



SVPR 4 – A High Yielding Superior Medium Staple Cotton Variety for Summer Irrigated / Rice Fallow Tracts of Tamil Nadu

A. Ramalingam*, C. Vanniarajan, M. Suriachandra selvam and N. Murugeswaran

Cotton Research Station, Srivilliputtur - 626 125

SVPR 4 is a high yielding superior medium staple cotton variety developed at Cotton Research Station, Srivilliputtur. It was released in the year of 2009 for summer irrigated/ Rice fallow cotton tracts of Tamil Nadu. It is a hybrid derivative of the cross between MCU 5 and S 4727. SVPR 4 cotton is robust in nature with determinant growth habit and matures in 150 days. It has recorded an average seed cotton yield of 1583 kg/ha which is 13.0 % increase over SVPR 2. Its fibre qualities are comparably superior to SVPR 2 with 27.9 mm span length and 22.5 g/tex strength. The cotton SVPR 4 can spin 40's counts which is the current demand of the textile Industries. It is moderately resistant to leaf hopper and tolerant to drought in summer irrigated season. Hence, SVPR 4 cotton was released as an alternate variety to replace SVPR 2 in summer irrigated cotton area and SVPR 3 in rice fallow tracts of Tamil Nadu.

Key words: Cotton, SVPR 4, Rice fallow, Summer irrigated

*Corresponding author email: alagumuthuramalingam@gmail.com

In Tamil Nadu cotton is cultivated in different eco systems of which the high productivity and production is realized in summer irrigated / rice fallow condition. The present acreage of 40,000 hectare is very meagre and there is a great possibility for expanding the area in rice fallow / summer condition (Koodalingam *et al.*, 1998). Cotton consumption is increasing day by day, beyond 90 lakh bales per annum and our production remains static, *i.e* 5 lakh bales/annum. The area of cotton is declining from 2.5 lakhs ha to 1.6 lakh ha in the current year 2010-2011 (Anon, 2010). Even though many Bt cotton hybrids were released, it could not meet the current requirement of Tamil Nadu. It needs location specific varieties for different situations. None of the Bt. hybrid / Non Bt hybrid was found to adopt in summer condition. The location specific varieties suitable for this situation are SVPR 2 for summer irrigated and SVPR 3/MCU 7 for rice fallow cultivation of Tamil Nadu. Since the recent requirement of textile industries towards 40's counts, the existing varieties could not match the requirements. Hence to overcome the above situation, attempts were made to develop a high yielding cotton variety with recent CIRCOT quality norms and the release of SVPR 4 cotton variety can meet this demand.

Materials and Methods

Long staple cotton variety MCU 5 was taken as base parent and crossed with multiple resistant donor S 4727 during 1997. Pedigree method of selection was followed from F₂ to F₅ generations under unprotected condition for screening against leaf hopper. A superior segregant with resistance to leaf hopper and drought was isolated in F₂

population and was further evaluated upto F₅ generation to reach homozygosity as TSH 9704. Based on the consistent performance in station yield trials, the cotton culture TSH 9704 was selected for large scale testing and forwarded to Multi Location Trials (MLT) for testing in three research station of TNAU during summer 2003. The performance of the culture TSH 9704 was evaluated in coordinated varietal trials of AICCIP (South Zone) from 2002 to 2004. Adaptive Research Trials (ART) were also conducted over 69 locations during 2005 to 2007 under summer irrigated/rice fallow conditions and released as SVPR 4.

Results and Discussion

The culture TSH 9704 (SVPR 4) was tested at Cotton Research Station, Srivilliputtur from the year 2000 to 2008. The mean of ten yield trials conducted over eight years indicated consistent superiority of the culture over the standard check SVPR 2. It has recorded an average seed cotton yield of 2170 kg/ ha as against 1657 kg/ha for SVPR 2, accounting for 31.0 % increase over check SVPR 2 (Table 1).

In All India Co-ordinated Cotton Improvement Project (AICCIP) trials, the culture TSH 9704 was tested in Initial Evaluation Trial (Breeding 02 (a)) during 2002 and in Preliminary Varietal Trial (Br. 03 (a)) and Co-ordinated Varietal Trial for rice fallow I(Br.04 (c) 1 during 2003. TSH 9704 has established its superiority over SVPR 3 (zonal check) and local check SVPR 2 by recording 10.1 % increase over SVPR 2 and 17.1 % increase over SVPR 3 respectively (Table 1).

During summer 2003, TSH 9704 was tested MLT (two TNAU research station trials) and registered an average seed cotton yield of 1932 kg/ha against

Table 1. Yield performance of COTTON TSH 9704 in different trials

Particulars	No. of trials	No. of trials in which higher yield obtained		Seed Cotton Yield (kg/ha)			% increase over	% increase over
		TSH 9704	SVPR 2	TSH 9704	SVPR 2	SVPR 3	SVPR 2	SVPR 3
Station Trial								
(Cotton Research Station, Srivilliputtur)	10	10	-	2170	1657	1646	31.0	31.8
TNAU, Research station trials (MLT I)	2	2	-	1932	1677	-	15.2	-
All India Co-ordinated Cotton Improvement Project trials 2002-2003								
a.SZ Trials (W-2002-Br. 02 (a))	6	3	3	2033	1847	-	10.1	-
b.Rice fallow tracts – Br. 04 C1 (S 2003)	4	3	1	1995	1612	1701	23.8	17.1
Adaptive Research trials (Summer 2005)	20	14	6	1392	1330	-	5.0	-
Adaptive Research trials (Summer 2006)	49	41	8	1455	1322	-	10.1	-
Over all mean	91	73	18	1583	1402	-	13.0	-

the check SVPR 2 (1677 kg/ha). The yield increase to the tune of 15.2 % over SVPR 2 was observed in the culture TSH 9704 (Table 1).

In Adaptive Research Trials at 20 locations conducted during summer 2005 revealed that the culture TSH 9704 recorded its superiority over SVPR 2 with an in yield increase of 5 per cent under summer conditions. Similarly in the Adaptive

Table 2. Fibre and Spinning test of TSH 9704

Particulars	CIRCOT, Coimbatore	CIRCOT, Coimbatore	CIRCOT, Mumbai	CIRCOT, Coimbatore Average	
	Summer 2005	ART sample summer 2006	Full scale spinning test 2007-2008	Summer 2008-09	
2.5% span length (mm)	28.7	27.0	26.5	29.3	27.9
Uniformity ratio	49	50	49.0	46.0	48.5
Fineness(Micronaire value)	4.9	4.0	4.1	3.7	4.2
Bundle strength (g/tex)	22.2	22.9	21.7	23.0	22.5
Elongation percent	5.8	5.2	5.4	4.4	5.2
			Strength / length ratio	0.81	

Research Trials at 49 locations, conducted during summer 2006 revealed that the culture TSH 9704 was found to be superior than SVPR 2 with yield increase of 10.1 per cent (Table 1).

Besides its high yield, TSH 9704 also possess higher lint yield (573 kg/ha) than SVPR 2 (504 kg/ ha). TSH 9704 is a superior medium staple cotton with an average 2.5 % span length of 27.9 mm, fibre

Table 3. Full scale spinning test report of TSH 9704 conducted at CIRCOT, Mumbai (2007-2008)

St. No.	Code No/ variety	2.5% Staple Length	Uniformity Ratio	MIC	Maturity %	Strength (3.2 g/tex)	Elongation %	CSP
072838	TSH 9704	26.5	49	4.1	66	21.7	5.4	2244 (40s) 2075 (50s)
072839	SVPR 2	24.5	51	4.1	61	21.2	6.5	2109 (30s) 2052 (40s)
Minimum		24.5	49	4.1	61	21.2	5.4	
Maximum		26.5	51	4.1	66	21.7	6.5	
Average		25.5	50	4.1	64	21.5	6.0	

Standard CSP for 30 s count : 2116 Standard CSP for 40 s count : 2208

strength of 22.5 g/tex in 1/8 gauge and micronaire value of 4.2. Hence the fibre properties of TSH 9704 match the recent CIRCOT norms and can spin 40s counts (Table 2-4).

Table 4. Comparative fibre and spinning trait of TSH 9704 with SVPR 2

Particulars	TSH 9704	SVPR2
2.5% span length (mm)	27.9	24.1
Uniformity ratio	48.5	51.0
Fineness (Micronaire value)	4.2	3.3
Bundle strength (g/tex)	22.5	21.2
Elongation percent	5.2	8.6
Strength / length ratio	0.81	0.87
Ginning outturn (%)	36.2	36.0
Lint yield (kg/ha)	573	504
Seed index (g)	8.4	7.8
Lint index (g)	4.8	4.2

TSH 9704 is moderately resistant to leaf hopper with an average population of 2.5 per plant (Table 5). TSH 9704 exhibited a high relative water content of 90.0 and 82.5 % on 60 & 90 DAS respectively under stress. It has also registered a high proline content of 0.094 with lesser square shedding of 18

Table 5. Reaction of TSH 9704 to leaf hopper and drought under controlled condition (Summer, 2006)

Entry	Leaf hopper			Relative water content (RWC) In %	
	Population (No./Plant)	Injury grade	Reaction	60 DAS	90 DAS
TSH 9704	2.5	2.0	MR	90.0	82.5
SVPR 2	2.2	2.0	MR	87.5	78.5
MCU 5	12.2	4.0	HS	74.7	70.5

MR-Moderately resistant; HS-Highly susceptible (1-4 scale)

% during peak flowering stage when the night temperature attains the maximum of more than 27°C. Stem and leaf petioles are pigmented with purple colour when exposed to high intensity of sunlight. This adoption mechanism has avoided the absorption of sunlight during summer season.

Table 6. Reaction of TSH 9704 to drought under summer irrigated condition (Summer 2006)

Entry	Relative water content (RWC) In %		Proline content (mg/g fresh weight)	% of square shedding when the night temperature is >27°C(60-90 DAS during 15 th April-15 th May)
	60 DAS	90 DAS		
TSH 9704	90.0	82.5	0.094	18.0
SVPR 2	87.5	78.5	0.089	21.4
MCU 5	74.7	70.5	0.062	54.6

Hence it is suitable for Adaptable Srivilliputtur IPM Module under summer condition (Table 7).

An overall analysis revealed that the cotton culture TSH 9704 was superior over SVPR 2 with an average seed cotton yield of 1583 kg/ha against 1402 kg/ha of SVPR 2. The yield increase of TSH 9704 is 13.0 % over SVPR 2 (Table 1). It has recorded the maximum yield potential of 3772 kg kapas per hectare at LAM Farm, Guntur in the National trial of AICCIP. Based on the above desirable features the cotton culture TSH 9704 was released as SVPR 4

Table 7. Performance of TSH 9704 in IPM trials (Summer, 2006)

Entry	Seed Cotton Yield (kg/ha)		% of yield increase over conventional method
	Conventional method	ASIPM Module	
TSH 9704	1950	2220	13.9
SVPR 2	1650	1820	10.3

cotton by the State Variety Release Committee, Tamil Nadu during 2009 for the summer irrigated/ rice fallow tracts of Tamil Nadu. This variety was notified for the above eco system of Tamil Nadu during 2010 vide Notification order No. 1816 dated: 31.08.2010

Morphological descriptions of SVPR 4 (TSH 9704)

Two distinguishing morphological features

Stem is slightly pubescent, pigmented with purple colour when exposed to sunlight (Anon, 1997).

Cream petal with yellow pollen

The other morphological characters are

Plant height	:	100 – 120 cm
Distinguishing morphological characters (as in Crop Production Guide)	:	Stem is slightly pubescent, pigmented with purple colour when exposed to sunlight. Cream petal with yellow pollen

Hence it is tolerant to drought (Table 6) adopted to and high night temperature prevailing in summer season. In IPM demonstration plot, the culture TSH 9704 has recorded an average seed cotton yield of 2220 kg/ha in ASIPM plot which is 13.9 % increase against the conventional method (1950 kg/ha).

Growth habit and plant type	:	Plant is erect, tall with determinate growth habit.
No. of monopodia	:	1- 2
Leaves and petiole	:	Leaves are broad, palmate lobed, green with purple pigmentation on the leaf petiole
Stem	:	Stem is slightly pubescent, pigmented with purple colour when exposed to sunlight.
Petal colour	:	Cream
Anther colour	:	Yellow
Petal spot	:	Absent
Boll	:	Medium, oblong with pointed tip
Epicalyx	:	Bract is pigmented with purple colour when exposed to sunlight
Boll weight	:	3.6 g
No. of locules per boll	:	3 – 4
Seeds	:	Fuzzy
Seed index	:	8.4 g
Lint index	:	4.8 g
Lint Colour	:	White

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