

REGISTRATION OF PARENTAL LINES

Registration of ICS 88019 and ICS 88020 Midge-Resistant Grain Sorghum A and B Parental Lines

ICSA 88019 and ICSB 88019 (Reg. no. PL-254, PI 592505) and ICSA 88020 and ICSB 88020 (Reg. no. PL-255, PI 592506) are sorghum midge [*Contarinia sorghicola* (Coquillett)] resistant sorghum [*Sorghum bicolor* (L.) Moench] seed parents based on the A₁ cytoplasmic-genetic male-sterility system, and were developed by the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) at ICRISAT Asia Center, Patancheru, AP, India. They were selected for resistance to sorghum midge during 1988. ICSB 88019 (PM 7061B) was derived by pedigree selection; its pedigree is IS 152 × DJ 6514-8-1-1-1-1. ICSB 8020 (PM 7068B) was similarly derived, and its pedigree is FLR 101 × DJ 6514-13-1-1-2-1. DJ 6514 is a stable source of resistance to sorghum midge from India (2). IS 152 is a locally adapted germplasm accession from India, while FLR 101 is an elite line derived from the FLR population. The B-lines were crossed to 296A (A₁ cytoplasm) for conversion into male-sterile lines. Six backcrosses with continued selection for midge resistance and agronomic desirability were made during 1984–1988.

ICSB 88019 and ICSB 88020 have tan plant color, with non-juicy stems of medium thickness. Leaves are erect, narrow, long, with light-green midrib, and leaf sheaths cover the next internode. Flag leaves are short and slightly drooping. These lines flower in 59 to 60 days during the rainy season, and 72 to 74 days during the post-rainy season at ICRISAT Asia Center. Panicles are compact and elliptical. Glumes are short, straw colored, and cover about 25% of the caryopsis. Seeds are white, lustrous, without subcoat, and have a beak and a thin pericarp. At ICRISAT Asia Center, plant height is 151 to 155 cm during the rainy season and 116 to 120 cm during the post-rainy season. During 1993, ICSB 88019 yielded 1.214 t ha⁻¹ and ICSB 88020 yielded 1.365 t ha⁻¹, compared with 0.664 t ha⁻¹ in ICSB 42 and 1.135 t ha⁻¹ in 296B under midge infestation (Table 1). Several hybrids using these male-sterile lines have yielded more than the commercial hybrid CSH 11 (296A × CS 3541) over two sowing dates (1). In combination with midge-resistant restorer lines, these lines have good potential for producing high yielding midge-resistant hybrids.

ICSB 88019 and ICSB 88020 have shown high levels of resistance to sorghum midge over locations and seasons. ICSB 88019

and ICSB 88020 suffered 8 to 18% midge damage, compared with 60 to 82% in ICSB 42 and 296B under no-choice panicle cage screening. Under natural infestation, ICSB 88019 and ICSB 88020 suffered midge damage rating (DR) of 1.7 to 3.3 (1 = <10% damage and 9 = >80% damage), compared with a DR of 7.0 to 9.0 in ICSB 42 and 296B (1). They are as susceptible to spotted borer (*Chilo partellus* Swinhoe) as ICSB 42 and 296B, and moderately susceptible (DR 4.0 to 5.3, compared with 4.7 to 6.7 in ICSB 42 and 296B) to head bug (*Calocoris angustatus* Lethierry).

These lines are less susceptible to rust (caused by *Puccinia purpurea* Cooke), leaf blight [caused by *Exserohilum turcicum* (Pass.) K.J. Leonard & E.G. Suggs], zonate leaf spot [caused by *Gloeocercospora sorghi* Bain & Edgerton ex Deighton], and anthracnose [caused by *Colletotrichum graminicola* (Cesati) G.W. Wilson] (DR 4.3 to 5.3, compared with a DR of 6.7 to 8.0 in ICSB 42 and 296B). These lines showed moderate susceptibility to grain molds (DR 3.3 to 5.7, compared with 6.0 to 8.3 in ICSB 42 and 296B).

Seed of these lines will be maintained and distributed by the Genetic Resources Division of ICRISAT Asia Center, Patancheru PO, Andhra Pradesh, 502 324, India, and seed of the two B-lines has been stored under quarantine conditions at the U.S. National Seed Storage Laboratory, 1111 S. Mason St., Fort Collins, CO 80521-4500.

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References and Notes

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Table 1. Performance of midge-resistant lines ICSB 88019 and ICSB 88020 (ICRISAT Asia Center, 1990 to 94).

Cultivar	Plant height		Time to 50% anthesis		Grain yield		Midge damage			
	R†	PR	R	PR	R	PR	Headcage		Natural infestation‡	
	1991	1991-1992	1991	1991-1992	1993	1993-1994	1990	1990-1991	1990	1990-1991
	cm		d		t ha ⁻¹		%			
ICSB 88019	151	115	63	82	1.21	1.99	18	8	3.3	1.7
ICSB 88020	155	120	63	79	1.37	2.17	14	12	3.3	2.0
Controls										
ICSB 42	135	104	70	74	0.66	0.95	71	82	9.0	7.3
296B	124	98	70	74	1.14	0.98	62	60	7.5	7.0
SE	11.1	3.5	—	—	0.207	0.343	8.8	5.8	0.9	0.7

† R, rainy season; PR, post-rainy season.

‡ Midge damage rating under natural infestation: 1 = <10% damage, 9 = >80% damage.