Subiksha, the Compact Long Staple Cotton Variety with High Strength Suitable for High Density Planting System in India

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Cotton in India

- Cotton fibre consumption increased ~10-12 % annually
- Import gradually reduced and exports have picked up.
- Import is restricted mainly to extra-long staple which is in short supply within country
- Yield stagnation in India at around 500 – 550 kg lint/ha
- Low cotton prices, increasing production costs, and vagaries of monsoon are seriously challenging the cotton farmers in the country
- Promising strategy for overcoming this economic challenge is to identify production practices that increase yield or reduce cost

Cotton in India

- Staple wise production
  - 70-75 % in 27.5mm to 32 mm
  - 2-3 % in ELS
- Consumption
  - 300 lakh bales in 2015-16
- Staple wise consumption
  - 50-60 % in Long staple range for 24s to 36s count yarn
- Import of cotton in India
  - 14 lakh bales in 2015-16 (19 lakh bales in 2016-17 P)
  - United States of America is the largest supplier of Cotton followed by Australia and Tanzania to India.

Source: USDA, http://www.indexmundi.com/agriculture and http://www.infodriveindia.com/india-import-data/cotton-raw-cotton-import-data.aspx, Global Agricultural Information Network, USDA

Back ground Information

- Conventional cotton breeding contributed to substantial achievements in fibre quality improvement in India
- Indian cottons in staple group 31-36 mm - have lower micronaire and the tenacity by about 4-10 g/tex
- Progress to meet the growing demand on quantity and quality of the cotton fibre by the modern textile mills has been slow mainly due to complex inheritance pattern of fibre quality traits

Fibre quality norms (ICAR-CIRCOT)

Count	2.5% SL	UR	BS (g/tex)	EP	Mic
1s-10s	22.0-24.0	50	20.0	7	4.5-5.0
11s-20s	24.0-25.0	50	21.0	7	4.0-4.5
21s-30s	25.0-27.0	50	23.5	7	3.8-4.5
31s-40s	27.0-29.0	50	25.0	7	3.8-4.5
41s-50s	29.0-31.0	48	26.0	6	3.8-4.5
51s-60s	31.0-33.0	48	28.0	6	3.8-4.2
61s-80s	33.0-34.0	48	29.0	6	3.7-4.0
81s-100s	35.0-36.0	48	31.0	6	3.6-3.8
101s&above	36.0-38.0	48	32.0	6	3.5-3.8

ICC Mode

Back ground Information

- In the multi-location trial under AICRP, several cotton cultivars are evaluated at National level and zonal level along with the zonal check and local check varieties every year.
- Based on the average performance of the cultivar, the best performing cultivars vis-a-vis the check varieties are promoted and then released over the years.
- While promoting the cultivars major emphasis is given to the yield characters and so some of the cultivars with better fibre quality parameters get eliminated in the preliminary stage itself.
- Hence, efforts were made to collect those cultivars with superior fibre quality parameters and to reconfirm their fibre quality parameters again along with efforts to maximize their yield potential through suitable agro-techniques.

Performance of CCH 4474 (Subiksha) in AICRP Trials during 2008-09

No. of Locations: 5

Parameter	CCH 4474	CCH 2623	Zonal Check	Local Check
Seed Cotton Yield (kg/ha)	1649	1911	1537	1758
	(1528-1921)	(1545-2351)	(1157-1898)	(1341-2101)
Rank	16	2	31	10
2.5% Span Length (mm)	30.4	27.3	31.6	29.9
	(29.4-32.4)	(26.3-28.6)	(30.7-32.8)	(27.6-31.5)
Micronaire	4.1	4.7	4.1	4.3
Bundle Strength	24.2	21.9	22.3	21.5
	(23.0-24.9)	(20.6-22.6)	(20.2-23.1)	(20.8-22.4)

ICC Mode

Consolidation of repository of high strength cotton genotypes and evaluation for quality traits and yield in specific agro-eco zones (TMC-MM I – 1.3)

- Seeds of forty identified cultivars from various AICRP centres were consolidated and evaluated in the field for reconfirming the yield potential and fibre quality traits in two separate trials.
- AHH 10-1, CCH 03-23, CCH 10-2, CCH 1831, **CCH 4474**, CCH 7122, CCH 820, CCH LS2, CSH 3047, CSH 3129, CSH 3312, CSH 3313, CSH 3314, GISV 157, GISV 267 , GSHV 161, GTHV 0/32, KH 1101, KH 1201, NDLH 1928, NDLH 1939, RAH 1003, RAH 1004, RAH 1065, SCS 1002, SCS 1061, SCS 793, SH 2-4

TMC High Strength Material Trial – I (20+2) at ICAR-CICR, Coimbatore (2013-14)

Genotype	BW	Total SCY (kg/ha)	% Inc over Suraj	% Inc over Surabhi	Rank	GOT	2.5% SL (mm)	Tenacity 3.2 mm (g/tex)
CCH 10-2	**5.5**	**1482***	53	184	1	33.8	29.8	20.8
CCH 4474	4.9	1423	47	173	2	37.3	33.4	25.0
CCH LS2	4.6	1382	43	165	3	35.9	**33.6**	23.5
CCH 1831	4.6	1232	28	136	4	33.7	30.7	23.1
CSH 3312	4.3	1121	16	115	5	36.7	29.7	22.6
CCH 7122	4.5	1112	15	113	6	32.4	32.8	**25.1**
CSH 3047	5.2	1110	15	113	7	36.3	29.1	22.4
Suraj (C)	5.0	966	0	85	12	**37.4**	32.1	21.8
Surabhi (C)	4.0	521	-46	0	21	33.1	32.8	24.1
Mean		960						
CD @ 5%		494						
CV %		17						

*Sig over all checks

TMC High Strength Material Trial – II (20+2) at ICAR-CICR, Coimbatore (2013-14)

Genotype	BW	Total SCY (kg/ha)	% Inc over Suraj	% Inc over Surabhi	Rank	GOT	2.5% SL (mm)	Tenacity 3.2 mm (g/tex)
SCS 1061	4.9	**1672***	100	88	1	29.4	**33.9**	22.4
SCS 793	5.7	1501*	80	69	2	35.9	29.4	19.7
RAH 1003	5.0	1376	65	55	3	39.8	28.4	19.1
SCS 9	5.6	1372	65	54	4	37.9	29.5	21.3
NDLH 1928	4.9	1311	57	47	5	34.4	32.0	22.5
SH 2-4	4.8	1300	56	46	6	36.4	30.1	**23.7**
GISV 267	**5.9**	914	10	3	14	**39.8**	29.1	20.5
Surabhi (C)	4.2	890	7	0	15	33.6	33.0	22.2
Suraj (C)	5.0	834	0	-6	19	36.5	31.8	21.0
Mean		1068						
CD @ 5%		521						
CV %		19						

*Sig over all checks

TMC High Strength Material Trial – Comparative Performance at ICAR-CICR, Coimbatore

Genotype	SCY (kg/ha)			2.5% SL (mm)			BS (g/tex)			AICCIP	
	2013-14	2012-13	Mean	2013-14	2012-13	Mean	2013-14	2012-13	Mean	SL	BS
CCH 4474	1423	594	1008	33.4	33.5	33.5	25.0	25.9	25.5	30.1	24.7
CCH LS2	1382	346	864	33.6	31.3	32.5	23.5	24.4	24.0	31.5	22.5
CCH 1831	1232	485	858	30.7	27.7	29.2	23.1	22.3	22.7	26.7	23.4
Suraj (C)	966	647	807	32.1	32.6	32.4	21.8	21.9	21.9		
CCH 7122	1112	342	727	32.8	33.2	33.0	25.1	25.0	25.1	28.1	22.0
CCH 03-23	1034	384	709	30.3	30.8	30.6	21.4	21.1	21.3	30.5	23.4
CCH 820	1024	281	653	31.5	33.2	32.4	24.1	25.6	24.9	31.3	23.5
Surabhi (C)	521	329	425	32.8	33.3	33.1	24.1	23.5	23.8		

Performance of CCH 4474 across locations (2013-14)

Per se performance for seed cotton yield (kg/ha)

Genotype	Coimbatore	Surat	Nagpur	Lam	Dharwad	Mean
CCH 4474	1423	537	616	2061	1559	1239
Surabhi (C)	890	675	1044	2054	1092	1151
Suraj (C)	966	490	797	2366	2078	1339

Per se performance for bundle strength (g/tex)

Genotype	Coimbatore	Surat	Nagpur	Lam	Dharwad	Mean
CCH 4474	**23.5**	**24.5**	**23.9**	**19.7**	**26.1**	**23.5**
Surabhi (C)	23.0	21.7	23.2	20.4	21.1	21.9
Suraj (C)	23.8	24.9	22.8	20.6	21.7	22.8

Per se performance for 2.5 % Span length (mm)

Genotype	Coimbatore	Surat	Nagpur	Lam	Dharwad	Mean
CCH 4474	30.4	30.1	28.2	26.6	32.7	29.6
Surabhi (C)	31.8	29.3	31.3	27.7	31.8	30.4
Suraj (C)	29.8	32.2	31.6	27.8	30.3	30.3

Effect of geometry and fertilizer levels on CCH4474

Plant geometry

1) Recommended spacing (75x45 cm) with 29629 plants/ha
2) HDPS I spacing (90x10 cm) with 1,11,111 plants/ha
3) HDPS II spacing (45x10 cm) with 2,22,222 plants/ha and
4) HDPS III spacing (37.5x10cm) with 2,66,666 plants/ha

Nutritional levels

F1) 100% RDF (60:30:30 kg NPK /ha)
F2) 125 % RDF
F3) 150% RDF.

Effect of geometry and fertilizer levels on Yield of CCH4474 at ICAR-CICR, Coimbatore

Design: FRBD Number of rows: 8 Replications: 3

CD@5% = 471 (Geometry); 408 (Fertilizer level); NS (Interaction)

Fertilizer levels	Seed Cotton Yield (kg/ha)				Mean
	75x45 cm (G1)	90 x10 cm (G2)	45x10 cm (G3)	37.5x10cm (G4)	
100% RDF	2158	3183	2895	2503	2685
125% RDF	2526	**3325**	3263	3266	**3095**
150% RDF	2297	3043	3130	3056	2882
Mean	**2297**	**3184**	**3096**	**2941**	**2880**

Effect of geometry and fertilizer levels on Yield of CCH4474 at ANGRAU, Guntur

Design: FRBD Number of rows: 8 Replications: 3

Spacing	90-45-45 kg NPK/ha	120-60-60 kg NPK/ha	150-75-75 kg NPK/ha	Mean
90 × 45 cm	3313	3735	**4201**	**3750**
105 × 60 cm	2754	2730	2851	**2778**
Mean	**3034**	**3233**	**3526**	**3264**

Spinning Data

Characteristics	CCH 4474	CIRCOT Standard
2.5 % Span Length (mm)	32.4	
Uniformity Ratio	49.0	
Micronaire	3.6	
U (%)	17.7	19.4
Neps / km	2343	2000
CSP (60s Count)	2322	2210

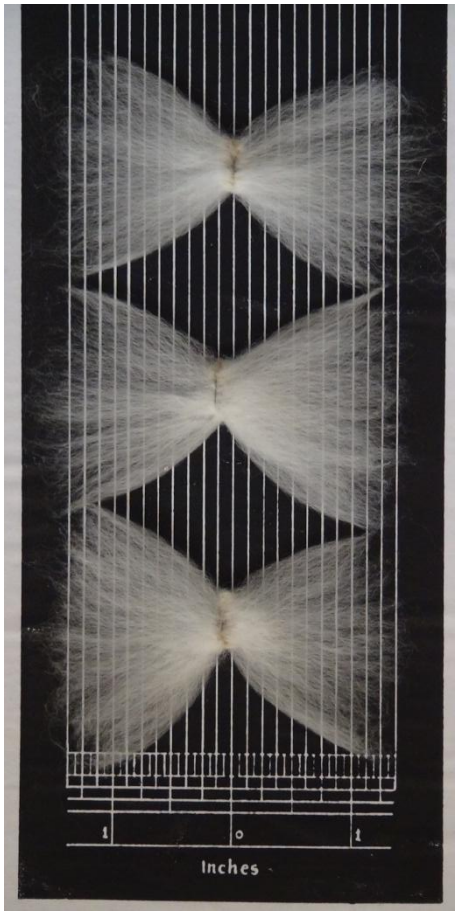
HVI Data

Genotype	2.5% SL (mm)	Tenacity 3.2 mm (g/tex)
CCH 4474	33.4	25.0
Suraj (C)	32.1	21.8
Surabhi (C)	32.8	24.1

Central Cotton CCH 4474 (Subiksha)

Year 1	MCU 5 X Z 2	Hybridization
	⇩	
Year 2	Bunny x F 1	Hybridization
	⇩	
Year 3	Double Cross F1	Selection in Double cross F1
	⇩	
Year 4-8	F2 to F6	Single Plant Selection
	⇩	
Year 9	F7 Progeny Row	Plant to Row Evaluation
	⇩	
Year 10	Preliminary Yield Trial	Replicated evaluation for yield and quality
	⇩	
Year 11	Confirmatory Yield Trial	Replicated evaluation for yield and quality in bigger plot
	⇩	
Year 12	Entry in AICRP Trial **(CCH 4474)**	

CCH 4474



Proceedings of Central Variety Identification Committee Meeting

Date: 07-04-2016 Venue: NAU, Surat

The committee was chaired by Dr. R. K. Singh, Assistant Director General (Commercial Crops), ICAR, New Delhi. The following members were present.

20. CCH 4474 (Compact Hirsutum culture)

The entry was sponsored by ICAR-Central Institute for Cotton Research, Nagpur. The compact culture has been proposed for identification in South Zone States of Tamil Nadu, Andhra Pradesh and Karnataka under irrigated conditions. Considering the importance of high bundle strength desired by the textile mills, the compact high strength culture has been selected based on its performance in AICRP during 2008-09 and evaluated in Technology Mission on Cotton for fibre quality and yield potential. The culture maintained high strength throughout the evaluation in TMC trials across the locations. The culture showed yield superiority under closer spacing when compared to normal spacing. Hence, the culture is **identified for release in South Zone States of Tamil Nadu, Andhra Pradesh and Karnataka under irrigated condition.** The Breeder may send lint for one more spinning test reports from ICAR-CIRCOT, Mumbai to reconfirm such high fibre strength.

Summary

- Subiksha recorded a mean seed cotton yield of 1542 kg/ha as against 1305 kg/ha of the Zonal check variety Surabhi under conventional spacing with 24.7 per cent yield increase.
- It is compact and yield better under closer spacing - as high as **3325** kg/ha in Coimbatore and **4201** kg/ha in Guntur.
- Mean Ginning Out turn of 35.4 per cent as against 32.2 per cent of Surabhi - recorded 38 per cent higher lint yield than the zonal check variety.
- 2.5 % Span length of 32.4 mm, Micronaire of 3.6 in the spinning test in ICC mode and Upper Half Mean Length of 32.7 mm, Micronaire of 3.7 and Tenacity of 33.8 g/tex in the spinning test in HVI mode.
- Recorded a CSP value of 2376 in 50s count and 2322 in 60s count and was found to spin up to 60s count yarn.
- On par incidence vis-à-vis check varieties for majority of diseases.
- Subiksha showed field tolerance to jassids.
- Subiksha combines high yield potential under closer spacing, better ginning outturn, basic tolerance to pests and diseases and the farmers will be highly benefitted by cultivating this genotype

Acknowledgement

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- Scientists of participating centres in TMC Project
- Dr. P. Nalayini, Principal Scientist




Thank you