STUDY OF TRANSMISSION OF MAJORSEED-BORNE PUNGAL PATHOGENS FROM SEED TO PLANT TO SEED IB JUTE (Corchorus capsularis L.)

A Thesis

By

MD. FARIDUL ISLAM

Examination Roll No. 20

(Session : 1986-87)

MASTER OF SCIENCE : AGRICULTURE

PLANT PATHOLOGY

June 1982

Bangladesh Agricultural University

Mymensingh

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(Session: 1986-`87)

Submitted to
the Faculty of Agriculture
Bangladesh Agricultural University, Mymensingh,
in partial fulfilment of the requirements

for the degree

of

MASTER OF SCIENCE (AGRICULTURE)

IN

PLANT PATHOLOGY

JUNE, 1992

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TO MY

BELOVED PARENTS

ACKNOWLEDGEMENT

The author express his hearty deep sense of gratitude and sincere appreciation to Dr. Md. Golam Ali Fakir, M.Ag. (Dhaka), Ph.D. (UCSO, U.S.A.), Diploma in Seed Pathology (Denmark), Professor, Department of Plant Pathology, Bangladesh Agricultural University (BAU), Mymensingh for his constant and dynamic guidance during the entire course of the research work.

The author is highly grateful to his beloved members of the Supervisory Committee, Dr. Md. Abdul Momin, Professor and Mr. Md. Ashrafuzzaman, Associate Professor of the Department of Plant Pathology, BAU, Mymensingh for their sympathetic advice, valuable suggestions and constructive criticism from time to time. The author is very much thankful to Mr. G.M.M. Rahman, Assistant Professor, Dept. of Plant Pathology, BAU, Mymensingh for his sincere help during the preparation of this dissertation and photographic assistance. The author is also grateful to all other teachers in the Department, fellow students and the staff of Seed Pathology Laboratory for the help they rendered in course of this work.

The author also grateful to Mr. A.F.M. Habibur Rahman, Manager (Production), Agro-service Centre Division, Bangladesh Agricultural Development Corporation (BADC), Dilkusha, Dhaka for his encouragement and sincere help during the period of the study.

The author extends his appreciation to his parents, younger brothers, sister and all other relatives for their patience and sacrifices during the study period.

Thanks are extended to Mr. Md. Nazrul Islam, U.D. Asstt.-cum-Typist, Graduate Training Institute, BAU, Mymensingh for typing this manuscript.

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ABSTRACT

Transmission of the three major seed-borne fungal pathogens of jute viz. *Botryodiplodia theobromae, Colletotrichum corchori* and *Macrophomina phaseolina* from seed to plant to seed was studied. Germination of the seeds were found to decrease with the increasè of the seed-borne infection of the test fungal pathogens. Seeds having higher seed-borne infection resulted significantly higher amount of disease development in the field. Likewise, higher seed-borne infection was obtained in the harvested seeds from the higher number of diseased plants. However, the rate of transmission of the three test pathogens from infected seeds to the growing plants and ultimately to the harvested seeds was relatively low.

INTRODUCTION

Jute (*Corchorus capsularis* L. and *C. olitorius* L.), the most important cash crop of Bangladesh, suffers from more than 12 different diseases. Of all these diseases, at least six are known to be seed-borne. Among the seed-transmitted diseases, five except leaf mosaic, are caused by fungi. Of the fungal seed-borne diseases, black band, anthracnose and stem-rot caused by *Botryodiplodia theobromae*, *Colletotrichum corchori* and *Macrophomina phaseolina*, respectively, are of major importance. Again, among the major seed-transmitted diseases, stem rot, alone can cause 10% yield loss of the crop annually (Ahmed, 1968).

B. theobromae, *C. corchori* and *M. phaseolina*, the three major fungal pathogens are known to be quite frequently transmitted through jute seeds (Akanda and Fakir, 1985; Anon., 1985 and Fakir *et al.*, 1990).

Analysis of seed-borne infection of farmers seeds carried by the Seed Pathology Laboratory, Department of Plant Pathology, Bangladesh Agricultural University (BAU), Mymensingh also showed that rarely a seed sample was free from seed-borne infection of the three major pathogens and as high as 50.0, 75.0 and 85.5% seed-borne infection of *B. theobromae*, *C. corchori* and *M. phaseolina*, respectively were encountered in certain seed lots (Anon., 1989). Sowing of such infected seeds fail to germinate, the young seedlings emerging from the infected seeds may die and often the growing plants, escaping early infection, succumb to death or got partly affected due to disease(s). Besides, pathogens can spread very easily from one place to another through infected seeds, become established in pathogen free soil

and may cause epidemic disease development resulting enormous losses to crop production in subsequent seasons. As use of seeds infected by these pathogens reduces planting value of a seed lot and spreads disease in the field, it is a burning question from the farmers that what should be the maximum acceptable limit of prevalence of these pathogens in a given seed lot. This can be answered by studying the rate of transmission of a given pathogen in a seed lot to the growing plants in the field raised from the same seed lot. But, no study regarding the rate of transmission of major seed-borne fungal pathogens of jute from seed to growing plants and its consequences have been conducted in Bangladesh. Recently seed standard or maximum acceptable limit of the three major fungal pathogens - *B. theobromae, C. corchori* and *M. phaseolina* has been fixed by the National Seed Board (BARC, 1986). But these standards have been fixed arbitrarily-, not based on research data. As such, these are not reliable. In view of the above facts, there is a great need to study the rate of transmission of these three major pathogens critically from seed to growing plants in order to generate reliable information. This, inturn, will be helpful to fix standard or maximum acceptable limit of the presence of these three pathogens in a given seed lot of the crop.

The present study has, therefore, been undertaken to determine the transmission of the three major fungal pathogens - *B. theobromae, C. corchori* and *M. phaseolina* from seed to plant and again to seed.

SUMMARY

Transmission of the three major seed-borne fungal pathogens of jute viz. *Botryodiplodia theobromae*, *Colletotrichum corchori* and *Macrophomina phaseolina* from seed to plant to seed was studied using a local variety 'Deshipat' in the Bangladesh Agricultural University (BAU) farm during 1989-90 growing season. Eight seed samples having different level of seed-borne infections of the three pathogens were included in the study. Observations were made on (i) initial seed-borne infection of the pathogens in the test seed samples, (ii) germination of seeds, (iii) disease development in the growing plants in the field raised from the infected seeds and (iv) seed-borne infection transmitted from infected seeds to the harvested seeds.

Germination of the test seed samples decreased with the increase of the total seed-borne infection of the test three fungal pathogens and this decrease was negatively correlated.

Higher seed-borne infection of both total and the individual pathogen caused significantly higher amount of disease development in the field. Total disease development combinedly caused by the three pathogens and the disease incurred in the field due to each of the individual pathogens were positively correlated with the seed-borne infection recorded in the harvested seed. The rate of transmission of the three pathogens from infected seeds to the growing plants and again to the harvested seeds of the same plants was relatively low.

From this limited field study, only some preliminary indication regarding the mode of transmission of the three selected seed-borne fungal pathogens from seed to plant to seed in jute has been obtained. Further, studies with more representative jute seed samples under different agro-ecological zones of the country as well as under controlled conditions in the greenhouse are suggested to draw final conclusion.