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Short Communication

A new genetic male sterile line of *desi* cotton (*Gossypium arboreum* L.)

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Among the cultivated cotton species, diploid cottons have wide adaptability and are relatively tolerant to biotic and abiotic stresses. Conventional *desi* cotton hybrids like G cot DH 7, G cot DH 9, DDH 2, MDCH 201 and DHA 46 have been developed and released for commercial cultivation, however, significant coverage under these hybrids has not been achieved. Seed production in large quantities at cheaper rate is a limiting factor.

Hybrid cotton is grown in 45 percent of the total area and contributing 55 percent of the total cotton production and about 44 percent area is covered by tetraploid hybrids and diploid hybrids cover hardly 1 percent [1]. Several reports on male sterility in American cotton [2-5] and in *desi* cotton also [6-8] are available. Petaloidy in which anthers are transformed into petal like leafy structure has been reported in *desi* cotton [9]. However, due to unstable and partial male fertile behaviour of petaloidy, it has not been used for hybrid seed production in *desi* cotton [10].

Desi hybrids are high yielding with short fibre and ginning outturn more than 40 percent. However, F_1 hybrid availability/ suitability for genetic/cytoplasmic genetic male sterility (GMS / CGMS) line would solve this problem [11]. Male sterility system may reduce the cost of seed production.

Identification of male sterility: The original male sterile plant was observed in the seed multiplication plot of CISA 2 (*G. arboreum* L. race *bengalense*) at Central Institute for Cotton Research, Regional Station, Sirsa. Genetic basis of this character was studied in F_2 and BC_1 from cross between male sterile plant observed in CISA 2 and fertile CISA 2. The data is presented in Table 1 and Chi square test confirmed 3:1 segregation in F_2 and 1:1 test cross.

Identification of gene: The male sterile plants identified in the present study were crossed with heterozygous male fertile plants of DS 5 (GMS) line having genetic constitution of aMs1 ams1. If the gene governing the male sterility in new source were same then the test cross ratio among male fertile and male sterile plants would have segregated into 1:1 ratio but the segregation was 3:1 ratio (Table 2). Therefore, the genetic male sterility observed in the present study is

Table 1. Segregation of fertility and sterility in F_1, F_2 and back cross of CIS A 2 (GMS) line of *Gossypium arboreum* L.

Year	Generation	Ratio	Segregation				Total	χ^2 value	
			Observed		Expected				
			Fertile	Sterile	Fertile	Sterile		Fertile	Sterile
2002-03	F_1	1:1	91	83	87	87	174	0.184*	0.184*
2003-04	F_1	1:1	90	66	78	78	156	1.850*	1.850*
2004-05	F_1	1:1	250	270	260	260	520	0.385*	0.385*
2003-04	F_2	3:1	128	54	142	45	182	1.380*	1.800*
2004-05	F_2	3:1	383	117	402	128	500	0.898*	0.945*
2003-04	BC_1	1:1	87	67	74	62	154	2.280*	0.403*
2004-05	BC_1	1:1	83	72	76	64	155	0.645*	1.000*
Pooled	F_1	1:1	431	419	425	425	850	0.085*	0.085*
	F_2	3:1	511	171	544	173	682	2.002*	0.023*
	BC_1	1:1	170	139	150	126	309	2.667*	1.341*

*Non-Significance at 5%

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Table 2. Studies on identification of gene controlling genetic male sterility through test cross analysis

Test Cross	Observed (O)	Expected (E)	(O-E)	$\chi^2=(O-E)^2/E$
Sterile	66	63	3	0.14*
Fertile	18	21	-3	0.43*
Ratio		1:3		

*Non-Significance at 5%

governed by a single pair of alleles, which are different from the gene ams1 ams1 governing male sterility in DS 5 (GMS) line. The gene for male sterility is designated as ams2 ams2 expressing completely male sterility condition and the heterozygous F_1 (male fertile) is designated as aMs2 ams2.

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