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## Field evaluation of sorghum genotypes for grain mold resistance

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### Abstract

Sorghum (*Sorghum bicolor* Linn. Moench) popularly known as Jowar, is the major cereal consumed in India and ranks fifth after wheat, rice, maize and pearl millet. A total of 35 sorghum genotypes were screened for their reaction against grain mold under field condition during 2018-19. Out of 35 genotypes screened, none of the genotype showed highly resistant reaction (Grade-1), 11 genotypes showed resistant reaction (Grade 2 and 3), 18 genotypes showed moderately resistant reaction (Grade 4 and 5), six genotypes showed susceptible reaction (Grade 6 and 7) and none of the genotypes showed highly susceptible reaction (Grade 8 and 9).

**Keywords:** Sorghum genotypes, grain mold, *Sorghum bicolor* Linn. Moench

### Introduction

Sorghum (*Sorghum bicolor* Linn. Moench) popularly known as Jowar, is the major cereal consumed in India and ranks fifth after wheat, rice, maize and pearl millet. The major sorghum cultivating states are Maharashtra, Karnataka, Rajasthan, Tamil Nadu and Andhra Pradesh. It is being grown in two seasons: *kharif* season as a rainfed crop while in *rabi* season under remaining soil moisture conditions. In Karnataka, it is cultivated on 10.90 lakh hectares of which 1.16 lakh hectares in *kharif* and 9.74 lakh hectares in *rabi* with production and productivity of 11.50 lakh tons and 1,052 kg ha<sup>-1</sup> respectively (Anon., 2017) [1]. Current commercial hybrids are bred for earliness so that they escape drought. However, maturity coincides with heavy rains and the grain gets infected by grain molds, which are caused by a complex of fungi, predominantly by *Fusarium moniliforme*, *Curvularia lunata*, *Fusarium semitectum*, and *Phoma sorghina* (Forbes *et al.*, 1992) [3].

Grain mold is a major disease of sorghum that affects grain production and quality. The disease is particularly important on improved, short and medium duration sorghum cultivars that mature during rainy season in humid, tropical and subtropical climates. Grain mold can be broadly defined as pre-physiological grain deterioration caused by several fungal species interacting pathogenically and or saprophytically with developing grain. Grain weathering on the other hand, is a post-physiological maturity problem when grain turn discolored and tissues are damaged by fungal colonization due to wet weather (Thakur *et al.*, 2007) [6]. Damage due to grain mold has been associated with losses in seed mass, grain density, seed germination, storage quality, food and feed processing quality and market value. Some of the mold fungi are producers of potent mycotoxin which is harmful to human and animal health, and productivity. With this background, present investigation was made to evaluate thirty-five genotypes for grain mold resistance under field conditions.

### Materials and Methods

A field experiment was conducted during *kharif* 2018 at Main Agricultural Research Station, Dharwad under natural epiphytotic conditions since the sufficient natural inocula of mold fungi were present during the previous rainy seasons over the years in sorghum fields. Test genotypes were sown during the first fortnight of July with a spacing of 45 cm × 15 cm with three replications. Data was recorded for disease reaction types and disease severity at physiological maturity on 1 to 9 scale (IIMR Hyderabad) as described below

**Table 1:** Disease severity (1-9 scale) against grain mold

Severity grade	Description (% grains molded on panicle)	Reaction category
1	0 to < 1	Highly resistant
2	1-5	Resistant
3	6-10	Resistant
4	11-20	Moderately resistant
5	21-30	Moderately resistant
6	31-40	Susceptible
7	41-50	Susceptible
8	51-75	Highly susceptible
9	>75	Highly susceptible

## Results and Discussion

The screening of 35 sorghum genotypes for their reaction against grain mold and the results revealed that, out of 35 genotypes screened none of the genotypes showed highly resistant reaction (Grade 1), 11 genotypes showed resistant reaction *viz.*, GM-8-18, GM-9-18, GM-32-18, GM-34-18, GM-4-18, GM-6-18, GM-16-18, GM-24-18, GM-25-18, GM-28-18 and GM-33-18 (Grade 2 and 3), 18 genotypes showed moderately resistant reaction *viz.*, GM-5-18, GM-7-18, GM-13-18, GM-15-18, GM-17-18, GM-27-18, GM-29-18, GM-31-18, GM-35-18, GM-1-18, GM-3-18, GM-10-18, GM-11-18, GM-12-18, GM-19-18, GM-20-18, GM-23-18 and GM-30-18 (Grade 4 and 5), six genotypes showed susceptible reaction *viz.*, GM-14-18, GM-21-18, GM-22-18, GM-26-18, GM-2-18 and GM-18-18 (Grade 6 and 7) and none of the

genotypes showed highly susceptible disease reaction (Grade 8 and 9) (Table 2 and Table 3).

The results are similar to the findings of Singh *et al.*, (1995) [5] who identified IS 7173, IS 7326, IS 8614, IS 21599, IS 5292 and IS 14388 as resistant lines whereas SPV 104 as susceptible line for grain mold. Resistance has been found mostly in coloured grain sorghums with and without tannins and also in very few white grain sorghums (Audilakshmi *et al.*, 2000) [2]. However, the level of resistance is invariably more in coloured grain genotypes with tannins, followed by coloured grain genotypes without tannin and much less in white and har grain sorghums (Reddy *et al.*, 2000) [2, 4]. Thus, we can utilize the resistance lines for breeding programme against grain mold pathogens.

**Table 2:** EDPV (Evaluation of derivatives of population) Trial Field Grade for grain mold, *Kharif* 2018

Sl. No.	Genotype	RI	RII	RIII	Mean
1.	GM-1-18	8	2	5	5.00
2.	GM-2-18	6	8	7	7.00
3.	GM-3-18	4	8	2	4.70
4.	GM-4-18	3	3	2	2.70
5.	GM-5-18	2	5	6	4.33
6.	GM-6-18	3	2	4	3.00
7.	GM-7-18	7	1	4	4.00
8.	GM-8-18	2	1	3	2.00
9.	GM-9-18	2	2	2	2.00
10.	GM-10-18	6	6	3	5.00
11.	GM-11-18	5	7	2	4.70
12.	GM-12-18	2	5	8	5.00
13.	GM-13-18	5	2	4	3.70
14.	GM-14-18	8	4	6	6.00
15.	GM-15-18	3	8	2	4.33
16.	GM-16-18	3	3	3	3.00
17.	GM-17-18	6	4	3	4.33
18.	GM-18-18	5	8	8	7.00
19.	GM-19-18	4	4	3	5.00
20.	GM-20-18	2	8	4	4.70
21.	GM-21-18	8	6	4	6.00
22.	GM-22-18	8	7	4	6.33
23.	GM-23-18	3	5	3	4.70
24.	GM-24-18	2	3	4	3.00
25.	GM-25-18	3	3	2	2.70
26.	GM-26-18	5	8	4	5.70
27.	GM-27-18	3	7	2	4.00
28.	GM-28-18	2	5	2	3.00
29.	GM-29-18	2	8	3	4.33
30.	GM-30-18	6	7	3	5.33
31.	GM-31-18	4	5	3	4.00
32.	GM-32-18	3	2	2	2.33
33.	GM-33-18	2	3	5	3.33
34.	GM-34-18	1	2	3	2.00
35.	GM-35-18	6	4	2	4.00

**Table 3:** Disease reaction of genotypes to grain mold (PGS)

Severity grade	Genotypes	Disease reaction	No.
1	Nil	Highly resistant	0
2	GM-8-18, GM-9-18, GM-32-18 and GM-34-18	Resistant	4
3	GM-4-18, GM-6-18, GM-16-18, GM-24-18, GM-25-18, GM-28-18 and GM-33-18	Resistant	7
4	GM-5-18, GM-7-18, GM-13-18, GM-15-18, GM-17-18, GM-27-18, GM-29-18, GM-31-18 and GM-35-18	Moderately resistant	9
5	GM-1-18, GM-3-18, GM-10-18, GM-11-18, GM-12-18, GM-19-18, GM-20-18, GM-23-18 and GM-30-18	Moderately resistant	9
6	GM-14-18, GM-21-18, GM-22-18 and GM-26-18	Susceptible	4
7	GM-2-18 and GM-18-18	Susceptible	2
8	Nil	Highly susceptible	0
9	Nil	Highly susceptible	0
	Total		35

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