Electronic Journal of Plant Breeding, 8(4): 1028-1034 (Dec 2017)
ISSN 0975-928X
DOI: 10.5958/0975-928X.2017.00153.3

Research Article

Cotton SVPR 5 (TSH 0250) - A high yielding long staple cotton variety for southern zone of India and winter/summer irrigated tracts of Tamil Nadu

A. Ramalingam[1], M. Gnanasekaran[2], M. Gunasekaran[3], P. Amala Balu[4] and K. Thiyagu[2]
1. Dean, AC&RI, Killikulam, 2. Assistant Professor, CRS, Srivilliputtur, 3. Professor and Head, CRS, Srivilliputtur,
4. Professor, Dept. of Cotton, TNAU, Coimbatore
* Email : **gene@rediffmail.com**

(Received: 6 Dec 2017; Revised: 15 Dec 2017; Accepted: 31 Dec 2017)

Abstract
SVPR 5 is a high yielding long staple *hirsutum* cotton variety developed by Cotton Research Station, Srivilliputtur. It was released in the year of 2014 and notified during the year 2016 for *kharif* season of southern zone of India under for winter and summer irrigated tracts of Tamil Nadu. It is a hybrid derivative of the cross between NDLH 1658 and Surabhi. SVPR 5 cotton is semi spreading in nature with determinant growth habit and matures in 150 days. It has recorded a mean seed cotton yield of 1845 kg/ha which is 13.0 % increase over the zonal check Surabhi in AICCIP trials. The overall performance revealed that the cotton culture TSH 0250 was superior over SVPR 2 and SVPR 4 with an average seed cotton yield of 1661 kg/ha against 1583 kg/ha of SVPR 2 and 1425 kg/ha of SVPR 4. Its fibre qualities are comparable to Surabhi with 29.4 mm span length and 22.0g/tex of bundle strength. The cotton SVPR 5 can able to spin to 50s counts which suit the current demand of the textile industries. It is moderately resistant to leaf hopper, bacterial leaf blight, Alternaria leaf spot and grey mildew.

Keywords
Cotton variety, long staple, *hirsutum*, 50s counts

Introduction

Cotton is a major crop of global importance and has high commercial value which provides raw material in the form of lint to the textile industry. It is a principle fibre crop, as well as an important source of edible oil throughout the world. 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, summer irrigated, rice fallow and winter rainfed 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 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 has resulted in the release of SVPR 5 cotton variety.

Materials and Methods

In the resistance breeding project, high yielding drought tolerant parent NDLH 1658 was taken as base parent and crossed with long staple cotton variety Surabhi during 2003. Pedigree method of selection was followed from F_2 to F_5 generations under unprotected condition for screening against leaf hopper. A superior segregant with resistance to leaf hopper and desirable fibre properties was isolated in F_2 population and was further advanced upto F_5 generation to reach homozygosity. Based on the consistent performance in station yield trials (Table 1), the cotton culture TSH 0250 was promoted for large scale testing and forwarded to multi location trials for testing in three research station of TNAU during summer 2011. Simultaneously, the performance of the culture TSH 0250 was evaluated in coordinated varietal trials of AICCIP (South Zone) from 2011 to 2013. Adoptive Research Trials (ART) was also conducted over 50 locations during 2012, 2013 under summer irrigated conditions in Tamil Nadu.

Result and discussion

The culture TSH 0250 was tested at Cotton Research Station, Srivilliputtur during the year 2006-2008. The mean of three yield trials conducted over three years indicated consistent superiority of the culture over the standard check SVPR 2. It has recorded an average seed cotton yield of 1832 kg/ha as against 1402 kg/ha for

DOI: 10.5958/0975-928X.2017.00153.3

SVPR 2, accounting 30.7% increase over check SVPR 2 (Table 1).

In All India Coordinated Cotton Improvement Project (AICCIP) trials, the culture TSH 0250 was tested in Br. 02 (a) NT, in Br. 03 (a) ZT and Br. 04 (a) ZT during 2010-2013. The overall performance (2010-2012) of the culture TSH 0250 revealed that it recorded mean seed cotton yield of 1845 kg/ha as against zonal check (1633 kg/ha) and the local check (1662 kg/ha). The increase in kapas yield was 13.0 % over zonal check Surabhi and 11.0 % over local check SVPR 2. (Table 2).

During summer 2011, TSH 0250 was tested in three TNAU research station trials (MLT) in which TSH 0250 registered an average seed cotton yield of 1598 kg/ha over the check SVPR 2 (1397 kg/ha). The yield increase of TSH 0250 was 10.3 % over SVPR 2 (Table 3).

In Adaptive Research Trials conducted over 50 locations during summer 2011-13 revealed that the culture TSH 0250 (1489 kg/ha) proved its superiority over SVPR 2 (1346 kg/ha) and SVPR 4 (1425 kg/ha) with yield increase of 10.6% and 4.5% respectively. (Table 4).

It has high seed cotton yield besides, notable lint yield (651 kg/ha) compared to the zonal check (569 kg/ha). This culture comes under the long staple category with 2.5% span length of 29.4 mm, fibre strength of 22.0 g/tex and micronaire value of 3.6. It can spin to 50's counts. (Table 5a & b). TSH 0250 is Moderately Resistant to leafhopper in South Zone (Guntur, Raichur, Coimbatore and Srivilliputtur), which recorded Mean Leaf Hopper Injury Grade of 2.09, whereas, DCH 32 (Susceptible check to leafhopper) registered a mean Injury Grade of 3.93 and Surabhi had Injury Grade of 2.77 (Moderately susceptible) and this culture also registered moderately resistant to Bacterial Leaf Blight, Alternaria Leaf Spot, and Grey mildew (Table 6 and 7).

The overall performance revealed that the cotton culture TSH 0250 was superior over SVPR 2 and SVPR 4 with an average seed cotton yield of 1661 kg/ha against 1583 kg/ha of SVPR 2 and 1425 kg/ha of SVPR 4. The yield increase of TSH 0250 is 6.8 % over SVPR 2 and 18.7 % over SVPR 4 (Table 8). TSH 0250 has recorded the potential seed cotton yield of 3266 kg/ha at Raichur in AICCIP trial Br. 03 (a) ZT during 2011-12. Based on the above, the cotton culture TSH 0250 was identified as Cotton SVPR 5 by the Central Variety Release Committee during 2016 for the irrigated areas of Tamil Nadu, Andhra Pradesh, Telangana and Karnadaka in kharif season and also for the summer irrigated conditions of Tamil Nadu (Notification No: S.O. 3540 (E) dated 22.11.2016).

Morphological descriptions of TSH 0250

Two distinguishing morphological features

- Plant is semi spreading nature with hairy stem. Boll is medium, round to oblong with pointed tip and having 4-5 locules.
- Light yellow petal with cream pollen

SI. No.	Characteristics	TSH 0250
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
1(	Plant : Stem pigmentation	Present
1:	Plant : Height (cm)	Medium Tall (104-120 cm)
1:	Plant : Growth habit	Semi Spreading (31-60 cm)
1:	Bract : Type	Normal
1-	Flower : Time of flowering (50% of plants with at least one open flower)	Medium
1:	Flower : Petal colour	Light Yellow
1(	Flower : Petal spot	Absent
1:	Flower : Stigma	Slightly protruded
1:	Flower : Anther filament colouration	Absent
1:	Flower : Pollen colour	Cream
2(	Flower : Male sterility (Only for A and B lines)	-
2:	Boll : Bearing habit	Solitary
2:	Boll : Colour	Green
2:	Boll : Shape (Longitudinal section)	Round to oblong
2-	Boll : Surface	Smooth
2:	Boll : Prominence of tip	Pointed
2(	Boll : Opening	Open
2:	Boll : Weight of seed cotton / boll (g)	Medium (4.1g)
2:	Seed : Fuzz	Dense
2:	Seed : Fuzz colour	Grey
3(	Seed : Index (100 seed wt in gram)	Medium (8.2 g)
3:	Ginning (%)	Medium (34.9 %)
3:	Fibre : Colour	White
3:	Fibre : Length (2.5 % span length) (mm)	Long (29.4 mm)
3-	Fibre : Strength (g/tex)	Medium (22.0 g/tex)
3:	Fibre : Fineness (Micronaire value)	Fine (3.6)
3(	Fibre Uniformity (%)	Good (46.5 %)
3:	Fibre: Maturity (%)	Good (0.75)

.

Electronic Journal of Plant Breeding, 8(4): 1028-1034 (Dec 2017)
ISSN 0975-928X
DOI: 10.5958/0975-928X.2017.00153.3

Table 1. Performance of TSH 0250 at Cotton Research Station, Srivilliputtur (2006-09)

S.No.	Entry	Seed cotton yield (kg/ha)			Average seed Cotton yield (kg/ha)	% over check SVPR 2
		2006-07 (RRYT)	2007-08 (PYT)	2008-09 (AVT)		
1.	TSH 0250	1880	1620	1995	1832	+30.7
2.	Sumangala	1465	1325	1612	1467	-
3.	SVPR 2	1510	1280	1416	1402	-

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

Table 2. Performance of TSH 0250 in All India Co-ordinate Cotton Improvement Project trials (2010-13

Name of proposed variety: TSH 0250 Adaptability Zone: South Zone
Production condition: Irrigated

Particulars	Year of Testing	No. of Locations	Proposed variety (TSH 0250)	Check Var. 1 Surabhi/ Suraj	LC SVPR 2
		Mean Yield (kg/ha)			
I.(a) South Zone Mean	I year (2010-11) NT	**9**	**1850**	**1550**	**1523**
II. (a) South Zone Mean	II year (2011-12) ZT	**8**	**1939**	**1733**	**1703**
III. (a) South Zone Mean	III year (2012-13) ZT	**6**	**1715**	**1623**	**1814**
	Weighted mean		**1845**	**1633**	**1662**
	Percentage increase/decrease over the checks and qualifying varieties				
I.(a) South Zone Mean	I year (2010-11) NT	**9**		**+19.4**	**+21.5**
II. (a) South Zone Mean	II year (2011-12) ZT	**8**		**+11.9**	**+13.9**
III. (a) South Zone Mean	III year (2012-13) ZT	**6**		**+5.7**	**-5.5**
	Weighted mean			**+13.0**	**+11.0**

Table 3. Performance of TSH 0250 in MLT of TNAU research Stations (Summer 2011)

SI.No.	Entry	Seed cotton yield (kg/ha)			Average seed cotton yield (kg/ha)	% over SVPR 4
		CRS, SVPR	AC & RI, MDU	TRRI, Aduthurai		
1.	TSH 0250	2200	1815	778	1598	+10.3
2.	SVPR 2	1890	1650	651	1397	-
3.	SVPR 4	1950	1681	716	1449	-
4.	MCU 5	1450	1500	680	1210	-

 DOI: 10.5958/0975-928X.2017.00153.3

Table 4. Performance of TSH 0250 in Adaptive Research Trial conducted during summer -2012 and 2013

Locations	TSH 0250	SVPR 2	SVPR 4	% over SVPR 2	% over SVPR 4
		ART/05/2011-12			
Tirunelveli	1617	1489	1526	+8.6	+6.0
Trichy	1209	1207	1169	+0.1	+3.4
Madurai	1462	1408	1521	+3.8	-3.9
Virudhunagar	1541	1341	1521	+14.9	+1.3
Over all Mean (20 Locations)	**1457**	**1361**	**1434**	**+7.1**	**+1.6**
		ART/05/2012-13			
Tirunelveli	1385	1220	1303	+13.5	+6.3
Trichy	1110	1171	1270	-5.2	-12.6
Madurai	1226	1305	1287	-6.1	-4.8
Virudhunagar (KVK, APK)	1736	1433	1566	+21.1	+10.9
Nagapattinam (KVK, Sikkal)	1750	1439	1513	+21.6	+15.7
Salem (KVK, Sandhiyur)	1926	1446	1551	+33.2	+24.2
Over all Mean (30 Locations)	**1522**	**1336**	**1415**	**+13.9**	**+7.6**
Grand Mean (50 Locations)	**1489**	**1346**	**1425**	**+10.6**	**+4.5**

TSH 0250 recorded higher yield in 32 locations out of 50 locations evaluated)

 DOI: 10.5958/0975-928X.2017.00153.3

Table 5 a. Fibre and Spinning test of TSH 0250

Quality Characteristics	Years	Proposed variety (TSH 0250)	Check Var. 1 (Surabhi/Suraj)	LC (SVPR 2)
GOT (%)	2010-11	36.0	33.4	35.0
	2011-12	35.0	32.4	37.1
	2012-13	33.6	32.8	31.4
	Mean	**34.9**	**32.9**	**34.5**
2.5% Span Length (mm)	2010-11	28.9	34.2	26.8
	2011-12	28.7	32.1	29.6
	2012-13	28.9	31.4	27.4
	2013-14 (SVPR)	31.2	-	-
	2013-14 (LAM, Guntur)	29.4	-	-
	Mean	**29.4**	**32.6**	**27.9**
Micronaire value	2010-11	5.2	4.3	4.9
	2011-12	3.1	2.9	3.4
	2012-13	3.2	3.2	2.9
	2013-14 (SVPR)	3.8	-	-
	2013-14 (LAM, Guntur)	2.7	-	-
	Mean	**3.6**	**3.5**	**3.7**
Bundle Strength (g/tex)	2010-11	20.1	22.2	18.8
	2011-12	23.3	25.6	22.2
	2012-13	22.7	24.1	22.4
	2013-14 (SVPR)	23.1	-	-
	2013-14 (LAM, Guntur)	21.0		
	Mean	**22.0**	**24.0**	**21.1**
Uniformity Ratio (%)	2013-14 (SVPR)	47	-	--
	2013-14 (LAM, Guntur)	46	-	-
	Mean	**46.5**	**-**	**-**

Table: 5b. Full scale spinning test report of TSH 0250 conducted at CIRCOT, Mumbai (2013-2014)

Variety	2.5% SL	UR	MIC	Strength (g / tex)	E%	CSP
TSH 0250	31.2	47	3.8	23.1	6.1	**2418 (50s)**

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 2011, 12, 13 and Technological Report of CIRCOT, Mumbai for Annual Group Meet 2013-14 held on 7-9th April 2014 at PAU, Ludhiana

DOI: 10.5958/0975-928X.2017.00153.3

Table 6. Reaction of TSH 0250 to leafhopper under field condition

Location	Insect Pest	Item	Year	Proposed variety (TSH 0250)	Check var.1 (DCH 32)	Check var.2 ZC (Surabhi/ Suraj)	LC
Lam,Guntur	Leafhopper	Injury Grade	2010	2	3.5	1.5	2
			2011	2	4	3	3
			2012	3	4	4	3
Raichur	Leafhopper	Injury Grade	2010	4	-	3	4
			2011	1	4	3	3
			2012	2	4	3	4
TNAU,CBE	Leafhopper	Injury Grade	2010	-	-	-	3
			2011	1	-	2	2
			2012	2	-	2	2
Srivilliputtur	Leafhopper	Injury Grade	2010	2	-	4	3
			2011	2	4	2	3
			2012	2	4	3	3
Mean IG				**2.09** (MR)	**3.93** (MS)	**2.77 (MS)**	
Lam,Guntur	Leafhopper	Population (No./3leaves)	2010	3.5	8.62	2.25	4.1
			2011	8.5	14.1	11.0	8.8
			2012	12.7	15.2	13.0	8.8
Raichur	Leafhopper	Population	2010	15.8	-	9.8	11.8
			2011	6.4	15.2	10.8	8.8
			2012	4.33	10.67	5.37	10.33
TNAU,CBE	Leafhopper	Population	2010	-	-	-	2.1
			2011	1.4	-	0.6	1.8
			2012	3.1	-	1.8	1.4
Srivilliputtur	Leafhopper	Population	2010	1.7	-	9.0	7.3
			2011	2.90	8.90	2.5	4.2
			2012	4.33	8.33	3.67	3.67
Mean population				**5.88**	**11.57**	**6.34**	

DOI: 10.5958/0975-928X.2017.00153.3

Table 7 - Reaction to major diseases under field condition

Diseases	Location	Year	Proposed variety (TSH 0250)	Check Var. 1 Surabhi/Suraj	CLCUV Check F 1861
BLB (Bacterial Leaf Blight)	Guntur	2010	2	3	0
		2011	2	1	-
		2012	-	-	-
ALB (Alternaria Leaf Blight)	Guntur	2010	2	4	1
		2011	2	2	-
		2012	2	2	-
	Coimbatore	2010	-	-	-
		2011	1	1	-
		2012	0	3	-
Grey Mildew	Guntur	2010	0	0	0
		2011	-	-	-
		2012	-	-	-

Table 8. Overall performance of cotton culture TSH 0250 in different trials

SI.No	Particulars	No. of Trials	Higher Yield			Kapas Yield (kg/ha)			% over	% over
			TSH 0250	SVPR 2	SVPR 4	TSH 0250	SVPR 2	SVPR 4	SVPR 2	SVPR 4
1.	Station Trial (CRS, SVPR)	3	3	-	-	1832	1402	-	+30.7	-
2.	TNAU, Research station trials (MLT)	3	3	-	-	1598	1397	-	+14.4	-
3.	All India Co-ordinated Cotton Improvement Project trials (2011-2013)	23	11	10	-	1845	1662	-	+11.1	-
4.	Adoptive Research Trials (Summer 2012, 2013)	50	32	10	7	1489	1346	1425	+10.6	+4.5
	Overall Mean	**79**	**49**	**20**	**7**	**1691**	**1583**	**1425**	**+6.8**	**+18.7**