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# Evaluation of pearl millet hybrids and varieties against smut under artificial inoculation

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**Abstract**
Smut [(*Tolyposporium penicillariae*) Bref.] is one of the important biotic constraint in obtaining the optimum grain yield of many hybrids and varieties of pearl millet in northern region of Madhya-Pradesh. Forty promising and locally cultivated hybrids and varieties of pearl millet were evaluated under artificial inoculation at research found of college of agriculture, Gwalior during 2021-22 and 2022-23. During 2021-22 four cultivars *viz*., Kaveri super boss, MP-7792, Pratap and NBH 4903 were found completely free from smut, while the maximum smut severity (38.75%) was recorded in RHB-173 and GHB-732. In 2022-23 six cultivars *viz.*, PB 1705, Kaveri super boss, MP 7792, HHB 299. Pratap and NBH 4903 were found free from smut, while its maximum severity was recorded in Dhanshakti (34.60 %). On the basis of two years mean data, four cultivars Kaveri super boss, MP 7792, Pratap and NBH 4903 were found absolutely free from smut under artificial inoculation and these four were significantly superior over most of the tested cultivars except HHB 299 and PB 1705, while the maximum mean smut severity per cent was recorded in Dhanshakti (37.55%).

**Keywords:** Pearl millet, smut, smuts severity, resistant

## Introduction
Pearl millet [*Pennisetum glaucum* (L.) R. Br.] is one of the important cereal crop subsequent to rice, wheat, maize and sorghum. It is staple food for millions of people and widely grown in about 30 million ha in the arid and semi-arid tropical regions of Africa (>18 million ha) and Asia (>10 million ha) accounting for half of the global millet production. In India during 2021-22**,** It was grown in 6.70 million ha with 9.62 million ton and the productivity of 1436 kg/ha) (Anon.2022) [2]. In India, pearl millet is the fourth most widely cultivated food crop after rice, wheat and maize. It is used as a staple food for human consumption, as fodder and feed in livestock sector. It is also used in industries such as alcohol and fuel, starch and processed food sectors. Its grains are most commonly used in the form of chapattis and roti, as bhakri baked over a hot fire, pearl millet grains are also consumed after roasting them in hot sand. Other preparation include frying in deep fat and mixing with pulses, other cereals, crude sugar, butter milk, vegetable, spices, *etc*. Being a climate-resilient crop, pearl millet is very important in mitigating the adverse effects of climate change facilitating income and food security among farming communities of arid regions.
The crop is affected by number of diseases such as blast, downy mildew, smut, rust, and ergot *etc.* (Rachie and Majmudar, 1980) [4]; Singh *et al.* 1988) [2]. Smut caused by *Tolyposporium penicillariae* (Bref.) (Alexopoulos *et al*. 1988) [2] has become one of the major biotic constraints in the cultivation of many Pearl millet hybrids and varieties, in many parts of the county including northern resign of Madhya Pradesh. Therefore in the present study a set of forty hybrids and varieties were evaluated against smut under artificial inoculation during *kharif* 2021 and 2022.

## Methodology
A field experiment consisting of forty hybrids and varieties of pearl millet were evaluated against smut under artificial inoculation at research farm of college of agriculture, Gwalior during two consecutive *kharif* season i.e. during 2021 and 2022. The above experiment was conducted in randomized block design (RBD) having 4 m single row length with two replications. Five plants of each entry per replication were artificial inoculated with sporidial suspension of *Tolyposporium penicillariae* at boot leaf stage followed by covering the inoculated boot with labelled parchment selfing bag to create the humidity inside the bag which is required for smut infection. After twenty days of inoculation the bags were removed and the smut severity was recorded by using the smut severity rating scale 0- 100% assessment key as suggested by Thakur and King (1988a) [7].

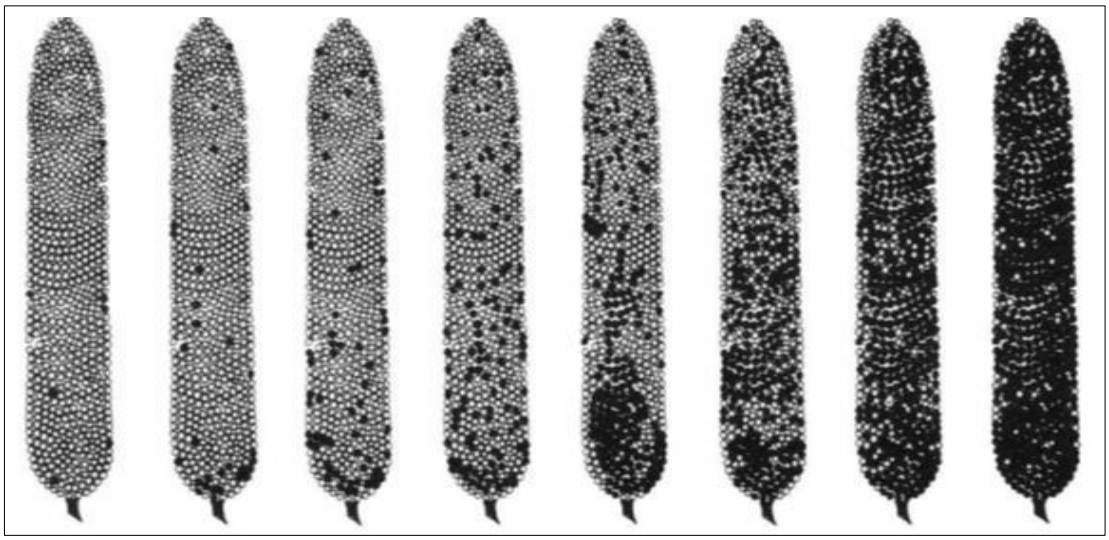


**Fig:** Smut severity rating scale

## Results and Discussion

The data summarized in the table reveals that the tested entries showed wide variation in respect of smut severity under artificial inoculation. During *kharif* season of 2021, four cultivar's *viz.*, Kaveri Super Boss, MP-7792, Pratap, and NBH 4903 were found completely free from smut. These four entries were significantly superior over rest of the entries except PB1705 (1.00%) which was statically at par. In respect of smut severity four, eighteen, thirteen and five cultivars are placed in the categories of highly resistant, resistant, moderate susceptible and susceptible reaction respectively.

During *Kharif* 2022, six cultivars *viz*., PB 1705, Kaveri Super Boss, MP-7792, HHB 299, Pratap and NBH 4903 where found completely free from smut. These entries were significantly superior to the rest of the entries but statistically at par with 86M86. Out of forty- six, fourteen, sixteen and four were categorized as highly resistant, resistant, moderate susceptible and susceptible reaction respectively against the disease.

The two years mean data summarized in the table reveal that four entries *viz.*, Kaveri Super Boss, MP-7792, Pratap and NBH 4903, were found completely free from smut and were significantly superior over 34 entries but were statically at par with the remaining two entries *viz*. PB1705 (0.50%) and HHB299 (1.25%). In respect of these reactions four entries *viz.*, Kaveri Super Boss, MP-7792, Pratap and NBH 4903 where placed in the category of highly resistant. Eighteen entries PB 1852, PB 1705, MPMH 17,GHB 744, KBH 108, 86M86, Proagro 9444, GHB 558, HHB 299, ICMV 221, Pusa Comp. 701,Pusa Comp.383, Raj 171, 86M64, Pusa Comp.612, ICMV 155,NBH-27 and Krishna Hybrid 7711 where places in the category of resistant. Thirteen entries *viz*., RHB 223, PB 1756, MPMH 21, GHB 719, HHB 67 Imp., GHB 538, GHB 905, AHB 1269, NBH 5767, ABV 04, PB 1720, JBV-3, and JBV-4, were placed in category as moderately susceptible, while the remaining five entries *viz*., AHB 1200, RHB 173, GHB 732, JBV-2 and Dhanshakti where found susceptible to smut under artificial inoculation.

Earlier several workers evaluated the hybrids/varieties against smut of pearl millet and reported variation among the entries in respect of smut severity. The present finding is also supported by the work of pandya *et al*. (2005) [3] evaluated promising pearl millet hybrids/varieties against smut under artificial inoculation and reported PB 106 as the source of smut resistant and also reported proagro 9444. Kaveri super boss was also found free against smut under artificial inoculation during the evaluation of hybrid and varieties. (Sharma, 2017) [5]

**Table:** Evaluation of released/promising pearl millet hybrids/varieties against smut during *Kharif* 2021 and 2022.

| S. No. | Entry | Smut Severity (%) | | |
|---|---|---|---|---|
| | | 2021 | 2022 | Mean |
| 1 | RHB 223 | 20.00 (26.57) | 12.50 (20.70) | 16.25 (23.77) |
| 2 | PB 1756 | 11.50 (19.82) | 9.75 (18.19) | 10.63 (19.02) |
| 3 | MPMH 21 | 25.00 (30.00) | 21.25 (27.45) | 23.13 (28.74) |
| 4 | GHB 719 | 20.00 (26.57) | 13.75 (21.77) | 16.88 (24.25) |
| 5 | HHB 67 Imp. | 20.00 (26.57) | 13.75 (21.77) | 16.88 (24.25) |
| 6 | GHB 538 | 25.00 (30.00) | 18.75 (25.66) | 21.88 (27.89) |
| 7 | PB 1852 | 10.00 (18.43) | 3.00 (9.97) | 6.50 (14.77) |
| 8 | PB 1705 | 1.00 (5.74) | 0.00 (0.00) | 0.50 (4.05) |
| 9 | MPMH 17 | 5.00 (12.92) | 2.50 (9.10) | 3.75 (11.17) |
| 10 | GHB 905 | 7.50 (15.89) | 14.00 (21.97) | 10.75 (19.14) |
| 11 | RHB 173 | 38.75 (38.50) | 16.25 (23.77) | 27.50 (31.63) |
| 12 | GHB 732 | 38.75 (38.50) | 23.75 (29.17) | 31.25 (33.99) |
| 13 | GHB 744 | 5.00 (12.92) | 5.00 (12.92) | 2.50 (9.10) |
| 14 | KBH 108 | 8.50 (16.95) | 2.50 (9.10) | 5.50 (13.56) |
| 15 | Kaveri Super Boss | 0.00 (0.00) | 0.00 (0.00) | 0.00 (0.00) |

| | | | | |
|---|---|---|---|---|
| 16 | 86M86 | 3.50 (10.78) | 1.50 (7.03) | 2.50 (9.10) |
| 17 | MP-7792 | 0.00 (0.00) | 0.00 (0.00) | 0.00 (0.00) |
| 18 | Proagro 9444 | 6.50 (14.77) | 5.00 (12.92) | 5.75 (13.87) |
| 19 | GHB 558 | 5.00 (12.92) | 13.75 (21.77) | 9.38 (17.83) |
| 20 | AHB 1269 | 18.75 (25.66) | 16.25 (23.77) | 17.50 (24.73) |
| 21 | HHB 299 | 2.50 (9.10) | 0.00 (0.00) | 1.25 (6.42) |
| 22 | AHB 1200 | 30.00 (33.21) | 21.25 (27.45) | 25.63 (30.41) |
| 23 | Dhanshakti | 40.50 (39.52) | 34.60 (36.03) | 37.55 (37.79) |
| 24 | ICMV 221 | 6.25 (14.48) | 12.5 (20.7) | 9.38 (17.83) |
| 25 | Pusa Comp.701 | 10.00 (18.43) | 5.00 (12.92) | 7.50 (15.89) |
| 26 | Pusa Comp.383 | 12.50 (20.70) | 6.00 (14.18) | 9.25 (17.71) |
| 27 | Raj 171 | 11.00 (19.37) | 6.50 (14.77) | 8.75 (17.21) |
| 28 | NBH 5767 | 13.75 (21.77) | 26.25 (30.82) | 20.00 (26.57) |
| 29 | Pratap | 0.00 (0.00) | 0.00 (0.00) | 0.00 (0.00) |
| 30 | NBH 4903 | 0.00 (0.00) | 0.00 (0.00) | 0.00 (0.00) |
| 31 | 86M64 | 4.00 (11.54) | 3.50 (10.78) | 3.75 (11.17) |
| 32 | Pusa Comp. 612 | 11.25 (19.6) | 3.00 (9.97) | 7.13 (15.48) |
| 33 | ABV 04 | 10.00 (18.43) | 12.50 (20.7) | 11.25 (19.6) |
| 34 | ICMV 155 | 5.00 (12.92) | 13.50 (21.56) | 9.25 (17.71) |
| 35 | PB 1720 | 17.50 (24.73) | 26.00 (30.66) | 21.75 (27.8) |
| 36 | NBH-27 | 6.80 (15.12) | 4.40 (12.11) | 5.60 (13.69) |
| 37 | Krishna Hybrid 7711 | 8.20 (16.64) | 8.80 (17.26) | 8.50 (16.95) |
| 38 | JBV-3 | 15.50 (23.18) | 12.00 (20.27) | 13.75 (21.77) |
| 39 | JBV-4 | 8.50 (16.95) | 15.00 (22.79) | 11.75 (20.05) |
| 40 | JBV-2 | 33.40 (35.30) | 29.50 (32.90) | 31.45 (34.11) |
| | S.Em | 2.863 | 2.326 | 2.741 |
| | C.D. | 8.22 | 6.678 | 7.87 |

The data given in parenthesis are angular transformed*

## Conclusion

Pearl millet hybrids Kaveri Super Boss, MP-7792, Pratap and NBH 4903, were found highly resistant against smut under artificial inoculation, hence may be cultivated in smut sensitive areas.

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