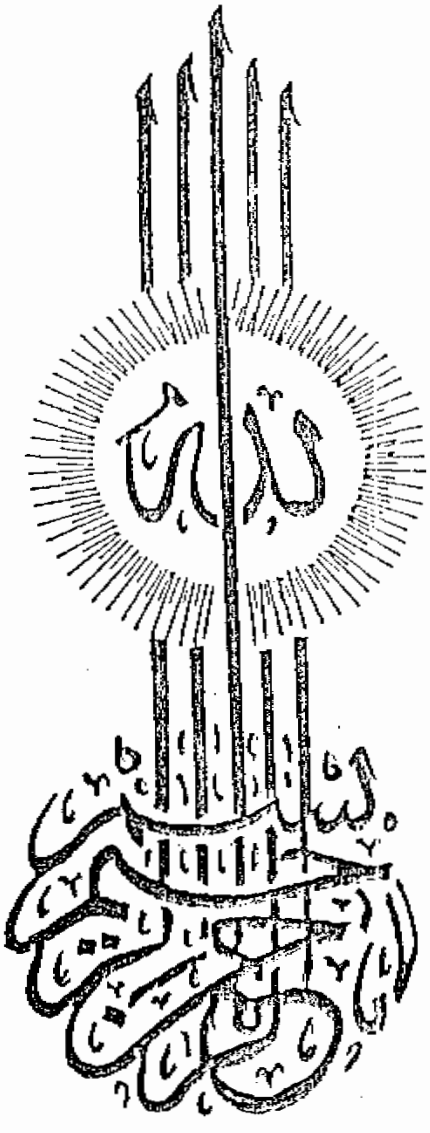
Fungus and Plant Pathology Branch

Faculty Of Agriculture, Moshtohor

ZAGAZIG UNIVERSITY

(BENHA BRANCH)

(1992)



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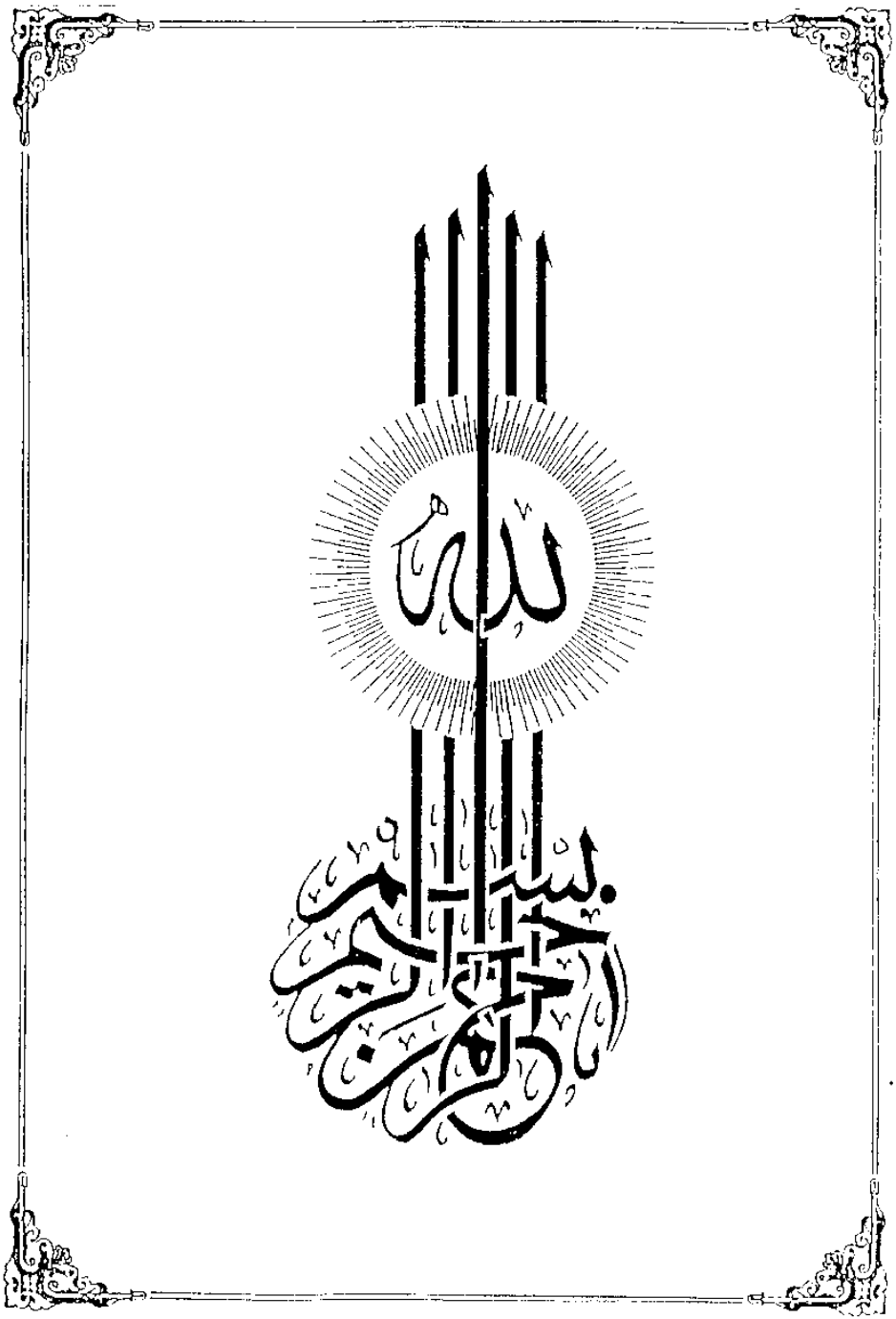

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ACKNOWLEDGMENT

The author wishes to express his deepest thank's and sincere appreciation to *Prof. Dr. kamal Galal Mohamed Ahmed,* **Professor of plant pathology and head of Fungus and plant pathology Branch and To** *Dr. Abdou Mahdy Mohamed Mahdy* **Associate professor of same branch, Department of Agricultural Botany, Faculty of Agriculture, Moshtohor, Zagazig University " Benha Branch " for their invaluable and help during the course of study and the preparation of the manuscript.**

Gratitude is extended also to *all staff members of the Fungus and plant pathology Division, Agric. Bot. Dept. Fac. of Agric . Moshtohor, Zagazig University" Banha Branch"* **for their kind help and encouragement.**

CONTENTS

INTRODUCTION

INTRODUCTION

Faba bean (Vicia faba L.) is one of the important leguminous crops in A.R.E. and all over the world . Its important comes from high value and content of protein found in the seeds which is used for human and animal consumption. The cultivated area in 1990/1991 reached (293.474 feddans) producing 6.24 ardabs per feddan (according to the Annual Report of Statistical Department, Ministry of Agriculture, A.R.E.

Faba bean is subjected to suffer from several diseases which affect the quality and quantity of total seed production . Leaf spots are sometimes considered from the most harmful diseases in Egypt . Botrytis fabae, Stemphylium botryosum and Alternaria alternata are the main causal organisms of leaf spots disease in Egypt *(Mohamed 1982)* .

This investigation aims mainly towards the study of the following points :

(1) The important pathogens causing leaf spot disease of broad bean and their pathogenicity .

(2) Effect of fungicides and foliar nutrients on disease incidence and yield .

(3) Effect of leaf exudates on spore germination and mycelial growth of B. fabae .

(4) Effect of spraying with fungicides and foliar nutrients on leaves content from chemical components and their relation with leaf spots disease of broad bean .

(5) Effect of N,P,K, fertilizers on infection with leaf spots disease of broad bean plants and yield .

(6) Effect of sowing density on infection with leaf spots disease of broad bean plants and yield .

REVIEW OF LITERATURE

REVIEW OF LITERATURE

Broad bean (Vicia faba L.), is susceptible to infection with different leaf spot pathogens which cause considerable losses to the cultivated plants . Chocolate spot which is incited by Botrytis fabae Sard., Stemphylium leaf spot incited by Stemphylium botrysoum Wall. and Alternaria leaf spot incited by Altranaria alternata (Fr.) Keissler are the most predominant and widespread leaf spot diseases of faba bean in Egypt (*Hussien, 1963 and Mohamed, 1982*) .

I- Leaf Spot Causal Pathogens:

a) Botrytis Fabae Sard.

Sardina (1929) was the first who established that the fungus Botrytis fabae is the causal pathogen of chocolate spot and not Botrytis cinerea Pers .

El-Helaly (1936) (Egypt) found that Botrytis sp. was the causal organism of leaf spot disease of Broad bean . Also, he stated that during the artificial inoculation tests, the fungus was reisolated from the plants inoculated with spore suspension of the fungus .

He later added (1938) that B. fabae was the principal causal pathogen for chocolate spot disease on Vicia faba . It caused severe damages in the northern localities .

Berger (1937) reported that broad bean in Morocco was attacked by Botrytis fabae Sard. and was distinctly different from Botrytis cinerea (Pers) Er. in its biological characters and specificity to Vicia faba . In the artificial inoculation trials using conidia of Botrytis fabae and of the strains of Botrytis cinerea, he obtained positive results only in case B. fabae .

The fungus Botrytis fabae Sard. was one of the most important pathogens

which causes great damage to broad bean (Vicia faba. L.) *(Anon 1940)* .

Sirry (1953) and (1956) found that there was a significant inverse correlation between the severity of chocolate spot and the available phosphorus ($P_2 O_5$) in the soil . The infection of Botrytis fabae in broad bean was more sever in unmanured plots than in those treated with superphosphate .

Leach (1955) studied the role of Botrytis fabae and Botrytis cinerea in causing chocolate spot to field bean in the field . Botrytis fabae caused conspicuous spot and Botrytis cinerea in significant ones . Sporulation occurred only when the lower leaves were generally invaded and become senescent .

Deverall and Wood (1961) found in their studies on detached leaves of broad bean plants, inoculated with spore suspensions of Botrytis fabae of known concentrations or with single spores, that increasing the number of spores in the inoculation drops increased the number of lesions . Lesions were produced more ready on older than on younger leaves . A larger proporation of the spores germinated when these were on older leaves and when the drops contained glucose.

Higazy (1964) stated that the fungus Botrytis fabae was the causal of leaf spot of broad bean plants .

Harrison (1978) obtained evidence that B. fabae can over winter on broad bean and produce infective spores in the spring .

Hutson and Mansfield (1980) compared between 15 pure strains of B. cinerea and B. fabae, after 6 generations of single spore isolation and found that these strains differed in their pathogenicity and therefore both may be heterokaryotic or heteroplasmic for virulence factors .

Mahmoud (1985) showed that the predominant leaf spot during the survey in the northern parts of the Delta, was the chocolate leaf spot caused by Botrytis fabae .

Habib (1990) (Egypt) found in the isolation trials from broad bean leaves that the most frequent fungus was B. fabae followed by B. cinerea .

b) Stemphylium Botryosum Wall:

Smith (1940) found that Stemphylium botryosum had a wide host range . It has been reported to produce leaf spots on many crops including legumes such as Medicago rodica and M. sativa (Lucerne) .

Abdou and Fahim (1969) recorded, Stemphylium leaf spot of Vicia faba, caused by Stem. botryosum Wall. for the first time in Egypt . The disease was reported on introduced broad bean variety named . " Equadolce " grown in El-Tahyrir province .

Skidomore and Dickinson (1973) found in their studies with phylloplane fungi that leaf spotting Stemphylium botryosum (Pleospora herbarum) accelerated senescence and caused more restricted leaf spotting .

Fahim et al. (1975) reported that Benlate (benomyl) at 1500 ppm sprayed on vicia bean 5-30 days before inoculation with Stem. botryosum (Pleospora herbarum) controlled the disease .

Ibrahim and Nassib, (1979) indicated that of 4000 lines of broad bean plants tested, 30 showed moderate field resistance to leaf spots Stemphylium botryosum (Pleospora herbarum) .

Abou zeid et al. (1980) stated that 15 fungicides were tested for their effect on leaf spot diseases of Vicia faba under field conditions at (a) Sakha and (b) Nubaria in 1979-80 . Seed yield increased by 26 and 50.8% over the control at (a) and (b) respectively . Calxin M (maneb), white Zineb (Zineb z) and Mancozan (Maneb) also gave high yields .

Habib (1990) found in the isolation trials from broad bean leaves that

Stemphylium botryosum was intermediate compared with other twenty-eight fungal isolates .

c) **Alternaria Alternata** *(Fr.) Keissler:*

Soad and Hagedorn (1969) found that Alt. alternata caused leaf spot of bean which mostly occurred on wounded leaves injured by mints .

Skidomore and Dichinson (1973) found in their studies with 6 phelloplane fungi and 2 pathogens that leaf spotting Alternaria alternata accelerated senescence and caused more restricted leaf spotting .

Sumer et al. (1982) stated that Alternaria leaf spot (Alt. alterneta), powdery mildew and chocolate spot were the most common diseases on faba beans .

Mahmoud (1985) stated that surveying of leaf spots in three Gavernorates in Egypt (i,e Kafr El-Sheikh, El-Sharkia and El-Dakhlia), showed that faba bean plants were attacked by Alternaria alternata .

Simay (1987) found that Alt. alternata was isolated from Vicia faba with heavy leaf spotting in experimental plots at Topioszele . In the glass house, inoculation with conidia was successful; symptoms being most marked on plants previously infested by Aphis fabae or Teranychus urticae . Seed transmission was observed in spite of sterilization of the seed surface .

Habib (1990) found that Alternaria alternata was less frequent in the isolation trials from faba bean (Vicia faba L.) diseased leaves which yielded different twenty-eight fungal isolates .

Zaglol (1991) reported that Stemphylium botryosum and Alt. alternata resulted in typical leaf spot symptoms on Giza 3 and Giza 402 cvs after 45 days from sowing . He also stated that Alt. alternata was virulent than Stem. botryosum .

II. Media:

El-Helaly (1938) stated that the fungus Botrytis fabae gave its best growth on malt extract agar and Brown's agar media respectively, sclerotia were formed on all the above media . Conidia were produced on malt-extract agar, bean leaf extract agar, and Brown's agar when kept at 15 °C and on leaf extract medium they also appear at 25 °C .

Deverall (1960) recorded that the addition of sugars, especially glucose and manose to the infection drops increased lesions production .

Shiraishi et al. (1970) showed that recovery of germinability of aged conidia of Botrytis cinerea was best with glucose and fructose followed by sucrose, maltose, lactose, and less effective with dextrin, Inuline and strach .

Ungaro and Azebeo, (1986) reported that good sporulation (10^6 conidia /ml) for Alternaria alternata was obtained in the dark at 27 ± 1 °C, with or without wounding the mycelium . In the presence of light, some isolates had a lower growth rate and sporulation, indicating high genetic variability within the sp. The addition of sunflower leaf extract to potato dextrose agar restored sporulation in mycelial isolates .

Beniwa and Dereje Gorf (1989) found a method for mass production of Botrytis fabae, the causal fungus of chocolate spot to faba bean . A high level of sporulation was obtained on a medium containing chrysanthemum flowers and 3% dextrose under normal lab. conditions (18-25 °C) and without Uv. irradiation . This method is recommended for the production of large amounts of inoculation especially in developing countries where sophisticated equipment is not always available .