Table 1. Incidence of shoot bug on 20 genotypes of sorghum, Rajendranagar, Hyderabad, India, postrainy (*rabi)* season, 1998

Genotype	Number of shoot bugs plant^{-1}			Plants infested (%)
	64 DAE[1]	74 DAE	Mean	
ICSV 700	5.9	7.6	6.8	18.9
ICSV 705	20.0	5.5	12.8	28.2
ICSV 745	11.6	6.1	8.9	48.1
SPV 462	22.4	4.5	13.5	23.8
SPV 492	9.1	4.7	6.9	11.7
SPV 839	12.5	4.3	8.4	37.5
CSH 6	8.6	4.1	6.4	9.5
CSH 9	13.2	1.6	7.4	31.3
CSH 13	6.8	2.0	4.4	33.3
CSH 14	9.2	4.3	6.8	28.8
CSH 16	8.3	4.6	6.5	26.7
CSV 15	9.3	6.4	7.9	50.5
Swati	23.4	4.4	13.9	41.8
RS 29	17.8	5.4	11.6	44.5
M 35-1	25.8	9.5	17.7	33.2
CS 3541	9.0	2.9	6.0	17.2
DJ 6514	3.5	1.6	2.6	27.1
IS 2205	6.4	3.6	5.0	29.6
IS 2212	8.3	4.2	6.3	38.5
IS 18551	9.1	4.2	6.7	39.8
CD (P = 0.05)	-	-	-	NS[2]

1. DAE = Days after emergence
2. NS = Non-significant

The mean populations in both monitorings clearly indicated that M 35-1 (17.70), Swati (13.90), SPV 462 (13.50), and ICSV 705 (12.80) are genotypes highly susceptible to shoot bug damage. DJ 6514 (2.60), CSH 13 (4.40), IS 2205 (5.00), and CS 3541 (6.00) are less susceptible to shoot bug. When the percentage of plants infested is considered, the maximum number of damaged plants was recorded on CSV 15 (50.5%) and minimum on CSH 6 (9.5%), but the difference among genotypes was not significant. The highest population of shoot bugs (adults and nymphs) was recorded on M 35-1 and the lowest on DJ 6514 in both monitorings. The present experimental results are similar to work by Agarwal et al. (1978) who screened 127 cultivars of sorghum for shoot bug and noticed that I 753, H 109, GIB 3677B, and BP 53 were free from infestation, and Rajasekhar (1989) who evaluated 88 sorghum genotypes and found that hybrids MSH 65 and SPH 3888, and varie-ties SPV 475, 678, 736, 741, 756, 775, 819, 858, and CSV 10 showed promising resistance to shoot bug. Genotypes DJ 6514, CSH 13, IS 2205, and CS 3541 have potential for incorporation in sorghum shoot bug resistance breeding programs.

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Sorghum Diseases in Eritrea - A Survey Report

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Introduction

Sorghum [*Sorghum bicolor* (L.) Moench] is one of the main food crops of Eritrea. It is particularly important in the lowlands where rainfall is erratic but it is grown in nearly all Zobas (zones), including the highlands. Average yields are about 0.5 t ha^{-1}. The most common reasons for low yields are drought, pests, diseases and weeds (Shattercane, *Striga,* wild sorghums and their intermedia-tes with cultivated sorghum) and lack of improved practices (Tesfamichael 1999; Obilana et al. 2002). A survey of diseases in major sorghum-growing areas was carried out under the collaborative sorghum and pearl millet research in Eritrea (Danida-Eritrea-ICRISAT collaboration).

Materials and methods

The survey covered highland (Debub zone) and lowland (Gash Barka zone) sorghum-growing areas, excluding the Northern Red Sea zone, it was conducted with the assistance of plant protection personnel from the Eritrean Department of Agriculture. Thirty-five fields (approximately 207 ha) at 15 locations in the lowlands, and 13 fields (approximately 15 ha) at 8 locations in the high-lands were surveyed for sorghum diseases. At each location information on site identification, cultivar, area sown, number of fields, latitude and longitude using a global positioning machine (Garmin GPS 12XL®, Garmin International, 1200 East 151st Street, Olathe, Kansas 66062, USA), crop stage, and cultural practices was collected from farmers. Information on cropping sequence for the last three seasons was also noted.

The disease incidence was based on the percentage of diseased plants in five randomly selected subplots (4 m^2) in each field. Both incidence and severity were recorded for leaf diseases and smuts, only incidence for *Striga,* and severity for foliar diseases based on mean percentage area damaged on the top four leaves.

Results and discussion

Sorghum was grown mainly in the western lowlands and highlands (altitude range 610-2075 m; latitude 14° 19'-15°09' Nand longitude 36°31'-38°52' E). In most areas the crop was at the soft to hard dough stage. In highland areas, local landrace cultivars, such as Shiketi, Ammal, and unknown locals were predominant whereas in lowland ares local landrace cultivars, such as Wediaker, Faterita, Hariray, Hugurtay, Wediferege, Arfaghedemes, Wediaker-keihafu, Bazenay, and Wediahmad were predominant (Table 1). Shattercanes and their intermediate types with cultivated sorghum were observed as contaminants in most fields. *Striga hermonthica* (Del.) Benth. was predominant in and around fields of sorghum.

The diseases recorded included such foliar diseases as leaf blight *(Exserohilum turcicum* (Pass.) K.J. Leonard & E.G. Suggs), anthracnose (*Colletotrichum graminicola* (Ces.) GW. Wilson), zonate leaf spots (*Gloeocercospora sorghi* D. Bain & Edgerton ex Deighton), gray leaf spots (*Cercospora sorghi* (Ellis & Everh.), oval leaf spots (*Ramulispora sorghicola* E. Harris), sooty stripe (*Ramulispora sorghi* (Ellis & Everh), downy mildew [*Peronosclerospora sorghi* (W. Weston & Uppal) C.G Shaw]; and panicle diseases including head smut [*Sporisorium reilianum* (Kuhn) Langdon & Fullerton], covered kernel smut *[Sporisorium sorghi* (Link in Willd.)l, loose kernel smut *[Sporisorium cruentum* (Kuhn) K. Vanky], and long smut *{Sporisorium ehrenbergii* Vanky).

Table 1. Distribution of sorghum diseases on local cultivars grown in two zones of Eritrea surveyed during the 2001 rainy season

Zone	Sub-zone	Cultivars grown	Diseases identified
Debub	Mendefera	Locals	Covered smut, Head smut, *Striga*
	Adi Quala	Shiketi, Ammal	Anthracnose, Covered kernel smut
Gash Barka	Shambuko	Wediaker	Anthracnose, Leaf blight, Head smut, Loose kernel smut, *Striga*
	Gogne	Bazenay	Loose kernel smut, *Striga*
	Goluj	Wediaker, Faterita, Hariray, Wediferege, Hugurtay, Arfaghedemes, Wediaker-Keihafu, Locals	Leaf blight, Anthracnose, Zonate leaf spot, Gray leaf spot, Sooty stripe, Oval leaf spot, Loose kernel smut. Head smut, Covered kernel smut. Stalk rot, *Striga*
	Tessenei	Wediaker, Hugurtay, Hariray, Wediahmad	Leaf blight, Anthracnose, Zonate leaf spot. Gray leaf spot. Sooty stripe, Oval leaf spot, Loose kernel smut, Head smut. Covered kernel smut, Long smut, Downy mildew. Maize Dwarf Mosaic Virus, *Striga*

Table 2. Mean disease reactions[1] across local landrace cultivars grown in farmers' fields in Eritrea surveyed during the 2001 rainy season

Disease	Fields	Disease incidence (%)		Disease severity (%)	
		Mean	Range	Mean	Range
Leaf blight	18	23 ± 4.2	5-60	16 ±2.5	5-40
Anthracnose	17	43 ± 6.6	10 100	24 ± 3.5	10-50
Gray leaf spot	7	25 ± 9.3	10-80	20 ± 5.7	5-50
Zonate leaf spot	9	36 ±10.5	10 90	32 ± 9.9	10-80
Oval leaf spot	2	35 ± 15.0	20-50	20 ± 0.0	20-20
Sooty stripe	5	11 ±2.4	5-20	10 ±3.9	5-25
Loose kernel smut	13	29 ± 4.8	1-50	58 ± 6.8	20-100
Covered kernel smut	7	19 ±5.2	1-35	58 ± 2.9	50-70
Head smut	8	2 ± 0.6	1-5	100 ±0.0	100-100
Long smut	4	4 ±2.1	1-10	2 ± 0.3	1-2
Striga	17	44 ±7.5	2-100	-	-

1. Across 10 predominantly grown cultivars: Faterita, Hariray, Hugurtay, Wediaker, Wediahmad, Wediakerkeihafu, Wedeferage, Bazenay, Gcdamhamam, and Arfaghedemes

In highland areas covered kernel smut was predominant with mean incidences of 5-8% and 35-50% severity on Shiketi and some other local cultivars, followed by head smut with 5% incidence and 100% severity on local cultivars. About 10% incidence *of Striga* was recorded on local cultivars. Local cv. Ammal was free from both leaf diseases and smuts.

In lowland areas the occurancc of individual diseases and their incidence and severity across cultivars are summarized in Table 2. Among leaf diseases, leaf blight (prevalence 50%, incidence 23% and severity 16%), anthracnose (prevalence 50%, incidence 43% and severity 24%) and zonate leaf spot (prevalence 27%, incidence 36% and severity 32%) were important. Among smuts, loose kernel smut (prevalence 37%; incidence 29% and severity 58%) and covered kernel smut (prevalence 20%, incidence 19% and severity 58%) were important. Wediaker was found to be the most susceptible cultivar to all the leaf diseases and smuts except long smut followed by Hariray. Bazenay was free from leaf blight, anthracnose, zonate leaf spot, sooty stripe, oval leaf spot, covered kernel smut and head smut followed by Hugurtay and Faterita which were free from gray leaf spot, oval leaf spot, sooty stripe, covered kernel smut, head smut and long smut. Stalk rot caused by *Colletotrichum graminicola* (Ces.) GW. Wilson was also observed on Wediaker with 60% incidence.

Striga was recorded on all the cultivars with a range of 2-100% incidence. *Striga* incidence was comparatively lower in highland areas that receive more rainfall than on the cultivars grown in lowlands where rainfall was less, indicating that drought stress may enhance the incidence of *Striga.* The Eritrean farmers were of the opinion that *Striga* appears mostly at the flowering stage and drought enhances *Striga* infestation. Heavy rains and fertilizer application reduce *Striga* infestations. Farmers observed reduction in *Striga* infestation when sorghum is grown in rotation with sesame (*Sesamum indicum* L). Fallowing land for 2-3 years reduced *Striga* infection. Since shattercanes and their intermediate types had all leaf diseases including downy mildew and smuts, their role as collateral or alternate hosts for sorghum diseases need investigation.

Because sorghum after sorghum cropping sequence was the most common practice, its impact as a primary source of inocula for several diseases requires further investiga-tion.

The average rainfall in area under survey was about 500 mm. About 10 local cultivars are grown pre-dominantly indicates that there is limited genetic diversity in the local sorghum gcrmplasm of Eritrea. Treatment of seeds with cow's urine (stored for 3 days in a closed container) is thought to reduce infection by smuts. These local practices require further investigations. Breeding for resistance to the most economically important foliar and panicle diseases coupled with improved agronomic and seed treatment practices could help to reduce losses in yield and fodder.

Acknowledgments

We thank Semere Amlesom, Director General; Asmerom Kidane, Director for Research; Negusse Abraha, Pearl

Millet Breeder, DARHRD, Ministry of Agriculture, Eritrea, and all other plant protection staff for their assistance in carrying out this task. V P Rao is specially thankful to R P Thakur, F R Bidinger, C T Hash, and K N Rai (ICRISAT, Patancheru) for facilitating and approving the survey. We also thank the Danish Government for financial support.

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Leaf Blight of Sorghum Caused by *Drechslera australiensis*—a New Report from India

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Foliar diseases of sorghum (*Sorghum bieolor* (L.) Moench] are potential yield reducers as they cause premature drying of leaves that results in considerable reduction in grain and fodder yields. The widely prevalent common leaf blight is incited by *Exserohilum turcicum* (Pass.) Leonard & Suggs (Frederiksen 2000). We have observed a leaf blight on grain sorghum cultivars in Rajasthan, India, caused by a different pathogen, *Drechslera australiensis* as described below.

Severely blighted leaves of local landrace cultivars grown in a farmers' field near Udaipur were collected in the rainy season, 2001. The characteristic symptoms were narrow (1-5 mm) lesions of varying (2-71 mm) length. The lesions had reddish brown margins and straw-colored centers, and coalesced to cover the leaf lamina (Fig. 1). Isolation from the diseased leaves on potato dextrose agar (PDA) medium yielded a culture with brownish-grey mycelium and pale brown, small, 3-septate conidia resembling *Drechslera* sp. Pathogenicity of the purified culture was tested by spray inoculating (1 x 10^5 conidia mL^{-1}) on

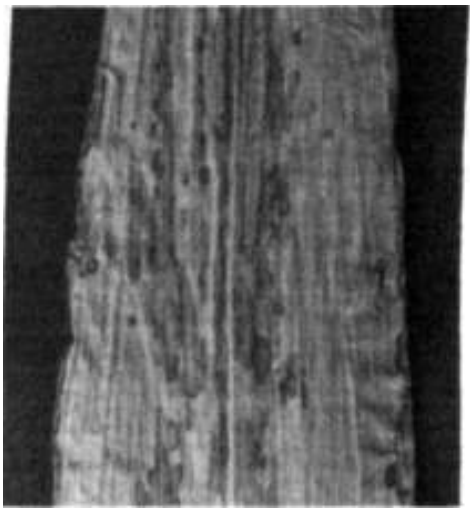

Figure 1. Symptoms on sorghum due to *Drechslera australiensis.*

the leaves of 21-day old plants of known susceptible sorghum cultivar, Kekri local. The characteristic lesions developed within 7 days of inoculation.

The cultural and morphological characters of the isolate were studied in details in slide culture. The conidiophores were geniculate, measuring 90-300 x 3-6 mm. Conidia were solitary and arranged in a verticillate manner, straight, ellipsoidal to oblong, rounded at the base, pale brown, 3-pseudoseptate with slightly protruding hilum, and measured 15.5-31.8 x 7.5-15.7 mm. The pathogen resembled *Drechslera australiensis* (Bugnicourt) Subramanian and Jain ex M.B. Ellis. A search through the literature revealed that *D. australiensis* has so far been reported from living leaves of *Sorghum halepense* L. (Kushawaha et al. 1999), and ours is the first report of it causing severe leaf blight on grain sorghum. Similar cultures were subsequently recovered from leaf samples received from Surat and Parbhani, and further studies on these are in progress.

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