

## FIELD SCREENING OF LOCAL GENOTYPES AGAINST CHARCOAL ROT OF SORGHUM CAUSED BY *MACROPHOMINA PHASEOLINA* (TASSI) GOID

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### ABSTRACT

Twelve local genotypes were screened for charcoal rot resistance in the sick plot during 1998-99 and 1999-2000. The results of the study indicated that the local genotypes Honnutagi local (17.9%), Kannoli local (20.3%), Muddebihal local (21.1%) and Barsi Prakash (24.1%) followed by disease incidence were found superior to popularly grown variety M 35-1 (41.2%). The study also revealed that the local genotypes recorded reduced levels of other charcoal rot parameters such as per cent lodging due to charcoal rot (% soft stalk), MLS and MNC. The local genotypes also possessed desired breeding traits such as delayed senescence and stay green type could be employed in resistance breeding programme for *rabi* sorghum.

Sorghum (*Sorghum bicolor* Linn.) Moench has occupied an area of 15.1 mha with a production of 11.85 mt in India (Hosmani and Chitapur, 1997). The area under both *kharif* and *rabi*, has shown dynamic progression for the last few years. However, the productivity per unit area has increased considerably. *Rabi* sorghum area is mainly covered by states of Maharashtra, Karnataka, Tamil Nadu and Gujarat. The hunt for new varieties and hybrids with better productivity and resistance is a continuous process in crop improvement. The poor yield level is often reflected by the increased susceptibility to pests and diseases. Charcoal rot, leaf blight and rust have become major production constraints in *rabi* sorghum. The indirect loss computed due to charcoal rot alone amounts to 40 per cent (Anahosur and Rao, 1997). The most feasible and cost effective approach in charcoal rot management is the identification of new resistant sources. In this set up, present investigation was made to collect and screen local genotypes for charcoal rot resistance with good agronomic background.

Twelve local genotypes including checks were screened under sick plot conditions of Regional Research Station, Bijapur during *rabi* 1998-99 and 1999-2000. The experiment was designed in medium deep black

soil with three replications having 4.0 x 1.2 m<sup>2</sup> plots and a spacing of 60 x 30 cm. The plots were fertilized at 60:30:30 kg NPK per ha. The sowing was taken up on 30.9.98 and 17.10.99. Observations were recorded at physiological maturity on charcoal rot (%), lodging % due to charcoal rot (% soft stalk), Mean nodes crossed (MNC no.) and mean length of spread (MLS in cm) by the pathogen. All per cent values were converted to angular transformations.

The data recorded on various charcoal rot parameters for different local genotypes during 1998-1999 and 1999-2000 are presented in Table 1.

During 1998, the local genotypes like Honnutagi local (16.1%), Kannoli local and Muddehalli jola respectively and superior to M 35-1 (21.4 cm). The mean number of nodes crossed (MNC) was 1.7 and 1.9 in Bidar local and Kannoli local respectively when compared to M 35-1 (1.7) and CSH-15R (1.9).

During 1999, the minimum charcoal rot incidence of 19.8, 22.8 and 24.3 was recorded on Honnutagi local, Sel-3 and Kannoli local respectively and found significantly superior to check M 35-1 (39.1%). The MLS was 19.1 and 19.5 in Honnutagi local and Sel 3 respectively when compared to local checks

**Table 1a.** Evaluation of local genotypes against charcoal rot of sorghum

S. No.	Entry	Charcoal rot (%)			Lodging due to charcoal rot		
		1998	1999	Avg.	1998	1999	Avg.
1.	Honnutagi local	16.0 (23.6)*	19.8 (26.5)	17.9 (25.0)	20.8 (27.1)	18.7 (25.6)	19.7 (26.3)
2.	Kannoli local	16.3 (23.8)	24.3 (29.5)	20.3 (31.9)	22.6 (28.4)	26.1 (30.7)	24.4 (29.6)
3.	Muddehalli local	16.3 (32.5)	27.1 (31.4)	28.0 (31.9)	29.4 (32.7)	24.3 (29.5)	26.8 (31.2)
4.	Sel-3	22.9 (28.5)	22.8 (28.6)	22.8 (28.5)	27.2(31.4)	29.9 (33.1)	28.5 (32.3)
5.	Phool mallige	31.7(34.3)	30.1 (33.2)	30.9 (33.7)	19.0 (25.8)	28.6 (32.3)	23.8 (29.2)
6.	Bidar local	29.1 (32.6)	30.6 (33.6)	29.8 (33.1)	35.3 (36.4)	23.8 (29.2)	29.5 (32.9)
7.	Muddebihal local	16.1 (23.6)	26.1 (30.7)	21.1 (27.3)	25.2 (30.1)	29.4 (32.8)	27.3 (31.5)
8.	Barsi prakash	19.9 (26.5)	28.3 (32.1)	24.1 (29.4)	31.7 (34.3)	28.4 (32.2)	30.1 (33.3)
9.	M 35-1	43.4 (41.2)	39.1 (38.7)	41.2 (39.9)	38.8 (38.5)	32.3 (34.5)	35.5 (36.6)
10.	GRS-1	14.8 (22.6)	17.4 (24.6)	16.1 (23.6)	7.3 (15.7)	10.3 (18.7)	8.8 (17.3)
11.	9-13	18.1 (25.2)	19.4 (26.1)	18.7 (25.6)	5.4 (13.4)	4.1 (11.7)	4.8 (12.6)
12.	CHR 15 R	25.3 (30.2)	32.4 (34.7)	29.3 (32.7)	20.3 (26.8)	31.9 (34.4)	26.1 (30.7)
	Sem±	1.22	1.84		1.39	0.43	
	CD (5%)	3.49	5.62		4.32	1.33	
	CV (9%)	5.52	8.55		6.93	12.11	

\* Parenthesis values are arcsine transformed values.

**Table 1b.** Evaluation of local genotypes against charcoal rot of sorghum

S. No	Entry	MLS (cm)			MNC (cm)			Senescence grade (0-4)		
		1998	1999	Avg.	1998	1999	Avg.	1998	1999	Avg.
1.	Honnutagi local	19.4	19.1	19.3	2.1	2.3	2.2	2.0	1.5	1.7
2.	Kannoli local	19.2	21.2	20.2	1.9	2.8	2.3	2.0	1.7	1.8
3.	Muddehalli local	21.3	25.1	23.2	2.1	1.5	1.8	1.5	1.2	1.8
4.	Sel-3	25.7	19.5	22.6	2.4	2.1	2.2	1.5	1.3	1.8
5.	Phool mallige	25.5	26.3	25.9	2.1	2.4	2.2	1.5	1.4	1.9
6.	Bidar local	21.6	28.6	25.1	1.7	2.0	1.8	1.5	1.7	2.1
7.	Muddebihal local	23.7	22.6	23.2	2.1	2.4	2.2	1.0	1.2	1.1
8.	Barsi prakash	25.5	21.4	23.4	2.2	2.1	2.1	2.0	2.1	2.1
9.	M 35-1	21.4	28.9	25.2	1.7	2.9	2.3	2.5	2.7	2.6
10.	GRS-1	16.5	15.7	16.1	1.6	1.0	1.3	1.5	1.6	1.5
11.	9-13	15.1	18.3	16.7	1.5	1.2	1.3	2.0	1.5	1.7
12.	CHR 15 R	27.1	23.5	25.3	1.9	2.1	2.0	2.5	2.8	2.6
	Sem±	0.83	3.69		0.08	0.24				
	CD (5%)	2.64	NS		0.27	0.73				
	CV (9%)	5.5	25		6.37	16.3				

\* Parenthesis values are arcsine transformed values.

GRS-1 (15.7 cm) and 9-13 (18.3 cm) and popular check M-35-1 (28.9 cm). The MNC was 1.5, 2.0, 2.1 and 2.1 in Muddehalli jola, Bidar local, Sel3 and Barasi Prakash when compared to M 35-1 (2.9). The mean charcoal rot incidence (average of 1998 and 1999) was 17.9, 20.3 and 21.1 per cent incidence in Honnutagi local, Kannoli local and Muddebihal local respectively. However, the

maximum incidence (41.2%) was recorded in M 35-1. The average soft-stalk per cent was minimum in Honnutagi local (19.7%), Kannoli local (24.4%) and Phool-mallige (23.8%), when compared to maximum M 35-1 (35.5%). The local genotypes were on par with local checks and superior to popular check M 35-1.

^The average minimum MLS was 19.3, 20.2 and 22.6 cm in Honnutagi local, Kannoli

local and Sel-3 when compared to M 35-1 (25.2 cm): The local genotypes Honnutagi local, Kannoli local, Barsi Prakash and Bidar local also performed better over M 35-1 in average mean number of nodes crossed (Table 1).

The average senescence grade was minimum in Muddebihal local (1.1), Honnutagi local (1.7) when compared to M 35-1 (2.6) and CSH 15R (2.6). Several workers reported resistant sources in parental lines/varieties against charcoal rot (Anaso, 1995; Hiremath and Palakshappa, 1991; Desai, 1988). However, the present study identified in local genotypes such as Honnutagi local, Kannoli local, Muddehalli local and Muddebihal jola as resistant sources against charcoal rot disease. Non-senescence expressed as in the form of slow

drying at physiological maturity is an indicator of level of charcoal rot tolerance.

Bramel-Cox and Claffin (1990) suggested that improvement in charcoal rot resistance and breeding is largely dependent in identification of sources with delayed senescence and stay greentype. The local genotypes in the present study possessed both the characters. Padagaonkar and Mayee (1990) were of the opinion that genotypes with low stem water depletion rate will tolerate infections from *Macrophomina phaseolina*. Thus, from the results it is clear that employment of newer resistance sources like local genotypes can be effectively employed in resistance breeding programme against charcoal rot in sorghum.

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