



Title: Development of Extra long staple *G. barbadense* cotton with improved fibre qualities to meet the requirements of textile industry

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INTRODUCTION

In India substantial portion of Extra Long Staple *G. barbadense* cotton production is constituted by Interspecific hybrids developed such as DCH 32 and TCHB 213. Further requirement of ELS Cotton is met through import from USA, Egypt and Sudan. The susceptibility of *G. barbadense* to sucking pests as well as their low yielding nature necessitate the urgent need of its improvement. The project thus aims at genetic enhancement of *G. barbadense* cotton for earliness and higher ginning out turn maintaining acceptable fiber quality.

OBJECTIVES:

1. Screening of Germplasm lines for earliness, yield, ginning out turn and fibre quality parameters.
2. Identification of superior genotypes with improved fibre quality using biotechnological tools like marker aided selection

ACTIVITIES:

- To identify suitable genotypes with earliness, higher ginning out turn and fibre quality parameters.
- Utilization of desirable lines in crosses with good agronomic base
- Screening of segregating material for earliness, boll number, boll weight, ginning out turn and fibre quality parameters.

EXECUTIVE SUMMARY

Fifty *G. barbadense* lines were evaluated at five locations. ICB

125 and ICB 134 were characterized by high boll numbers per plant and recorded highest mean seed cotton yield of 155 g/plant and 141 g/plant, respectively. The line ICB 125 had a mean fibre length of 33.5 mm and strength of 26.6 g/tex. The line ICB 134 had a mean fibre length of 32.1 mm. mean fibre strength 26.4 g/tex. As regards fibre length, Suvin (35.4 mm) and GSB 39 (37.2 mm) were the best. As regards fibre strength, GSB 39 was the best with 31.1 g/tex. Among the germplasm lines ICB 170 recorded highest fibre strength of 30.8 g/tex. Evaluation of segregating lines at different centers resulted in identification of several cultures giving higher seed cotton yield and ginning out turn along with fibre quality on par with Suvin. Among the existing materials evaluated, CCB 6 recorded the highest yield of 1444 kg/ha with a high ginning out turn of 35.2 per cent. However, quality wise the check variety Suvin was the best.

SALIENT FINDINGS

Under the activity on identification of suitable genotypes with earliness, yield, GOT and fibre quality parameters a total of four hundred and nine germplasm lines were evaluated at five locations in an augmented design for their agronomic and fibre quality traits. Several promising lines with better agronomic and fibre quality attributes were identified for further utilization in breeding programme. Attributes of some of the identified lines are as under table 1.

Under the activity on utilization of desirable lines in crosses at CICR, Coimbatore, based on number of days to first flowering, fifteen germplasm lines were selected. Cultures ICB 6, ICB 114 and ICB 260 were utilized in the crossing programme. Based on earliness, single plant yield, ginning out turn and fibre properties ICB 14, ICB 37, ICB 38, ICB 52, ICB 57, ICB 84, ICB 87, ICB 124, ICB 188, ICB 191, ICB 196, ICB 260 and ICB 283

**Table 1: Promising *G.barbadense* germplasm lines at CICR, Coimbatore**

S.No	Accessions	Yield/ Plant (g)	Ginning %	2.5% SL (mm)	Micronaire	Strength (g/tex)	Elongation %
1	ICB-71	112	37	33.9	3.6	27.7	5.3
2	ICB-128	103	34	34.1	3.5	26.3	5.1
3	ICB-129	129	35	33.1	3.5	26.6	5.7
4	ICB-164	107	30	34.9	3.5	27.8	5.0
5	ICB-208	106	35	32.8	3.3	27.8	4.9
6	ICB-214	120	33	33.1	3.9	26.8	5.0
7	ICB-219	95	32	33.1	3.5	27.1	4.6
8	ICB-220	61	27	33.1	3.8	28.0	5.3
9	ICB-222	118	36	32.0	3.7	26.9	5.5
10	ICB-240	50	34	33.6	3.7	28.3	4.6
11	ICB-281	54	34	35.2	3.6	27.4	4.4
12	Suvin ©	39	30	36.2	3.2	29.5	4.3

have been utilized in the crossing programme. Eighteen F1s were backcrossed with Suvin to develop BC1F1 population. F1s were backcrossed to Suvin. At UAS, Dharwad, F1 filial generation of Suvin crosses involving ICB 6, ICB 24, ICB 75, ICB 115, ICB 122, ICB 172 and ICB 179 were grown and single plants evaluated. At TNAU, Coimbatore, five lines viz., B1, B3, B4, B26 and B41 were utilized in crosses to widen variability. At NAU, Surat eleven crosses were attempted to widen variability.

Under the activity on screening of segregating materials at CICR, Coimbatore, from various straight and backcrosses, one hundred and sixty plants were selected based on single plant yield, ginning outturn. Further selections based on fibre quality parameters were made.

Sufficient variability was noticed in respect of yield and ginning out turn. However, as regards fibre length and strength, only very few plants exceeded Suvin. At UAS, Dharwad, promising single plants in F2 population of nine straight crosses and three double crosses were selected for yield, boll number and boll weight. Quality evaluation is under progress. At TNAU, Coimbatore, promising single plants were selected in two double cross and six straight cross derivatives. Sufficient variability was noticed for single plant yield, 2.5% SL and fibre strength.

In the F2 segregating materials, a total of thirty-four single plants were selected. The single plant yield ranged from 31.5

g/plant to 134.5 g/plant (SN x ICB 122-1). The 2.5 per cent span length ranged from 29.6 mm to 37.5 mm while the range of bundle strength was from 24.9 g/tex to 35.2 g/tex. At MPKV, Rahuri, the F2 generations of six crosses along with parents were raised during Kharif, 2007. The single plant selections were made in these segregating populations on the basis of yield and other morphological characters along with good boll opening. At NAU, Surat thirty plants were selected in BC1 F2 and F3 generations. The yield levels were low in the crosses but good variability was seen for ginning out turn. The selected plants would be advanced to next generation in the next season.

Under the activity on evaluation of existing materials, at CICR, Coimbatore, twelve genotypes contributed by the participating centres were evaluated in a replicated trial at six locations. Results from QUAT, Bhawanipatna were not received. A combined analysis of the results from five centres showed that CCB 6 recorded the highest yield of 1444 kg/ha and was superior to Suvin by 67 percent (Table 2). CCB 6 recorded the highest ginning out turn of 35.2 percent as against 30.2 percent of Suvin. However, as regards fibre quality, the control variety Suvin was found to be the best.

At TNAU, Coimbatore, forty one lines were evaluated for yield and fibre quality parameters. Among them, B 26 recorded the highest yield of 1037 kg/ha followed by B 12 (932 kg/ha) The line B 23 recorded the highest ginning out turn of 38.8 percent



followed by B 16 (38.4 percent). The mean single plant yield was the highest in B 16 (68.8 g/plant) followed by B 26 and B 32 (61.3 g/plant). The single plant with highest yield (98.8 g/plant) was observed in the line B 16. The 2.5 per cent span length was the highest in B 35 (35.9 mm) followed by B1 and B 42 (34.6 mm). For fibre strength the line B 28 recorded 28.7 g/tex followed by B 23 (28 g/tex). Seven lines recorded more than 27 g/tex of bundle strength.

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Table 2: Multilocation evaluation of *G. barbadense* cultures

S.No	Entry	Seed Cotton Yield (kg/ha)	% increase over Suvin	Boll Wt (g)	Ginning out turn %	2.5% SI (mm)	Micro naire	Strength (g/tex)
1	CCB 6	1444	67	2.9	35.2	35.0	3.8	26.8
2	RAB 107	1359	57	3.1	32.4	32.8	3.9	27.0
3	CCB 5	1306	51	2.9	34.9	34.6	3.8	26.6
4	GSB 39	1252	45	2.6	32.9	36.9	3.6	27.6
5	TCB 1	1216	40	3.1	32.3	32.8	4.1	25.2
6	RHCB 001	1164	34	3.0	34.6	32.1	4.3	23.0
7	CCB 1	1122	30	3.0	35.0	35.9	3.7	26.5
8	CCB 7	1037	20	2.6	32.7	34.5	3.9	27.1
9	CCB 3	1017	17	2.9	31.8	36.5	3.5	27.8
10	CCB 4	994	15	3.0	31.9	37.3	3.8	27.3
11	CCB 2	872	1	2.8	33.1	36.3	3.7	29.3
12	DB 5	660	-24	3.0	33.2	34.2	4.2	25.7
13	Suvin©	866	0	2.8	30.3	37.6	3.7	29.1

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Under the activity on identification of molecular markers linked to fibre quality attributes in *G. barbadense* at TNAU, Coimbatore, fifty germplasm lines were screened for polymorphism using SSR markers. Fourteen primers were found to show good polymorphism.

At NAU, Surat, twelve SSR primers(BNL-1064,BNL-840,BNL-852,BNL-686,BNL-193,BNL-150,BNL-116,BNL-387,BNL-448,BNL-1 017,BNL-1 030 and BNL-834) were screened on 22 germplasm lines for polymorphism. The primer BNL-193 was

found to be polymorphic, where as others are found to be monomorphic. Further screening is in progress. Crosses will be done between select diverse parents.

At UAS, Dharwad, *G. barbadense* germplasm lines ICB 21 for high strength (31.9 g/tex) and NDGB 19 for low strength (22.2 g/tex) were identified. These lines also showed maximum variability for micronaire. The cross of these parents has been made.