

## STUDY ON THE FIELD RESISTANCE TO *DRECHSLERA MAYDIS* NISIKADO CAUSING LEAF BLIGHT OF MAIZE

BY

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Ninetythree genotypes/varieties of maize were tested against leaf blight due to *Drechslera maydis* under field condition by the standard whorl inoculation method during the Kharif season ( summer/monsoon ) of 1985 and 1986. Fifteen genotypes, namely Pratap Composite Philippine DMR-Composite, Vikram, VL-16 Composite, Blanco Theobromina, Bracaticas (Y), Bracaticas (W), Composite A 53-54, Early White, EVA ( MDR-1 ) 76, EVA ( MDR-2 ) 76, EH 400175 X Hunius ( ZFS 2 ) Ru-80-3, MCU-204, MCU-314 and Philippine DMR-2 were found resistant. Thirtytwo genotypes were moderately resistant whereas twentyeight genotypes were moderately susceptible. All other genotypes were either susceptible or highly susceptible in disease reaction.

### INTRODUCTION

Leaf blight caused by *Drechslera maydis* Nisikado ( *Drechslera* state of *Cochliobolus heterostrophus* ) is one of the sixteen major diseases ( *Zea mays* Linn. ) in India which occurs in both tropical and temperate environments as delineated by Renfro and Ullstrup ( 1976 ). The disease is mainly prevalent in the north eastern plains and north western plains of India. It is also one of the major diseases of maize in the plains of West Bengal. It is also present in the hills of West Bengal. Under favourable condition the disease may cause appreciable damage to the standing crop causing loss in yield as well as in the crop value ( Payak and Sharma, 1978, 1985 ).

Among the various approaches of maize disease management the most appropriate one is considered to be host resistance in the Indian context. Adoption of this approach has yielded promising results for as many as 12 major diseases. But it may be pointed out that, so far, among the materials released by All India Coordinated Maize Improvement Project ( AICMIP ) and other private agencies, which are resistant to one disease, or one set of diseases, most turn out to be susceptible to another set of diseases under the diverse agro-ecosystems of India.

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Thus, for example, two composite varieties, namely Diara and Hunius recommended by AICMIP for the plains of West Bengal are showing progressive susceptibility to this disease. The present study was, therefore, undertaken to locate new sources of resistance to *D. maydis* from the available germplasm from India and other countries.

## MATERIALS AND METHODS

Ninety three genotypes/varieties of maize consisting of different hybrids and composites, originating in different countries of the world, were evaluated for resistance to leaf blight (*D. maydis*) at Maize Research Station, Bidhan Chandra Krishi Viswavidyalaya, Kalyani West Bengal during the *kharif* season (summer/monsoon) of 1985 and 1986. The germplasm was supplied by the Project Coordinator, AICMIP, IARI, New Delhi-12. The seeds were planted by the third week of June in plots of 2 rows of 5 meters length each containing 20 plants, with 2 replications. Normal agronomic practices were followed and no plant protection measure was undertaken during the entire crop season.

The standard whorl inoculation method by using fungal suspension as described by Sharma (1982) was followed to inoculate the standing plants of about 45 cm high. The inoculum was prepared by using a virulent isolate collected from the Maize Experimental Plots at Kalyani. The inoculation was repeated 3 times at weekly interval and the disease incidence was recorded 7 days after the final inoculation. The disease was rated visually on the basis of 1 (very slight to slight infection) to 5 (very heavy infection) scale as described elsewhere in details (Payak and Sharma, 1982). The scale consisted of five broad categories designated by different grades/index from 1 to 5. The measurement was based on the number of lesions present on a leaf and their subsequent spread. Thus all the

| Disease index | Intensity of infection                                                                                 | Category               |
|---------------|--------------------------------------------------------------------------------------------------------|------------------------|
| 1.0           | <i>Very slight to slight infection</i> , one or two to few scattered lesions on lower leaves.          | Resistant              |
| 2.0           | <i>Light infection</i> , moderate number of lesions on lower leaves only.                              | Moderately resistant   |
| 3.0           | <i>Moderate infection</i> , abundant lesions on lower leaves, few on upper leaves.                     | Moderately susceptible |
| 4.0           | <i>Heavy infection</i> , lesions abundant on lower and middle leaves, extending to upper leaves.       | Susceptible            |
| 5.0           | <i>Very heavy infection</i> , lesions abundant on almost all leaves, plants prematurely dry or killed. | Highly susceptible     |

plants in a variety were affixed with the particular disease index and the average disease index per plant was calculated. Finally the type of disease reaction in a variety was determined on the basis of disease index scale (1.0 to 5.0).

Only those varieties which showed resistant to moderately susceptible reaction were included for further testing in the next year and the remaining varieties showing susceptible to highly susceptible reaction were excluded.

## RESULTS AND DISCUSSION

The genotypes/varieties differed greatly in their reaction to this disease with the average grade ranging from resistant to highly susceptible (Table 1). Among the genotypes tested 15 genotypes, namely Pratap Composite (J-54), Philippine DMR-Composite, Vikram, VL-16 Composite, Blanco Theobromina, Bracaticas (Y),

Table 1. Reaction of different genotypes/varieties of maize to *Drechslera maydis*

| Reaction               | Genotype/Variety                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Resistant              | Pratap Composite (J-54), Philippine DMR-Composite, Vikram, VL-16 Composite, Blanco Theobromina, Bracaticas (Y), Bracaticas (W), Composite A53-54, Early white, EVA (MDR-1) 76, EVA (MDR-2) 76, EH 400175 x Hunius (ZFS <sub>2</sub> ) Ru-80-3, MCU-204, MCU-314, Philippine DMR-2.                                                                                                                                                                                                                             |
| Moderately resistant   | A-de-Cuba, Kishan, Navin Composite (D-74), NDL Composite, Philippine DMR-1, Super Composite, Safeda, Tarun, Vijay, Vasant-3, Composite A51-54, Cuba 11 J (Arr <sub>2</sub> ), CIMMYT bulk-5, Diara EV (IFS-3) x EH 400175, Ru 80-35, D-816, Philippine DMR-5, G-25, J305, J660, J2006, J3017, J3018, J <sub>1</sub> (Arr <sub>2</sub> ) KFS-3, J <sub>1</sub> (Arr <sub>2</sub> ) Original, Kmr-35, Kalyani Pool, M-9, MCU-78-2034, Prop 61, Sona recon II, U. K. bulk, VC 80 x (Eto x Tuxp br <sub>2</sub> ). |
| Moderately susceptible | Ageti, Auli-Auli (High alt. Comp), African Tall, Balanced Canadian Composite, Diara, Hunius, Virendra, Diara (ZFS-3), D-765, G-40, H-265, H-405, Hunius, x J603, Ru-80-3, J1006, J2017, L-16, L-19, MCU-216, MCU-501, NLD-DEP-106, P-6875, R-4, (Syn P200 x Kisan) x Hunius, U-27, (Syn P200 x Kisan) x Hunius U-42, VC-69, VC-80, VL-20, VL-42.                                                                                                                                                               |
| Susceptible            | MCU-78-1002, NLD (recon), Pool-7, (Syn P200 x Kisan) x Hunius U-37, Composite A52-53, Diara (MFS-4), D-823, H-251, Hunius (FS-8) F <sub>2</sub> F, J2018.                                                                                                                                                                                                                                                                                                                                                      |
| Highly susceptible     | Auli Composite, LG-66, MCU-507, MCU-508, MCU-78-1006, VL-41, VL-54, VL-71.                                                                                                                                                                                                                                                                                                                                                                                                                                     |

Bracaticas (W), Composite A53-54, Early white, EVA (MDR-1) 76, EVA (MDR-2) 76, EH 400175 x Hunius (ZFS<sub>2</sub>) Ru-80-3, MCU-204, MCU-314 and Philippine DMR-2 were resistant, while 32 genotypes, namely A-de-Cuba, Kisan, Navin Composite (D-74), NLD Composite, Philippine DMR-1, Super Composite, Safeda, Tarun, Vijay, Vasant-3, Composite A51-54, Cuba II J (Arr<sub>2</sub>), CIMMYT bulk-5, Diara EV (IFS-3) x EH 400175, Ru 80-35, D-816, Philippine DMR-5, G-25, J305, J660, J2006, J3017, J3018, J<sub>1</sub> (Arr<sub>2</sub>) KFS-3, J<sub>1</sub> (Arr<sub>2</sub>) original, Kmr.35, Kalyani Pool 1, M-9, MCU-78-2034, Pop-61, Sona recon II, U.K. bulk, VC x (Etox Tuxp. br<sub>2</sub>) were moderately resistant. Among the important genotypes, Ageti, Auli-Auli (High altitude Composite), African tall, Balanced Canadian Composites, Diara, Hunius, Virendra, D-765, G-40, MCU-216, MCU-5 1, VC-69, VC-80, VL-20 and VL-42 were moderately susceptible, whereas genotypes MCU-78-1002, NLD (recon), Pool-7, (Synp-200 x Kisan) x Hunius U-37, Composite A52-53, Diara (MFS-4), D-823, H-251, Hunius (QFS8) F<sub>2</sub>F and J2018 were susceptible and Auli Composite, LG-66, MCU-507, MCU-508, MCU-78-1006, VL-41, VL-54 and VL-71 were highly susceptible. Sharma (1982) also reported, high degree of resistance in Kisan, Philippine DMR-1, Philippine DMR-5, EVA (MDR-1) 76, EVA (MDR-2) 76 under artificial epiphytotic condition in the field for several years. But Kisan, Philippine DMR-1 and Philippine DMR-5 reported resistant were found moderately resistant in the present study. Further, 2 exotic varieties, namely African Tall and Balanced Canadian were observed moderately susceptible under Indian conditions. This may be attributed to the change of environment or the different race of the pathogen used for screening. The present study also indicates that there are different levels of resistance to *D. maydis* available in the maize germplasm. This might be due to presence of several genes in the maize genotypes which governed resistance to this disease. Pate and Harvey (1954) observed wide range in the disease reaction and the continuous nature of variation in maize to *D. maydis* and suggested that the resistance to *D. maydis* in maize has polygenic inheritance. Handoo (1969) in a study in India also reached at the similar conclusion. This resistance as observed in the present study can be further exploited by the breeders and pathologists for the development of new varieties.

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