SCREENING OF DIFFERENT MAIZE GENOTYPES TO CURVULARIA LEAF SPOT

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Abstract: A total of 55 genotypes of maize as listed below, were screened under field condition at ARS, Arabhavi. Each genotype was sown in a single row of 3 mt length with a spacing of 60 cm X 20 cm. The results revealed that, among 55 genotypes screened, none was found immune or highly resistant (CI 4), ten genotypes showed moderately susceptible reaction (KDMI 6, NAH 137, African Tall, MAH 974, MAH 957, GH 110204, KDMI 10, CM 111, GH 110145 and Pop corn), 25 genotypes were) and remaining 19 genotypes were found highly susceptible.

Keywords: Curvularia leaf spot, Maize genotypes, Screening

INTRODUCTION

Maize (Zea mays L.) is one of the most important cereal crops in the world and ranks high next to wheat and rice. It is grown throughout the world under a wide range of climatic conditions. Since pre-Hispanic time, it has been the basic food for the majority of the people in Mexico, Central America and Latin America. Maize was introduced to India from America at the beginning of 17th century. In addition to staple food for human being and quality feed for animals, it serves as a basic raw material as an ingredient to thousands of industrial products that includes starch, oil, protein, alcoholic beverages, food sweeteners, pharmaceutical, cosmetic, film, textile, gum, package and paper industries etc. In the last one decade, it has registered the highest growth rate among all food grains including wheat and rice because of newly emerging food habits as well as enhanced industrial requirements.

In India, maize is the third most important cereal crop after rice and wheat that serves as a source of raw material for developing hundreds of industrial products (Anon., 2007). Maize kernel contains about 77 per cent starch, two per cent sugar, nine per cent protein, two per cent ash on a water free basis, five per cent pentosan and five per cent oil. It has more than 1000 industrial uses and mainly used for production of starch due to its high starch content of 77 per cent. Maize seed oil contains the highest polyunsaturated fatty acids (PUFA), linoleic acid (61.99%) and it remains as liquid at fairly low temperature which is helpful in combating heart disease. Maize seed oil is also low in linolenic acid (0.7%) and contains a high level of natural flavor.

Maize is being plagued by an array of diseases which include the leaf spot of maize caused by C. lunata (Singh et al., 2002) exhibiting symptoms as small chlorotic spots which gradually expand into round or oval shaped lesion surrounded by a wide translucent straw yellow halo. A number of lesions can be connected leading to the formation of leaf necrosis. This cause significant damage to maize up to 60% due to great loss of photosynthetic area of the crop (Dia Hong-hai et al.,1995; Huang et al., 2004; Li-FuHua et al., 2006). This disease is an important seed and soil borne disease prevalent mostly in subtropical and tropical regions. Despite extensive damage caused by the pathogen, scanty literature is available. Keeping in view the destructive nature of the disease, the present investigation was under taken to screening of different maize genotypes against Curvularia leaf spot

MATERIALS AND METHODS

Screening of maize genotypes to Curvularia leaf spot

A total of 55 genotypes of maize as listed below, were screened under field condition at ARS, Arabhavi. Each genotype was sown in a single row of 3 mt length with a spacing of 60 cm X 20 cm. The inoculum of C. lunata was sprayed 20 days after sowing to create high disease pressure. The disease severity was recorded using 0-9 scale by (Mayee and Datar, 1986) randomly selecting five plants in each genotype. Based on their reaction genotypes were categorized into immune, resistant, moderately resistant, moderately susceptible, susceptible and highly susceptible.

Table 1. Details of Genotypes

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Germplasm</th>
<th>Pedigree</th>
<th>Origin</th>
<th>Sl. No</th>
<th>Germplasm</th>
<th>Pedigree</th>
<th>Origin</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ARYP 81</td>
<td>YP</td>
<td>AICMIP, Arabhavi</td>
<td>29.</td>
<td>ARYP 2</td>
<td>YP</td>
<td>AICMIP</td>
</tr>
</tbody>
</table>

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Where, YP = Yellow Pool

The severity of Curvularia leaf spot disease was recorded by using 0 - 9 scale of Mayee and Datar (1986).

### Scale:

<table>
<thead>
<tr>
<th>Rating value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No symptoms on the leaf.</td>
</tr>
<tr>
<td>1</td>
<td>Up to 1% of leaf area covered with leaf spots</td>
</tr>
<tr>
<td>3</td>
<td>1-10% of leaf area covered with leaf spots.</td>
</tr>
<tr>
<td>5</td>
<td>11-25% of leaf area covered with leaf spots.</td>
</tr>
<tr>
<td>7</td>
<td>26-50% of leaf area covered with leaf spots</td>
</tr>
<tr>
<td>9</td>
<td>More than 50% of leaf area covered with leaf spots</td>
</tr>
</tbody>
</table>

Further, these scales were converted to per cent disease index (PDI) using the formula given by Wheeler (1969).

\[
\text{Per cent disease index} = \frac{\text{Sum of the individual disease ratings}}{\text{Number of leaves assessed} \times \text{Maximum grade}} \times 100
\]
Table 2. Screening of maize genotypes against Curvularia leaf spot disease

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Disease grade</th>
<th>Disease reaction</th>
<th>Genotypes</th>
<th>No. of genotypes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>Immune</td>
<td>-</td>
<td>Nil</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>Resistant</td>
<td>-</td>
<td>Nil</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>Moderately Resistant</td>
<td>CI 4</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>Moderately susceptible</td>
<td>ARYP 81, ARYP 36, ARYP 64, ARYP 60, ARYP 6, ARYP 43, ARYP 28, ARYP 30, ARYP 68, ARYP 53, ARYP 76, ARYP 78, ARYP 47, ARYP 14, ARYP 2, NAH 1137, NAC 6004, GPMH 1111, GPMH 1101, GH 1043, DMH 100-3, BGMH 2, BGMH 1, CM 501 and CI 5</td>
<td>25</td>
</tr>
<tr>
<td>5</td>
<td>7</td>
<td>Susceptible</td>
<td>ARYP 83, ARYP 82, ARYP 33, ARYP 53, ARYP 47, ARYP 63, ARYP 74, ARYP 46, ARYP 24, ARYP 23, ARYP 39, ARYP 25, ARYP 79, ARYP 61, ARYP 33, NAH 2049, Thaipop, SKV 50 and NAC 6002</td>
<td>19</td>
</tr>
</tbody>
</table>

RESULTS AND DISCUSSION

Fifty five maize genotypes were screened during kharif 2014 against *C. lunata* under artificial epiphytotic condition in the field to identify the resistant sources as described in “Material and Methods” and the data are presented in Table 2. The results revealed that, among 55 genotypes screened, none was found immune or highly resistant, one was found moderately resistant (CI 4), ten genotypes showed moderately susceptible reaction (KDMI 6, NAH 137, African Tall, MAH 974, MAH 957, GH 110204, KDMI 10, CM 111, GH 110145 and Pop corn), 25 genotypes were susceptible (ARYP 81, ARYP 36, ARYP 64, ARYP 60, ARYP 6, ARYP 43, ARYP 28, ARYP 30, ARYP 68, ARYP 53, ARYP 76, ARYP 78, ARYP 47, ARYP 14, ARYP 2, NAH 1137, NAC 6004, GPMH 1111, GPMH 1101, GH 1043, DMH 100-3, BGMH 2, BGMH 1, CM 501 and CI 5) and remaining 19 genotypes were found highly susceptible (ARYP 83, ARYP 82, ARYP 33, ARYP 53, ARYP 47, ARYP 63, ARYP 74, ARYP 46, ARYP 24, ARYP 23, ARYP 39, ARYP 25, ARYP 79, ARYP 61, NAH 2049, Thaipop, SKV 50 and NAC 6002).

Management of the disease through host plants resistance has been the best choice in all crop improvement programmes. Utilization of resistant cultivars in farming system is the most simple, effective and economical method in the management of plant diseases. Besides this, these resistant cultivars conserve natural resources and reduce the cost, time and energy when compared to the other methods of disease management. In the present study 55 maize genotypes were screened under artificial epiphytotic field condition for resistance against Curvularia leaf spot. The study revealed that none of the genotypes were found to be immune or highly resistant and one genotype was show moderately resistant, ten genotype showed moderately susceptible, 25 were susceptible and remaining 19 were highly susceptible. Choudhary *et al.* (2011) evaluated 35 maize inbred lines against *C. lunata* and identified five lines viz., EI 460, EI 585, EI 582, EI 586-1 and LM 10 as resistant, six as moderately resistant, 14 as susceptible and remaining ten lines as highly susceptible. The screening of maize genotypes to different diseases at All India Coordinated Maize Improvement Project centers in India during kharif 2010 to 2012 has yielded 77 lines with resistant to moderately reaction one or more diseases. Two lines viz., WINPOP-3 and HKI 1040-5 have shown resistant against reaction to Curvularia leaf spot (Anon., 2013 and Anon., 2014). Thus the promising high yielding CLS resistant maize genotypes identified through this investigation can be deployed in disease endemic areas to aim for sustainable productivity or can be used in resistance breeding programme.
REFFERENCES


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