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Introgression of fiber traits of *Gossypium barbadense* L. into *Gossypium hirsutum* L.

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Abstract

F_2 of cotton hybrid DCH-32 was forwarded to F_3 as a bulk by taking 10 seeds per plant; similarly two seeds from each F_3 plants were taken to constitute F_4 generation. Selection in F_4 generation was carriedout. Measurement of halo length was used as base for selection of plants. As many as 184 plants were selected. On detail investigation of fibre traits, plants with >23 g/tex fibre strength, 30 mm fibre length (2.5% SL) and around 4 micronnaire value have been isolated. Selected platns were tested in F_5 generation in plant to row progeny, plants with higher fibre strength (>23 g/tex) have been recovered; however micronaire of these platns was around 2.8. Finally the selected plants tested in F_6 have been recorded for seed cotton yield, ginning outturn and fibre properties. Desirable plants having higher seed cotton yield than DS-28 (38 g/plant) with high fibre strength (>23 g/tex) have been recovered, however, the micronaire of these plants is around 2.8.

Key words: Cotton, fibre quality, interspecific hybridization, introgression

Introduction

India can take pride for being the only country growing a wide spectrum of quality cottons right from the shortest and coarsest, capable of spinning 6 counts to the longest and finest used for producing 120 counts yarns. Although Indian cottons have very wide quality spectrum, the right combination of fibre length, micronnaire and strength is however absent in many of the popular varieties. This deficiency is particularly discernible in staple range 27-30 mm combined with a micronnaire of 4.0 to 4.5 and strength of 22-25 g/tex. Indian cottons conforming to long and extra long staple group are either too fine or too weak. There is an urgent need to promote those cottons that could come closer in quality to the most-sought-after foreign cottons [1].

Earlier, cotton industries were giving preference in the order of fibre length, fibre fineness, fibre maturity and lastly to fibre strength. But, due to modernization of textile industry through increased automation of spinning and weaving, there is demand for the change in the order of preference of fibre quality parameters for making our cotton quality to be comparable and competitive with the man made fibres. There is an urgent need to develop cotton varieties or hybrids for high fibre strength (>23 g/tex) because the fibre strength in present day cultivars especially upland and *desi* cotton is just any where between 15 to 22 g/tex.

At present, in order to derive cotton varieties/hybrids, which are suitable for 60 counts and above, there must be an involvement of *G. barbadense* L. directly as a variety or indirectly as a parent of hybrid with G. *hirsutum* L. Development of Suvin variety, which is capable of spinning 120 counts and is comparable to Egyptian Giza-45 in quality, is a distinct landmark in cotton breeding in India [2]. Due to their higher susceptibility to sucking pests, poor boll opening, shy yielding ability, varieties belonging to *G. barbadense* L. did not spread and they have just of 0.1 per cent area out of total cotton cultivation in India [3]. So they were used as male (donor) parent in developing inter-specific hybrids (*G. hirsutum* × *G. barbadense*). The possibilities of evolving interspecific commercial hybrid between *G. hirsutum* and *G. barbadense* with extra-long, fine, strong and silky fibre were indicated in early fifties [4]. The first of such interspecific hybrid between American and Egyptian cotton known as Varalaxmi was released in 1972 [5]. Subsequently DCH-32 was released in 1981 [6], which is superior to Varalaxmi. DHB-105 is another later addition, to interspecific hybrids list developed by Khadi [7]. Katageri and Kadapa [8] identified bollworm tolerant interspecific hybrids. Although all of them are high yielding and spinning 60-80 count, the area under cultivation of interspecific hybrid is dwindling drastically because of their long duration, high susceptibility to sucking pests and bollworms. Smaller boll size, bad boll opening and lower fibre maturity are the additional problems of interspecific hybrids. So there is an urgent need to develop potential varieties/hybrids suitable for 60 and

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above counts. Although option like developing *intra-hirsutum* hybrids or varieties suitable for 60 and above counts weighs more because of their early maturity, bigger bolls, good boll opening, high fibre maturity and tolerance to sucking pests and pink boll worm, it is difficult and /or impossible task because of absence of genetic resource for higher fibre properties in *G. hirsutum*. In the present study an effort has been made to isolate *G. hirsutum* lines with superior fibre properties like higher fibre length (>32 mm), fibre strength (>23 g/tex) and optimum fibre fineness (around 3.5 micronaire).

Materials and methods

The present investigation was initiated since 2000. Pedigree bulk method of selection was carried out and evaluation of plant to row progenies has been followed during *kharif* 2002-03 and 2003-04. Segregating progenies of a cross [*G. hirsutum* var. DS-28 × *G. barbadense* var. SB (YF)-425] were tested at F_4, F_5 and F_6. An interspecific hybrid, DCH-32 developed at UAS, Bangalore, ARS, Dharwad in 1981 was used as base material. There were two main reasons to choose this hybrid. DCH-32 is superior quality hybrid involving *G. barbadense* var. SB (YF)-425 as male parent and DS-28 a female parent that has big boll, good boll opening and high yielding besides its earliness nature.

Seeds were treated with imidacloprid to protect the crop from the incidence of sucking pests during early growth stage. Seeds were hand dibbled in rows of each 5.4 m length with spacing of 90 cm between rows and 20 cm between plants within a row. For every 20 progenies, DS-28 genotype was planted as check.

The pedigree method of selection was started in 1999-2000 with initial population of 200 plants in F_2. Out of those, 32 plants were sterile. From remaining plants 10 seeds per plant were obtained and bulked to raise F_3 (2000-01) generation of population size 1620 plants. Later 2 seeds per plant of F_3 were taken to raise F_4 generation (3365 plants). In F_4 generation 184 plants were selected and carried to F_5. Selection criteria was mainly on *G. hirsutum* type of plants (low leaf lobing, hairy and early maturing with halo length of more than 33-34 mm). Totally, 184 plant-to-row progenies (5214 plants) were evaluated in detail at F_5 during 2002-03 and finally 66 plants were selected and used to raise plant to row progeny at F_6 generation.

Halo length was used as base for selection of plants. Measurement of halo length was carried out after 50 per cent boll burst. Optimum agronomic package of practices were followed with irrigation in order to maintain healthy condition of plants so as to measure morphological characters effectively even at later stages. Three bolls, each picked at bottom, middle and top were used for measurement of halo length. Eighteen halo readings from three bolls per plant were taken. Mean halo length was calculated for each plant. Later plants having more than 34 mm halo length were selected.

Based on halo length, selected recombinants were considered for detailed study on morphological characters. Four morphological characters *viz.*, petal spot, pubescence, branching nature and leaf lobing which can easily differentiate *G. hirsutum* and *G. barbadense* were considered for evaluation of recombinants (Table 1).

Table 1. Distinguishable characters of parents and F_1 of DCH-32

Sl. No.	Character	Female (DS-28)	Male [SB(YF)-425]	F_1
1.	Leaf lobing	Less deeper	Deeper	Intermediate
2.	Pubescence	Pubescent (Hairy)	Non-pubescent (Glabrous)	Non-pubescent (Glabrous)
3.	Petal spot	Petal spot absent	Petal spot present (bigger in size)	Petal spot present (Smaller in size)
4.	Branching	Multinodal sympodia	Uninodal sympodia	Multinodal sympodia
5.	Maturity	160-170 days	190-2 10 days	190-2 10 days
6.	Fibre length (2.5% span length in mm)	28-30	35-36	35-36
7.	Fibre strength (g/tex)	18-21	26-27	26-27
8.	Fibre fineness (micronaire in µg/inch)	3.6-3.9	2.9-3.2	3.0-3.5

Based on morphological characters and halo length few plants were subjected for detail investigation on fibre properties using HVI (High Volume Instrument) at Central Institute for Research on Cotton Technology (CIRCOT), Regional quality evaluation unit situated at ARS, Dharwad farm.

Results and discussion

An interspecific hybrid, DCH-32 developed at University of Agricultural Sciences, Bangalore; ARS, Dharwad [6] was used as base material, which is superior to Varalaxmi in yield potential, ginning outturn and mote content. This hybrid one time (1982-92) covered an area of 2.0 lakh ha in Karnataka but today it occupies just around 50,000 ha. This drastic reduction in area of DCH-32 cotton cultivation is because of its long duration nature and susceptibility to sucking pests and pink bollworms.

In F_2 generation we have observed 32 sterile plants. In F_3, F_4, F_5 and F_6 generations sterility was not a problem, but extreme types were observed. The earlier workers reported that handling of interspecific hybrids is difficult task due to occurrence of sterility and haploids [9-12].

At F_4 generation the plants having more than 30mm halo length were analyzed for all fiber characteristics. Although selected plants were recombinants, they were hirsutums in terms of boll opening, maturity and plant type. The presence of genetic variability for fiber properties in the derived lines i.e. the ranges for fiber length, strength and micronaire value were 26-33 mm, 16.2-24.3 g/tex and 2.6-4.2 µg/inch respectively. As many as 23 plants, which had fiber length and strength of more than 30 mm and 22 g/tex respectively, were selected and can be classified as extra long staple cottons. Another 21 plants had fiber strength of more than 22 g/tex (22-24.5 g/tex), but their fiber length was less than 30 mm (26.6-29.8mm). Of these 21 plants the fiber length of 19 plants were more than 28 mm and can be considered as long staple cotton.

Selected recombinants based on fiber and other properties from F_4 were tested in detail at F_5 generation. As many as 184 plant to row progenies were raised. Here also halo length was used to screen all 5214 plants. The enormous variation (14.3 mm to 38.72 mm) was seen for halo length among recombinants with the mean halo of 27.15mm. Frequency distribution of 5214 plants for halo length was depicted (Fig. 1). Finally 66 plants were selected in F_5 which showed halo length of more than 34 mm. Among these selected plants, lowest halo length (34 mm) was recorded by plant number 29-3, 34-64, 35-15, 42-1 and 69-4, whereas highest halo length was recorded by plant number 42-14 (38.72 mm) (Fig. 2). The halo length categories *viz.*, 34 to 35, 35 to 36, 36 to 37, 37 to 38 and 38 to 39 contained 46, 7, 4, 6 and 3 plants, respectively. Nine plants (plant number 28-32, 42-14, 69-1, 69-5. 69-9, 69-10. 73-17, 77-49 and 77-53) could show halo length between 37 to 39mm. However, all nine plants did not possess sufficient lint for fibre quality analysis using HVI, only some plants *viz.*, 73-17 and 77-49 which were subjected for detailed fibre quality analysis could show fibre length (2.5% SL) of 30.2 mm and 33.1 mm. Recombinants with superior in fibre length (34 mm) to female parent (30 mm) have been isolated.

The four morphological characters *viz.*, plant hairiness, leaf lobing, branching behaviour and petal spot which can easily differentiate between *G. hirsutum* L. and *G. harbadense* L. were considered for phenotyping of 66 recombinants selected based on halo length (>34mm) at F_5 generation. They formed eight groups with each group possessing characters in different combination. The details of the recombinant characters with number of plants present in each recombination group are presented in Table 2. Highest number of plants were present in group number 4 (36 plants), where in these plants possessed two characters (spotted petals and glabrousness) from *G. barbadense* L. and another two characters (normal branching and normal leaf characters) from *G. hirsutum* L., accounting to 54.55 percentage, followed by 5th and 7th group (7 plants, 10.6%) and 6th group (6 plants, 9.09%). Lowest number of plants were present in-group 2nd and 3rd (1 each, 1.52%).

Table 2. Recombinants based on morphological characters at F_5 from cross between *G. hirsutum* L. var. DS-28 × *G. barbadense* L. var. SB (YF)-425

Classes	Phenotype		No. of plants	% of plants out of 66
1	Petal spot	: **Spotted**	4	6.06
	Pubescence	: Hairy		
	Branching	: Normal		
	Leaf lobing	: Normal		
2	Petal spot	: Spotless	1	1.52
	Pubescence	: Hairy		
	Branching	: **Compact**		
	Leaf lobing	: Normal		
3	Petal spot	: Spotless	1	1.52
	Pubescence	: **Glabrous**		
	Branching	: **Compact**		
	Leaf lobing	: Normal		
4	Petal spot	: **Spotted**	36	54.55
	Pubescence	: **Glabrous**		
	Branching	: Normal		
	Leaf lobing	: Normal		
5	Petal spot	: Spotless	7	10.60
	Pubescence	: **Glabrous**		
	Branching	: Normal		
	Leaf lobing	: **Lobed**		
6	Petal spot	: Spotless	6	9.09
	Pubescence	: **Glabrous**		
	Branching	: Normal		
	Leaf lobing	: Normal		
7	Petal spot	: **Spotted**	7	10.60
	Pubescence	: **Glabrous**		
	Branching	: **Compact**		
	Leaf lobing	: Normal		
8	Petal spot	: **Spotted**	4	6.06
	Pubescence	: **Glabrous**		
	Branching	: Normal		
	Leaf lobing	: **Lobed**		
	Total		66	100

Regular: *G. hirsutum* character Bold: *G. barbadense* character

These recombinants were further grouped according to different proportion of characters from both parents. Eleven plants were seen with 3H: IB (three *G. hirsutum* L. characters and one *G. barbadense* L. character) combination and another 11 plants were also with 1H: 3B (one *G. hirsutum* character and three *G. barbadense* characters) combination. Highest number of plants (44) were seen with 2H: 2B (*G. hirsutum* and *G. barbadense* both contributed two characters) combination accounting to 66.66 per cent but plants possessing all the four characters either from *G. barbadense* (0H: 4B) or *G. hirsutum* (4H:0B) were not seen. None of the plants possessed all the four characters of either of the parents and were recombinant in different proportions. Normal leaf, hairiness, either normal branching or compact branching with improved fiber properties are desirable. As many as 9 compact plants with good boll opening were also isolated. Compact types obtained in this study are useful in mixed and multiple cropping systems in country like India besides growing as an entire crop by increasing plant population. In the studies of *G. hirsutum* × *G. barbadense* crosses, Sikka and Avtar Singh [13] also developed short fruiting branch type hirsutums. These compact types also useful in machine harvesting. Lastly near *hirsutum* lines with *barbadense* fiber characters derived from the project would be useful to develop long and extra-long staple *hirsutum* varieties/hybrids for different situations. As all the selected 66 plants did not possess sufficient lint for fiber quality test, hence 23 samples were analyzed. The details of the fiber properties of selected 23 plants are mentioned in Table 3.

Fiber length (2.5% SL, mm): The mean of fiber length of recombinants recorded (30.5 mm) was on par with the mean of fiber length of DS-28 (29.5 mm). The longest fiber length was recorded by plant number 4-56 (33.6 mm), followed by plant number 42-18 (33.4 mm) and plant number 42-21 (33.2 mm). The shortest fiber length was recorded by plant number 92-13 (27.4 mm). However, selected 14 plants possessing more than 30 mm 2.5% span length were subjected for 't' test. The mean of length of these plants (31.8 mm) was significantly higher than female parent DS-28 (29.5 mm).

Fibre strength (g/tex): Highest fibre strength was recorded by plant number 61-1 (28.4 g/tex) followed by plant number 42-18 (27.4 g/tex) and plant number 38-25 (27.3 g/tex). Whereas lowest fiber strength was recorded by plant number 9-20 (20.1 g/tex). The mean of fibre strength of recombinants (24.2 g/tex) was significantly higher than the mean of fiber strength of female parent (20 g/tex) *i.e.*, check.

Fiber strength to fiber length ratio (FS/FL): The mean of strength to length ratio of these recombinants (0.79) was found significantly higher over the DS-28 (0.67). The highest strength to length ratio (0.93) was recorded by plant number 38-25, followed by plant number 38-27 (0.90), but both have micronnaire of 2.4 and 2.5, respectively, hence cannot be exploited. Whereas lowest strength to length ratio (0.63) was recorded by plant number 9-20. Ratio of fibre strength to length is more than 0.80 in 13 plants as against 0.67 of DS-28. This is most desired ratio in any category of quality cottons.

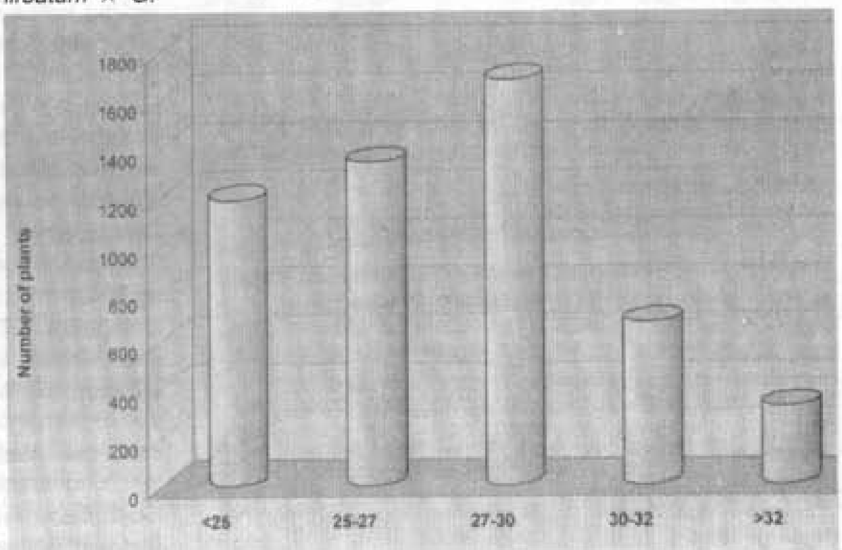

Fig. 1. Mean halo length of 5214 plants grouped under five classes of cross between DS-28 × SB (YF) 425

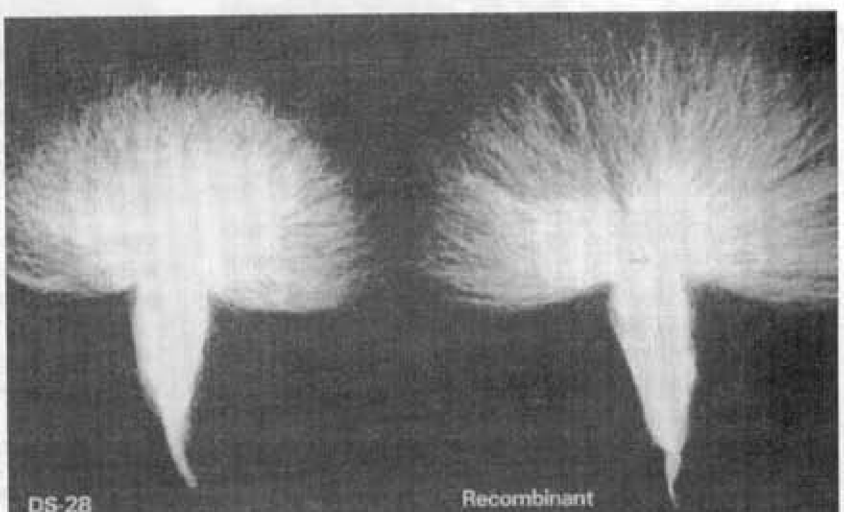

Fig. 2. Higher halo of recombinant compared to female parent (DS-28)

Table 3. Fibre properties of recombinants at F_5 from cross between DS-28 × SB(YF)-425

Sl. No.	Plant number	Fibre length (2.5% SL, mm)	Fibre strength (g/tex)	Fibre strength to length ratio (FS/FL)	Fibre fineness (µg/inch)	Uniformity ratio (%)	Fibre maturity ratio	Fibre length (>30 mm only)
1.	4-56	33.6	22.4	0.66	3.1	45	0.72	33.6
2.	9-20	31.9	20.1	0.63	3.1	47	0.73	31.9
3.	18-6	29.9	25.2	0.84	2.6	48	0.69	-
4.	28-8	30.2	26.7	0.88	2.8	50	0.70	30.2
5.	29-1	28.3	23.8	0.84	2.5	48	0.62	-
6.	30-7	29.8	22.8	0.77	2.8	47	0.70	-
7.	35-6	30.5	21.0	0.68	3.0	47	0.71	30.5
8.	35-15	28.6	23.0	0.80	2.6	47	0.64	-
9.	38-14	31.5	20.8	0.66	2.8	44	0.70	31.5
10.	38-25	29.3	27.3	0.93	2.4	48	0.52	-
11.	38-26	28.8	25.6	0.88	-	46	-	-
12.	38-27	27.6	25.0	0.90	2.5	50	0.66	-
13.	38-29	30.1	24.2	0.80	2.6	47	0.66	30.1
14.	42-1	32.6	26.5	0.81	2.6	48	0.66	32.6
15.	42-18	33.4	27.4	0.82	3.2	45	0.74	33.4
16.	42-21	33.2	25.7	0.77	2.9	44	0.72	33.2
17.	42-32	31.5	24.5	0.77	3.1	48	0.73	31.5
18.	61-1	32.6	28.4	0.87	2.4	45	0.60	32.6
19.	73-17	30.2	21.8	0.72	2.8	49	0.70	30.2
20.	74-5	28.5	21.2	0.74	3.9	50	0.76	-
21.	77-49	33.1	25.4	0.77	2.6	45	0.74	33.1
22.	78-22	31.0	24.8	0.80	2.9	47	0.72	31.0
23.	92-13	27.4	24.0	0.88	3.1	50	0.73	-
Mean		30.5	24.2	0.79	2.8	47	0.69	31.8
Mean (DS-28 check)		29.5	20.0	0.67	3.7	43	0.70	29.5
Variance		3.67	5.31	0.007	0.12	3.60	0.003	1.63
SD		1.91	2.30	0.082	0.34	1.89	0.055	1.27
Test of significance		NS	**	*	**	**	NS	*

*,**Significance at 5% and 1% level of probability respectively; NS - Non-significant

Fiber fineness (micronaire value): The mean of micronaire value of these recombinants (2.8 µg/inch) was significantly lower than the mean of micronnaire value of check (3.7 µg/inch) *i.e.*, female parent (DS-28). The lowest micronaire value was recorded by plant number 61-1 and 38-25 (2.4 µg/inch). The highest micronaire value was 3.9 µg/inch, recorded by plant number 74-5.

Uniformity ratio (%): The mean of uniformity ratio of recombinants (47%) was found significantly superior over the DS-28 (43%). The highest uniformity ratio (50%) was recorded by 4 plants *viz.*, 28-8, 38-27, 74-5 and 92-13. Whereas the lowest uniformity ratio was recorded by plant number 42-21 (44%).

Fiber maturity ratio: Higher maturity ratio was recorded by plant number 74-5 (0.76) followed by plant number 42-18 and plant number 77-49 (0.74) whereas lowest maturity ratio was recorded by 38-25 (0.52). The mean of fiber maturity ratio of recombinants (0.69) was lower than the mean of maturity ratio of DS-28 (0.70) but it was non-significant.

Female parent (*G. hirsutum* var. DS-28) of DCH-32 is the best line possessing 29.59 mm fibre length (2.5% SL), 20 g/tex fibre strength, 3.78 micronaire and 43.4 per cent uniformity ratio [14]. So in the present study plants, which are superior to female parent in fibre properties, were selected. These *hirsutum* looking plants with superior fibre traits have been derived from introgression of fibre traits of male parent into female parent (DS-28). Out of 23 plants, 10 showed fibre length of more than 30 mm (30-33.6 mm) and fibre strength of more than 22 g/tex (22-28.4 g/tex), and other eight plants recorded fibre strength of more than 22 g/tex (22-27.3 g/tex) although their fibre length ranged between 27.4 to 29.9 mm. Plant number 42-18 and 78-22 possessed all required superior fibre qualities. Plant number 42-18 having halo of 34.72 mm showed highest 2.5 per cent SL of 33.4 mm, 27.4 g/tex fibre strength with 3.2 micronnaire value which is very much required for textile industry. Plant number 78-22 has all required qualities but its micronnaire (2.9) is quite low. However with all these problems associated with interspecific hybridization, some workers have achieved noticeable success. In the studies of Kadapa and Gangaprasad [15], similar kind of fibre length improvement (1-1.2") than Laxmi (0.94"), from cross between *G. hirsutum* var. Laxmi and *G. barbadense* var. Raichur and Lingasugur perennials has been observed. Mention may be made of the evolution of the long staple varieties like Sea Island Andrew in North Carolina [16], BP-52 in East Africa [17], HA-2 in Mysore [18] and MCU-2 and 0892-B in Madras, were the instances where interspecific hybridization involving *hirsutum* and *barbadense* has long been resorted for transferring extra long staple and fineness from the latter species to former.

Finally at F_6, 66 selected plants were raised in plant to row progenies. Here before estimation of all the fiber properties of all (1848) plants under HVI, halo length was measured. The enormous variation (16mm to 40.0mm) was seen for halo length among recombinants. Only 13 plants have been finally chosen based on halo length (>34mm) and availability of sufficient lint for HVI test. The results of HVI test are presented in Table 4.

Out of thirteen plants, four plants (21-17-2, 28-17-4, 61-1-10 and 78-22-19) showed fiber length (2.5% SL) of more than 30 mm with fiber strength of 27 g/tex, 26.7 g/tex, 23.1g/tex and 24.9 g/tex respectively. These four plants recorded seed cotton yield of 61g/plant, 53g/plant, 52 g/plant and 44 g/plant respectively, with the GOT of 34.43, 35.85, 36.54 and 38.64 (Table 4).

Table 4. Fibre properties, seed cotton yield (SCY) and yield contributing characters at F_6 from cross between DS-28 × SB (YF)-425

Sl. No.	Recombinants	Fibre length 2.5% SL (mm)	Fibre strength (g/tex)	Fibre fineness (µg/inch)	Uniformity ratio (%)	Fibre maturity ratio	Elongation (%)	SCY (g)	100 seed weight (g)	GOT (%)	Lint index
1.	9-20-18	28.60	23.20	2.80	43.00	0.63	5.00	78.00	9.60	32.05	4.53
2.	21-17-2	30.80	27.00	2.80	43.00	0.61	4.70	61.00	9.50	34.43	4.99
3.	22-33-16	29.80	25.30	2.20	42.00	0.57	4.40	65.00	10.00	35.38	5.48
4.	28-2-1	29.60	22.40	2.50	41.00	0.58	4.70	48.00	8.80	39.58	5.77
5.	28-29-10	27.90	22.80	2.30	41.00	0.56	5.40	62.00	8.80	33.87	4.51
6.	29-1-2	29.40	27.20	2.20	44.00	0.58	5.00	58.00	8.80	34.48	4.63
7.	28-17-4 .	32.30	26.70	2.20	44.00	0.55	4.50	53.00	11.70	35.85	6.54
8.	28-32-13	28.90	24.70	2.40	43.00	0.57	4.60	49.00	10.80	36.73	6.27
9.	38-25-22	29.30	24.30	2.40	44.00	0.57	4.00	46.00	10.10	36.96	5.92
10.	46-78-28	29.90	23.30	2.40	42.00	0.61	5.20	47.00	9.80	36.17	5.55
11.	61-1-10	32.50	23.10	2.90	43.00	0.62	3.90	52.00	9.50	36.54	5.47
12.	74-4-2	28.20	21.00	2.80	41.00	0.61	5.70	48.00	9.90	37.50	5.94
13.	78-22-19	32.50	24.90	2.30	42.00	0.56	4.90	44.00	10.20	38.64	6.42
	Mean	29.97	24.30**	2.47**	42.54	0.586**	4.76**	54.69**	9.80**	36.01**	5.53**
	DS-28	29.50	20.30	3.40	43.00	0.68	5.40	38.00	8.00	34.21	4.16
	Variance	2.5	3.61	0.06	1.3	0.001	0.26	94.50	0.68	4.0	0.49
	SD	1.6	1.90	0.26	1.1	0.03	0.51	9.70	0.82	2.0	0.70

**1% level of significance

Other than these four plants, another four plants (22-33-16, 29-1-2, 28-32-13 and 38-25-22) showed fiber strength of more than 24 g/tex. In F_6 some plants *viz.*, plant number 9-20-18, 29-1-2, 38-25-22, 61-1-10 and 78-22-19 showed good length, strength as in previous season (F_5) but the micornnaire value has been reduced due to the presence of long spell of moisture stress during boll maturation stage. Interspecific derived progenies frequently revert to phenotypes approaching those of the parents. According to Richmond [19], even though large spectrum of variability can be released in progenies of interspecific cotton hybrids, majority of the recombinants are ill balanced.

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