

Original Research Article

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Screening of Pearl Millet (*Pennisetum glaucum*) Genotypes against Smut Caused by *Moesziomyces penicillariae* (Bref) Vanky

Annie Khanna*, Kushal Raj and Narender Singh

Department of Plant Pathology, College of Agriculture, Haryana Charan Singh Haryana Agricultural University, Hisar 125004, Haryana, India

*Corresponding author

ABSTRACT

Keywords

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Smut caused by *Moesziomyces penicillariae* is one of the major pearl millet diseases in India. In order to find out cost effective, economical and ecofriendly method to manage the disease attempts were made to identify the resistant sources of smut by germplasm screening. The field screening involved the artificial inoculation of the germplasm. Observations on smut severity were recorded 15-20 days after inoculation using smut severity (%) rating scale. Amongst 239 pearl millet genotypes comprising of initial varietal trial (IVT), advanced varietal trial (AVT) and final yield trial (FYT) were screened for their reaction to smut and identification of the resistant source against pearl millet smut. It was observed that 52 genotypes were completely free from smut, 93 genotypes showed less than 10 per cent smut severity, 66 genotypes showed 10-25 per cent smut severity and 27 genotypes showed more than 25 per cent smut severity.

Introduction

Pearl millet [*Pennisetum glaucum* (L.) R. Br.], also known as bajra, bajri etc is the important cereal crop for the population living in drought prone arid and semi arid regions of less developed countries in the world. Recent archaeobotanical research has confirmed the presence of domesticated pearl millet on the Sahel zone of northern Mali between 2500-2000 BC (Manning *et al.*, 2010). In India this crop is grown in the states of Haryana, Rajasthan, Madhya Pradesh, Andhra Pradesh, Tamil Nadu, Gujarat and Karnataka. Pearl millet is the major kharif crop of Haryana with area of 5.10 lakh ha and productivity is 1850

kg/ ha. Though the pearl millet yield is increased with the introduction of hybrids but it has become susceptible to many diseases. Amongst those smut is one of the major diseases in areas where pearl millet is cultivated. *Moesziomyces penicillariae* (*Tolyposporium penicillariae*), causes smut disease and has been observed in the pearl millet growing regions. Smut in pearl millet reduces the grain yield. Use of host plant resistance is one of the best measures for the integrated disease management. The present investigation was therefore undertaken to evaluate the pearl millet genotypes to find out resistance against smut.

Materials and Methods

During kharif, 2016 the experiment for screening was conducted with a total of 239 pearl millet genotypes with two replications in randomized block design (RBD), with row length of 5 meter. The test entries were sown on 16-07-2016 with row to row spacing of 50 cm and plant to plant distance of 10 cm in each row. For artificial screening fifteen earhead at boot leaf stage of each entry were randomly selected from each replication and were inoculated by aqueous sporidial suspension of *Moesziomyces penicillariae*. The sporidial suspension (10^6 sporidia/ml) was prepared by dipping the smut infected earheads in water for 24 hours so that spores germinate before inoculation. After inoculation of the earheads at boot leaf stage, the earheads were covered with a parchment paper bag and water was sprinkled regularly to maintain high humidity. The parchment paper bags were removed 15-20 days after inoculation and smut severity was recorded using smut severity (%) rating scale as given by Thakur and King (1988) (Fig. 1).

Results and Discussion

In order to manage the disease, incorporation of resistance in suitable genotype is the demand of current era as it is considered as the most economical method. In the present study, amongst 239 genotypes screened against smut of pearl millet, 52 genotypes were free from smut, 94 genotypes exhibited smut severity <10%, 66 genotypes showed smut severity 10-25 per cent and in remaining 27 genotypes smut severity was more than 25%. Thakur *et al.*, (1986) screened 1500 pearl millet accessions against *M. bullatus* for 1-6 years of multi location testing in India and West Africa and found that six germplasm accessions *viz.*, SSC FS 252-S-4, ICI 7517-S-1, ExB 132-2-S-5-2-DM-1, ExB 46-1-2-S-2, ExB 112-1-S-1-1 and P-489-S-3 and four newly developed, resistant, agronomically elite lines *viz.*, ICMPS 100-5-1, 900-9-3, 1600-24 and 2000-5-2 showed consistently high levels of resistance (Table 1-3).

Fig.1 Smut severity (%) rating scale as given by Thakur and King (1988)

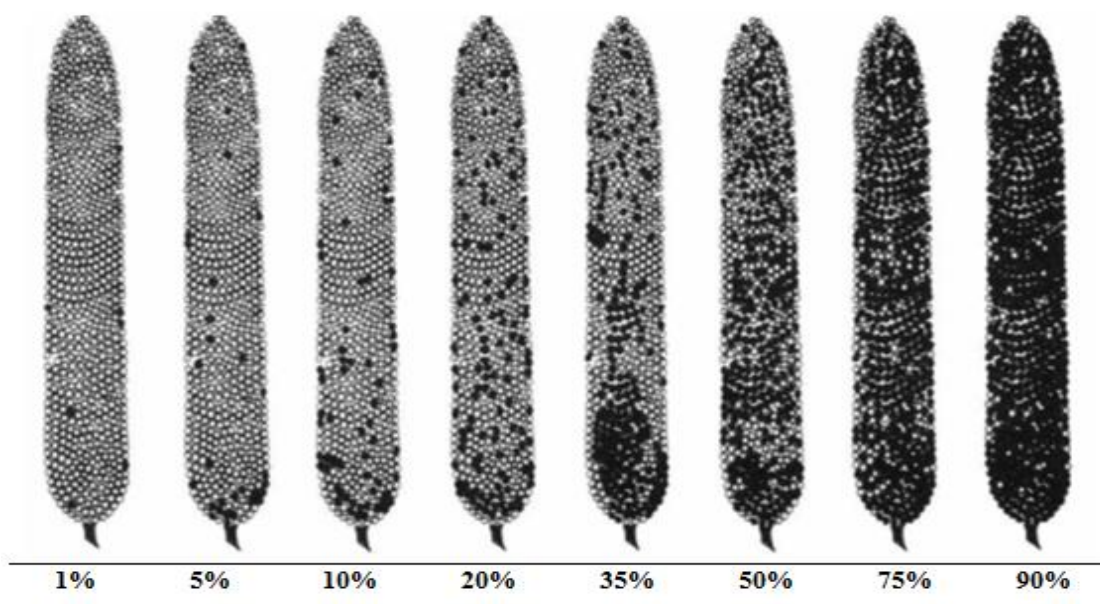


Table.1 Screening of pearl millet initial varietal trial (IVT) genotypes against smut caused by *Moesziomyces penicillariae*

Smut severity %	Genotype	Total number of genotypes
FREE	MH2187, MH2188, MH2189, MH2202, MH2215, MH2228, MH2231, MH2241, MH2242, MH2249, MH2256, MH2260, MH2263, MH2266, MH2268, MH2272, MH2273, MH2281, MH2285, MH2287, RHB177, KBH108, NBH5061, Kaveri Super Boss, RAJ171, ICMV 221	26
0-10	MH2190, MH2203, MH2211, MH2214, MH2216, MH2219, MH2223, MH2227, MH2233, MH2236, MH3337, MH2238, MH2239, MH2240, MH2245, MH2246, MH2247, MH2248, MH2250, MH2251, MH2252, MH2253, MH2254, MH2255, MH2257, MH2258, MH2259, MH2261, MH2264, MH2265, MH2267, MH2271, MH2276, MH2278, MH2279, MH2282, MH2283, MH2284, MH2288, MP574, MP575, MP577, MP579, MP580, MP581, 86M01, GH905, MPMH17, Pratap, NBH5767, PAC909, 86M86	52
10-25	MH2191, MH2192, MH2194, MH2195, MH2199, MH2201, MH2205, MH2208, MH2209, MH2212, MH2213, MH2217, MH2218, MH2220, MH2221, MH2222, MH2224, MH2226, MH2229, MH2230, MH2232, MH2234, MH2235, MH2243, MH2244, MH2262, MH2269, MH2274, MH2275, MH2277, MH2280, MH2286, MP576, MP578, MP-7792, JBV2, ICMV155	37
>25	MH2193, MH2196, MH2197, MH2198, MH2200, MH2204, MH2206, MH2207, MH2210, MH2225, MH2270, Dhanshakti, ICMH356, HHB67 Improved	14

Table.2 Screening of pearl millet advanced varietal trial (AVT) genotypes against smut caused by *Moesziomyces penicillariae*

Smut severity %	Genotype	Total number of genotypes
FREE	MH2035, MH2047, MH2078, MH2106, MH2129, MH2137, MH2151, MH2162, MH2172, MH2174, MP562, PRATAP, NBH5061, Kaveri Super Boss	14
0-10	MH1993, MH1996, MH2008, MH2010, MH2039, MH2053, MH2076, MH2087, MH2098, MH2099, MH2101, MH2107, MH2113, MH2130, MH2132, MH2149, MH2154, MH2155, MH2173, RHB177, HHB67 Improved, MPMH17, RHB173, NBH5767, PAC909, 86M86, 86M64, Pusa Composite 383, ICMV221, ICMV155	30
10-25	MH1998, MH2024, MH2072, MH2077, MH2082, MH2088, MH2097, MH2110, MH2114, MH2123, MH2134, MH2141, MH2147, MH2156, MH2180, MP570, GHB905, GHB744, KBH108, MP-7792, RAJ171, Dhanshakti	22
>25	MH2089, MH2118, MH2178, MH2179, MH2183, MH2185, MP 552, MP 571, ICMH 356, GHB 558	10

Table.3 Screening of pearl millet final yield trial (FYT) genotypes against smut caused by *Moesziomyces penicillariae*.

Smut severity %	Genotype	Total number of genotypes
FREE	HHB234, HHB 67 Improved, GHB905, MPMH17, RHB173, GHB558, MP-7792, Nandi 61, 86M88, Dhanshakti, Raj 171, JBV 2	12
0-10	HHB226, HHB197, HHB223, KBH108, GHB732, Kaveri Suoer Boss, NBH 5767, Pratap(MH 1642), NBH 5061, MBC 2, ICMV 155	11
10-25	GHB 538, 86M01, 86M86, Proagro 9444, PAC 909, Pusa Composite 383, ICMV 221	7
>25	RHB 177, GHB 744, 86M64	3

Pandya and Bartaria (2000) evaluated several pearl millet lines under artificial inoculation and identified ICMB 92888, ICMB 92777 and IP 19874 as a source of smut resistance. Choursia (2007) evaluated 138 entries against smut and observed that only one entry MH 1317 remained absolutely free from smut while nineteen entries were in the category of 5.1- 10 per cent smut severity and maximum severity was recorded in MH 1391. Based on screening of pearl millet entries against smut, the new hybrids are promoted for cultivation from time to time.

In conclusion, screening of pearl millet genotypes was done during *khariif* 2016, in IVT genotypes found free from smut were MH2187, MH2188, MH2189, MH2202, MH2215, MH2228, MH2231, MH2241, MH2242, MH2249, MH2256, MH2260, MH2263, MH2266, MH2268, MH2272, MH2273, MH2281, MH2285, MH2287, RHB177, KBH108, NBH5061, Kaveri Super Boss, RAJ171 and ICMV 221 whereas in AVT fourteen genotypes namely MH2035, MH2047, MH2078, MH2106, MH2129, MH2137, MH2151, MH2162, MH2172, MH2174, MP562, PRATAP, NBH5061, Kaveri Super Boss were free from smut. Amongst thirty three genotypes screened against smut in FYT eleven genotypes *viz.*,

HHB234, HHB 67 Improved, GHB905, MPMH17, RHB173, GHB558, MP-7792, Nandi 61, 86M88, Dhanshakti, Raj 171, JBV 2 were found resistant to smut. Thus, the resistant sources identified can be used for future breeding programme.

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