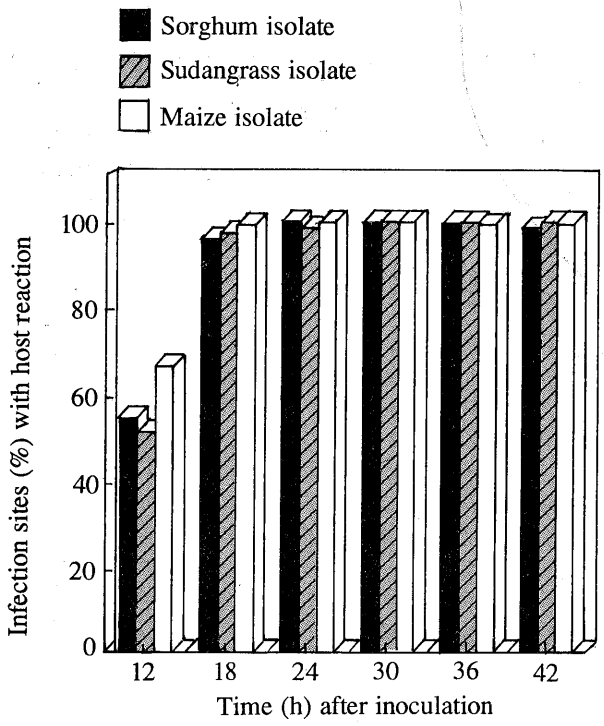

Figure 3. Infection sites (%) showing host defense reaction.

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Sources of Rust Resistance in Purple-colored Sorghum

S.D. Singh, P. Sathiah, and **K.E.P. Rao**
(International Crops Research Institute for the Semi-Arid Tropics, ICRISAT Asia Center, Patancheru 502 324, Andhra Pradesh, India)

Rust, caused by *Puccinia purpurea* Cooke, is prevalent in most of the sorghum-growing areas of the world. The disease occurs in epiphytotic form almost every year wherever sorghum is grown in cool and humid weather. Exact data on yield loss are not available, although losses as high as 65% may occur (Bandyopadhyay 1986). The disease is particularly important because it predisposes plants to infection by such other diseases as fusarium stalk rot and charcoal rot (Frederiksen 1980). Research on the identification of resistance sources has been limited, and no efforts appear to have been made to produce rust-resistant cultivars. However, host-plant resistance is the only feasible way to control this disease.

At ICRISAT Asia Center (IAC), Patancheru, we evaluated 5218 sorghum accessions for their reaction to rust during the postrainy seasons of 1991/92 to 1993/94. Each accession was sown in a single 4-m row plot in two replications. Rust occurred naturally in severe form. Severity of rust infection was rated at the hard dough stage using a 1–5 rating scale.

In 1991/92, 15 accessions were rated 2 for rust, and an additional 107 were rated 3–4. All these accessions were resown during the 1992/93 postrainy season to confirm their rust reaction. In 1992/93, the trial was a part of a leaf blight [*Exserohilum turcicum* (Pass.) Leonard and Suggs] nursery where high humidity was maintained by sprinkler irrigation between 1500 and 1700 h three times a week. The irrigation began 30 days after sowing and continued until the soft dough stage. Fifty-one accessions that remained rust-free or showed resistance to rust and leaf blight were tested again during the 1993/94 postrainy season. In the 1992/93 and 1993/94 screenings, accessions were evaluated for both rust and leaf blight, using 1–9 rating scales. In 1993/94, plant height and days to 50% flowering were also recorded.

The rust reactions of 15 accessions that were evaluated for 3 consecutive years are shown in Table 1. No accession was rust-free, but six of them (IS 2300, IS 3443 C40, IS 31446, IS 18758 C242, IS 18758 C603, and IS 7023) showed extremely high levels of resistance (rust scores 1–3); the other nine showed moderate to high levels of rust resistance. These accessions also showed moderate to high levels of resistance to leaf blight.

Table 1. Origin, plant color, plant height, and days to 50% flowering (DTF) of 15 sorghum accessions and their reaction to rust (1991/92–1993/94) and leaf blight (1992/93–1993/94) at ICRISAT Asia Center, Patancheru, India.

Identity	Origin	Plant color	Plant height (cm)[1]	DTF[1] (50%)	Rust severity			Leaf blight severity	
					1991/92[2]	1992/93[3]	1993/94[3]	1992/93[3]	1993/94[3]
IS 2300	Sudan	Tan	130	53	1	2	2	2	4
IS 3443 C40	Sudan	Tan	130	59	1	2	2	3	4
IS 31446	Uganda	Purple	180	91	1	2	2	3	2
IS 18758 C242	Ethiopia	Tan	155	67	2	3	3	3	4
IS 18758 C603	Ethiopia	Tan	210	73	2	3	2	3	4
IS 7023	Sudan	Purple	240	68	1	2	3	4	7
IS 31496	Uganda	Purple	220	70	1	2	4	4	2
IS 32811	Zimbabwe	Purple	275	71	1	2	4	3	4
IS 19667	Zimbabwe	Purple	310	74	1	3	4	3	4
IS 19669	Zimbabwe	Purple	260	64	1	3	4	3	2
IS 9249	Uganda	Purple	220	60	2	3	4	3	5
IS 9515	S Africa	Tan	185	60	2	4	3	3	4
IS 9404	S Africa	Purple	170	59	2	4	5	3	3
IS 15217	Cameroon	Purple	210	74	1	5	-[4]	4	-
IS 7157	Zimbabwe	Purple	280	54	2	3	6	3	4
IS 18420 (Khundi Jowar, control)	India	Purple	145	52	5	9	9	3	3

1. Plant height and days to 50% flowering were recorded during the 1993/94 screening.
2. Screening was done on a 1–5 rating scale where 1 = no rust pustules and 5 = 40% leaf area damaged.
3. Rust and leaf blight severities were recorded on a 1–9 rating scale where 1 = no lesions and 9 = >81% of the leaf area damaged.
4. – = not tested.

Among these 15 rust-resistant accessions reported here, 10 are purple-colored and two of them—IS 31446 and IS 7023—showed very high levels of rust resistance (rust ratings 1–3). As purple-pigmented sorghums are generally susceptible to rust, the identification of high levels of rust resistance in these is a significant advance, and a valuable addition to sources of rust resistance. These sources are being used to transfer rust resistance to agronomically elite backgrounds at IAC and the National Research Centre for Sorghum (NRCS), Rajendranagar, Hyderabad, Andhra Pradesh, India.

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Integrated Approach to Tackle the Grain Mold Problem in Maharashtra

T.B. Garud, B.N. Aglave, and **S.S. Ambekar**
(Marathwada Agricultural University, Parbhani 431 402, Maharashtra, India)

In Maharashtra rainy-season sorghums are generally affected by grain mold because of the rains in September and October. Grain mold, caused by a complex of many fungi, becomes more severe due to prolonged wet conditions and delayed harvesting. Control of grain mold requires on integrated approach in Maharashtra.

Grain mold can be managed through avoidance, chemical control, and genetic resistance.

Avoidance

Grain mold infection can be reduced by increasing the duration of cultivars by 10–15 days. Such early hybrids as CSH 1 (100 days) are more regularly and severely affected by grain molds than late ones such as CSH 9 (110 days) and SPV 462 (115 days), which take 10–15 days longer to mature.