

BT COTTON HYBRIDS EVALUATION REPORT

CENTRAL ZONE : 2010-11

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Report by

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BT COTTON HYBRIDS EVALUATION REPORT

(CENTRAL ZONE)

The Indian Council of Agriculture has assigned the task of evaluating the Private sector Bt cotton hybrids belonging to the approved events to the All India Coordinated Cotton Improvement Project (AICCIP) in the Central Zone vide ICAR letter No. 2-3/2010-CCI Dt. 17.05.2010. The details of the trial conducted are as follows:

Test Entries

There were two sets of trials, one under irrigated conditions and the other under rainfed situation. In both the trials, both BG I and BG II check hybrids were included apart from test entries. The hybrids evaluated were given below.

I. Irrigated trial entries:

Institution	Name of the Hybrid
Ankur Seeds Pvt. Ltd.	Ankur 5642 BG II
Mahyco	MRC 7388 BG II, MRC 7391 BG II
Monsanto	DPC 9066 BG II, Sudarshan BG II
Namdhari Seeds Pvt. Ltd.	Namcot 605 BG II, Namcot 627 BG II
Nuziveedu Seeds Pvt. Ltd.	NCS 9012 Bt 2, NCS 567 Bt 2
Prabhat Agri Biotech Ltd.	PCH 9605 Bt 2, PCH 789 Bt 2
Pravardhan	PRCH 731 Bt 2
Rasi	RCH 668 BG II
Tulasi Seeds Pvt. Ltd.	Tulasi 252 BG II, Tulasi 135 BG II
Vibha	VBCH 1539 BG II
Vikram seeds	VICH 304 BG II, VICH 313 BG II
Xylem Seeds Pvt. Ltd.	NSPL 252 BG II
Check I	RCH 2 BG I
Check II	RCH 2 BG II

II. Rainfed trial entries

Institution	Name of the Hybrid
Ankur Seeds Pvt. Ltd.	Ankur 5642 BG II
Monsanto	DPC 7065 BG II, DPC 5061 BG II
Namdhari Seeds Pvt. Ltd.	Namcot 614 BG II, Namcot 615 BG II
Nuziveedu Seeds Pvt. Ltd.	NCS 9012 BG II, NCS 567 BG II
Prabhat Agri Biotech Ltd.	PCH 9605 BG II, PCH 789 BG II
Pravardhan	PRCH 731 BG II
Rasi	RCH 665 BG II
Tulasi Seeds Pvt. Ltd.	Tulasi 171 BG II, Tulasi 144 BG II
Vibha	VBCH 1503 BG II
Vikram seeds	VICH 311 BG II, VICH 314 BG II
Xylem Seeds Pvt. Ltd.	NSPL 252 BG II
Check I	Bunny BG I
Check II	Bunny BG II

The trial locations

The irrigated and rainfed trials were conducted in the following locations.

Irrigated trials

1. Cotton Research Station, Khandwa under Rajamatha Vijayaraje Scindia Krishi Vishwa Vidyalaya, Madhya Pradesh.
2. Cotton Research Station, Surat under Navsari Agricultural University, Gujarat.
3. Regional Cotton Research Station, Junagadh under Junagadh Agricultural University, Gujarat.
4. Agricultural Research Station, Talod under Sardarkrishinagar Dantiwada Agricultural University, Gujrat.
5. Agricultural Research Station, Banswara under Maharana Pratap University of Agriculture and Technology, Rajasthan

Rainfed trials

1. College of Agriculture, Indore under Rajamatha Vijayaraje Scindia Krishi Vishwa Vidyalaya, Madhya Pradesh.
2. Regional Cotton Res. Station, Bharuch under Navsari Agricultural University, Gujrat.
3. Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, Maharashtra

4. Cotton Research Station, Nanded under Marathwada Agricultural University, Maharashtra and
5. Central Institute for Cotton Research, Nagpur, Maharashtra.

The trial details:

Irrigated Trial

Number of Entries	19 + 2 checks
Number of rows	Six
Row length	6 M
Spacing	90 x 60 Cm
Number of replications	Three
Design	Randomised Block Design
Fertilizers	As per local recommendation

Rainfed Trial

Number of Entries	17 + 2 checks
Number of rows	Three
Row length	6 M
Spacing	90 x 60 Cm
Number of replications	Three
Design	Randomised Block Design
Fertilizers	As per local recommendation

Method of evaluation

Weekly observations were recorded from 45 DAS against major sucking pests and bollworms. The insecticidal sprayings were given based on the economic threshold levels of the sap sucking pests and bollworms. The sprayings were undertaken in all the replication of an entry, even if the threshold level of infestation had exceeded only in one of the replications.

Observations recorded

The biometrical observations like germination percentage, final plant stand, mean boll weight, ginning percentage, lint and seed index and seed cotton yield were recorded in the ETL based plant protection trial. Important fibre quality attributes like 2.5% span length, micronaire and fibre strength were also determined through the High Volume Instrument. The entomological observations on sap sucking pests, bollworms, green boll damage, open boll damage and locule damage were also recorded in ETL based trial. Under unprotected conditions, boll and locule damage and seed cotton yield were assessed.

The trials have been reported in two parts. In the first part, irrigated trials have been reported. In the second part, rainfed trial results have been reported.

IRRIGATED TRIALS

In this trial, 19 test hybrids were evaluated with two Bt check hybrids viz., RCH 2 BG I and RCH 2 BGII. The sowings were completed during the first fortnight of July 2010.

A. BIOMETRICAL EVALUATION

Biometrical observations recorded in the ETL based plant protection trial are reported below.

Germination and final plant stand

The germination of all the entries at all the locations was very good with corresponding plant stand maintained at harvest.

Boll weight, Ginning Outturn, Lint Index and Seed Index:

The data recorded on boll weight (g/boll), ginning outturn (%), lint index (g) and seed index (g) in various locations are furnished in Tables 1-3.

Table 1. Boll weight (g)

Hybrid	Surat	Junagadh	Talod	Khandwa	Mean
NCS 9012 Bt 2	4.0	4.9	5.1	3.8	4.4
Namcot 605 BG II	4.1	4.5	5.0	2.8	4.1
PRCH 731 Bt 2	5.1	5.6	4.5	4.0	4.8
VBCH 1539 BG II	4.2	5.2	5.3	3.6	4.6
MRC 7388 BG II	4.3	5.3	5.1	3.5	4.6
RCH 668 BG II	4.1	4.7	5.4	3.4	4.4
RCH 2 BG II	3.3	4.3	4.0	3.0	3.6
VICH 304 BG II	3.7	4.6	5.7	2.9	4.2
DPC 9066 BG II	5.2	5.0	6.0	3.6	5.0
RCH 2 BG I	3.5	3.8	5.1	3.1	3.9
NSPL 252 BG II	3.6	5.3	5.3	4.3	4.6
Tulasi 252 BG II	5.2	4.9	5.9	3.6	4.9
VICH 313 BG II	4.1	5.3	5.7	3.2	4.6
Tulasi 135 BG II	5.1	3.6	4.6	3.1	4.1
PCH 9605 Bt 2	3.8	4.7	6.0	3.2	4.4
Ankur 5642 BG II	3.3	4.8	4.9	3.0	4.0
PCH 789 Bt 2	4.1	4.4	4.7	3.1	4.1
NCS 567 Bt 2	5.2	5.5	4.9	3.8	4.9
MRC 7391 BG II	4.2	5.4	5.8	3.4	4.7
Sudarshan BG II	3.8	4.0	4.8	3.5	4.0
Namcot 627 BG II	4.4	4.4	4.7	3.7	4.3

Table 2. Ginning Outturn %

Hybrid	Surat	Junagadh	Talod	Khandwa	Mean
NCS 9012 Bt 2	33.2	31.6	32.8	34.7	33.1
Namcot 605 BG II	34.2	32.0	35.2	34.4	34.0
PRCH 731 Bt 2	33.3	32.3	33.7	34.7	33.5
VBCH 1539 BG II	34.9	32.9	35.4	34.7	34.5
MRC 7388 BG II	33.6	32.2	33.3	33.3	33.1
RCH 668 BG II	35.6	33.7	35.3	33.3	34.5
RCH 2 BG II	30.6	32.3	35.9	34.4	33.3
VICH 304 BG II	37.5	33.5	35.8	34.3	35.3
DPC 9066 BG II	33.9	31.9	31.1	32.8	32.4
RCH 2 BG I	31.3	33.0	33.6	34.9	33.2
NSPL 252 BG II	37.1	32.7	35.3	34.1	34.8
Tulasi 252 BG II	32.2	30.2	31.2	32.3	31.5
VICH 313 BG II	29.4	30.3	30.9	19.2	27.5
Tulasi 135 BG II	34.4	32.1	33.6	31.7	33.0
PCH 9605 Bt 2	34.7	31.5	33.0	16.0	28.8
Ankur 5642 BG II	31.7	30.2	29.8	33.0	31.2
PCH 789 Bt 2	31.2	30.0	31.2	36.7	32.3
NCS 567 Bt 2	31.6	31.8	32.8	28.8	31.2
MRC 7391 BG II	32.5	32.0	35.0	32.9	33.1
Sudarshan BG II	37.5	33.4	35.7	33.3	35.0
Namcot 627 BG II	34.6	34.7	35.9	31.1	34.1

Table 3. Lint Index (g) and Seed Index (g)

Hybrid	Lint Index (g)			Seed Index (g)		
	Surat	Khandwa	Mean	Surat	Khandwa	Mean
NCS 9012 Bt 2	5.1	4.0	4.6	10.3	8.0	9.2
Namcot 605 BG II	5.4	4.0	4.7	10.3	7.0	8.7
PRCH 731 Bt 2	5.1	4.0	4.5	10.2	8.0	9.1
VBCH 1539 BG II	5.5	4.0	4.8	10.3	8.0	9.2
MRC 7388 BG II	4.8	4.0	4.4	9.5	8.0	8.8
RCH 668 BG II	6.2	4.0	5.1	11.2	8.0	9.6
RCH 2 BG II	4.2	5.0	4.6	9.5	9.0	9.3
VICH 304 BG II	5.3	4.0	4.7	8.8	8.0	8.4
DPC 9066 BG II	5.6	4.0	4.8	10.8	9.0	9.9
RCH 2 BG I	4.6	4.0	4.3	10.2	8.0	9.1
NSPL 252 BG II	5.5	5.0	5.3	9.3	10.0	9.7
Tulasi 252 BG II	5.4	4.0	4.7	11.3	9.0	10.2
VICH 313 BG II	4.6	2.0	3.3	11.0	9.0	10.0
Tulasi 135 BG II	5.7	4.0	4.8	10.8	9.0	9.9
PCH 9605 Bt 2	5.0	2.0	3.5	9.3	8.0	8.7
Ankur 5642 BG II	4.3	4.0	4.2	9.3	8.0	8.7
PCH 789 Bt 2	4.9	5.0	5.0	10.8	8.0	9.4
NCS 567 Bt 2	4.7	3.0	3.8	10.2	8.0	9.1
MRC 7391 BG II	4.9	4.0	4.5	10.2	8.0	9.1
Sudarshan BG II	5.0	4.0	4.5	8.3	8.0	8.2
Namcot 627 BG II	5.4	4.0	4.7	10.2	8.0	9.1

B). MEAN SEED COTTON YIELD (KG/HA) UNDER PROTECTED CONDITIONS

Of the five locations evaluated under irrigated situation, the yield levels very high in Talod, moderate in Junagadh, Surat and Banswara and poor in Khandwa (Table 4). Among the check hybrids, the performance of RCH 2 BG I (1279 kg/ha) was better than RCH 2 BG II (1139 kg/ha). The highest mean seed cotton yield was recorded in the test hybrid VBCH 1539 BG II (2243 kg/ha) with 75.4 % yield increase over RCH BG I and 96.9 % yield increase over RCH 2 BG II. Except Tuasi 135 BG II (1119 kg/ha) all other hybrids showed yield superiority over both the check hybrids.

Table 4. Seed Cotton Yield (kg/ha)

Hybrid	Surat	Juna-gadh	Talod	Khan-dwa*	Bans-wara	Mean	% Inc over RCH 2 BG I	% Inc over RCH 2 BG II	Rank
NCS 9012 Bt 2	1620	2051	2452	672	1286	1852	44.8	62.6	10
Namcot 605 BG II	1281	1271	2656	183	926	1534	19.9	34.6	18
PRCH 731 Bt 2	2081	1927	2517	687	1147	1918	50.0	68.4	7
VBCH 1539 BG II	2041	2605	3005	1003	1322	2243	75.4	96.9	1
MRC 7388 BG II	2109	2221	2614	1099	1229	2043	59.8	79.4	5
RCH 668 BG II	1689	2177	3174	605	1430	2118	65.6	85.9	3
RCH 2 BG II	845	1303	1452	432	956	1139	-10.9	0.0	20
VICH 304 BG II	1804	1794	2279	530	1196	1768	38.3	55.2	13
DPC 9066 BG II	1689	1678	2415	652	1394	1794	40.3	57.5	12
RCH 2 BG I	1051	1272	1620	335	1172	1279	0.0	12.3	19
NSPL 252 BG II	1866	2643	3103	1254	1241	2213	73.0	94.3	2
Tulasi 252 BG II	1045	1928	2276	1049	1122	1593	24.5	39.8	16
VICH 313 BG II	2018	2134	3019	620	1021	2048	60.1	79.8	4
Tulasi 135 BG II	1216	1403	1164	436	692	1119	-12.5	-1.8	21
PCH 9605 Bt 2	1669	2041	2730	589	1101	1885	47.4	65.5	9
Ankur 5642 BG II	1878	2102	2776	787	1163	1980	54.8	73.8	6
PCH 789 Bt 2	1727	1919	3001	901	946	1898	48.4	66.7	8
NCS 567 Bt 2	1513	1713	1878	466	1425	1632	27.6	43.3	15
MRC 7391 BG II	1402	1469	2904	713	1151	1732	35.4	52.0	14
Sudarshan BG II	1791	1822	2588	579	1166	1842	44.0	61.7	11
Namcot 627 BG II	1242	1381	2384	398	1200	1552	21.3	36.2	17
CD @ 5 %	217	345	488	104	274				
CV %	8	11	12	10					

*Since the yield was very low in most of the hybrids, it was not considered for calculating mean yield

LINT YIELD (KG/HA)

For lint yield (kg/ha) also similar trend as that of seed cotton yield was noticed (Table 5).

Table 5. Lint Yield (kg/ha)

Hybrid	Surat	Junagadh	Talod	Khandwa*	Mean	% Inc over RCH 2 BG I	% Inc over RCH 2 BG II	Rank
NCS 9012 Bt 2	538	647	803	233	663	54.5	66.1	12
Namcot 605 BG II	438	408	931	63	592	38.1	48.5	15
PRCH 731 Bt 2	693	623	849	239	722	68.2	80.9	7
VBCH 1539 BG II	712	857	1070	348	880	105.1	120.5	2
MRC 7388 BG II	709	715	874	366	766	78.6	92.0	4
RCH 668 BG II	601	732	1116	202	816	90.3	104.6	3
RCH 2 BG II	258	421	519	149	399	-6.9	0.1	21
VICH 304 BG II	677	600	820	182	699	62.9	75.2	9
DPC 9066 BG II	573	535	745	214	618	44.0	54.8	14
RCH 2 BG I	329	418	541	117	429	0.1	7.6	19
NSPL 252 BG II	693	864	1098	428	885	106.3	121.8	1
Tulasi 252 BG II	337	582	711	339	543	26.7	36.2	18
VICH 313 BG II	594	647	930	119	724	68.7	81.4	6
Tulasi 135 BG II	418	451	392	138	420	-2.0	5.3	20
PCH 9605 Bt 2	578	644	898	94	707	64.7	77.1	8
Ankur 5642 BG II	595	634	829	260	686	59.9	71.9	10
PCH 789 Bt 2	540	576	932	331	683	59.1	71.1	11
NCS 567 Bt 2	478	546	616	134	547	27.4	37.0	17
MRC 7391 BG II	456	470	1021	235	649	51.3	62.7	13
Sudarshan BG II	672	609	923	193	735	71.3	84.1	5
Namcot 627 BG II	429	478	858	124	588	37.1	47.5	16
CD @ 5 %	73	114		34				
CV %	8	12		10				

*Since the yield was very low in most of the hybrids, it was not considered for calculating mean yield

C). FIBRE QUALITY EVALUATION

The fibre quality evaluations were done two locations viz., Surat and Khandwa. The fibre length ranged from 26.7 mm to 32.2 mm and the micronaire varied from 3.3 to 4.5 (Table 6). Whereas, the bundle strength ranged between 20.6 and 25.5 g/tex. In total, four test hybrids recorded a bundle strength of 25.0 g/tex or more.

D). ENTOMOLOGICAL EVALUATION

The entomological evaluations were primarily targeted for testing the entries against the bollworms and sap sucking insects.

Sucking pests

The data recorded in respect of jassids, aphids, whiteflies and thrips are furnished in Tables 7 to 10.

Natural enemies

In general, there was no discernable difference between the check hybrids and the other Bt entries in harbouring the natural enemies (Table 10)

Table 6. 2.5 % Span Length (mm), Micronaire and Bundle Strength

Hybrid	2.5 % Span Length (mm)			Micronaire			Bundle Strength		
	Surat	Khandwa	Mean	Surat	Khandwa	Mean	Surat	Khandwa	Mean
NCS 9012 Bt 2	32.9	30.2	31.6	4.8	3.0	3.9	23.4	27.0	25.2
Namcot 605 BG II	27.0	26.3	26.7	4.3	3.1	3.7	19.8	21.3	20.6
PRCH 731 Bt 2	31.6	31.0	31.3	5.0	3.9	4.5	23.2	25.8	24.5
VBCH 1539 BG II	31.1	29.6	30.4	5.0	4.0	4.5	22.0	23.5	22.8
MRC 7388 BG II	30.8	30.4	30.6	3.9	3.6	3.8	22.5	25.7	24.1
RCH 668 BG II	30.4	29.5	30.0	3.7	2.9	3.3	24.6	25.0	24.8
RCH 2 BG II	29.6	28.3	29.0	4.3	3.8	4.1	21.7	23.6	22.7
VICH 304 BG II	30.5	28.4	29.5	4.2	3.0	3.6	20.9	23.3	22.1
DPC 9066 BG II	31.3	30.6	31.0	4.7	4.1	4.4	23.6	26.0	24.8
RCH 2 BG I	31.3	27.5	29.4	3.8	3.9	3.9	22.7	22.8	22.8
NSPL 252 BG II	31.7	29.6	30.7	4.4	4.5	4.5	22.9	23.7	23.3
Tulasi 252 BG II	32.1	30.2	31.2	4.2	4.0	4.1	26.1	24.8	25.5
VICH 313 BG II	30.7	27.0	28.9	4.6	3.3	4.0	23.4	25.1	24.3
Tulasi 135 BG II	29.7	28.6	29.2	5.1	3.6	4.4	22.9	24.4	23.7
PCH 9605 Bt 2	33.1	31.2	32.2	4.8	3.1	4.0	24.0	24.7	24.4
Ankur 5642 BG II	31.9	30.0	31.0	4.2	3.2	3.7	24.5	25.3	24.9
PCH 789 Bt 2	32.0	28.8	30.4	4.9	3.0	4.0	23.3	26.9	25.1
NCS 567 Bt 2	31.5	29.7	30.6	4.8	4.0	4.4	21.1	24.5	22.8
MRC 7391 BG II	30.6	28.8	29.7	4.0	2.9	3.5	22.2	27.9	25.1
Sudarshan BG II	27.3	26.7	27.0	4.3	3.7	4.0	21.1	23.6	22.4
Namcot 627 BG II	28.6	26.8	27.7	4.9	3.6	4.3	20.9	22.4	21.7

Table 7. Jassids / 3 leaves (pooled) and Jassid Injury Grade

Hybrid	Jassids / 3 leaves (pooled)					Jassid Injury Grade	
	Surat	Juna-gadh	Khandwa	Banswara	Mean	Khandwa	Banswara
NCS 9012 Bt 2	3.8	6.2	4.6	14.2	7.2	II	1.5
Namcot 605 BG II	4.3	8.4	4.7	20.5	9.4	IV	2.5
PRCH 731 Bt 2	3.0	7.4	5.1	16.5	8.0	III	2.0
VBCH 1539 BG II	3.2	6.8	3.3	14.3	6.9	I	1.5
MRC 7388 BG II	3.1	6.4	3.0	15.7	7.0	I	1.5
RCH 668 BG II	3.3	7.1	4.3	16.2	7.7	II	2.5
RCH 2 BG II	5.5	10.5	4.8	17.0	9.4	III	2.0
VICH 304 BG II	3.5	6.8	4.8	15.7	7.7	III	2.0
DPC 9066 BG II	3.1	7.5	4.6	16.2	7.8	II	2.0
RCH 2 BG I	5.3	11.9	4.7	15.8	9.4	IV	2.0
NSPL 252 BG II	2.3	5.3	3.5	13.2	6.0	II	2.0
Tulasi 252 BG II	3.8	6.4	4.3	17.1	7.9	II	2.5
VICH 313 BG II	3.3	6.5	4.7	19.7	8.5	II	3.0
Tulasi 135 BG II	6.7	11.1	4.7	20.6	10.8	IV	2.5
PCH 9605 Bt 2	4.2	7.1	4.6	13.8	7.4	II	1.5
Ankur 5642 BG II	4.3	7.0	4.3	17.0	8.2	II	2.5
PCH 789 Bt 2	2.8	7.3	3.2	18.6	8.0	I	2.0
NCS 567 Bt 2	4.0	7.2	4.3	16.6	8.0	II	2.0
MRC 7391 BG II	3.5	6.3	4.3	15.3	7.3	II	2.5
Sudarshan BG II	4.1	8.9	4.4	16.3	8.4	III	2.0
Namcot 627 BG II	6.0	11.6	4.9	15.5	9.5	IV	2.0

Table 8. Aphids / 3 leaves

Hybrid	Surat	Junagadh	Khandwa	Mean
NCS 9012 Bt 2	3.6	79.4	17.4	33.5
Namcot 605 BG II	1.2	114.7	14.3	43.4
PRCH 731 Bt 2	1.1	107.8	16.5	41.8
VBCH 1539 BG II	2.6	89.3	11.9	34.6
MRC 7388 BG II	2.5	84.9	11.0	32.8
RCH 668 BG II	2.4	82.6	17.7	34.2
RCH 2 BG II	4.1	98.3	25.8	42.7
VICH 304 BG II	1.9	77.6	21.4	33.6
DPC 9066 BG II	1.2	123.3	18.3	47.6
RCH 2 BG I	1.5	92.8	17.0	37.1
NSPL 252 BG II	2.5	84.9	17.3	34.9
Tulasi 252 BG II	4.3	107.7	11.7	41.2
VICH 313 BG II	3.0	109.1	21.0	44.4
Tulasi 135 BG II	2.0	105.7	20.6	42.8
PCH 9605 Bt 2	2.3	85.0	17.5	34.9
Ankur 5642 BG II	1.3	87.5	14.4	34.4
PCH 789 Bt 2	2.7	111.5	12.0	42.1
NCS 567 Bt 2	1.8	122.2	16.5	46.8
MRC 7391 BG II	1.8	102.6	16.9	40.4
Sudarshan BG II	3.9	126.7	16.4	49.0
Namcot 627 BG II	6.9	114.6	23.2	48.2

Table 9. Whiteflies / 3 leaves

Hybrid	Surat	Junagadh	Khandwa	Banswara	Mean
NCS 9012 Bt 2	2.1	28.1	3.7	19.9	13.4
Namcot 605 BG II	4.0	20.3	3.6	25.1	13.3
PRCH 731 Bt 2	2.1	20.1	4.0	21.2	11.8
VBCH 1539 BG II	1.7	31.3	3.3	19.3	13.9
MRC 7388 BG II	2.8	23.5	3.2	20.7	12.5
RCH 668 BG II	3.8	28.7	4.0	19.3	14.0
RCH 2 BG II	1.3	19.9	4.4	23.9	12.4
VICH 304 BG II	3.5	20.9	3.6	18.5	11.6
DPC 9066 BG II	2.0	22.9	3.6	21.9	12.6
RCH 2 BG I	0.8	19.6	3.5	22.0	11.5
NSPL 252 BG II	2.5	20.9	3.2	20.2	11.7
Tulasi 252 BG II	0.8	19.0	3.7	22.5	11.5
VICH 313 BG II	1.8	25.1	4.2	24.3	13.9
Tulasi 135 BG II	1.6	20.7	4.1	25.6	13.0
PCH 9605 Bt 2	0.9	29.2	3.4	19.7	13.3
Ankur 5642 BG II	3.0	21.7	3.5	22.4	12.7
PCH 789 Bt 2	2.1	22.2	3.3	24.3	13.0
NCS 567 Bt 2	2.0	32.0	3.6	19.3	14.2
MRC 7391 BG II	3.5	29.1	3.4	23.0	14.7
Sudarshan BG II	3.9	23.5	3.8	22.3	13.4
Namcot 627 BG II	4.3	25.7	4.0	23.3	14.3

Table 10. Thrips / 3 leaves and Predators /plant

Hybrid	Thrips / 3 leaves				Predators /plant		
	Surat	Khandwa	Banswara	Mean	Khandwa	Banswara	Mean
NCS 9012 Bt 2	7.2	0.5	-	3.8	1.3	3.0	2.2
Namcot 605 BG II	8.1	0.5	-	4.3	1.6	3.2	2.4
PRCH 731 Bt 2	7.8	0.7	-	4.2	1.3	2.8	2.1
VBCH 1539 BG II	6.2	0.3	-	3.3	1.6	3.4	2.5
MRC 7388 BG II	8.0	0.4	-	4.2	1.6	3.2	2.4
RCH 668 BG II	7.3	0.7	-	4.0	1.1	3.2	2.2
RCH 2 BG II	4.5	0.7	-	2.6	1.1	3.4	2.3
VICH 304 BG II	7.6	0.4	-	4.0	1.1	3.0	2.1
DPC 9066 BG II	7.2	0.4	-	3.8	1.5	2.9	2.2
RCH 2 BG I	6.0	0.3	-	3.2	1.4	3.1	2.3
NSPL 252 BG II	9.7	0.4	-	5.0	1.3	2.8	2.1
Tulasi 252 BG II	7.2	0.7	-	4.0	1.8	3.3	2.6
VICH 313 BG II	9.3	0.5	-	4.9	1.5	3.3	2.4
Tulasi 135 BG II	8.6	0.7	-	4.6	1.6	3.4	2.5
PCH 9605 Bt 2	11.8	0.5	-	6.1	1.1	3.3	2.2
Ankur 5642 BG II	8.6	0.5	-	4.6	1.4	3.2	2.3
PCH 789 Bt 2	9.7	0.5	-	5.1	1.6	2.9	2.2
NCS 567 Bt 2	8.8	0.6	-	4.7	1.0	3.1	2.1
MRC 7391 BG II	9.0	0.5	-	4.8	1.6	3.6	2.6
Sudarshan BG II	8.8	0.4	-	4.6	1.5	3.2	2.3
Namcot 627 BG II	8.7	0.5	-	4.6	1.4	3.4	2.4

Bollworms

Larval population

The larval populations of *Earias* spp. and *Helicoverpa armigera* (Table 11) and *Pectinophora gossypiella* (Table 12) were very low. All the entries recorded larval population of *Earias* and *Helicoverpa armigera* below ETL.

Table 11. Spotted bollworm and *Helicoverpa* bollworm population / 5 plants

Hybrid	Spotted bollworm population / 5 plants				<i>Helicoverpa</i> bollworm population / 5 plants		
	Surat	Khandwa	Banswara	Mean	Surat	Banswara	Mean
NCS 9012 Bt 2	0.0	1.1	0.0	0.4	0.3	0.0	0.2
Namcot 605 BG II	0.2	1.1	0.0	0.4	0.0	0.0	0.0
PRCH 731 Bt 2	0.0	0.9	0.0	0.3	0.0	0.0	0.0
VBCH 1539 BG II	0.0	0.6	0.0	0.2	0.3	0.0	0.2
MRC 7388 BG II	0.0	0.7	0.0	0.2	0.0	0.0	0.0
RCH 668 BG II	0.0	1.5	0.0	0.5	0.0	0.0	0.0
RCH 2 BG II	0.0	1.3	0.0	0.4	0.0	0.0	0.0
VICH 304 BG II	0.0	1.1	0.0	0.4	0.0	0.0	0.0
DPC 9066 BG II	0.0	0.7	0.0	0.2	0.0	0.0	0.0
RCH 2 BG I	0.2	0.9	0.0	0.4	0.0	0.0	0.0
NSPL 252 BG II	0.0	1.0	0.0	0.3	0.0	0.0	0.0
Tulasi 252 BG II	0.0	0.6	0.0	0.2	0.0	0.0	0.0
VICH 313 BG II	0.0	0.9	0.0	0.3	0.0	0.0	0.0
Tulasi 135 BG II	0.0	1.3	0.0	0.4	0.0	0.0	0.0
PCH 9605 Bt 2	0.0	1.2	0.0	0.4	0.0	0.0	0.0
Ankur 5642 BG II	0.0	0.7	0.0	0.2	0.0	0.0	0.0
PCH 789 Bt 2	0.0	0.6	0.0	0.2	0.0	0.0	0.0
NCS 567 Bt 2	0.0	0.8	0.0	0.3	0.0	0.0	0.0
MRC 7391 BG II	0.0	1.1	0.0	0.4	0.0	0.0	0.0
Sudarshan BG II	0.2	0.9	0.0	0.3	0.0	0.0	0.0
Namcot 627 BG II	0.3	1.2	0.0	0.5	0.0	0.0	0.0

Table 12. Pink Bollworm larvae / 20 green bolls

Hybrid	Surat	Junagadh	Khandwa	Banswara	Mean
NCS 9012 Bt 2	0.5	0.0	1.3	0.0	0.5
Namcot 605 BG II	0.0	0.7	1.1	0.0	0.5
PRCH 731 Bt 2	0.0	0.0	1.2	0.0	0.3
VBCH 1539 BG II	0.3	0.0	1.1	0.0	0.4
MRC 7388 BG II	0.0	0.0	0.6	0.0	0.2
RCH 668 BG II	0.0	0.0	1.1	0.0	0.3
RCH 2 BG II	0.0	0.0	1.3	0.0	0.3
VICH 304 BG II	0.0	0.0	1.2	0.0	0.3
DPC 9066 BG II	0.0	0.0	1.4	0.0	0.4
RCH 2 BG I	1.2	1.0	1.3	0.0	0.9
NSPL 252 BG II	0.0	0.0	1.5	0.0	0.4
Tulasi 252 BG II	0.0	0.0	1.4	0.0	0.3
VICH 313 BG II	0.0	0.0	1.4	0.0	0.3
Tulasi 135 BG II	0.0	0.0	1.4	0.0	0.3
PCH 9605 Bt 2	0.0	0.0	1.1	0.0	0.3
Ankur 5642 BG II	0.0	0.0	0.7	0.0	0.2
PCH 789 Bt 2	0.0	0.0	1.2	0.0	0.3
NCS 567 Bt 2	0.0	0.0	0.9	0.0	0.2
MRC 7391 BG II	0.0	0.0	1.4	0.0	0.4
Sudarshan BG II	0.0	0.0	1.1	0.0	0.3
Namcot 627 BG II	0.0	0.0	1.3	0.0	0.3

Green boll and Locule damage by Pink bollworm

There was no incidence of pink bollworm at Banswara centre. At Surat, both green boll as well as locule damage was considerable. Per cent green boll damage varied from 0 to 7.8 and locule damage ranged from 0 to 3.6 % at Surat (Table 13)

Table 13. Per cent Green boll damage and Per cent locules damage in green boll by PBW

Hybrid	Per cent Green boll damage by PBW				Per cent locules damage in green boll by PBW		
	Surat	Khandwa	Banswara	Mean	Surat	Banswara	Mean
NCS 9012 Bt 2	6.7	1.0	0.0	2.6	3.6	0.0	1.8
Namcot 605 BG II	7.8	1.2	0.0	3.0	3.1	0.0	1.5
PRCH 731 Bt 2	2.8	0.7	0.0	1.2	1.4	0.0	0.7
VBCH 1539 BG II	6.1	0.3	0.0	2.1	2.5	0.0	1.3
MRC 7388 BG II	0.0	0.4	0.0	0.1	0.0	0.0	0.0
RCH 668 BG II	0.0	0.8	0.0	0.3	0.0	0.0	0.0
RCH 2 BG II	7.2	1.0	0.0	2.7	3.3	0.0	1.7
VICH 304 BG II	0.6	0.5	0.0	0.4	0.3	0.0	0.1
DPC 9066 BG II	3.3	0.7	0.0	1.3	1.4	0.0	0.7
RCH 2 BG I	7.2	1.0	0.0	2.8	2.4	0.0	1.2
NSPL 252 BG II	5.6	1.3	0.0	2.3	2.4	0.0	1.2
Tulasi 252 BG II	1.1	0.5	0.0	0.5	0.4	0.0	0.2
VICH 313 BG II	0.0	0.5	0.0	0.2	0.0	0.0	0.0
Tulasi 135 BG II	0.0	0.7	0.0	0.2	0.0	0.0	0.0
PCH 9605 Bt 2	0.0	0.5	0.0	0.2	0.0	0.0	0.0
Ankur 5642 BG II	0.0	0.5	0.0	0.2	0.0	0.0	0.0
PCH 789 Bt 2	0.0	0.3	0.0	0.1	0.0	0.0	0.0
NCS 567 Bt 2	0.0	1.3	0.0	0.4	0.0	0.0	0.0
MRC 7391 BG II	0.0	0.7	0.0	0.2	0.0	0.0	0.0
Sudarshan BG II	0.0	0.5	0.0	0.2	0.0	0.0	0.0
Namcot 627 BG II	2.8	1.1	0.0	1.3	0.6	0.0	0.3

Open boll and locule damage

Higher damage of open boll as well as locule was reported at Khandwa (Table 14). No damage on the basis of locule was reported at Banswara. At Junagadh, open boll damage was reported only in two hybrids viz., Namcot 605 BG II and RCH 2 BG I, whereas, other hybrids were free from any damage.

Table 14. Open boll damage (%) - Boll and locule basis

Hybrid	Open boll damage (%) - Boll basis			Open boll damage (%) - Locule basis		
	Junagadh	Khandwa	Mean	Khandwa	Banswara	Mean
NCS 9012 Bt 2	0.0	7.2	3.6	8.2	0.0	4.1
Namcot 605 BG II	1.3	7.5	4.4	8.9	0.0	4.5
PRCH 731 Bt 2	0.0	7.5	3.8	8.5	0.0	4.3
VBCH 1539 BG II	0.4	5.9	3.2	5.9	0.0	3.0
MRC 7388 BG II	0.0	5.7	2.8	5.8	0.0	2.9
RCH 668 BG II	0.0	7.6	3.8	8.3	0.0	4.2
RCH 2 BG II	0.0	7.8	3.9	8.7	0.0	4.4
VICH 304 BG II	0.0	7.0	3.5	8.0	0.0	4.0
DPC 9066 BG II	0.0	7.1	3.5	8.0	0.0	4.0
RCH 2 BG I	1.7	7.4	4.5	8.6	0.0	4.3
NSPL 252 BG II	0.0	6.2	3.1	7.7	0.0	3.9
Tulasi 252 BG II	0.0	5.5	2.7	6.3	0.0	3.1
VICH 313 BG II	0.0	7.6	3.8	8.5	0.0	4.3
Tulasi 135 BG II	0.0	7.9	4.0	9.1	0.0	4.6
PCH 9605 Bt 2	0.0	8.3	4.2	9.3	0.0	4.7
Ankur 5642 BG II	0.0	7.6	3.8	8.3	0.0	4.1
PCH 789 Bt 2	0.0	6.0	3.0	5.9	0.0	3.0
NCS 567 Bt 2	0.0	7.6	3.8	7.9	0.0	3.9
MRC 7391 BG II	0.0	7.2	3.6	7.9	0.0	4.0
Sudarshan BG II	0.0	7.3	3.7	8.3	0.0	4.1
Namcot 627 BG II	0.0	7.0	3.5	8.0	0.0	4.0

Plant protection measures

Jassids, aphids and thrips were the most predominant sucking pests noticed. All entries tested including the check hybrids were found to be susceptible to these pests at varying degrees and at different stages of crop growth at all locations, warranting chemical intervention. Depending upon the ETL level, 1 – 3 sprays were given for controlling sucking pests.

Overall Performance of Bt Hybrids tested under Irrigated Conditions

Hybrid	Mean Seed Cotton Yield (kg/ha)	% Inc over RCH 2 BG I	% Inc over RCH 2 BG II	Mean Lint Yield (kg/ha)	% Inc over RCH 2 BG I	% Inc over RCH 2 BG II	2.5 % Span Length (mm)	Micronaire	Bundle Strength (g/tex)
VBCH 1539 BG II	2243	75.4	96.9	880	105.1	120.5	30.4	4.5	22.8
NSPL 252 BG II	2213	73.0	94.3	885	106.3	121.8	30.7	4.5	23.3
RCH 668 BG II	2118	65.6	85.9	816	90.3	104.6	30.0	3.3	24.8
VICH 313 BG II	2048	60.1	79.8	724	68.7	81.4	28.9	4.0	24.3
MRC 7388 BG II	2043	59.8	79.4	766	78.6	92.0	30.6	3.8	24.1
Ankur 5642 BG II	1980	54.8	73.8	686	59.9	71.9	31.0	3.7	24.9
PRCH 731 Bt 2	1918	50.0	68.4	722	68.2	80.9	31.3	4.5	24.5
PCH 789 Bt 2	1898	48.4	66.7	683	59.1	71.1	30.4	4.0	25.1
PCH 9605 Bt 2	1885	47.4	65.5	707	64.7	77.1	32.2	4.0	24.4
NCS 9012 Bt 2	1852	44.8	62.6	663	54.5	66.1	31.6	3.9	25.2
Sudarshan BG II	1842	44.0	61.7	735	71.3	84.1	27.0	4.0	22.4
DPC 9066 BG II	1794	40.3	57.5	618	44.0	54.8	31.0	4.4	24.8
VICH 304 BG II	1768	38.3	55.2	699	62.9	75.2	29.5	3.6	22.1
MRC 7391 BG II	1732	35.4	52.0	649	51.3	62.7	29.7	3.5	25.1
NCS 567 Bt 2	1632	27.6	43.3	547	27.4	37.0	30.6	4.4	22.8
Tulasi 252 BG II	1593	24.5	39.8	543	26.7	36.2	31.2	4.1	25.5
Namcot 627 BG II	1552	21.3	36.2	588	37.1	47.5	27.7	4.3	21.7
Namcot 605 BG II	1534	19.9	34.6	592	38.1	48.5	26.7	3.7	20.6
RCH 2 BG I	1279	0.0	12.3	429	0.1	7.6	29.4	3.9	22.8
RCH 2 BG II	1139	-10.9	0.0	399	-6.9	0.1	29.0	4.1	22.7
Tulasi 135 BG II	1119	-12.5	-1.8	420	-2.0	5.3	29.2	4.4	23.7

RAINFED TRIALS

In the rainfed trial, 17 test hybrids belonging to different Private R & D firms were evaluated along with two check hybrids viz., Bunny BG I and Bunny BG II. Sowing of the trial at proper time and all the agronomic practices were followed as per standard protocol.

A. BIOMETRICAL EVALUATION

In the ETL based plant protection trial, biometrical observations recorded were recorded and are presented below.

Germination and final plant stand

Very good germination was recorded in most of the entries and subsequently sufficient plant population was maintained till the harvest at all the locations where the trial have been conducted.

Boll weight, Ginning Outturn, Lint Index and Seed Index:

The biometrical data pertaining to boll weight, ginning outturn, lint index and seed index recorded in the trial are given in Tables 15-17.

Table 15. Boll weight (g)

Hybrid	Bharuch	Akola	Nanded	Nagpur (CICR)	Indore	Mean
NCS 9012 BG II	3.5	4.0	4.5	4.5	2.9	3.9
Ankur 5642 BG II	5.0	3.8	4.1	3.6	2.6	3.8
PRCH 731 BG II	4.9	4.5	4.9	4.8	3.0	4.4
Namcot 614 BG II	4.1	3.7	4.3	3.1	2.6	3.6
NSPL 252 BG II	4.3	4.2	4.2	4.5	2.9	4.0
VBCH 1503 BG II	3.5	4.1	4.6	4.4	2.9	3.9
VICH 311 BG II	4.3	3.3	3.2	2.2	2.4	3.1
NCS 567 BG II	4.7	3.3	4.5	4.4	2.6	3.9
Namcot 615 BG II	4.2	4.1	3.8	3.3	3.1	3.7
Bunny BG I	3.7	3.1	3.9	3.9	3.5	3.6
DPC 7065 BG II	3.5	3.7	3.7	3.9	2.8	3.5
PCH 9605 BG II	4.2	4.4	4.2	4.5	2.6	4.0
RCH 665 BG II	4.1	4.3	4.1	4.5	3.0	4.0
Tulasi 171 BG II	4.1	3.8	4.1	3.8	3.0	3.8
Bunny BG II	4.1	4.1	3.8	3.8	2.9	3.7
Tulasi 144 BG II	4.6	4.4	4.9	4.4	2.7	4.2
PCH 789 BG II	3.7	3.3	3.7	3.8	2.5	3.4
DPC 5061 BG II	4.3	3.2	3.7	3.1	2.6	3.4
VICH 314 BG II	3.9	3.0	3.5	3.1	2.8	3.2

Table 16. Ginning Outturn %

Hybrid	Bharuch	Akola	Nanded	Nagpur (CICR)	Indore	Mean
NCS 9012 BG II	32.5	41.0	37.8	34.8	34.8	36.2
Ankur 5642 BG II	28.4	31.3	33.6	30.6	31.5	31.1
PRCH 731 BG II	32.8	40.3	38.5	34.6	36.2	36.5
Namcot 614 BG II	34.0	38.0	35.7	35.2	34.6	35.5
NSPL 252 BG II	33.3	36.7	39.1	37.0	35.1	36.2
VBCH 1503 BG II	32.1	37.2	37.5	33.8	35.2	35.1
VICH 311 BG II	35.0	40.0	38.8	32.3	36.8	36.6
NCS 567 BG II	31.1	38.3	38.7	33.7	34.8	35.3
Namcot 615 BG II	34.7	39.7	39.0	36.5	36.3	37.2
Bunny BG I	34.1	35.7	38.2	35.5	35.8	35.8
DPC 7065 BG II	35.9	39.3	37.6	35.9	36.2	37.0
PCH 9605 BG II	32.0	37.0	35.8	34.7	35.5	35.0
RCH 665 BG II	30.8	36.5	35.6	34.7	34.1	34.3
Tulasi 171 BG II	32.1	36.3	36.0	34.6	33.1	34.4
Bunny BG II	34.3	38.5	37.5	37.0	35.7	36.6
Tulasi 144 BG II	32.0	40.0	37.0	33.8	36.0	35.7
PCH 789 BG II	30.1	33.7	33.6	32.3	32.1	32.4
DPC 5061 BG II	33.1	42.7	39.4	36.6	37.5	37.9
VICH 314 BG II	30.9	34.8	36.0	32.9	32.3	33.4

Table 17. Lint Index (g) and Seed Index (g)

Hybrid	Lint Index (g)					Seed Index (g)				
	Akola	Nanded	Nagpur (CICR)	Indore	Mean	Akola	Nanded	Nagpur (CICR)	Indore	Mean
NCS 9012 BG II	7.7	5.8	4.3	4.1	5.5	7.8	9.5	8.1	7.8	8.3
Ankur 5642 BG II	4.1	5.1	3.1	3.7	4.0	3.8	10.0	7.0	8.1	7.2
PRCH 731 BG II	7.2	6.6	3.7	4.0	5.4	7.7	10.5	7.0	7.1	8.1
Namcot 614 BG II	5.5	5.5	2.9	4.0	4.4	6.4	9.8	5.3	7.5	7.2
NSPL 252 BG II	6.9	6.1	4.0	4.2	5.3	6.3	9.5	6.8	7.7	7.6
VBCH 1503 BG II	7.2	5.2	4.2	4.3	5.2	7.3	8.7	8.3	7.9	8.0
VICH 311 BG II	4.4	4.9	4.5	4.1	4.5	4.7	7.7	8.3	7.1	6.9
NCS 567 BG II	6.6	5.7	3.3	3.8	4.9	6.6	9.1	6.5	7.2	7.3
Namcot 615 BG II	5.8	4.9	3.3	4.0	4.5	5.9	7.7	5.8	7.1	6.6
Bunny BG I	5.9	5.0	2.7	4.0	4.4	6.3	8.0	4.9	7.2	6.6
DPC 7065 BG II	7.0	6.1	4.5	4.0	5.4	6.9	10.0	8.0	7.1	8.0
PCH 9605 BG II	4.7	5.3	2.7	3.9	4.2	4.3	9.5	5.1	7.2	6.5
RCH 665 BG II	4.8	5.5	3.7	3.7	4.4	5.2	9.9	7.0	7.1	7.3
Tulasi 171 BG II	5.7	5.3	4.4	3.9	4.8	5.6	9.4	8.4	7.9	7.8
Bunny BG II	6.0	5.4	4.3	4.0	4.9	5.8	9.0	7.5	7.3	7.4
Tulasi 144 BG II	5.3	6.0	4.3	4.1	4.9	5.0	10.3	8.5	7.3	7.8
PCH 789 BG II	4.9	4.5	3.2	3.8	4.1	4.5	8.8	6.8	8.0	7.0
DPC 5061 BG II	5.8	5.3	3.6	4.2	4.7	5.3	8.2	6.3	7.0	6.7
VICH 314 BG II	4.7	4.6	3.5	3.8	4.1	4.5	8.2	7.1	7.9	6.9

B). MEAN SEED COTTON YIELD (KG/HA) UNDER PROTECTED CONDITIONS

The yield levels recorded in the hybrids were comparatively higher in Bharuch and Indore. Only two test hybrids recorded higher mean seed cotton yield as compared to the best check hybrid of Bunny BG II (Table 18). The highest mean seed cotton yield of 1476 kg/ha was recorded in NSPL 252 BG II with 46.8 % yield increase over Bunny BG I and 19.0% yield increase over Bunny BG II. The second best hybrid was PRCH 731 BG II with 1244 kg/ha with 23.7 and 0.3 % increase over Bunny BG I and Bunny BG II, respectively. Numerically, eight other hybrids recorded higher seed cotton yield over Bunny BG I.

Table 18. Seed Cotton Yield (kg/ha)

Hybrid	Bharuch	Akola	Nanded	Nagpur (CICR)	Indore	Mean	% Inc over Bunny BG I	% Inc over Bunny BG II	Rank
NCS 9012 BG II	1525	764	1069	743	1752	1171	16.5	-5.6	4
Ankur 5642 BG II	1762	798	1042	596	1613	1162	15.6	-6.3	5
PRCH 731 BG II	2163	1067	1001	549	1438	1244	23.7	0.3	2
Namcot 614 BG II	1999	749	836	393	1191	1034	2.8	-16.6	9
NSPL 252 BG II	2086	1132	1426	796	1938	1476	46.8	19.0	1
VBCH 1503 BG II	1732	463	752	566	703	843	-16.1	-32.0	17
VICH 311 BG II	1728	424	418	220	625	683	-32.0	-44.9	19
NCS 567 BG II	1632	584	865	330	1006	883	-12.1	-28.8	16
Namcot 615 BG II	971	816	617	346	1040	758	-24.6	-38.9	18
Bunny BG I	1046	903	1260	674	1144	1005	0.0	-18.9	12
DPC 7065 BG II	1475	931	891	459	998	951	-5.4	-23.3	14
PCH 9605 BG II	1286	832	1042	542	1733	1087	8.2	-12.3	8
RCH 665 BG II	1390	582	784	485	1299	908	-9.7	-26.8	15
Tulasi 171 BG II	1547	864	1066	498	1641	1123	11.8	-9.4	6
Bunny BG II	1734	1002	1316	694	1453	1240	23.4	0.0	3
Tulasi 144 BG II	1990	909	937	632	1075	1109	10.3	-10.6	7
PCH 789 BG II	1854	723	647	635	1274	1027	2.1	-17.2	10
DPC 5061 BG II	2042	736	676	340	1015	962	-4.3	-22.4	13
VICH 314 BG II	2353	599	556	385	1160	1011	0.6	-18.5	11
CD @ 5 %	256	460	270	229	169				
CV %	16	14	19		8				

Considering lint yield (kg/ha), only one test hybrid was found to be superior to the best check hybrid while all other hybrids were inferior (Table 19).

Table 19. Lint Yield (kg/ha)

Hybrid	Bharuch	Akola	Nanded	Nagpur (CICR)	Indore	Mean	% Inc over Bunny BG I	% Inc over Bunny BG II	Rank
NCS 9012 BG II	496	313	404	258	610	416	15.0	-7.5	4
Ankur 5642 BG II	500	251	350	182	508	358	-1.0	-20.4	10
PRCH 731 BG II	709	430	385	190	521	447	23.5	-0.7	3
Namcot 614 BG II	679	285	298	138	412	362	0.1	-19.5	8
NSPL 252 BG II	695	415	557	295	680	528	46.0	17.4	1
VBCH 1503 BG II	556	172	282	191	247	290	-20.0	-35.6	17
VICH 311 BG II	606	170	162	71	230	248	-31.5	-44.9	19
NCS 567 BG II	508	226	334	111	350	306	-15.5	-32.0	16
Namcot 615 BG II	337	324	240	126	378	281	-22.4	-37.6	18
Bunny BG I	356	322	483	239	409	362	-0.1	-19.6	9
DPC 7065 BG II	530	364	337	165	362	352	-2.9	-21.9	12
PCH 9605 BG II	411	308	373	188	615	379	4.7	-15.8	7
RCH 665 BG II	429	212	280	168	443	306	-15.4	-31.9	15
Tulasi 171 BG II	497	315	383	172	543	382	5.5	-15.1	6
Bunny BG II	594	385	493	257	519	450	24.2	-0.1	2
Tulasi 144 BG II	636	367	347	213	387	390	7.7	-13.3	5
PCH 789 BG II	558	244	217	205	409	327	-9.8	-27.4	14
DPC 5061 BG II	677	315	267	124	381	353	-2.5	-21.6	11
VICH 314 BG II	728	209	200	127	374	328	-9.5	-27.2	13

C). FIBRE QUALITY EVALUATION

Data on fibre quality evaluations tested in three locations viz., Bharuch, Akola and Nagpur are furnished in Table 20. The fibre length ranged from 26.3 mm to 32.3 mm and the micronaire varied from 3.3 to 4.1 (Table 20). Whereas, the bundle strength ranged between 20.6 and 26.3 g/tex.

Table 20. 2.5 % Span Length (mm), Micronaire and Bundle Strength

Hybrid	2.5 % Span Length (mm)				Micronaire				Bundle Strength			
	Bharuch	Akola	Nagpur (CICR)	Mean	Bharuch	Akola	Nagpur (CICR)	Mean	Bharuch	Akola	Nagpur (CICR)	Mean
NCS 9012 BG II	33.5	31.1	29.4	31.3	4.2	4.1	4.1	4.1	28.3	22.5	21.1	24.0
Ankur 5642 BG II	32.9	30.8	29.2	31.0	3.5	3.4	3.0	3.3	30.9	23.4	24.5	26.3
PRCH 731 BG II	31.2	31.0	27.1	29.8	4.4	4.0	3.2	3.9	25.7	23.4	22.2	23.8
Namcot 614 BG II	28.7	29.2	26.0	28.0	4.1	3.5	3.0	3.5	23.4	23.2	18.8	21.8
NSPL 252 BG II	31.7	29.1	28.3	29.7	4.2	4.0	2.8	3.7	26.4	21.8	23.7	24.0
VBCH 1503 BG II	35.2	30.8	29.5	31.8	4.0	4.0	3.8	3.9	26.3	22.8	20.5	23.2
VICH 311 BG II	27.9	27.6	23.4	26.3	3.9	3.5	2.7	3.4	22.8	20.3	18.7	20.6
NCS 567 BG II	31.7	30.3	27.6	29.9	3.7	3.9	3.6	3.7	25.4	21.6	19.5	22.2
Namcot 615 BG II	29.3	28.2	26.0	27.8	3.8	3.8	3.4	3.7	24.8	23.1	20.6	22.8
Bunny BG I	31.8	29.7	29.3	30.3	3.7	4.1	4.0	3.9	23.9	19.4	23.4	22.2
DPC 7065 BG II	31.2	28.7	28.1	29.3	4.0	3.9	3.8	3.9	24.8	22.1	21.1	22.7
PCH 9605 BG II	33.1	30.5	30.6	31.4	4.1	3.8	3.9	3.9	26.9	22.9	21.2	23.7
RCH 665 BG II	34.8	31.9	30.2	32.3	4.2	3.2	3.3	3.6	26.2	21.8	22.2	23.4
Tulasi 171 BG II	31.9	31.2	29.4	30.8	4.2	4.6	3.5	4.1	23.5	22.0	23.0	22.8
Bunny BG II	32.9	31.4	30.7	31.7	4.2	4.4	3.4	4.0	23.3	21.8	21.2	22.1
Tulasi 144 BG II	35.1	28.8	30.9	31.6	3.9	4.1	4.2	4.1	26.8	22.1	21.9	23.6
PCH 789 BG II	30.1	31.8	26.9	29.6	4.7	3.6	3.1	3.8	24.1	23.4	20.2	22.6
DPC 5061 BG II	29.2	28.4	27.2	28.3	4.4	3.9	3.3	3.9	24.0	20.0	23.7	22.6
VICH 314 BG II	27.5	26.7	25.8	26.7	4.1	4.0	2.7	3.6	20.7	21.8	20.3	20.9

D). ENTOMOLOGICAL EVALUATION

The entomological evaluations were made for testing the entries against the bollworms and sap sucking insects.

Sucking pests

The data recorded in respect of jassids, aphids, whiteflies and thrips are given in Tables 21 to 24.

Natural enemies

There was no discrete difference between the check hybrids and other Bt entries in harbouring the natural enemies (Table 24).

Table 21. Jassids / 3 leaves (pooled) and Jassid Injury Grade

Hybrid	Jassids / 3 leaves (pooled)				Jassid Injury Grade
	Bharuch	Akola	Nagpur (CICR)	Mean	Nagpur (CICR)
NCS 9012 BG II	5.0	4.8	2.7	4.1	2.3
Ankur 5642 BG II	4.7	5.1	2.9	4.2	2.1
PRCH 731 BG II	5.1	5.4	2.7	4.4	2.3
Namcot 614 BG II	7.1	4.5	2.7	4.8	2.3
NSPL 252 BG II	8.9	3.7	2.2	4.9	2.1
VBCH 1503 BG II	10.1	4.7	3.2	6.0	2.6
VICH 311 BG II	5.4	4.8	2.6	4.2	2.5
NCS 567 BG II	1.6	5.1	2.3	3.0	2.4
Namcot 615 BG II	5.4	4.3	2.5	4.1	2.3
Bunny BG I	1.8	4.6	2.8	3.0	2.4
DPC 7065 BG II	5.3	4.8	2.9	4.3	2.4
PCH 9605 BG II	5.3	4.6	2.2	4.0	2.3
RCH 665 BG II	1.4	5.0	3.0	3.1	2.4
Tulasi 171 BG II	4.9	4.8	2.6	4.1	2.4
Bunny BG II	5.5	5.6	2.5	4.5	2.2
Tulasi 144 BG II	2.0	5.0	2.8	3.3	2.5
PCH 789 BG II	5.5	4.7	2.4	4.2	2.2
DPC 5061 BG II	5.3	5.4	2.1	4.3	2.4
VICH 314 BG II	1.9	5.8	2.6	3.4	2.3

Table 22. Aphids / 3 leaves

Hybrid	Bharuch	Akola	Nagpur (CICR)	Mean
NCS 9012 BG II	58.8	11.8	23.6	31.4
Ankur 5642 BG II	70.8	17.9	12.3	33.6
PRCH 731 BG II	27.3	26.6	12.7	22.2
Namcot 614 BG II	68.7	19.2	15.1	34.3
NSPL 252 BG II	29.1	21.4	20.7	23.8
VBCH 1503 BG II	30.9	32.5	22.6	28.7
VICH 311 BG II	27.1	15.0	25.1	22.4
NCS 567 BG II	12.9	26.6	17.4	19.0
Namcot 615 BG II	72.4	23.1	23.4	39.6
Bunny BG I	27.9	25.8	21.1	24.9
DPC 7065 BG II	27.5	18.1	14.3	19.9
PCH 9605 BG II	56.5	26.7	35.6	39.6
RCH 665 BG II	12.4	30.5	13.8	18.9
Tulasi 171 BG II	63.4	22.3	19.8	35.2
Bunny BG II	28.5	28.1	14.7	23.8
Tulasi 144 BG II	12.6	21.4	21.3	18.4
PCH 789 BG II	28.7	24.1	21.2	24.6
DPC 5061 BG II	30.0	25.7	25.9	27.2
VICH 314 BG II	28.6	32.9	26.0	29.2

Table 23. Whiteflies / 3 leaves

Hybrid	Bharuch	Akola	Nagpur (CICR)	Mean
NCS 9012 BG II	11.8	8.8	1.4	7.3
Ankur 5642 BG II	27.7	9.8	1.1	12.9
PRCH 731 BG II	26.7	10.0	1.5	12.7
Namcot 614 BG II	26.6	12.2	1.6	13.5
NSPL 252 BG II	12.5	13.5	1.3	9.1
VBCH 1503 BG II	11.9	10.4	1.5	7.9
VICH 311 BG II	28.4	8.1	1.1	12.5
NCS 567 BG II	12.1	9.6	1.1	7.6
Namcot 615 BG II	25.9	12.6	1.3	13.3
Bunny BG I	11.5	12.2	1.5	8.4
DPC 7065 BG II	12.4	13.6	1.4	9.1
PCH 9605 BG II	11.5	11.3	1.1	8.0
RCH 665 BG II	12.3	9.8	1.5	7.9
Tulasi 171 BG II	12.3	10.4	1.2	8.0
Bunny BG II	11.9	11.0	1.6	8.2
Tulasi 144 BG II	11.7	10.7	1.3	7.9
PCH 789 BG II	12.2	12.3	1.3	8.6
DPC 5061 BG II	12.1	10.6	1.0	7.9
VICH 314 BG II	11.8	10.2	1.0	7.7

Table 24. Thrips / 3 leaves and Predators /plant

Hybrid	Thrips / 3 leaves			Predators /plant		
	Akola	Nagpur (CICR)	Mean	Akola	Nagpur (CICR)	Mean
NCS 9012 BG II	5.6	0.7	3.1	1.3	0.5	0.9
Ankur 5642 BG II	5.9	0.7	3.3	0.9	0.4	0.6
PRCH 731 BG II	6.3	0.5	3.4	1.1	0.6	0.8
Namcot 614 BG II	5.9	0.8	3.4	1.5	0.5	1.0
NSPL 252 BG II	6.5	0.9	3.7	1.6	0.5	1.0
VBCH 1503 BG II	5.9	1.0	3.5	1.1	0.5	0.8
VICH 311 BG II	5.3	0.4	2.8	1.0	0.5	0.7
NCS 567 BG II	5.3	0.6	2.9	1.3	0.5	0.9
Namcot 615 BG II	5.6	0.4	3.0	1.5	0.5	1.0
Bunny BG I	7.2	0.6	3.9	1.1	0.5	0.8
DPC 7065 BG II	6.4	0.7	3.6	1.3	0.5	0.9
PCH 9605 BG II	5.4	0.8	3.1	1.0	0.4	0.7
RCH 665 BG II	5.7	0.9	3.3	1.3	0.5	0.9
Tulasi 171 BG II	6.1	0.9	3.5	0.9	0.5	0.7
Bunny BG II	6.7	0.6	3.7	1.1	0.5	0.8
Tulasi 144 BG II	6.3	0.4	3.4	1.3	0.6	0.9
PCH 789 BG II	5.7	0.8	3.2	1.4	0.4	0.9
DPC 5061 BG II	6.3	0.4	3.3	1.1	0.4	0.8
VICH 314 BG II	6.7	0.8	3.7	1.0	0.4	0.7

Bollworms

Larval population

There was no larval populations of *Earias* spp. and *Helicoverpa armigera* recorded in both test entries as well as check hybrids (Table 25) and population of *Pectinophora gossypiella* (Table 26) was very low and below ETL.

Table 25. Spotted bollworm and *Helicoverpa* bollworm population / 5 plants

Hybrid	Spotted bollworm population / 5 plants			<i>Helicoverpa</i> bollworm population / 5 plants		
	Akola	Nagpur (CICR)	Mean	Akola	Nagpur (CICR)	Mean
NCS 9012 BG II	0.0	0.0	0.0	0.0	0.0	0.0
Ankur 5642 BG II	0.0	0.0	0.0	0.0	0.0	0.0
PRCH 731 BG II	0.0	0.0	0.0	0.0	0.0	0.0
Namcot 614 BG II	0.0	0.0	0.0	0.0	0.0	0.0
NSPL 252 BG II	0.0	0.0	0.0	0.0	0.0	0.0
VBCH 1503 BG II	0.0	0.0	0.0	0.0	0.0	0.0
VICH 311 BG II	0.0	0.0	0.0	0.0	0.0	0.0
NCS 567 BG II	0.0	0.0	0.0	0.0	0.0	0.0
Namcot 615 BG II	0.0	0.0	0.0	0.0	0.0	0.0
Bunny BG I	0.0	0.0	0.0	0.0	0.0	0.0
DPC 7065 BG II	0.0	0.0	0.0	0.0	0.0	0.0
PCH 9605 BG II	0.0	0.0	0.0	0.0	0.0	0.0
RCH 665 BG II	0.0	0.0	0.0	0.0	0.0	0.0
Tulasi 171 BG II	0.0	0.0	0.0	0.0	0.0	0.0
Bunny BG II	0.0	0.0	0.0	0.0	0.0	0.0
Tulasi 144 BG II	0.0	0.0	0.0	0.0	0.0	0.0
PCH 789 BG II	0.0	0.0	0.0	0.0	0.0	0.0
DPC 5061 BG II	0.0	0.0	0.0	0.0	0.0	0.0
VICH 314 BG II	0.0	0.0	0.0	0.0	0.0	0.0

Table 26. Pink Bollworm larvae / 20 green bolls

Hybrid	Akola	Nagpur (CICR)	Mean
NCS 9012 BG II	0.0	0.0	0.0
Ankur 5642 BG II	0.0	0.0	0.0
PRCH 731 BG II	0.0	0.0	0.0
Namcot 614 BG II	0.5	0.0	0.3
NSPL 252 BG II	0.0	0.0	0.0
VBCH 1503 BG II	0.0	0.0	0.0
VICH 311 BG II	0.0	0.0	0.0
NCS 567 BG II	0.2	0.0	0.1
Namcot 615 BG II	0.7	0.0	0.3
Bunny BG I	0.0	0.0	0.0
DPC 7065 BG II	0.0	0.0	0.0
PCH 9605 BG II	0.2	0.0	0.1
RCH 665 BG II	0.2	0.0	0.1
Tulasi 171 BG II	0.0	0.0	0.0
Bunny BG II	0.2	0.0	0.1
Tulasi 144 BG II	0.0	0.0	0.0
PCH 789 BG II	0.0	0.0	0.0
DPC 5061 BG II	0.2	0.0	0.1
VICH 314 BG II	0.0	0.0	0.0

Green boll and Locule damage by Pink bollworm

There was no incidence of pink bollworm at Nagpur centre and correspondingly no green boll damage was noticed. At Akola, both green boll as well as locule damage was recorded and were found negligible (Table 27)

Table 27. Per cent Green boll damage and Per cent locules damage in green boll by PBW

Hybrid	Per cent Green boll damage by PBW			Per cent locules damage in green boll by PBW
	Akola	Nagpur (CICR)	Mean	Nagpur (CICR)
NCS 9012 BG II	0.0	0.0	0.0	0.0
Ankur 5642 BG II	0.0	0.0	0.0	0.0
PRCH 731 BG II	0.0	0.0	0.0	0.0
Namcot 614 BG II	2.5	0.0	1.3	0.0
NSPL 252 BG II	0.0	0.0	0.0	0.0
VBCH 1503 BG II	0.0	0.0	0.0	0.0
VICH 311 BG II	0.0	0.0	0.0	0.0
NCS 567 BG II	0.8	0.0	0.4	0.0
Namcot 615 BG II	4.2	0.0	2.1	0.0
Bunny BG I	0.0	0.0	0.0	0.0
DPC 7065 BG II	1.7	0.0	0.8	0.0
PCH 9605 BG II	0.8	0.0	0.4	0.0
RCH 665 BG II	0.8	0.0	0.4	0.0
Tulasi 171 BG II	0.0	0.0	0.0	0.0
Bunny BG II	1.7	0.0	0.8	0.0
Tulasi 144 BG II	0.0	0.0	0.0	0.0
PCH 789 BG II	0.0	0.0	0.0	0.0
DPC 5061 BG II	0.8	0.0	0.4	0.0
VICH 314 BG II	0.0	0.0	0.0	0.0

Open boll and locule damage

Considerable damage of open boll as well as locule was reported at Bharuch (Table 28). No damage on the basis of both boll and locule was reported at Nagpur.

Table 28. Open boll damage (%) - Boll and locule basis

Hybrid	Open boll damage (%) - Boll basis				Open boll damage (%) - locule basis			
	Bharuch	Akola	Nagpur (CICR)	Mean	Bharuch	Akola	Nagpur (CICR)	Mean
NCS 9012 BG II	1.5	0.0	0.0	0.5	1.6	0.0	0.0	0.5
Ankur 5642 BG II	2.9	0.0	0.0	1.0	1.2	0.0	0.0	0.4
PRCH 731 BG II	1.4	0.0	0.0	0.5	1.5	0.0	0.0	0.5
Namcot 614 BG II	2.6	6.7	0.0	3.1	2.0	4.2	0.0	2.1
NSPL 252 BG II	1.0	0.0	0.0	0.3	1.6	0.0	0.0	0.5
VBCH 1503 BG II	1.5	1.1	0.0	0.9	1.2	0.3	0.0	0.5
VICH 311 BG II	1.8	0.0	0.0	0.6	2.3	0.0	0.0	0.8
NCS 567 BG II	2.1	0.0	0.0	0.7	3.1	0.0	0.0	1.0
Namcot 615 BG II	7.7	14.4	0.0	7.4	11.5	7.5	0.0	6.3
Bunny BG I	10.8	0.0	0.0	3.6	9.8	0.0	0.0	3.3
DPC 7065 BG II	1.4	0.0	0.0	0.5	2.3	0.0	0.0	0.8
PCH 9605 BG II	10.0	0.0	0.0	3.3	8.5	0.0	0.0	2.8
RCH 665 BG II	1.7	0.0	0.0	0.6	3.7	0.0	0.0	1.2
Tulasi 171 BG II	1.4	0.0	0.0	0.5	2.6	0.0	0.0	0.9
Bunny BG II	3.2	0.0	0.0	1.1	2.9	0.0	0.0	1.0
Tulasi 144 BG II	1.7	0.0	0.0	0.6	2.3	0.0	0.0	0.8
PCH 789 BG II	0.9	0.0	0.0	0.3	1.5	0.0	0.0	0.5
DPC 5061 BG II	1.4	0.0	0.0	0.5	2.0	0.0	0.0	0.7
VICH 314 BG II	2.0	0.0	0.0	0.7	1.6	0.0	0.0	0.5

Overall Performance of Bt Hybrids tested under Rainfed Conditions

Hybrid	Mean Seed Cotton Yield (kg/ha)	% Inc over Bunny BG I	% Inc over Bunny BG II	Mean Lint Yield (kg/ha)	% Inc over Bunny BG I	% Inc over Bunny BG II	2.5 % Span Length (mm)	Micronaire	Bundle Strength (g/tex)
NSPL 252 BG II	1476	46.8	19.0	514	41.9	14.2	29.7	3.7	24.0
PRCH 731 BG II	1244	23.7	0.3	423	16.7	-6.1	29.8	3.9	23.8
Bunny BG II	1240	23.4	0.0	421	16.3	-6.4	31.7	4.0	22.1
NCS 9012 BG II	1171	16.5	-5.6	394	8.8	-12.5	31.3	4.1	24.0
Ankur 5642 BG II	1162	15.6	-6.3	391	7.9	-13.2	31.0	3.3	26.3
Tulasi 171 BG II	1123	11.8	-9.4	375	3.6	-16.6	30.8	4.1	22.8
Tulasi 144 BG II	1109	10.3	-10.6	369	2.1	-17.9	31.6	4.1	23.6
PCH 9605 BG II	1087	8.2	-12.3	361	-0.3	-19.8	31.4	3.9	23.7
Namcot 614 BG II	1034	2.8	-16.6	340	-6.1	-24.5	28.0	3.5	21.8
PCH 789 BG II	1027	2.1	-17.2	337	-6.9	-25.1	29.6	3.8	22.6
VICH 314 BG II	1011	0.6	-18.5	331	-8.6	-26.5	26.7	3.6	20.9
Bunny BG I	1005	0.0	-18.9	329	-9.2	-26.9	30.3	3.9	22.2
DPC 5061 BG II	962	-4.3	-22.4	312	-13.9	-30.7	28.3	3.9	22.6
DPC 7065 BG II	951	-5.4	-23.3	307	-15.1	-31.7	29.3	3.9	22.7
RCH 665 BG II	908	-9.7	-26.8	291	-19.7	-35.4	32.3	3.6	23.4
NCS 567 BG II	883	-12.1	-28.8	281	-22.4	-37.6	29.9	3.7	22.2
VBCH 1503 BG II	843	-16.1	-32.0	265	-26.8	-41.1	31.8	3.9	23.2
Namcot 615 BG II	758	-24.6	-38.9	232	-36.0	-48.6	27.8	3.7	22.8
VICH 311 BG II	683	-32.0	-44.9	202	-44.2	-55.1	26.3	3.4	20.6

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