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Field evaluation of sorghum genotypes against charcoal rot caused by *Macrophomina phaseolina* (Tassi) Goid.

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Abstract

Twenty-seven genotypes were screened for charcoal rot resistance in the sick plot during *rabi* 2018-19. The results of the study indicated that the genotypes E 36-1 (11.00), followed by SPV 2652 (12.00), SPH 1931, SPV 2468, SPV 2646 and SPV 2647 (13.00) showed minimum charcoal rot index compared to other genotypes. Highest charcoal rot index was recorded in CSH 15R and SPV 2638 (27.00) followed by SPH 1897 (21.00). Out of twenty-seven genotypes screened twenty-five genotypes showed moderately resistant reaction and remaining two genotypes showed susceptible disease reaction.

Keywords: Sorghum, charcoal rot, *Macrophomina phaseolina*

Introduction

Sorghum bicolor (L.) Moench commonly known as "Jowar" is one of the most important millets of India belonging to the family "Poaceae". 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^{-1} respectively (Anon., 2017) [2].

Charcoal rot caused by *Macrophomina phaseolina* (Tassi) Goid. is major disease among biotic stresses in post rainy season and it cause major losses in grain and fodder yield. In India, almost all the cultivated hybrids and varieties are susceptible to charcoal rot (Jahagirdar, 2007) [6]. The indirect loss computed due to this disease alone amounts to 40 per cent (Hiremath and Palakshappa, 1994) [5]. Patil (1980) [8] reported that loss in grain yield was more in *rabi*(40.83%) than in *kharif*(17.69%). With this background, present investigation was made to screen twenty-seven genotypes for charcoal rot resistance.

Materials and methods

A field experiment was conducted at Main Agricultural Research Station, Dharwad in sick plot conditions during *rabi* 2018-19. Test genotypes were sown during the second fortnight of October with a spacing of 45 cm × 15 cm with three replications. The susceptible check, CSV 8R was sown after two test entries. Observations on charcoal rot incidence, mean length of spread (cm), mean number of nodes crossed and charcoal rot index (CRI) were recorded for screening purpose. Charcoal rot percentage and mean length of spread of lesion were used for estimation of charcoal rot index (CRI) using the formula (CRI = CRP × 0.4 + MLS × 0.6). Disease reaction of each genotype was determined following the CRI scales (Das *et al*., 2018) [4].

CRI Value	Disease Reaction
≤ 5	Highly Resistant
6 – 10	Resistant
11 – 25	Moderately resistant
26 – 40	Susceptible
> 40	Highly susceptible

Results and Discussion

The results indicated that, charcoal rot index was least in E 36-1 (11.00) followed bySPV 2652 (12.00), SPH 1931, SPV 2468, SPV 2646 and SPV 2647 (13.00). Highest charcoal rot index was recorded in SPV 2638 and CSH 15R (27.00) followed by SPH 1897 (21.00) (Table 1).

Out of twenty-seven genotypes screened against charcoal rot incidence in sick plot, none of the genotype showed highly resistant reaction and resistant reaction. Twenty-five genotypes showed moderately resistant reaction. Two genotypes showed susceptible disease reaction. None of the genotype showed highly susceptible reaction (Table 2).

The results of the field evaluation of genotypes were in accordance with studies made by Virupaksha Prabhu *et al*., (2012) [9] who reported that the genotypes Dagadi Solapur (12.35%) followed by GRS 1 (13.15%) and BCR 9 (14.25%) showed less charcoal rot incidence compared to other genotypes. CSV 8R genotype recorded higher disease incidence (56.10%). Anahosur and Naik (1985) [1] reported that susceptible genotypes possess less sugar content compared to resistant genotypes. Similarly, Nalawade *et al*., (2008) [7] reported that resistant genotypes have more amount of sugar and phenolic compounds which confer resistant against the pathogen. In this present study, this may be the reason for genotypes showing resistant and susceptible disease reaction. Thus, from the results it is clear that employment of newer resistance sources particularly E 36-1 and SPV 2652 have shown resistance to charcoal rot over the years and can be effectively employed in resistance breeding programme against charcoal rot in sorghum.

Table 1: Field evaluation of sorghum genotypes against charcoal rot of sorghum

Sl. No.	Genotype name	Charcoal rot index
1.	SPH 1869	15
2.	SPH 1897	21
3.	SPH 1931	13
4.	SPV 2468	13
5.	SPV 2635	17
6.	SPV 2636	17
7.	SPV 2637	15
8.	SPV 2638	27
9.	SPV 2639	14
10.	SPV 2640	16
11.	SPV 2641	17
12.	SPV 2642	18
13.	SPV 2643	14
14.	SPV 2644	16
15.	SPV 2645	19
16.	SPV 2646	13
17.	SPV 2647	13
18.	SPV 2648	15
19.	SPV 2649	14
20.	SPV 2650	15
21.	SPV 2651	14
22.	SPV 2652	12
23.	CSH 13R	18
24.	CSH 15R	27
25.	CSV 22R	19
26.	CSV 29R	15
27.	E 36 1	11

Table 2: Reaction of sorghum genotypes to charcoal rot

CRI value	Genotypes	Disease reaction
< 5	Nil	Highly resistant
5-10	Nil	Resistant
11-25	SPH 1869, SPH 1897, SPH 1931, SPV 2468, SPV 2635, SPV 2636, SPV 2637, SPV 2639, SPV 2640, SPV 2641, SPV 2642, SPV 2643, SPV 2644, SPV 2645, SPV 2646, SPV 2647, SPV 2648, SPV 2649, SPV 2650, SPV 2651, SPV 2652, CSH 13R, CSV 22R, CSV 29R and E 36-1	Moderately resistant
26-40	SPV 2638 and CSH 15R	Susceptible
> 40	Nil	Highly susceptible

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