

Reaction of Rabi Sorghum Genotypes to Rust Downy Mildew and Charcoal Rot Diseases

Charcoal-rot of sorghum caused by *Macrophomina phaseolina* (Tassi) Gold. rust caused by *Puccinia purpurea* Cooke and rare occurrence of downy mildew caused by *Perenosclerospora sorghi* (Weston and Uppal) Shaw are the diseases of rabi sorghum in zone 8 of Karnataka. The charcoal rot is widely spread in India in the states of Karnataka, Maharashtra, Andhra Pradesh and Gujarat (Subramanian, 1994). The rust is another severe disease followed by very rare occurrence of sorghum downy mildew under favourable unusual climate conditions prevailed in transitional tract of Dharwad. All three diseases were noticed during the year rabi 2001 causing significant reduction in yield which needs attention of pathologists to search for resistant sources to combat the disease more economically. Hence an attempt was made to search for resistant sources for the diseases of rabi sorghum.

The sorghum genotypes contributed from different locations based on evaluation over seasons and locations in India were pooled under All India Nursery by National Research Centre for Sorghum (NRCS), Hyderabad were evaluated against charcoal rot, rust and sorghum downy mildew in sick soil. The sowing was done during second week of October with 2 rows of 5 mtr length in Randomized block design (RBD) with two replications. Because of the favourable weather, downy mildew was noticed and systemic infection was recorded. The rust was graded at Physiological maturity using 1-5 scale as recommended by AICSIP. The charcoal-rot was recorded at Physiological maturity of the grain for lodging per cent, Mean number of nodes crossed and length of spread by the pathogen by splitting 10 randomly selected plants in each genotypes. After transformation the data were analysed statistically.

The results from the table revealed that majority entries showed susceptible to rust. The sorghum downy mildew ranged from 0 to 14.21 per cent systemic infection. CRP36, 30 and 44 recorded 14.21, 10.47 and 9.56 per cent systemic infection, respectively and remaining genotypes showed <10.0 per cent systemic infection except CRP-41 which has recorded 0 per cent SDM.

The lodging due to charcoal-rot was ranged from 4.65 to 47.17 and 3.98 to 35.00 per cent during 2000 and 2001 respectively. Among the genotypes evaluated CRP-3 showed superiority over other genotypes in both the years and recorded 4.65 and 3.98 per cent lodging, 0.0 and 0.25 nodes crossed and 5.90 and 9.30 cm mean length of spread consistently. The other genotypes viz., CRP-43, 41, 38 and 44 were also recorded <10 per cent lodging and found promising for all parameters studied consistently in both the years of study. However the genotypes CRP-30, 37, 42 and 7 were found towards susceptibility to charcoal-rot. The lower incidence of charcoal-rot during the year 2001 is due to heavy rains upto 40 days after sowing and systemic infection of sorghum downy mildew. Padagoankar and Mayee (1990) suggested that genotypes with low stem water depletion rate will tolerate the attack by *M. phaseolina* Desai 1998 reported that the genotypes CRP-3, 4, 5, 6, 7, 8, 9, 11, 12, 14, 15, 16, 17, 19, 20, 22, 23, 24, 25 and 26 possess charcoal rot tolerance with significantly higher grain yield performance by only few entries viz., CRP 3, 5, 6, 12, 19 and 23 as compared to susceptible check SPV 86.

Jamadar *et al.*, 2000 reported IS 2243, 18671, 2550 and 33756 highly resistant. The present study clearly showed that the genotypes CRP-3, CRP-43 CRP-41 CRP-41 CRP-38 and CRP-44 were found promising for charcoal rot and can be utilized in the breeding for disease resistance.

Table 1. Reaction of rabi sorghum genotypes to rust, Downey mildew and charcoal rot

| Sl. No. | Genotype | Rust | DM | Mean lodging % | | Mean of nodes | | Mean length of spread (cm) | |
|---------|-----------|------|-----------------|-------------------|------------------|----------------|-----------------|----------------------------|-------|
| | | | % | due to CR | | crossed | | | |
| | | 2000 | 2001 | 2000 | 2001 | 2000 | 2001 | 2000 | 2001 |
| 1 | CRP-3 | 4 | 5.00 (2.15) | 4.65 (12.45)** | 3.98 (11.27) | 0.0 (1.00)* | 0.25 (1.11)* | 5.90 | 9.30 |
| 2 | CRP-7 | 4 | 4.95 (2.31) | 23.70 (28.93) | 6.42 (14.64) | 0.32 (1.14) | 1.02 (1.42) | 14.07 | 19.92 |
| 3 | CRP-17 | 4 | 5.33 (2.51) | 15.77 (23.27) | 6.62 (14.90) | 0.60 (1.26) | 0.25 (1.11) | 15.30 | 12.90 |
| 4 | CRP-30 | 5 | 10.47 (3.37) | 38.84 (38.47) | 7.44 (15.72) | 0.62 (1.27) | 0.05 (1.02) | 13.62 | 6.10 |
| 5 | CRP-36 | 5 | 14.21 (3.88) | 14.70 (22.53) | 6.51 (14.75) | 0.85 (1.35) | 0.30 (1.14) | 19.15 | 14.30 |
| 6 | CRP-37 | 5 | 7.54 (3.46) | 23.80 (29.08) | 11.69 (19.44) | 1.07 (1.43) | 0.30 (1.14) | 15.90 | 12.55 |
| 7 | CRP-38 | 5 | 6.26 (2.57) | 10.59 (18.92) | 7.82 (16.21) | 0.00 (1.00) | 0.05 (1.02) | 7.27 | 7.20 |
| 8 | CRP-39 | 4 | 7.33 (2.85) | 16.59 (24.02) | 8.22 (16.60) | 0.20 (1.09) | 0.20 (1.09) | 12.70 | 8.90 |
| 9 | CRP-40 | 4 | 2.77 (1.94) | 25.64 (30.41) | 2.41 (16.58) | 1.10 (1.43) | 0.80 (1.33) | 24.90 | 22.00 |
| 10 | CRP-41 | 5 | 0.00 (1.10) | 10.84 (19.00) | 8.13 (1.17) | 0.40 (1.17) | 0.05 (1.02) | 13.02 | 6.05 |
| 11 | CRP-42 | 4 | 3.94 (1.99) | 29.70 (32.98) | 13.49 (21.17) | 1.00 (1.41) | 1.15 (1.47) | 26.90 | 31.55 |
| 12 | CRP-43 | 4 | 6.43 (2.71) | 11.08 (19.42) | 5.04 (12.65) | 0.12 (1.05) | 0.05 (1.02) | 10.52 | 7.35 |
| 13 | CRP-44 | 5 | 9.56 (3.18) | 9.76 (18.19) | 9.66 (18.09) | 0.62 (1.25) | 0.53 (1.24) | 15.92 | 16.55 |
| 14 | E36-1 | 3 | - | 7.57 (15.96) | 6.47 (14.63) | 0.00 (1.00) | 0.00 (1.00) | 7.50 | 8.10 |
| 15 | CSV 8R- | 3 | - | 47.17 (43.37) | 35.00 (36.22) | 2.20 (1.78) | 2.54 (1.88) | 35.30 | 41.67 |
| 16 | SPV 1018- | | 25.44 (4.95) | | | | | | |
| | SEm ± | | 0.46 | 2.22 | 2.12 | 0.10 | 0.06 | 3.37 | 0.06 |
| | CD at 5% | | 1.37 | 6.58 | 6.02 | 0.31 | 0.19 | 10.18 | 0.19 |

* \sqrt{x} values ** Angular transformations

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