RESEARCH ARTICLE

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, 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) 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 third 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

Sl. No	Germplasm	Pedigree	Origin	Sl. No	Germplasm	Pedigree	Origin
1	ARYP 81	YP ⊗ 6 # 81	AICMIP, Arabhavi	29.	ARYP 2	YP⊗ 6 # 2	AICMIP,

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							Arabhavi
2	ARYP 83	YP ⊗ 6 # 83	AICMIP, Arabhavi	30.	KDMI 6		
3	ARYP 82	YP ⊗ 6 # 82	AICMIP, Arabhavi	31.	NAH 137		
4	ARYP 33	YP ⊗ 6 # 33	AICMIP, Arabhavi	32.	African Tall		
5	ARYP 53	YP ⊗ 6 # 53	AICMIP, Arabhavi	33.	MAH 974		
6	ARYP 36	YP ⊗ 6 # 36	AICMIP, Arabhavi	34.	MAH 957		
7	ARYP 64	YP ⊗ 6 # 64	AICMIP, Arabhavi	35.	NAH 1137		
8	ARYP 47	YP ⊗ 6 # 47	AICMIP, Arabhavi	36.	NAH 2049		
9	ARYP 63	YP ⊗ 6 # 63	AICMIP, Arabhavi	37.	Thaipop		
10	ARYP 60	YP ⊗ 6 # 60	AICMIP, Arabhavi	38.	SKV 50		
11	ARYP 74	YP ⊗ 6 # 74	AICMIP, Arabhavi	39.	Madhuri		
12	ARYP 46	YP ⊗ 6 # 46	AICMIP, Arabhavi	40.	NAC 6002		
13	ARYP 24	YP ⊗ 6 # 24	AICMIP, Arabhavi	41.	NAC 6004		
14	ARYP 6	YP ⊗ 6 # 6	AICMIP, Arabhavi	42.	GPMH 1111		
15	ARYP 43	YP ⊗ 6 # 43	AICMIP, Arabhavi	43.	GPMH 1101		
16	ARYP 28	YP ⊗ 6 # 28	AICMIP, Arabhavi	44.	GH 1043		
17	ARYP 30	YP ⊗ 6 # 30	AICMIP, Arabhavi	45.	DMH 100-3		
18	ARYP 68	YP ⊗ 6 # 68	AICMIP, Arabhavi	46.	BGMH 2		
19	ARYP 53	YP ⊗ 6 # 53	AICMIP, Arabhavi	47.	BGMH 1		
20	ARYP 23	YP ⊗ 6 # 23	AICMIP, Arabhavi	48.	GH 110204		
21	ARYP 76	YP ⊗ 6 # 76	AICMIP, Arabhavi	49.	GH 110145		
22	ARYP 39	YP ⊗ 6 # 39	AICMIP, Arabhavi	50.	CM 501		
23	ARYP 78	YP ⊗ 6 # 78	AICMIP, Arabhavi	51.	CI 4		CIMMYT, Mexico
24	ARYP 47	YP ⊗ 6 # 47	AICMIP, Arabhavi	52.	CI 5		
25	ARYP 25	YP ⊗ 6 # 25	AICMIP, Arabhavi	53.	KDMI 10		
26	ARYP 79	YP ⊗ 6 # 79	AICMIP, Arabhavi	54.	CM 111		DMR, Delhi
27	ARYP 14	YP ⊗ 6 # 14	AICMIP, Arabhavi	55.	Pop corn		
28	ARYP 61	YP ⊗ 6 # 61	AICMIP, Arabhavi				

Where, YP = Yellow Pool

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

Scale:

Rating value	Description
0 1 3 5 7 9	No symptoms on the leaf. Up to 1% of leaf area covered with leaf spots 1-10% of leaf area covered with leaf spots. 11-25% of leaf area covered with leaf spots. 26-50% of leaf area covered with leaf spots More than 50% of leaf area covered with leaf spots

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

$$\text{Per cent disease index (PDI)} = \frac{\text{Sum of the individual disease ratings}}{\text{Number of leaves assessed} \times \text{Maximum grade}} \times 100$$

Table 2. Screening of maize genotypes against Curvularia leaf spot disease

Sl. No	Disease grade	Disease reaction	Genotypes	No. of genotypes
1	0	Immune	-	Nil
2	1	Resistant	-	Nil
3	3	Moderately Resistant	CI 4	1
4	5	Moderately susceptible	KDMI 6, NAH 137, African Tall, MAH 974, MAH 957, GH 110204, KDMI 10, CM 111,GH 110145 and Pop corn	10
5	7	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	25
6	9	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, ARYP 33, NAH 2049, Thaipop, SKV 50 and NAC 6002	19

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 , NAC 6002 and Madhuri). 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

Anonymous (2007), *Annual Progress Report.* All India Coordinated Maize Improvement Project. Directorate of Maize Research, Indian Agricultural Research Institute, New Delhi : 5

Anonymous (2013), Project director review, Directorate of Maize Research, New Delhi : 10 -13

Anonymous (2014), *57th Annual maize workshop.* All India Coordinated Maize Improvement Project. Directorate of Maize Research, Indian Agricultural Research Institute, New Delhi : 34

Choudhary, O. P., Trivedi, A., Bunker, R. N. and Mathur, K. (2011), Factors affecting development of Curvularia leaf spot of maize (*Curvularia pallescens*) and its management. *Indian Phytopath.,* 64 (4): 371-373.

Dai Hong-hai, G. A. O Zeng-gui and Chen, J. (1995), The Research Program of Maize Curvularia Leaf Spot Disease. *J. Shenyang Agric. Univ. -03.*

Huang, J., Zheng, L. and Hsiang, T. (2004), First report of leaf spot caused by *Curvulariaverruculosa* on *Cynodon* sp. In Hubei, China. *Pl. Protec.* **54(2):** 253.

Li-FuHua, Ye-HuaZhi, Wang-YuTao and Xiong-Mian, P. (2006), Research progress for maize Curvularia leaf spot disease. *J. Maize Sci.* **12(2):** 97-101.

Mayee, C. D. and Datar, V. V. (1986), Phytopathometry, *Technical Bulletin-1 (Special Bulletin- 3). Marathwada Agric. Univ., Parbhani,* p.95.

Singh, A. K., Sinha, R. K. P. and Sinha, R. P. (2002), *Curvularia lunata*: a major pathogen for leaf blight of wheat in Bihar, India. *J. Appl. Biol.* **5:** 83-84.