

# Identification of Sources of Resistance to Sorghum Downy Mildew in Late-flowering Sorghum Germplasm

S.S. Navi and S.D. Singh (Crop Protection Division, ICRISAT Asia Center, Patancheru 502 324, Andhra Pradesh, India)

Sorghum downy mildew, caused by *Peronosclerospora sorghi* (Weston & Uppal) C.G. Shaw, is a serious disease of sorghum [*Sorghum bicolor* (L.) Moench] and maize (*Zea mays* L.) in many parts of Asia, Africa, and the Americas. At the ICRISAT Asia Center (IAC), we have been evaluating sorghum germplasm accessions for resistance to this disease. During 1991–92, we evaluated 800 sorghum accessions (taking more than 80 days to flower at IAC) for their reaction to downy mildew using a greenhouse screening technique. Seeds of each accession were soaked for 2 h in tap water in plastic petri dishes lined with blotting paper. Excess water was drained off and the plates were incubated at 30°C for 24 h. Sprouted seeds (25–30) of each accession were transplanted to pots filled with a potting mixture (consisting of 3 parts of Vertisol and 1 part of farmyard manure) and irrigated immediately. DMS 652 was used as the susceptible control. At the coleoptile-to-one-leaf stage, the seedlings were spray-inoculated with a conidial suspension ( $1 \times 10^5$  spores mL<sup>-1</sup> water). The IAC isolate of the pathogen was used. The details of the technique have been described by Singh and Gopinath (1985). This technique ensures that plants are inoculated when they are the most susceptible, with adequate inoculum concentration and under conditions optimum for disease development. Disease incidence was recorded 20 days after inoculation.

The incidence of downy mildew in DMS 652 was more than 95%. Ten entries (IS 18512, IS 18552, IS 18713, IS 18714, IS 19018, IS 19096, IS 19105, IS 19239, IS 20049, and IS 20205) remained free from downy mildew. In four others (IS 18716, IS 19019, IS 19506, and IS 19971), downy mildew incidence was less than 5%, and in nine entries (IS 18549, IS 18555, IS 19147, IS 19175, IS 19187, IS 19189, IS 19417, IS 19490, and IS 20220) it was 5 to 10%. In the remaining entries, the incidence ranged from 11 to 100%. This shows that good sources of resistance are available in late-flowering sorghum accessions. These sources will be particularly useful in breeding long-duration downy mildew resistant sorghum cultivars.

## Reference

Singh, S.D., and Gopinath, R. 1985. A seedling inoculation

technique for detecting downy mildew resistance in pearl millet. Plant Disease 69: 582–584.

## Evaluation of Wild and Weedy Sorghums for Downy Mildew Resistance

R.I. Karunakar<sup>1</sup>, Y.D. Narayana<sup>1</sup>, S. Pande<sup>1</sup>, L.K. Mughogho<sup>2</sup>, and S.D. Singh<sup>1</sup>

(1. Crop Protection Division, ICRISAT Asia Center, Patancheru 502 324, Andhra Pradesh, India;

2. ICRISAT Southern and Eastern Africa Region, P.O. Box 776, Bulawayo, Zimbabwe)

Downy mildew of sorghum [*Peronosclerospora sorghi* (Weston & Uppal) C.G. Shaw], is one of the widespread diseases of sorghum [*Sorghum bicolor* (L.) Moench] (Williams 1984). Systemically infected plants fail to produce panicles, resulting in complete loss of grain yield (Craig and Odvody 1985). Sources of resistance to this disease have been reported in wild sorghums (Mughogho et al. 1982). In an attempt to identify additional sources of resistance, we screened 308 wild and weedy sorghums belonging to 29 species and sub-species in greenhouse conditions at ICRISAT Asia Center (IAC) during 1990–91. Seeds of each accession, supplied by ICRISAT's Genetic Resource Division, were sown in two 12-cm square pots. Seedlings at the coleoptile-to-one-leaf stage were spray-inoculated with conidia ( $6 \times 10^5$  conidia mL<sup>-1</sup>) as described by Reddy et al. (1992). The IAC isolate of the pathogen was used. Downy mildew incidence was recorded three weeks after the inoculation.

Twenty-nine accessions were found to be free from downy mildew. Eight more showed very high levels of resistance with incidence ranging from 1–10% (Table 1). Of the downy-mildew-free accessions, eight belong to Para sorghums (IS 14262, IS 14275, IS 18926, IS 18941, IS 18942, IS 18946, IS 23159, and IS 23177), five belong to *Sorghum purpureosericeum* (IS 18939, IS 18947, IS 22191, and two without an IS number), two each belong to *S. drummondii*, *S. stipodeum*, *S. matarankense*, *S. nitidum*, and *S. dimidiatum*, and one each belongs to *S. australiense*, *S. brevicallousum*, *S. affstipodeum*, *S. plumosum*, *Sorgastrum*, and *S. laxiflorum* (Table 2). The results showed that the accessions varied greatly in their resistance/susceptibility to downy mildew. None of the accessions belonging to 12 species/subspecies/races including *S. virgatum*, *S. aethiopicum*, and *S. helepense* was downy-mildew-free or highly resistant (<10% downy mildew). Conversely, all the accessions belonging to Para sorghum were either free of the disease or highly resistant.