

## Research Article

# Cotton SVPR 6 (TSH 04/115) – A high yielding long staple cotton variety for southern zone of India and winter/summer irrigated tracts of Tamil Nadu

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### Abstract

A high yielding long staple *hirsutum* cotton variety SVPR 6 (TSH 04/115) was developed by Cotton Research Station, Srivilliputtur and released in the year of 2017. It was notified during the year 2018 for *kharif* season for the southern zone of India under winter irrigated and summer irrigated tracts of Tamil Nadu. It is a hybrid derivative of the cross between SVPR 2 and BJA 592. SVPR 6 cotton is semi spreading in nature with determinant growth habit and matures in 155 days. It has recorded its potential yield of 3392 kg/ha at Raichur during 2013-14. The overall performance revealed that the cotton culture TSH 04/115 was superior over Suraj and SVPR 4 with an average seed cotton yield of 2285 kg/ha which is 11.5 % and 30.9 % increase over the zonal check Suraj (2049 kg/ha) and local check SVPR 4 (1589 kg/ha) respectively. This culture comes under the long staple category with an average upper mean half length of 29.5 mm, fibre strength of 27.3 g/tex and micronaire value of 4.0. It can spin upto 40's counts. It is moderately resistant to jassid and white fly besides tolerance to Bacterial leaf blight and Alternaria leaf spot.

### Key words

Cotton, Variety, SVPR 6, Long staple

### Introduction

Cotton is a principle fibre crop of global importance and has high commercial value which provides raw material in the form of lint to the textile industry. The productivity of cotton in India is 475 kg / ha which is significantly low as compared to the world average and other major cotton producing countries. The area under cotton remains static over the past five years with minor fluctuation between 10 and 11 million hectares. In Tamil Nadu, cotton consumption is increasing day by day, beyond 100 lakhs bales per annum while our production remains static *i.e* 5 lakhs bales/annum. The area of cotton has declined from 2.5 lakhs ha (1998-99) to 1.47 lakhs ha (2015-16). Eventhough many *Bt.* cotton hybrids were released, they could not meet the current cotton requirement of Tamil Nadu. It needs location specific varieties for different situations. In Tamil Nadu, Cotton is being grown in four different seasons namely, winter irrigated, winter rainfed, summer irrigated and rice fallow season and none of the hybrids and varieties were found to adopt in all the seasons. Similarly in summer irrigated conditions, no stable hybrid was found to be suitable for cultivation. The location specific varieties suitable for this situation are SVPR 2 and SVPR 4 for both summer and winter irrigated

conditions and SVPR 3, Anjali and MCU 7 for rice fallow cultivation. All the above said varieties are medium and superior medium staple categories where there is need for long staple cotton variety for summer irrigated conditions and satisfy the modern textile industry requirements and therefore the SVPR 6 cotton variety was released for cultivation.

### Material and Methods

In the resistance breeding project which is in operation at Cotton Research Station, Srivilliputtur, drought tolerant and medium staple parent SVPR 2 was taken as base parent and crossed with BJA 592. Pedigree method of selection was followed from F<sub>2</sub> to F<sub>5</sub> generations under unprotected condition for screening against leaf hopper. A superior segregant (TSH 04/115) with resistance to leaf hopper and desirable fibre properties was isolated in F<sub>2</sub> population and was further advanced upto F<sub>5</sub> generation to reach homozygosity. Based on the consistent performance in station yield trials over three years 2010-13 (Table 1), the cotton culture TSH 04/115 was promoted for large scale testing and forwarded to multi location trials and tested in four research station of TNAU over three years during

summer (2014-2016) and one research station of TNAU during winter (2016). Simultaneously, the performance of the culture TSH 04/115 was evaluated in coordinated varietal trials of AICCIP (South Zone) from 2013-14 to 2015-16.

### Results and Discussion

The culture TSH 04/115 was tested at Cotton Research Station, Srivilliputtur during the year 2010-11 to 2012-13. The mean of three yield trials conducted over three years indicated consistent superiority of the culture over the check SVPR 4. It has recorded an average seed cotton yield of 1956 kg/ha as against 1628 kg/ha for SVPR 4, accounting 20.1% increase over check SVPR 4 (Table 1).

In All India Coordinated Cotton Improvement Project (AICCIP) trials, the culture TSH 04/115 was tested in Br. 02 (a) NT, in Br. 03 (a) ZT and Br. 04 (a) ZT during 2013-2016. The overall performance (2013-2016) of the culture TSH 04/115 revealed that the mean seed cotton yield of 2312 kg/ha as against zonal check Suraj(2049 kg/ha) and the local check SVPR 4 (2080 kg/ha). The increase in kapas yield was 12.8 % over zonal check and 11.2 % over local check (Table 2).

During summer (2014-2016) and winter (2016), TSH 04/115 was tested in TNAU research station trials (MLT) in which TSH 04/115 registered an average seed cotton yield of 1972 kg/ha over the check SVPR 4 (1549 kg/ha). The yield increase of TSH 04/115 was 27.3 % over SVPR 4 (Table 3).

This culture comes under the long staple category with upper half mean span length of 29.5 mm, fibre strength of 27.3 g/tex and micronaire value of 4.0. It can spin upto 40's counts (Table 4a & b). TSH 04/115 was exhibited moderately resistant to leafhopper in South Zone (Guntur, Raichur, Coimbatore and Srivilliputtur), with a Mean Leaf hopper Injury Grade of 2 as compared to the susceptible check, DCH 32 with a mean Injury Grade of 4. This culture also exhibited moderate resistance to White fly besides tolerance to Bacterial leaf blight and Alternaria leaf spot (Table 5 and 6).

The overall performance revealed that the cotton culture TSH 04/115 (2285 kg/ha) was superior over SVPR 4 (1589 kg/ha) and Suraj (2049 kg/ha). The yield increase of TSH 04/115 is 30.5 % over SVPR 4 and 11.5 % over Suraj (Table 7). TSH 04/115 has recorded its potential seed cotton yield of 3392 kg/ha at Raichur in AICCIP trial Br. 02 (a) NT during 2013-14. Based on the above, the cotton culture TSH 04/115 was identified for release as Cotton SVPR 6 by the Central Variety Release Committee during 2017 for the irrigated areas of Tamil Nadu, Andhra Pradesh, Telangana and Karnataka in kharif season and also for the summer irrigated conditions of Tamil Nadu (Notification No: S.O. 1379 (E) dated 27.03.2018).

### Morphological descriptions of SVPR 6 (TSH 04/115)

Two distinguishing morphological features

- Plant is semi spreading nature with hairy stem. Monopodia and sympodia branches slightly erect towards main stem and cream petal with light yellow pollen
- Boll is medium, round to oblong with pointed tip and having 4-5 locules.

### References

- Annual Report of AICRP on Cotton (2014-15) Released in Annual Group Meet held on 8-10<sup>th</sup> April at TNAU, Coimbatore. Tamil Nadu.
- Annual Report of AICRP on Cotton (2015-16) Released in Annual Group Meet held on 7-9<sup>th</sup> April at NAU, Surat, Gujarat.
- Annual Report of AICRP on Cotton (2016-17) Released in Annual Group Meet held on 8-10<sup>th</sup> April at TNAU, Coimbatore.
- Technological Report of CIRCOT, Mumbai (2016-17). Released in Annual Group Meet of AICRP on Cotton held between 8-10<sup>th</sup> April 2017 at TNAU, Coimbatore.



### The other morphological and DUS characters for TSH 14/115

S. No.	Characteristics	TSH 04/115
1.	Hypocotyl: Pigmentation	Absent
2.	Leaf : Colour	Green
3.	Leaf : Hairiness	Medium
4.	Leaf : Appearance	Flat
5.	Leaf : Gossypol glands	Present
6.	Leaf : Nectaries	Present
7.	Leaf : Petiole pigmentation	Present
8.	Leaf : Shape	Normal
9.	Plant : Stem hairiness	Medium
10.	Plant : Stem pigmentation	Present
11.	Plant : Height (cm)	Medium Tall (105cm)
12.	Plant : Growth habit	Semi Spreading (31-60 cm)
13.	Bract : Type	Normal
14.	Flower : Time of flowering (50% of plants with at least one open flower)	Medium
15.	Flower : Petal colour	Cream
16.	Flower : Petal spot	Absent
17.	Flower : Stigma	Protruded
18.	Flower : Anther filament colouration	Absent
19.	Flower : Pollen colour	Light yellow
20.	Flower : Male sterility (Only for A and B lines)	-
21.	Boll : Bearing habit	Solitary
22.	Boll : Colour	Green
23.	Boll : Shape (Longitudinal section)	Round to oblong
24.	Boll : Surface	Smooth
25.	Boll : Prominence of tip	Pointed
26.	Boll : Opening	Open
27.	Boll : Weight of seed cotton / boll (g)	Medium (4.3g)
28.	Seed : Fuzz	Dense
29.	Seed : Fuzz colour	White
30.	Seed : Index (100 seed wt in gram)	Medium (8.7 g)
31.	Ginning (%)	Medium (33.4 %)
32.	Fibre : Colour	White
33.	Fibre : Length (UHML) (mm)	Long (29.5 mm)
34.	Fibre : Strength (g/tex)	Strong (27.3 g/tex)
35.	Fibre : Fineness (Micronaire value)	Medium (4.0)
36.	Fibre Uniformity (%)	Good (83.1)



**Table 1. Performance of TSH 04/115 at Cotton Research Station, Srivilliputtur (2010-13)**

S.No.	Entry	Seed cotton yield (kg/ha)			Average seed Cotton yield (kg/ha)	% over check SVPR 4
		2010-11 (RRYT)	2011-12 (PYT)	2012-13 (AVT)		
1.	TSH 04/115	2178	1515	2174	1956	+20.1
2.	SVPR 2	1778	1334	1591	1568	--
3.	SVPR 4	1629	1433	1822	1628	--

(RRYT-Replicated Row Yield Trial, PYT-Preliminary Yield Trial, AVT-Advanced Varietal Trial)

**Table 2. Performance of TSH 04/115 in All India Coordinated Cotton Improvement Project trials (2013-16)**

Name of proposed variety: TSH 04/115

Adaptability Zone: South Zone

Production condition: Irrigated

Particulars	Year of Testing	No. of Locations	Proposed Variety (TSH 04/115)	Check Variety (Suraj)	LC (SVPR 4)
I. (a) South Zone Mean	I year (2013-14) NT	6	2530	2338	-
II. (a) South Zone Mean	II year (2014-15) ZT	5	2414	2091	2097
III. (a) South Zone Mean	III year (2015-16) ZT	5	1947	1660	2063
	<b>Weighted mean</b>		<b>2312</b>	<b>2049</b>	<b>2080</b>
	<b>Percentage increase/decrease over the checks and qualifying varieties</b>				
I. (a) South Zone Mean	I year (2013-14) NT	6	-	+8.2	-
II. (a) South Zone Mean	II year (2014-15) ZT	5	-	+15.4	+15.1
III. (a) South Zone Mean	III year (2015-16) ZT	5	-	+17.3	-5.6
	<b>Weighted mean</b>			<b>+12.8</b>	<b>+11.2</b>
<b>Frequency in the group (pooled for 3 years)</b>		<b>16</b>	<b>5/16</b>	<b>8/16</b>	<b>-</b>



**Table3. Performance of TSH 04/115 in MLT of TNAU Research Stations (Summer2014-2016 and Winter 2016)**

S.No.	Entry	Seed Cotton Yield (kg/ha)										Average SCY (kg/ha)	% over SVPR 4
		CRS, SVPR		ARS, VGD		AC&RI,KKM		RRS, BSR		CRS, SVPR			
		2014	2015	2014	2015	2014	2015	2014	2015	S-2016	W-2016		
1.	TSH 04/115	1849	2436	2021	2000	1954	2264	1568	1549	2256	1827	1972	+27.3
2.	SVPR 2	1569	1544	1760	1650	1602	1597	1865	1472	1494	-	1617	-
3.	SVPR 4	1504	1631	1859	1950	1538	1528	828	1528	1586	1538	1549	-
4.	Surabhi	-	1707	-	1725	-	1694	-	1417	1333	-	1575	-

**Table 4a. Fibre and Spinning test of TSH 04/115**

Quality Characteristics	Year	Proposed Variety (TSH 04/115)	Check Variety (Suraj)	LC SVPR 4
GOT (%)	2013-14	33.3	36.5	-
	2014-15	33.5	35.9	33.4
	2015-16	33.4	35.4	33.9
	<b>Mean</b>	<b>33.4</b>	<b>35.9</b>	<b>33.7</b>
UHML (mm)	2013-14	29.8	30.9	-
	2014-15	29.8	31.2	28.1
	2015-16	28.8	30.6	28.5
	<b>Mean</b>	<b>29.5</b>	<b>30.9</b>	<b>28.3</b>
Micronaire value (u)	2013-14	4.1	3.9	-
	2014-15	4.0	4.1	4.2
	2015-16	3.9	3.7	4.0
	<b>Mean</b>	<b>4.0</b>	<b>3.9</b>	<b>4.1</b>
Bundle Strength (g/tex)	2013-14	26.8	29.6	-
	2014-15	26.7	29.4	27.3
	2015-16	28.5	33.3	30.1
	<b>Mean</b>	<b>27.3</b>	<b>30.8</b>	<b>28.7</b>
Uniformity Index	2013-14	82.7	82.7	-
	2014-15	82.5	82.5	82.5
	2015-16	84.0	85.0	83.0
	<b>Mean</b>	<b>83.1</b>	<b>83.4</b>	<b>82.8</b>
Elongation %	2013-14	5.7	6.2	-
	2014-15	5.4	5.4	5.4
	2015-16	6.8	6.9	7.1
	<b>Mean</b>	<b>6.0</b>	<b>6.2</b>	<b>6.3</b>

**Table 4b. Full scale spinning test report of TSH 04/115 conducted at CIRCOT, Mumbai (2016-2017)**

Variety	UHML	UI	MIC	Strength (g / tex)	E%	CSP
TSH 04/115	29.0	84	3.7	27.6	5.8	<b>2237 (40s)</b> <b>1991 (50s)</b>

Standard CSP for 40 s count: 2208

Standard CSP for 50 s count: 2300

Standard CSP for 60 s count: 2392

**Ref:** AICCIP Annual Report 2014, 15, 16 and Technological Report of CIRCOT, Mumbai for Annual Group Meet 2016-17 held on 8-10<sup>th</sup> April 2017 at TNAU, Coimbatore



**Table 5. Reaction of TSH 04/115 to leafhopper under field condition**

Location	Insect Pest	Item	Year	Proposed Variety (TSH 04/115)	Check (DCH 32)	ZC Suraj	LC
Srivilliputtur	Leafhopper	Injury Grade	2013	-	-	-	-
			2014	3	4	3	1
			2015	1	4	1	1
TNAU,CBE	Leafhopper	Injury Grade	2013	-	-	-	-
			2014	2	-	2	3
			2015	1	3	2	2
Raichur	Leafhopper	Injury Grade	2013	-	-	-	-
			2014	3	-	4	3
			2015	3	-	4	2
Lam, Guntur	Leafhopper	Injury Grade	2013	-	-	-	-
			2014	3	4	3	3
			2015	3	4	2	3
<b>Mean IG</b>				<b>2 (MR)</b>	<b>4 (MS)</b>	<b>3 (MS)</b>	<b>2 (MR)</b>
Srivilliputtur	Leafhopper	Population (No./3leaves)	2013	-	-	-	-
			2014	3.47	3.53	4.0	2.8
			2015	1.3	13.17	1.6	0.73
TNAU,CBE	Leafhopper	Population (No./3leaves)	2013	-	-	-	-
			2014	3.7	-	1.4	4.1
			2015	0.4	5.1	2.2	1.9
Raichur	Leafhopper	Population (No./3leaves)	2013	-	-	-	-
			2014	9.67	-	6.67	11.6
			2015	6.42	-	9.42	8.84
Lam, Guntur	Leafhopper	Population (No./3leaves)	2013	-	-	-	-
			2014	8.2	9.9	7.8	6.0
			2015	8.0	18.34	5.67	7.0
<b>Mean population</b>				<b>5.1</b>	<b>10.0</b>	<b>4.8</b>	<b>5.4</b>
Srivilliputtur	White fly	Population (No./3leaves)	2013	-	-	-	-
			2014	0.73	0.53	0.67	0.47
			2015	0.47	-	0.47	0.33
TNAU,CBE	White fly	Population (No./3leaves)	2013	-	-	-	-
			2014	4.6	-	7.4	4.6
			2015	0.2	2.1	0.2	0.4
Lam, Guntur	White fly	Population (No./3leaves)	2013	-	-	-	-
			2014	-	-	-	-
			2015	0.50	1.50	0.83	1.17
<b>Mean population</b>				<b>1.3</b>	<b>1.4</b>	<b>1.9</b>	<b>1.4</b>



**Table 6. Reaction to major diseases under field condition**

	Location	Year	Proposed Variety (TSH 04/115)	Zonal Check (Suraj)	Check Var. 2 Guntur (NA 1325) CBE (RCH2 BG II)
Bacterial Blight	Coimbatore	2013	-	-	-
		2015	0	0	0
Alternaria Leaf Spot	Guntur	2013	3	3	-
		2014	3	3	3
		2015	3	4	3
	Coimbatore	2013	-	-	-
		2014	0	0	2
Grey Mildew	Guntur	2015	1	1	1
		2013	3	2	-
		2014	2	3	4
		2015	3	2	4
		2015	3	2	4

**Table 7. Overall performance of cotton culture TSH 04/115 in different trials**

S.No	Particulars	No. of Trials	Higher Yield				Kapas Yield (kg/ha)				% over SVPR 4	% over Suraj
			TSH 04/115	SVPR 2	SVPR 4	Suraj	TSH 04/115	SVPR 2	SVPR 4	Suraj		
1.	Station Trials (CRS, SVPR)(2010-13)	3	3	-	-	-	1956	1568	1628	-	+20.1	-
2.	TNAU, Research Station Trials (MLT) (2014-16)	10	9	1	-	-	1972	1617	1549	-	+27.3	-
3.	All India Coordinated Cotton Improvement Project Trials (2013-2016)	16	5	-	-	8	2312	-	2080	2049	+11.2	+12.8
4.	Agronomy Trial –AICCIP (2016-17)	1	-	-	-	-	2900	-	-	-	-	-
<b>Over all Mean</b>		<b>29</b>	<b>17</b>	<b>1</b>	<b>-</b>	<b>8</b>	<b>2285</b>	<b>1593</b>	<b>1589</b>	<b>2049</b>	<b>+30.9</b>	<b>+11.5</b>