

# Evaluation of Bt Cotton Hybrids

## North Zone - 2008-09

Report Submitted to

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Submitted by  
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## NORTH ZONE

### EVALUATION OF BT COTTON HYBRIDS

The technical programme for evaluation of the Bt cotton hybrids through ICAR trials during 2008-09 was formulated under the Chairmanship of the Assistant Director General (Commercial Crops), Indian Council of Agricultural Research, New Delhi for the four events which have been approved for commercial cultivation by GEAC (Ministry of Environment and Forests, Govt. of India). The programme was discussed at the All India Coordinated Cotton Improvement Project (AICCIP) Annual Group Meeting held at Punjab Agricultural University, Ludhiana on April 10<sup>th</sup> 2008. Accordingly, 39 Bt cotton hybrids belonging to private sector R & D firms as mentioned below were evaluated along with Bt cotton hybrid checks (RCH 134 BG I and BG II), Non Bt check hybrid (CSHH 198) and local check variety (LH 2076 for Punjab and H 1226 for Haryana state).

S. No.	Name of the Company	Name of the hybrid	S. No.	Name of the Company	Name of the hybrid
1	Ajeet Seeds	ACH 155-2 BG II	23	Pravardhan	PRCH 333 BG II
2	Ajeet Seeds	ACH 177-2 BG II	24	Pravardhan	PRCH 302 BG II
3	Amar Biotech	ABCH 7399 BG II	25	Rasi Seeds	RCH 605 BG II
4	Amar Biotech	ABCH 1299 BG II	26	Rasi Seeds	RCH 314 BG II
5	Ankur Seeds	Ankur 3028 BG II	27	Safal Seeds	SBCH 308 (Fusion)
6	Ankur Seeds	Jai BG II	28	Safal Seeds	SBCH 311 (Fusion)
7	Bayer Bioscience	SP 1169 B2	29	Seed Works	SWCH 4711 BG II
8	Bayer Bioscience	SP 7017 B2	30	Seed Works	SWCH 4707 BG II
9	Bioseeds	BCHH 6488 BG II	31	Solar Agrotech	Sarju BG II
10	JK Agri	JKCH 1950 (Event 1)	32	Solar Agrotech	Goldstar BG II
11	JK Agri	JKCH 1974 (Event 1)	33	Tulasi Seeds	Tulasi 162 BG II
12	Kaveri Seeds	15 K 39 BG II	34	Tulasi Seeds	Tulasi 225 BG II
13	Kaveri Seeds	14 K 59 BG II	35	Vibha Agro Tech	VBCH 1516 BG II
14	Krishidhan Seeds	KDCHH 516 BG II	36	Vibha Agro Tech	VBCH 1518 BG II
15	Krishidhan Seeds	KDCHH 08 Bt	37	Vikram Seeds	VICH 303 BG II
16	Mahyco	MRC 7361 BG II	38	Vikram Seeds	VICH 305 BG II
17	Mahyco	MRC 7365 BG II	39	Zuari Seeds	ZCH 193 Bt (Fusion)
18	Monsanto	Krishna BG II	40	BG II Check	RCH 134 BG II (C)
19	Nandi Seeds	SDS 6003 BG II	41	BG I Check	RCH 134 Bt (C)
20	Nandi Seeds	SDS 27 BG II	42	Check Variety	LH 2076 / H 1226
21	Nath Seeds	NCEH 145 (Fusion)	43	Non Bt Check	CSHH 198 (C)
22	Navkar	ACH 1005 Bt (Fusion)			

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### **Trial Locations:**

The trial was conducted at five locations. They are

1. Punjab Agricultural University, Ludhiana, Punjab
2. Punjab Agricultural University, Faridkot, Punjab
3. Punjab Agricultural University, Bathinda, Punjab
4. Choudhary Charan Singh Haryana Agricultural University, Hisar, Haryana
5. Central Institute for Cotton Research, Regional Station, Sirsa, Haryana

### **Trial Details**

Number of Entries:	39+4 checks
Number of Rows:	Yield trial 1: 6 Rows (Protected) Screening Trial: 3 Rows (Unprotected)
Row length:	6 m
Spacing:	67.5 x 75 cm (Punjab) 100 x 60 cm (Haryana)
No. of replications:	Three
Design:	Randomized Block Design
Fertilizers:	As per Recommendations.

## **TRIALS**

### **I. EVALUATION UNDER ETL BASED PLANT PROTECTION**

Weekly observations were recorded from 45 DAS against major sucking Pests and Bollworms. The insecticide sprays were based on the threshold levels of sap sucking pests and Bollworms. The sprayings were undertaken in all the replications of an entry, even if in one of the replications, the threshold level of infestation has exceeded.

### **II. PATHOLOGICAL EVALUATION OF Bt COTTON HYBRIDS**

All the entries in the trial were screened against Cotton Leaf Curl Virus (CLCuV) disease (CLCuD) and other fungal diseases.

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## Observations Recorded

The Biometrical observations recorded were final plant stand, ginning per cent, lint index, seed index, Seed Cotton Yield (kg/ha) and lint yield (kg/ha). The entomological observations on sap sucking pests, Bollworm damage and natural enemies were recorded under ETL based plant protection trial. The pathological observations on incidence of cotton CLCuV and other foliar diseases were recorded.

## I. EVALUATION UNDER ETL BASED PLANT PROTECTION

### A. BIOMETRICAL EVALUATION.

Biometrical observations were recorded in the ETL based Plant Protection Trial and are reported here.

#### Germination and final Plant Stand

Germination and correspondingly, the final plant stand was satisfactory in all the entries (Table 1). However, the plant stand in respect of KCH 707 BG II, and RCH 569 BG II was found less at Ludhiana, Sirsa and Sriganaganagar.

#### Boll Weight

Mean boll weight ranged from 3.1 g (Local check variety) to 4.8 g (PRCH 333 BG II, Jai BG II and VICH 305 BG II) (Table 2).

#### Ginning Out turn (%)

Ginning Outturn varied from 30.8 per cent (VICH 303 BG II) to 36.9 per cent (SBCH 308 (Fusion)). The non-Bt check hybrid CSHH 198 recorded a ginning out turn of 31.9 per cent (Table 3).

#### Lint Index and Seed Index

Noticeable variation was observed among the entries for lint and seed index. Lint index varied from 3.9 to 5.8 g (Table 4) and the seed index ranged from 8.0 to 11.4 g (Table 5).

**Table 1. Plant Stand at harvest**

<b>Entry</b>	<b>Bathinda</b>	<b>Ludhiana</b>	<b>Hisar</b>	<b>Mean</b>
SBCH 308 (Fusion)	51.3	43.0	59.0	51.1
ACH 155-2 BG II	48.7	47.0	61.0	52.2
RCH 605 BG II	50.7	49.0	58.0	52.6
SDS 6003 BG II	47.7	47.0	48.0	47.6
ZCH 193 Bt (Fusion)	50.0	50.0	48.0	49.3
Krishna BG II	48.0	47.0	52.0	49.0
VBCH 1516 BG II	49.3	49.0	58.0	52.1
VICH 303 BG II	49.7	49.0	57.0	51.9
KDCHH 516 BG II	46.3	51.0	53.0	50.1
NCEH 145 (Fusion)	48.0	51.0	55.0	51.3
Sarju BG II	51.7	50.0	56.0	52.6
SDS 27 BG II	48.7	48.0	54.0	50.2
SP 1169 B2	50.7	46.0	57.0	51.2
MRC 7361 BG II	47.3	50.0	56.0	51.1
VBCH 1518 BG II	50.7	49.0	57.0	52.2
Goldstar BG II	50.0	51.0	58.0	53.0
KDCHH 08 Bt	45.3	48.0	63.0	52.1
PRCH 333 BG II	51.3	48.0	55.0	51.4
Ankur 3028 BG II	47.3	48.0	58.0	51.1
15 K 39 BG II	42.3	49.0	57.0	49.4
RCH 134 BG II (C)	51.7	52.0	57.0	53.6
SWCH 4711 BG II	52.0	53.0	57.0	54.0
Tulasi 162 BG II	52.0	51.0	54.0	52.3
SP 7017 B2	48.7	50.0	59.0	52.6
CSHH 198 (C)	46.7	45.0	57.0	49.6
ACH 1005 Bt (Fusion)	46.3	50.0	61.0	52.4
Jai BG II	49.7	50.0	60.0	53.2
VICH 305 BG II	50.7	50.0	62.0	54.2
PRCH 302 BG II	50.0	51.0	55.0	52.0
Tulasi 225 BG II	51.3	48.0	51.0	50.1
RCH 314 BG II	48.7	48.0	55.0	50.6
JKCH 1950 (Event 1)	47.3	49.0	53.0	49.8
SBCH 311 (Fusion)	41.7	48.0	59.0	49.6
14 K 59 BG II	49.0	50.0	59.0	52.7
BCHH 6488 BG II	48.0	51.0	56.0	51.7
JKCH 1974 (Event 1)	47.3	48.0	52.0	49.1
ABCH 7399 BG II	49.7	46.0	52.0	49.2
ACH 177-2 BG II	47.0	49.0	54.0	50.0
ABCH 1299 BG II	52.0	51.0	53.0	52.0
MRC 7365 BG II	50.3	47.0	54.0	50.4
SWCH 4707 BG II	51.0	49.0	54.0	51.3
RCH 134 Bt (C)	49.3	52.0	59.0	53.4
LH 2076 / H 1226 (C)	50.0	50.0	56.0	52.0

**Table 2. Mean boll weight (g)**

<b>Entry</b>	<b>Bathinda</b>	<b>Faridkot</b>	<b>Ludhiana</b>	<b>Hisar</b>	<b>Sirsa</b>	<b>Mean</b>
SBCH 308 (Fusion)	3.8	4.2	4.3	3.6	3.6	3.9
ACH 155-2 BG II	3.8	4.3	4.2	4.2	3.9	4.1
RCH 605 BG II	4.6	4.6	4.5	3.2	3.6	4.1
SDS 6003 BG II	4.0	4.2	4.5	4.2	4.4	4.3
ZCH 193 Bt (Fusion)	4.4	4.4	4.6	3.5	3.7	4.1
Krishna BG II	3.5	4.4	4.0	3.5	3.4	3.8
VBCH 1516 BG II	5.0	4.2	4.7	4.5	4.9	4.6
VICH 303 BG II	4.5	4.7	5.0	4.2	4.6	4.6
KDCHH 516 BG II	4.2	4.4	4.7	3.6	4.2	4.2
NCEH 145 (Fusion)	4.6	4.7	5.0	3.7	4.4	4.5
Sarju BG II	3.9	4.6	4.6	4.4	4.0	4.3
SDS 27 BG II	3.5	3.5	4.0	3.0	3.8	3.5
SP 1169 B2	4.0	4.1	4.4	3.4	3.7	3.9
MRC 7361 BG II	4.5	4.7	5.0	4.4	4.6	4.6
VBCH 1518 BG II	4.8	4.2	5.2	4.4	4.1	4.6
Goldstar BG II	4.0	4.1	4.3	3.5	3.9	4.0
KDCHH 08 Bt	3.7	4.5	4.6	4.0	4.0	4.2
PRCH 333 BG II	4.9	5.1	5.1	4.2	4.9	4.8
Ankur 3028 BG II	4.0	4.9	4.7	3.7	3.8	4.2
15 K 39 BG II	4.9	5.1	5.1	4.3	4.4	4.7
RCH 134 BG II (C)	3.9	4.7	4.3	3.8	3.7	4.1
SWCH 4711 BG II	4.8	4.7	4.6	4.8	4.8	4.7
Tulasi 162 BG II	4.3	4.8	4.4	4.3	4.1	4.4
SP 7017 B2	3.9	5.0	4.7	3.6	4.1	4.3
CSHH 198 (C)	4.7	4.9	5.0	3.9	4.2	4.5
ACH 1005 Bt (Fusion)	3.5	4.0	4.1	3.4	3.2	3.6
Jai BG II	4.6	5.2	5.3	4.4	4.5	4.8
VICH 305 BG II	5.0	4.8	5.0	4.5	4.9	4.8
PRCH 302 BG II	3.7	3.9	3.9	3.4	3.4	3.7
Tulasi 225 BG II	4.4	5.1	4.7	4.4	4.3	4.6
RCH 314 BG II	4.0	4.0	4.5	3.6	3.5	3.9
JKCH 1950 (Event 1)	3.4	3.6	4.2	2.9	3.3	3.5
SBCH 311 (Fusion)	4.2	4.8	4.4	3.9	3.9	4.2
14 K 59 BG II	4.1	4.6	5.1	4.5	4.1	4.5
BCHH 6488 BG II	4.2	4.5	4.2	3.9	3.6	4.1
JKCH 1974 (Event 1)	3.4	3.9	4.1	3.3	3.2	3.6
ABCH 7399 BG II	4.3	4.3	4.8	3.8	4.1	4.2
ACH 177-2 BG II	3.6	4.8	4.7	3.9	3.9	4.2
ABCH 1299 BG II	3.5	3.9	3.9	3.1	3.0	3.5
MRC 7365 BG II	4.3	4.7	5.1	3.9	4.4	4.5
SWCH 4707 BG II	4.4	4.8	4.9	4.0	4.4	4.5
RCH 134 Bt (C)	4.4	4.5	4.7	3.7	3.7	4.2
LH 2076 / H 1226 (C)	3.2	--	3.9	2.6	2.7	3.1

**Table 3. Mean Ginning Out Turn (%)**

<b>Entry</b>	<b>Bathinda</b>	<b>Faridkot</b>	<b>Ludhiana</b>	<b>Hisar</b>	<b>Sirsa</b>	<b>Mean</b>
SBCH 308 (Fusion)	34.3	38.6	34.4	39.5	37.7	36.9
ACH 155-2 BG II	35.2	34.1	33.5	37.0	37.5	35.5
RCH 605 BG II	30.3	34.0	30.1	33.6	31.8	32.0
SDS 6003 BG II	34.2	34.7	34.2	34.9	35.7	34.7
ZCH 193 Bt (Fusion)	34.8	38.6	35.3	36.7	35.5	36.2
Krishna BG II	32.9	33.7	31.3	34.7	35.3	33.6
VBCH 1516 BG II	32.3	35.0	31.7	36.5	33.7	33.8
VICH 303 BG II	29.1	31.8	28.1	33.5	31.5	30.8
KDCHH 516 BG II	35.0	37.7	33.8	36.8	37.3	36.1
NCEH 145 (Fusion)	30.8	33.3	29.2	34.0	31.3	31.7
Sarju BG II	34.0	34.4	34.0	37.2	35.8	35.1
SDS 27 BG II	33.6	36.3	34.9	36.8	37.3	35.8
SP 1169 B2	35.4	34.4	34.4	37.2	35.3	35.3
MRC 7361 BG II	33.1	32.9	31.6	35.6	35.0	33.6
VBCH 1518 BG II	31.0	31.8	29.9	35.0	32.7	32.1
Goldstar BG II	32.1	34.4	31.3	34.5	33.7	33.2
KDCHH 08 Bt	33.5	34.6	30.1	36.8	34.8	34.0
PRCH 333 BG II	31.4	32.2	29.6	33.8	31.3	31.7
Ankur 3028 BG II	30.1	34.9	28.7	30.2	31.2	31.0
15 K 39 BG II	32.7	32.0	31.4	35.4	34.3	33.2
RCH 134 BG II (C)	34.6	36.2	32.5	37.5	36.7	35.5
SWCH 4711 BG II	31.9	33.7	31.8	39.8	32.5	34.0
Tulasi 162 BG II	31.1	32.3	33.1	33.4	32.7	32.5
SP 7017 B2	34.8	35.3	33.8	43.6	35.5	36.6
CSHH 198 (C)	30.4	33.7	29.4	34.4	31.8	31.9
ACH 1005 Bt (Fusion)	31.7	33.5	29.8	34.9	33.8	32.7
Jai BG II	32.2	35.3	33.5	35.5	34.7	34.2
VICH 305 BG II	34.4	37.0	33.6	38.2	36.0	35.8
PRCH 302 BG II	34.8	36.0	34.1	38.4	35.5	35.8
Tulasi 225 BG II	32.7	35.6	34.0	35.4	33.0	34.1
RCH 314 BG II	33.4	34.1	32.8	34.7	33.8	33.8
JKCH 1950 (Event 1)	35.5	34.7	34.0	36.7	35.5	35.3
SBCH 311 (Fusion)	31.8	35.1	31.5	36.1	34.3	33.8
14 K 59 BG II	33.6	34.4	30.4	36.8	35.0	34.0
BCHH 6488 BG II	36.0	36.8	34.8	37.5	37.7	36.6
JKCH 1974 (Event 1)	35.3	38.6	33.9	36.5	35.0	35.9
ABCH 7399 BG II	31.2	31.4	31.1	31.3	32.0	31.4
ACH 177-2 BG II	32.6	33.8	32.0	35.7	34.5	33.7
ABCH 1299 BG II	33.2	34.5	33.4	36.7	35.8	34.7
MRC 7365 BG II	32.2	35.0	33.4	36.4	34.0	34.2
SWCH 4707 BG II	33.6	35.5	32.4	34.9	35.0	34.3
RCH 134 Bt (C)	35.4	36.7	33.7	38.1	36.2	36.0
LH 2076 / H 1226 (C)	33.1	--	30.4	35.4	34.8	33.4

**Table 4. Lint index (g)**

Entry	Faridkot	Ludhiana	Hisar	Sirsa	Mean
SBCH 308 (Fusion)	5.9	5.2	5.3	6.0	5.6
ACH 155-2 BG II	5.5	5.1	4.9	5.4	5.2
RCH 605 BG II	4.5	4.0	3.9	3.3	3.9
SDS 6003 BG II	4.5	4.9	4.6	4.9	4.7
ZCH 193 Bt (Fusion)	5.6	5.0	4.6	4.4	4.9
Krishna BG II	4.3	4.2	4.1	4.3	4.2
VBCH 1516 BG II	4.2	4.7	5.5	5.4	4.9
VICH 303 BG II	5.6	4.5	5.5	5.3	5.2
KDCHH 516 BG II	5.8	4.9	4.9	5.2	5.2
NCEH 145 (Fusion)	4.9	4.1	4.6	4.3	4.5
Sarju BG II	5.5	5.3	5.5	5.5	5.4
SDS 27 BG II	4.4	4.8	4.4	4.9	4.6
SP 1169 B2	4.7	5.4	5.1	4.5	4.9
MRC 7361 BG II	5.0	4.9	5.0	5.4	5.1
VBCH 1518 BG II	4.6	4.5	4.8	4.8	4.7
Goldstar BG II	5.3	4.6	4.6	4.7	4.8
KDCHH 08 Bt	5.3	4.4	4.7	4.3	4.7
PRCH 333 BG II	4.6	4.8	4.2	4.2	4.4
Ankur 3028 BG II	5.7	4.4	3.8	4.2	4.5
15 K 39 BG II	5.6	5.3	5.6	5.8	5.6
RCH 134 BG II (C)	5.3	5.0	5.1	5.0	5.1
SWCH 4711 BG II	5.3	5.2	6.6	5.5	5.6
Tulasi 162 BG II	5.0	5.7	4.3	5.1	5.0
SP 7017 B2	5.3	5.6	6.5	5.2	5.6
CSHH 198 (C)	5.2	4.4	3.7	4.2	4.4
ACH 1005 Bt (Fusion)	4.9	3.8	5.2	4.3	4.5
Jai BG II	5.8	5.7	5.3	5.7	5.6
VICH 305 BG II	5.0	5.6	5.1	5.6	5.3
PRCH 302 BG II	5.7	5.2	6.6	4.7	5.5
Tulasi 225 BG II	6.2	6.1	5.3	5.5	5.8
RCH 314 BG II	4.7	5.0	4.0	5.1	4.7
JKCH 1950 (Event 1)	4.1	4.8	4.3	4.0	4.3
SBCH 311 (Fusion)	4.9	4.5	4.9	5.0	4.8
14 K 59 BG II	6.1	4.7	5.6	4.9	5.3
BCHH 6488 BG II	4.9	5.4	4.6	4.8	4.9
JKCH 1974 (Event 1)	6.1	4.6	4.1	4.0	4.7
ABCH 7399 BG II	5.3	5.3	4.4	4.8	5.0
ACH 177-2 BG II	5.4	4.9	5.1	5.1	5.1
ABCH 1299 BG II	4.6	4.4	4.4	4.4	4.4
MRC 7365 BG II	4.9	4.7	4.5	4.5	4.7
SWCH 4707 BG II	5.7	5.3	5.1	5.4	5.4
RCH 134 Bt (C)	5.6	5.6	5.2	4.9	5.3
LH 2076 / H 1226 (C)	--	4.2	3.8	4.0	4.0



**Table 5. Seed index (g)**

<b>Entry</b>	<b>Bathinda</b>	<b>Faridkot</b>	<b>Ludhiana</b>	<b>Hisar</b>	<b>Sirsa</b>	<b>Mean</b>
SBCH 308 (Fusion)	10.9	9.4	9.9	8.2	9.9	9.7
ACH 155-2 BG II	9.6	10.6	10.0	8.3	9.1	9.5
RCH 605 BG II	8.6	8.7	9.4	7.8	7.1	8.3
SDS 6003 BG II	9.2	8.4	9.4	8.6	8.9	8.9
ZCH 193 Bt (Fusion)	8.7	8.9	9.3	8.0	8.1	8.6
Krishna BG II	8.2	8.5	9.2	7.8	7.9	8.3
VBCH 1516 BG II	10.6	7.8	10.0	9.6	10.7	9.7
VICH 303 BG II	11.2	12.1	11.5	10.9	11.5	11.4
KDCHH 516 BG II	9.4	9.6	9.6	8.3	8.8	9.1
NCEH 145 (Fusion)	9.4	9.7	9.9	8.9	9.5	9.5
Sarju BG II	10.1	10.4	10.2	9.3	9.8	10.0
SDS 27 BG II	9.0	7.8	9.0	7.6	8.3	8.3
SP 1169 B2	8.8	8.9	10.3	8.6	8.1	8.9
MRC 7361 BG II	11.0	10.2	10.5	9.1	10.1	10.2
VBCH 1518 BG II	10.6	9.9	10.5	8.9	9.9	10.0
Goldstar BG II	9.2	10.2	10.1	8.8	9.3	9.5
KDCHH 08 Bt	9.5	9.9	10.2	8.0	8.1	9.2
PRCH 333 BG II	10.0	9.6	11.4	8.3	9.2	9.7
Ankur 3028 BG II	9.4	10.5	11.0	8.8	9.3	9.8
15 K 39 BG II	11.3	12.0	11.5	10.2	11.1	11.2
RCH 134 BG II (C)	9.0	9.3	10.4	8.5	8.6	9.1
SWCH 4711 BG II	11.8	10.4	11.1	9.9	11.3	10.9
Tulasi 162 BG II	10.9	10.6	11.5	8.6	10.5	10.4
SP 7017 B2	9.5	9.8	10.9	8.4	9.4	9.6
CSHH 198 (C)	10.0	10.2	10.6	7.0	9.0	9.4
ACH 1005 Bt (Fusion)	8.1	9.8	8.9	9.7	8.3	9.0
Jai BG II	11.1	10.6	11.3	9.6	10.7	10.6
VICH 305 BG II	10.1	8.5	11.0	8.3	9.9	9.6
PRCH 302 BG II	9.5	10.0	10.0	10.6	8.5	9.7
Tulasi 225 BG II	11.2	11.2	12.0	9.7	11.2	11.0
RCH 314 BG II	10.2	9.0	10.1	7.5	10.0	9.4
JKCH 1950 (Event 1)	8.3	7.7	9.2	7.5	7.3	8.0
SBCH 311 (Fusion)	9.5	9.1	9.8	8.7	9.5	9.3
14 K 59 BG II	10.1	11.7	10.7	9.6	9.1	10.2
BCHH 6488 BG II	8.5	8.5	10.1	7.6	8.0	8.5
JKCH 1974 (Event 1)	8.5	9.6	9.0	7.1	7.5	8.3
ABCH 7399 BG II	10.6	11.6	11.8	9.6	10.2	10.8
ACH 177-2 BG II	9.4	10.5	10.4	9.1	9.7	9.8
ABCH 1299 BG II	9.0	8.7	8.8	7.5	7.8	8.4
MRC 7365 BG II	8.8	9.1	9.5	7.9	8.7	8.8
SWCH 4707 BG II	9.5	10.3	11.0	9.4	10.0	10.1
RCH 134 Bt (C)	9.5	9.5	11.0	8.4	8.7	9.4
LH 2076 / H 1226 (C)	8.9	--	9.5	6.9	7.5	8.2

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## Seed Cotton Yield

Seed cotton yield data recorded in five different centres are furnished in Table 6. Among the check hybrids, RCH 134 Bt recorded the highest yield of 2803 kg/ha. Of the 39 test hybrids evaluated, seven hybrids recorded higher seed cotton yield over the best Bt check hybrid ranging from 2 – 16 per cent yield increase. The highest mean seed cotton yield of 3249 kg/ha was recorded in BCHH 6488 BG II with 16 and 28 per cent yield increase over RCH 134 BG I and BG II, respectively. The hybrid also registered an yield increase of 69 per cent over CSHH 198 (non-Bt check hybrid) and 82 per cent yield increase over local check variety. The other Bt hybrids which were found superior to the best Bt check hybrids are RCH 605 BG II, PRCH 333 BG II, 14 K 59 BG II, Ankur 3028 BG II, KDCHH 516 BG II and Jai BG II.

## Lint yield

The lint yield also followed more or less the same trend as that of seed cotton yield. RCH 134 Bt with a mean lint yield of 1012 kg/ha was the best check hybrid (Table 7). For lint yield also, the test hybrid BCHH 6488 BG II was the best recording 1194 kg/ha with 18 % increase over RCH 134 BG I and 32 % increase over RCH 134 BG II. However, only two other hybrids were found superior to the best Bt check hybrid viz., KDCHH 516 BG II and SP 7017 B2.

## B. FIBRE QUALITY EVALUATION

The mean fibre quality parameters recorded in the hybrids over the locations is furnished in Table 8. The 2.5% Span length varied from 25.4 mm (local check variety) to 32.3 mm (Jai BG II). The Micronaire value ranged from 4.1 to 5.1 and bundle strength varied from 20.1 (Krishna BG II) to 23.2 g/tex (15 K 39 BG II and SBCH 311 (Fusion)).

**Table 6. Seed cotton yield (kg/ha)**

Entry	Bathinda	Faridkot	Ludhiana	Hisar	Sirsa	Mean	% Inc. over RCH 134 BG I	% Inc. over RCH 134 BG II	% Inc. over CSHH 198	% Inc. over LC
BCHH 6488 BG II	4368	3365	1572	3380	3560	<b>3249</b>	16	28	69	82
RCH 605 BG II	4104	3394	2058	3361	2847	<b>3153</b>	12	24	64	77
PRCH 333 BG II	4093	2631	2150	2593	3264	<b>2946</b>	5	16	53	65
14 K 59 BG II	3243	2613	2598	2713	3227	<b>2879</b>	3	13	50	61
Ankur 3028 BG II	3435	3232	1987	2972	2718	<b>2869</b>	2	13	49	61
KDCHH 516 BG II	4148	2603	1826	2713	3019	<b>2862</b>	2	13	49	60
Jai BG II	3281	2804	2505	2407	3278	<b>2855</b>	2	12	48	60
RCH 134 Bt (C)	3394	2748	1958	2583	3333	<b>2803</b>	0	10	46	57
SP 7017 B2	3224	3018	2336	3000	2417	<b>2799</b>	0	10	45	57
MRC 7365 BG II	3019	3183	1462	3259	3065	<b>2798</b>	0	10	45	57
PRCH 302 BG II	3004	2661	2142	2963	3097	<b>2773</b>	-1	9	44	55
NCEH 145 (Fusion)	3235	2967	1150	2565	3306	<b>2645</b>	-6	4	37	48
SP 1169 B2	3268	3207	1365	2296	2907	<b>2609</b>	-7	3	36	46
Goldstar BG II	3232	2408	2042	2500	2852	<b>2607</b>	-7	3	35	46
ACH 155-2 BG II	2719	2726	2090	2398	2986	<b>2584</b>	-8	2	34	45
Krishna BG II	2792	2522	1837	2620	2991	<b>2552</b>	-9	0	33	43
RCH 134 BG II (C)	3025	2353	1927	2593	2806	<b>2541</b>	-9	0	32	42
RCH 314 BG II	2870	2949	1470	2792	2111	<b>2438</b>	-13	-4	27	37
15 K 39 BG II	2975	3084	1984	1880	2148	<b>2414</b>	-14	-5	25	35
VBCH 1518 BG II	3342	2115	1599	2037	2667	<b>2352</b>	-16	-7	22	32
ACH 1005 Bt (Fusion)	2436	2209	1757	2815	2384	<b>2320</b>	-17	-9	21	30
ABCH 1299 BG II	3065	1940	1305	2495	2792	<b>2319</b>	-17	-9	20	30

**Table 6. Seed cotton yield (kg/ha) Contd.**

Entry	Bathinda	Faridkot	Ludhiana	Hisar	Sirsa	Mean	% Inc. over RCH 134 BG I	% Inc. over RCH 134 BG II	% Inc. over CSHH 198	% Inc. over LC
VBCH 1516 BG II	3096	1565	1721	2000	3190	<b>2314</b>	-17	-9	20	30
KDCHH 08 Bt	2602	2286	2023	1944	2597	<b>2290</b>	-18	-10	19	28
ABCH 7399 BG II	2728	1906	1474	2343	2968	<b>2284</b>	-19	-10	19	28
ACH 177-2 BG II	2798	2412	1593	2074	2468	<b>2269</b>	-19	-11	18	27
ZCH 193 Bt (Fusion)	2680	2302	1488	2528	1944	<b>2188</b>	-22	-14	14	23
Tulasi 162 BG II	2686	1767	1858	2546	2028	<b>2177</b>	-22	-14	13	22
Sarju BG II	2812	1886	1486	2139	2519	<b>2168</b>	-23	-15	13	21
JKCH 1950 (Event 1)	2907	1875	1295	2565	2176	<b>2164</b>	-23	-15	12	21
SBCH 311 (Fusion)	2508	2110	1583	2065	2509	<b>2155</b>	-23	-15	12	21
MRC 7361 BG II	2488	2086	1742	1704	2644	<b>2133</b>	-24	-16	11	19
SDS 6003 BG II	3129	1586	1340	2167	2412	<b>2127</b>	-24	-16	10	19
JKCH 1974 (Event 1)	2262	2510	1535	2269	1935	<b>2102</b>	-25	-17	9	18
VICH 305 BG II	2247	2162	1949	1472	2616	<b>2089</b>	-25	-18	9	17
SWCH 4707 BG II	2606	2113	1627	2037	1972	<b>2071</b>	-26	-18	8	16
VICH 303 BG II	2412	2209	1687	2000	1949	<b>2051</b>	-27	-19	7	15
CSHH 198 (C)	2494	1693	1753	1676	2009	<b>1925</b>	-31	-24	0	8
SBCH 308 (Fusion)	2813	1837	1375	1639	1810	<b>1895</b>	-32	-25	-2	6
SWCH 4711 BG II	2546	1612	1349	1907	1921	<b>1867</b>	-33	-27	-3	5
LH 2076 / H 1226 (C)	1967	--	1275	1861	2037	<b>1785</b>	-36	-30	-7	0
Tulasi 225 BG II	2900	1212	805	1917	1625	<b>1692</b>	-40	-33	-12	-5
SDS 27 BG II	2022	1305	990	1556	1463	<b>1467</b>	-48	-42	-24	-18
CD at 5%	434	274	447	323	304					
CV (%)	9	7	16		7					

**Table 7. Lint yield (kg/ha)**

Entry	Bathinda	Faridkot	Ludhiana	Hisar	Sirsa	Mean	% Inc. over RCH 134 BG I	% Inc. over RCH 134 BG II	% Inc. over CSHH 198	% Inc. over LC
BCHH 6488 BG II	1573	1239	547	1267	1342	<b>1194</b>	18	32	95	98
KDCHH 516 BG II	1451	981	614	997	1126	<b>1034</b>	2	14	69	71
SP 7017 B2	1122	1065	790	1309	857	<b>1029</b>	2	14	68	71
RCH 134 Bt (C)	1202	1009	659	985	1206	<b>1012</b>	0	12	66	68
RCH 605 BG II	1243	1153	619	1128	906	<b>1010</b>	0	12	65	67
PRCH 302 BG II	1047	957	725	1137	1100	<b>993</b>	-2	10	63	65
14 K 59 BG II	1086	900	791	998	1129	<b>981</b>	-3	8	61	63
Jai BG II	1058	989	839	854	1137	<b>975</b>	-4	8	60	62
MRC 7365 BG II	971	1114	493	1186	1042	<b>961</b>	-5	6	57	59
PRCH 333 BG II	1285	845	636	876	1023	<b>933</b>	-8	3	53	55
SP 1169 B2	1159	1103	471	854	1028	<b>923</b>	-9	2	51	53
ACH 155-2 BG II	960	932	702	887	1120	<b>920</b>	-9	2	51	53
RCH 134 BG II (C)	1045	851	624	973	1029	<b>904</b>	-11	0	48	50
Ankur 3028 BG II	1033	1128	572	897	846	<b>895</b>	-12	-1	47	48
Goldstar BG II	1036	827	640	863	961	<b>865</b>	-14	-4	42	44
Krishna BG II	920	849	574	909	1058	<b>862</b>	-15	-5	41	43
NCEH 145 (Fusion)	995	989	334	871	1036	<b>845</b>	-17	-7	38	40
RCH 314 BG II	956	1004	481	969	714	<b>825</b>	-18	-9	35	37
ABCH 1299 BG II	1015	670	439	915	1001	<b>808</b>	-20	-11	32	34
15 K 39 BG II	974	987	626	666	738	<b>798</b>	-21	-12	31	32
ZCH 193 Bt (Fusion)	933	889	524	929	690	<b>793</b>	-22	-12	30	32

Table 7. Lint yield (kg/ha) Contd.

Entry	Bathinda	Faridkot	Ludhiana	Hisar	Sirsa	Mean	% Inc. over RCH 134 BG I	% Inc. over RCH 134 BG II	% Inc. over CSHH 198	% Inc. over LC
VBCH 1516 BG II	1000	547	552	730	1073	<b>780</b>	-23	-14	28	29
KDCHH 08 Bt	871	791	606	716	905	<b>778</b>	-23	-14	27	29
JKCH 1950 (Event 1)	1029	650	440	941	772	<b>766</b>	-24	-15	25	27
ACH 177-2 BG II	912	816	510	740	850	<b>766</b>	-24	-15	25	27
ACH 1005 Bt (Fusion)	771	739	522	982	808	<b>764</b>	-24	-15	25	27
Sarju BG II	958	651	505	796	903	<b>763</b>	-25	-16	25	26
JKCH 1974 (Event 1)	798	969	521	829	677	<b>759</b>	-25	-16	24	26
VBCH 1518 BG II	1037	672	477	714	871	<b>754</b>	-25	-17	23	25
VICH 305 BG II	774	799	653	563	942	<b>746</b>	-26	-17	22	24
SDS 6003 BG II	1071	550	458	756	861	<b>739</b>	-27	-18	21	23
SBCH 311 (Fusion)	798	743	499	746	861	<b>729</b>	-28	-19	19	21
MRC 7361 BG II	823	684	550	607	926	<b>718</b>	-29	-21	18	19
ABCH 7399 BG II	846	598	459	734	950	<b>717</b>	-29	-21	17	19
SWCH 4707 BG II	877	750	528	712	692	<b>712</b>	-30	-21	16	18
Tulasi 162 BG II	835	570	606	851	663	<b>705</b>	-30	-22	15	17
SBCH 308 (Fusion)	967	709	469	647	682	<b>695</b>	-31	-23	14	15
SWCH 4711 BG II	812	543	428	760	624	<b>633</b>	-37	-30	4	5
VICH 303 BG II	700	702	473	669	615	<b>632</b>	-38	-30	3	5
CSHH 198 (C)	757	571	511	577	639	<b>611</b>	-40	-32	0	1
LH 2076 / H 1226 (C)	652	---	392	659	709	<b>603</b>	-40	-33	-1	0
Tulasi 225 BG II	951	432	269	678	538	<b>574</b>	-43	-37	-6	-5
SDS 27 BG II	678	474	344	573	546	<b>523</b>	-48	-42	-14	-13
CD at 5%		101	144	125	111					
CV (%)		8	16	9	8					

**Table 8. Mean Fibre quality attributes**

<b>Entry</b>	<b>2.5 % Span Length (mm)</b>	<b>Uniformity Ratio</b>	<b>Micronaire</b>	<b>Bundle Strength (g/tex)</b>
SBCH 308 (Fusion)	28.9	48.5	4.6	22.6
ACH 155-2 BG II	27.1	51.5	4.6	22.4
RCH 605 BG II	27.7	49.5	4.1	21.8
SDS 6003 BG II	28.1	50.0	4.3	21.5
ZCH 193 Bt (Fusion)	26.4	50.5	4.5	21.5
Krishna BG II	25.6	50.5	4.4	20.1
VBCH 1516 BG II	30.3	48.0	4.5	22.6
VICH 303 BG II	30.7	49.0	4.9	23.1
KDCHH 516 BG II	27.1	50.5	5.0	23.0
NCEH 145 (Fusion)	27.3	49.5	4.3	21.0
Sarju BG II	29.2	51.5	4.7	21.4
SDS 27 BG II	28.6	48.5	4.7	20.9
SP 1169 B2	28.1	50.5	4.8	20.4
MRC 7361 BG II	30.1	49.5	4.6	21.3
VBCH 1518 BG II	30.1	50.5	4.4	22.7
Goldstar BG II	29.7	50.5	4.3	22.4
KDCHH 08 Bt	25.6	52.5	5.0	22.2
PRCH 333 BG II	30.2	49.0	4.8	22.9
Ankur 3028 BG II	31.0	50.0	4.6	22.8
15 K 39 BG II	32.0	47.0	5.0	23.2
RCH 134 BG II (C)	27.1	52.0	4.4	22.8
SWCH 4711 BG II	28.8	48.0	4.9	20.8
Tulasi 162 BG II	30.2	50.5	4.6	22.8
SP 7017 B2	28.1	50.5	4.7	21.7
CSHH 198 (C)	27.4	51.0	4.5	22.0
ACH 1005 Bt (Fusion)	26.2	52.5	4.4	21.3
Jai BG II	32.3	47.5	5.0	22.6
VICH 305 BG II	29.0	49.5	4.5	22.3
PRCH 302 BG II	26.9	51.5	4.7	21.1
Tulasi 225 BG II	27.6	50.0	4.8	21.9
RCH 314 BG II	28.2	48.5	4.7	21.2
JKCH 1950 (Event 1)	26.6	51.0	4.8	20.3
SBCH 311 (Fusion)	31.2	47.0	4.3	23.2
14 K 59 BG II	30.4	49.5	5.1	22.1
BCHH 6488 BG II	29.1	50.5	4.9	20.6
JKCH 1974 (Event 1)	27.5	51.0	4.8	20.8
ABCH 7399 BG II	30.9	49.0	4.7	22.3
ACH 177-2 BG II	30.3	49.0	4.7	22.3
ABCH 1299 BG II	29.0	49.0	4.6	22.8
MRC 7365 BG II	29.4	47.0	4.3	20.6
SWCH 4707 BG II	30.1	48.0	5.0	21.7
RCH 134 Bt (C)	27.3	51.0	4.6	21.2
LH 2076 / H 1226 (C)	25.4	52.0	4.2	20.5

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## **C. ENTOMOLOGICAL EVALUATION**

### **EVALUATION UNDER ETL BASED PLANT PROTECTION**

#### **SUCKING PESTS**

##### **Jassids**

Jassid population was recorded in Faridkot, Ludhiana and Sirsa and was found to be comparatively high in Ludhiana (Table 9). Mean jassid population in the hybrids varied from 2.7 to 5.3.

##### **White fly**

Whitefly population was more at Ludhiana and Sirsa as compared to Faridkot (Table 10). The local check varieties had the highest mean number of white fly (6.5) and the least number of white flies per plant was recorded in the hybrids SDS 27 BG II and PRCH 302 BG II (4.0).

##### **Thrips**

Very high population of Thrips was observed at Sirsa as compared to Faridkot and Ludhiana (Table 11). The lowest mean thrips population of 1.1 per plant was recorded in SBCH 308 (Fusion) and the highest number of thrips (3.1) was recorded in local check varieties.

##### **Aphids**

No aphids infestation was found in Faridkot and Ludhiana.

##### **Mealy bug / 10 cm terminal shoot**

Data on mealy bug infestation was recorded in Faridkot and in Sirsa (Table 12). Most of the entries have recorded similar susceptibility to mealy bugs.

##### **Predators**

The mean number of predators was more in Bt hybrids (2.7 to 3.9) as compared to conventional check varieties which recorded a mean number of 0.2 (Table 13).



**Table 9. Jassid / plant**

<b>Entry</b>	<b>Faridkot</b>	<b>Ludhiana</b>	<b>Sirsa</b>	<b>Mean</b>
SBCH 308 (Fusion)	2.5	4.2	1.7	2.8
ACH 155-2 BG II	2.0	4.6	1.9	2.8
RCH 605 BG II	2.2	4.4	1.7	2.7
SDS 6003 BG II	3.3	6.4	1.9	3.9
ZCH 193 Bt (Fusion)	2.3	6.4	1.7	3.5
Krishna BG II	2.4	4.7	2.2	3.1
VBCH 1516 BG II	2.2	5.9	1.8	3.3
VICH 303 BG II	2.5	6.8	1.7	3.7
KDCHH 516 BG II	2.5	6.5	1.9	3.6
NCEH 145 (Fusion)	2.8	5.5	1.7	3.4
Sarju BG II	2.7	10.1	2.0	4.9
SDS 27 BG II	2.4	6.5	2.0	3.6
SP 1169 B2	2.2	4.7	1.7	2.9
MRC 7361 BG II	2.5	6.3	1.9	3.6
VBCH 1518 BG II	2.3	6.6	1.7	3.5
Goldstar BG II	2.6	6.0	1.7	3.4
KDCHH 08 Bt	2.2	5.4	1.6	3.1
PRCH 333 BG II	2.3	5.4	2.0	3.2
Ankur 3028 BG II	2.4	5.6	1.9	3.3
15 K 39 BG II	2.2	7.1	1.7	3.7
RCH 134 BG II (C)	2.4	5.8	1.8	3.3
SWCH 4711 BG II	2.8	7.2	2.0	4.0
Tulasi 162 BG II	2.5	5.9	1.9	3.4
SP 7017 B2	2.7	6.1	1.8	3.5
CSHH 198 (C)	2.3	5.3	1.8	3.1
ACH 1005 Bt (Fusion)	2.5	4.9	1.7	3.0
Jai BG II	2.7	6.3	1.9	3.6
VICH 305 BG II	2.3	5.9	2.1	3.4
PRCH 302 BG II	2.4	4.3	2.1	2.9
Tulasi 225 BG II	1.8	6.1	2.0	3.3
RCH 314 BG II	2.0	6.5	1.6	3.4
JKCH 1950 (Event 1)	2.3	5.4	1.7	3.1
SBCH 311 (Fusion)	2.3	5.7	1.9	3.3
14 K 59 BG II	2.4	4.8	1.7	3.0
BCHH 6488 BG II	2.3	5.6	1.8	3.3
JKCH 1974 (Event 1)	2.6	6.8	2.0	3.8
ABCH 7399 BG II	2.6	8.0	1.8	4.1
ACH 177-2 BG II	2.5	6.8	1.9	3.7
ABCH 1299 BG II	2.4	6.7	1.8	3.6
MRC 7365 BG II	2.3	6.0	2.0	3.4
SWCH 4707 BG II	2.4	11.5	2.0	5.3
RCH 134 Bt (C)	2.4	7.6	1.9	4.0
LH 2076 / H 1226 (C)	--	7.3	1.7	4.5

**Table 10. Whitefly / plant**

<b>Entry</b>	<b>Faridkot</b>	<b>Ludhiana</b>	<b>Sirsa</b>	<b>Mean</b>
SBCH 308 (Fusion)	2.7	5.5	5.0	4.4
ACH 155-2 BG II	2.7	6.9	4.5	4.7
RCH 605 BG II	2.7	6.4	3.8	4.3
SDS 6003 BG II	2.8	7.0	4.1	4.6
ZCH 193 Bt (Fusion)	2.8	6.7	4.2	4.5
Krishna BG II	3.5	7.0	4.2	4.9
VBCH 1516 BG II	3.0	7.4	4.4	4.9
VICH 303 BG II	3.1	6.4	4.4	4.7
KDCHH 516 BG II	2.8	9.0	3.9	5.2
NCEH 145 (Fusion)	3.0	8.0	3.9	5.0
Sarju BG II	2.4	6.7	4.0	4.4
SDS 27 BG II	2.8	5.2	3.9	4.0
SP 1169 B2	3.0	5.6	4.5	4.4
MRC 7361 BG II	3.6	5.5	4.1	4.4
VBCH 1518 BG II	3.1	8.0	4.3	5.1
Goldstar BG II	3.4	4.9	4.5	4.3
KDCHH 08 Bt	3.2	8.2	4.5	5.3
PRCH 333 BG II	3.0	7.5	3.9	4.8
Ankur 3028 BG II	3.4	6.7	4.0	4.7
15 K 39 BG II	2.9	7.0	4.4	4.8
RCH 134 BG II (C)	3.3	6.4	4.3	4.7
SWCH 4711 BG II	3.2	7.4	4.1	4.9
Tulasi 162 BG II	3.1	6.7	5.4	5.1
SP 7017 B2	3.2	7.0	4.1	4.7
CSHH 198 (C)	2.8	8.8	4.0	5.2
ACH 1005 Bt (Fusion)	3.4	6.0	3.9	4.4
Jai BG II	3.5	10.2	4.0	5.9
VICH 305 BG II	3.1	6.3	4.4	4.6
PRCH 302 BG II	2.9	5.2	4.0	4.0
Tulasi 225 BG II	2.7	7.3	3.8	4.6
RCH 314 BG II	3.1	7.4	4.3	4.9
JKCH 1950 (Event 1)	3.0	5.7	3.7	4.1
SBCH 311 (Fusion)	3.2	6.8	4.3	4.8
14 K 59 BG II	3.4	7.4	4.1	5.0
BCHH 6488 BG II	3.1	8.1	4.4	5.2
JKCH 1974 (Event 1)	3.0	7.5	4.4	5.0
ABCH 7399 BG II	3.4	7.3	4.2	5.0
ACH 177-2 BG II	3.0	8.9	4.4	5.4
ABCH 1299 BG II	2.9	7.8	4.4	5.0
MRC 7365 BG II	3.1	8.2	4.0	5.1
SWCH 4707 BG II	3.0	7.8	4.5	5.1
RCH 134 Bt (C)	2.9	8.2	4.1	5.1
LH 2076 / H 1226 (C)	--	8.7	4.3	6.5

**Table 11. Thrips/ plant**

<b>Entry</b>	<b>Faridkot</b>	<b>Ludhiana</b>	<b>Sirsa</b>	<b>Mean</b>
SBCH 308 (Fusion)	0.1	0.3	2.8	1.1
ACH 155-2 BG II	0.2	0.3	4.4	1.6
RCH 605 BG II	0.1	0.3	5.2	1.9
SDS 6003 BG II	0.1	0.0	4.3	1.5
ZCH 193 Bt (Fusion)	0.3	0.7	4.0	1.6
Krishna BG II	0.1	0.0	4.5	1.5
VBCH 1516 BG II	0.3	0.0	5.1	1.8
VICH 303 BG II	0.8	0.0	4.5	1.8
KDCHH 516 BG II	1.3	0.4	4.8	2.2
NCEH 145 (Fusion)	0.1	0.0	4.4	1.5
Sarju BG II	0.1	0.0	4.4	1.5
SDS 27 BG II	0.7	0.0	4.0	1.5
SP 1169 B2	0.2	0.0	5.1	1.8
MRC 7361 BG II	1.3	0.0	4.5	1.9
VBCH 1518 BG II	0.2	0.0	4.8	1.7
Goldstar BG II	0.2	0.7	4.7	1.8
KDCHH 08 Bt	0.7	0.0	4.3	1.6
PRCH 333 BG II	0.1	0.0	5.0	1.7
Ankur 3028 BG II	0.2	0.0	5.3	1.8
15 K 39 BG II	0.2	0.4	4.2	1.6
RCH 134 BG II (C)	0.1	0.0	4.7	1.6
SWCH 4711 BG II	0.8	0.0	4.0	1.6
Tulasi 162 BG II	1.1	0.5	4.8	2.1
SP 7017 B2	0.2	0.5	5.4	2.0
CSHH 198 (C)	0.2	0.0	5.4	1.9
ACH 1005 Bt (Fusion)	0.1	0.0	4.2	1.4
Jai BG II	0.5	0.0	5.3	1.9
VICH 305 BG II	0.2	0.4	5.1	1.9
PRCH 302 BG II	1.2	0.1	5.0	2.1
Tulasi 225 BG II	0.8	0.7	4.1	1.9
RCH 314 BG II	0.2	0.0	4.7	1.6
JKCH 1950 (Event 1)	0.2	0.0	4.8	1.7
SBCH 311 (Fusion)	0.2	0.7	5.4	2.1
14 K 59 BG II	0.3	0.5	5.1	2.0
BCHH 6488 BG II	0.2	0.0	5.4	1.9
JKCH 1974 (Event 1)	0.2	1.3	5.4	2.3
ABCH 7399 BG II	0.8	0.9	4.8	2.2
ACH 177-2 BG II	0.2	0.0	4.4	1.5
ABCH 1299 BG II	1.2	0.0	5.2	2.1
MRC 7365 BG II	0.1	0.0	5.5	1.9
SWCH 4707 BG II	0.1	0.0	3.8	1.3
RCH 134 Bt (C)	0.2	2.2	5.2	2.5
LH 2076 / H 1226 (C)	--	0.9	5.3	3.1

**Table 12. Mealy bug/10cm terminal shoot**

<b>Entry</b>	<b>Faridkot</b>	<b>Sirsa</b>	<b>Mean</b>
SBCH 308 (Fusion)	0.5	2.4	1.4
ACH 155-2 BG II	0.4	2.0	1.2
RCH 605 BG II	0.5	1.3	0.9
SDS 6003 BG II	0.4	2.9	1.6
ZCH 193 Bt (Fusion)	0.4	1.7	1.0
Krishna BG II	0.4	1.5	1.0
VBCH 1516 BG II	0.5	2.3	1.4
VICH 303 BG II	0.5	3.1	1.8
KDCHH 516 BG II	0.5	1.1	0.8
NCEH 145 (Fusion)	0.4	1.5	0.9
Sarju BG II	0.6	1.6	1.1
SDS 27 BG II	0.4	1.3	0.9
SP 1169 B2	0.5	2.0	1.2
MRC 7361 BG II	0.5	1.9	1.2
VBCH 1518 BG II	0.4	2.3	1.3
Goldstar BG II	0.4	2.0	1.2
KDCHH 08 Bt	0.4	4.0	2.2
PRCH 333 BG II	0.5	1.8	1.2
Ankur 3028 BG II	0.4	1.8	1.1
15 K 39 BG II	0.4	2.0	1.2
RCH 134 BG II (C)	0.3	2.7	1.5
SWCH 4711 BG II	0.5	2.3	1.4
Tulasi 162 BG II	0.4	2.5	1.5
SP 7017 B2	0.3	2.6	1.5
CSHH 198 (C)	0.5	2.2	1.3
ACH 1005 Bt (Fusion)	0.5	4.4	2.4
Jai BG II	0.4	2.7	1.5
VICH 305 BG II	0.5	3.9	2.2
PRCH 302 BG II	0.5	2.9	1.7
Tulasi 225 BG II	0.5	2.7	1.6
RCH 314 BG II	0.6	2.8	1.7
JKCH 1950 (Event 1)	0.6	1.4	1.0
SBCH 311 (Fusion)	0.6	4.1	2.3
14 K 59 BG II	0.5	3.7	2.1
BCHH 6488 BG II	0.5	2.6	1.5
JKCH 1974 (Event 1)	0.4	1.7	1.0
ABCH 7399 BG II	0.4	2.1	1.3
ACH 177-2 BG II	0.3	3.5	1.9
ABCH 1299 BG II	0.4	1.7	1.1
MRC 7365 BG II	0.3	1.3	0.8
SWCH 4707 BG II	0.3	1.9	1.1
RCH 134 Bt (C)	0.4	2.4	1.4
LH 2076 / H 1226 (C)	--	2.4	2.4

**Table 13. Predators**

<b>Entry</b>	<b>Faridkot</b>	<b>Ludhiana</b>	<b>Sirsa</b>	<b>Mean</b>
SBCH 308 (Fusion)	4.0	0.0	4.0	2.7
ACH 155-2 BG II	4.4	0.7	5.0	3.3
RCH 605 BG II	3.9	0.3	4.2	2.8
SDS 6003 BG II	3.7	0.4	4.1	2.7
ZCH 193 Bt (Fusion)	4.5	0.7	5.2	3.5
Krishna BG II	4.7	1.1	5.8	3.9
VBCH 1516 BG II	4.2	0.3	4.6	3.0
VICH 303 BG II	4.9	1.0	5.9	3.9
KDCHH 516 BG II	4.6	0.2	4.8	3.2
NCEH 145 (Fusion)	4.1	1.0	5.1	3.4
Sarju BG II	4.1	0.2	4.3	2.9
SDS 27 BG II	4.2	0.3	4.5	3.0
SP 1169 B2	4.8	0.2	5.0	3.3
MRC 7361 BG II	4.5	0.7	5.1	3.4
VBCH 1518 BG II	4.3	0.3	4.6	3.1
Goldstar BG II	4.4	0.6	5.0	3.3
KDCHH 08 Bt	3.9	0.1	4.0	2.7
PRCH 333 BG II	4.8	0.3	5.2	3.4
Ankur 3028 BG II	4.6	0.1	4.7	3.1
15 K 39 BG II	4.5	0.3	4.8	3.2
RCH 134 BG II (C)	4.2	0.2	4.4	2.9
SWCH 4711 BG II	4.4	0.6	4.9	3.3
Tulasi 162 BG II	4.8	0.1	4.9	3.2
SP 7017 B2	4.1	0.6	4.7	3.1
CSHH 198 (C)	4.0	0.3	4.3	2.9
ACH 1005 Bt (Fusion)	4.4	0.0	4.4	2.9
Jai BG II	4.9	0.4	5.4	3.6
VICH 305 BG II	4.2	0.4	4.7	3.1
PRCH 302 BG II	3.5	0.7	4.2	2.8
Tulasi 225 BG II	3.7	0.3	4.0	2.7
RCH 314 BG II	3.6	0.4	4.0	2.7
JKCH 1950 (Event 1)	4.6	1.0	5.6	3.7
SBCH 311 (Fusion)	4.7	0.3	5.1	3.4
14 K 59 BG II	4.2	0.2	4.4	2.9
BCHH 6488 BG II	3.9	0.4	4.3	2.9
JKCH 1974 (Event 1)	4.6	0.8	5.3	3.6
ABCH 7399 BG II	4.5	1.2	5.7	3.8
ACH 177-2 BG II	4.1	0.6	4.7	3.1
ABCH 1299 BG II	4.1	0.1	4.2	2.8
MRC 7365 BG II	3.9	0.2	4.2	2.8
SWCH 4707 BG II	4.8	0.7	5.4	3.6
RCH 134 Bt (C)	4.1	0.6	4.7	3.1
LH 2076 / H 1226 (C)	--	0.2	0.2	0.2

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## Square Damage

Square damage was negligible in all the entries including the non-Bt checks at Hisar, Faridkot, Ludhiana and Sirsa (Table 14).

## Spotted Bollworm (*Earias spp.*)

Spotted bollworm was almost nil in all the Bt entries at both Faridkot and Ludhiana (Table 15) and ranged from 0.3 to 0.9 per 5 plants in the Non Bt hybrid and varieties.

## Pink Bollworm Larvae

Pink boll worm incidence was not observed at both Faridkot and Ludhiana on most of the Bt entries (Table 16); whereas, 0.4 and 0.8 larvae per 20 green bolls was recorded in non Bt check hybrid and in non Bt check varieties, respectively.

## Open boll and locule damage

Open boll and Locule damage was observed at harvest in Faridkot, Ludhiana and Sirsa. Open boll damage was low at Faridkot, Ludhiana and was high at Sirsa (Table 17). In general, less damage was noticed on non Bt check hybrids, and in non Bt checks higher damage of 4.6 (in CSHH 198) and 5.1 (local check varieties) was recorded. Similarly, locule damage was low at both the centres in Punjab (Table 17). The mean per cent locule damage was higher in non Bt checks (3.4 % in check varieties and 1.9 % in CSHH 198) as compared to Bt cotton hybrids.

## Plant protection measures

There was not much variation between Bt hybrids and non Bt checks in terms of requirements for number of sprays for sucking pests but there was notable difference observed for spray against bollworms. While the Bt entries did not cross ETL warranting pesticide spray, the non Bt checks crossed ETL for bollworms at least four times and needed pesticide spray.

**Table 14. % square damage by Bollworms**

<b>Entry</b>	<b>Faridkot</b>	<b>Ludhiana</b>	<b>Sirsa</b>	<b>Mean</b>
SBCH 308 (Fusion)	0.0	0.0	0.7	0.2
ACH 155-2 BG II	0.1	0.0	1.2	0.4
RCH 605 BG II	0.0	0.0	0.0	0.0
SDS 6003 BG II	0.0	0.0	0.0	0.0
ZCH 193 Bt (Fusion)	0.0	0.0	0.0	0.0
Krishna BG II	0.0	0.0	0.0	0.0
VBCH 1516 BG II	0.0	0.0	0.0	0.0
VICH 303 BG II	0.0	0.0	0.0	0.0
KDCHH 516 BG II	0.1	0.0	0.0	0.0
NCEH 145 (Fusion)	0.0	0.0	0.0	0.0
Sarju BG II	0.0	0.0	0.0	0.0
SDS 27 BG II	0.0	0.0	0.0	0.0
SP 1169 B2	0.0	0.0	0.0	0.0
MRC 7361 BG II	0.0	0.0	0.3	0.1
VBCH 1518 BG II	0.0	0.0	0.6	0.2
Goldstar BG II	0.0	0.0	0.0	0.0
KDCHH 08 Bt	0.0	0.0	0.0	0.0
PRCH 333 BG II	0.0	0.0	0.9	0.3
Ankur 3028 BG II	0.0	0.0	0.0	0.0
15 K 39 BG II	0.0	0.0	0.0	0.0
RCH 134 BG II (C)	0.0	0.0	0.0	0.0
SWCH 4711 BG II	0.1	0.0	0.0	0.0
Tulasi 162 BG II	0.0	0.0	0.0	0.0
SP 7017 B2	0.3	0.0	0.0	0.1
CSHH 198 (C)	0.0	0.5	0.0	0.2
ACH 1005 Bt (Fusion)	0.0	0.0	0.0	0.0
Jai BG II	0.0	0.0	0.0	0.0
VICH 305 BG II	0.0	0.0	0.4	0.1
PRCH 302 BG II	0.0	0.0	0.0	0.0
Tulasi 225 BG II	0.0	0.0	0.0	0.0
RCH 314 BG II	0.0	0.0	0.0	0.0
JKCH 1950 (Event 1)	0.0	0.0	0.0	0.0
SBCH 311 (Fusion)	0.0	0.0	1.2	0.4
14 K 59 BG II	0.0	0.0	0.0	0.0
BCHH 6488 BG II	0.0	0.0	0.0	0.0
JKCH 1974 (Event 1)	0.0	0.0	0.0	0.0
ABCH 7399 BG II	0.0	0.0	1.6	0.5
ACH 177-2 BG II	0.0	0.0	0.0	0.0
ABCH 1299 BG II	0.0	0.0	0.0	0.0
MRC 7365 BG II	0.0	0.0	0.0	0.0
SWCH 4707 BG II	0.0	0.0	0.4	0.1
RCH 134 Bt (C)	0.0	0.0	1.0	0.3
LH 2076 / H 1226 (C)	--	0.5	0.5	0.5

**Table 15. Spotted bollworm, *Earias spp.* (No. of Larvae / 5 plants)**

<b>Entry</b>	<b>Faridkot</b>	<b>Ludhiana</b>	<b>Mean</b>
SBCH 308 (Fusion)	0.0	0.0	0.0
ACH 155-2 BG II	0.0	0.0	0.0
RCH 605 BG II	0.0	0.0	0.0
SDS 6003 BG II	0.0	0.0	0.0
ZCH 193 Bt (Fusion)	0.0	0.0	0.0
Krishna BG II	0.0	0.0	0.0
VBCH 1516 BG II	0.1	0.0	0.0
VICH 303 BG II	0.1	0.0	0.0
KDCHH 516 BG II	0.0	0.0	0.0
NCEH 145 (Fusion)	0.0	0.0	0.0
Sarju BG II	0.0	0.0	0.0
SDS 27 BG II	0.0	0.0	0.0
SP 1169 B2	0.0	0.0	0.0
MRC 7361 BG II	0.0	0.0	0.0
VBCH 1518 BG II	0.0	0.0	0.0
Goldstar BG II	0.0	0.0	0.0
KDCHH 08 Bt	0.0	0.0	0.0
PRCH 333 BG II	0.0	0.0	0.0
Ankur 3028 BG II	0.0	0.0	0.0
15 K 39 BG II	0.0	0.0	0.0
RCH 134 BG II (C)	0.1	0.0	0.0
SWCH 4711 BG II	0.0	0.0	0.0
Tulasi 162 BG II	0.0	0.0	0.0
SP 7017 B2	0.0	0.0	0.0
CSHH 198 (C)	0.0	0.6	0.3
ACH 1005 Bt (Fusion)	0.1	0.0	0.0
Jai BG II	0.0	0.0	0.0
VICH 305 BG II	0.0	0.0	0.0
PRCH 302 BG II	0.1	0.0	0.0
Tulasi 225 BG II	0.0	0.0	0.0
RCH 314 BG II	0.0	0.0	0.0
JKCH 1950 (Event 1)	0.0	0.0	0.0
SBCH 311 (Fusion)	0.2	0.0	0.1
14 K 59 BG II	0.0	0.0	0.0
BCHH 6488 BG II	0.0	0.0	0.0
JKCH 1974 (Event 1)	0.0	0.0	0.0
ABCH 7399 BG II	0.0	0.0	0.0
ACH 177-2 BG II	0.0	0.0	0.0
ABCH 1299 BG II	0.0	0.0	0.0
MRC 7365 BG II	0.0	0.0	0.0
SWCH 4707 BG II	0.0	0.0	0.0
RCH 134 Bt (C)	0.0	0.0	0.0
LH 2076 / H 1226 (C)	--	0.9	0.9



**Table 16. Number of Pink Boll worm larvae / 20 green bolls**

<b>Entry</b>	<b>Faridkot</b>	<b>Ludhiana</b>	<b>Mean</b>
SBCH 308 (Fusion)	0.0	0.0	0.0
ACH 155-2 BG II	0.0	0.0	0.0
RCH 605 BG II	0.2	0.0	0.1
SDS 6003 BG II	0.0	0.0	0.0
ZCH 193 Bt (Fusion)	0.0	0.0	0.0
Krishna BG II	0.0	0.0	0.0
VBCH 1516 BG II	0.2	0.0	0.1
VICH 303 BG II	0.0	0.0	0.0
KDCHH 516 BG II	0.0	0.0	0.0
NCEH 145 (Fusion)	0.0	0.0	0.0
Sarju BG II	0.0	0.0	0.0
SDS 27 BG II	0.0	0.0	0.0
SP 1169 B2	0.0	0.0	0.0
MRC 7361 BG II	0.0	0.0	0.0
VBCH 1518 BG II	0.3	0.0	0.2
Goldstar BG II	0.0	0.0	0.0
KDCHH 08 Bt	0.0	0.0	0.0
PRCH 333 BG II	0.2	0.0	0.1
Ankur 3028 BG II	0.0	0.0	0.0
15 K 39 BG II	0.2	0.0	0.1
RCH 134 BG II (C)	0.0	0.0	0.0
SWCH 4711 BG II	0.0	0.0	0.0
Tulasi 162 BG II	0.0	0.0	0.0
SP 7017 B2	0.0	0.0	0.0
CSHH 198 (C)	0.0	0.9	0.4
ACH 1005 Bt (Fusion)	0.0	0.0	0.0
Jai BG II	0.0	0.0	0.0
VICH 305 BG II	0.0	0.0	0.0
PRCH 302 BG II	0.0	0.0	0.0
Tulasi 225 BG II	0.3	0.0	0.2
RCH 314 BG II	0.0	0.0	0.0
JKCH 1950 (Event 1)	0.0	0.0	0.0
SBCH 311 (Fusion)	0.0	0.0	0.0
14 K 59 BG II	0.2	0.0	0.1
BCHH 6488 BG II	0.0	0.0	0.0
JKCH 1974 (Event 1)	0.2	0.0	0.1
ABCH 7399 BG II	0.0	0.0	0.0
ACH 177-2 BG II	0.0	0.0	0.0
ABCH 1299 BG II	0.2	0.0	0.1
MRC 7365 BG II	0.0	0.0	0.0
SWCH 4707 BG II	0.0	0.0	0.0
RCH 134 Bt (C)	0.0	0.0	0.0
LH 2076 / H 1226 (C)	--	0.8	0.8

**Table 17. Open boll and locule damage (%)**

Entry	Open boll damage (%)				Locule damage (%)		
	Faridkot	Ludhiana	Sirsa	Mean	Faridkot	Ludhiana	Mean
SBCH 308 (Fusion)	0.6	0.0	11.3	4.0	0.3	0.0	0.2
ACH 155-2 BG II	0.5	0.0	10.0	3.5	0.1	0.0	0.1
RCH 605 BG II	0.3	0.0	9.5	3.3	0.7	0.0	0.4
SDS 6003 BG II	0.0	0.0	10.8	3.6	0.0	0.0	0.0
ZCH 193 Bt (Fusion)	0.9	0.0	6.6	2.5	1.9	0.0	1.0
Krishna BG II	0.0	0.0	4.9	1.6	0.0	0.0	0.0
VBCH 1516 BG II	0.0	0.0	9.4	3.1	0.0	0.0	0.0
VICH 303 BG II	0.9	0.0	6.3	2.4	0.2	0.0	0.1
KDCHH 516 BG II	1.4	0.0	7.6	3.0	0.4	0.0	0.2
NCEH 145 (Fusion)	0.5	0.0	8.1	2.9	0.5	0.0	0.2
Sarju BG II	0.0	0.0	12.8	4.3	0.0	0.0	0.0
SDS 27 BG II	0.7	0.0	5.1	1.9	0.2	0.0	0.1
SP 1169 B2	0.0	0.0	8.0	2.7	0.3	0.0	0.1
MRC 7361 BG II	0.0	0.0	9.8	3.3	0.0	0.0	0.0
VBCH 1518 BG II	1.3	0.0	6.5	2.6	0.3	0.0	0.2
Goldstar BG II	0.6	0.0	4.8	1.8	0.2	0.0	0.1
KDCHH 08 Bt	0.0	0.0	5.1	1.7	0.1	0.0	0.0
PRCH 333 BG II	1.0	0.0	9.5	3.5	0.3	0.0	0.2
Ankur 3028 BG II	0.7	0.0	6.7	2.4	0.3	0.0	0.1
15 K 39 BG II	0.0	0.0	4.9	1.6	0.0	0.0	0.0
RCH 134 BG II (C)	0.0	0.0	9.8	3.3	0.0	0.0	0.0
SWCH 4711 BG II	0.0	0.0	6.5	2.2	0.0	0.0	0.0
Tulasi 162 BG II	0.0	0.0	9.8	3.3	0.0	0.0	0.0
SP 7017 B2	1.2	0.0	3.3	1.5	0.4	0.0	0.2
CSHH 198 (C)	0.7	6.7	6.4	4.6	0.2	3.5	1.9
ACH 1005 Bt (Fusion)	0.0	0.0	8.1	2.7	0.0	0.0	0.0
Jai BG II	1.0	0.0	10.8	3.9	0.2	0.0	0.1
VICH 305 BG II	0.0	0.0	6.4	2.1	0.0	0.0	0.0
PRCH 302 BG II	0.4	0.0	1.6	0.7	0.9	0.0	0.5
Tulasi 225 BG II	0.0	0.0	9.8	3.3	0.0	0.0	0.0
RCH 314 BG II	0.0	0.0	6.6	2.2	0.0	0.0	0.0
JKCH 1950 (Event 1)	1.0	0.0	4.9	2.0	0.2	0.0	0.1
SBCH 311 (Fusion)	0.0	0.0	6.6	2.2	0.0	0.0	0.0
14 K 59 BG II	0.0	0.0	9.5	3.2	0.0	0.0	0.0
BCHH 6488 BG II	0.8	0.0	6.5	2.4	0.2	0.0	0.1
JKCH 1974 (Event 1)	0.0	0.0	5.0	1.7	0.0	0.0	0.0
ABCH 7399 BG II	0.4	0.0	9.7	3.4	0.2	0.0	0.1
ACH 177-2 BG II	0.0	0.0	4.5	1.5	0.0	0.0	0.0
ABCH 1299 BG II	1.0	0.0	3.7	1.6	0.5	0.0	0.2
MRC 7365 BG II	0.0	0.0	6.7	2.2	0.0	0.0	0.0
SWCH 4707 BG II	0.4	0.0	6.8	2.4	0.1	0.0	0.1
RCH 134 Bt (C)	0.0	0.0	9.8	3.3	0.0	0.0	0.0
LH 2076 / H 1226 (C)	--	6.8	3.5	5.1	--	3.4	3.4

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## II. PLANT PATHOLOGY TRIAL

The trial was conducted at two locations in Haryana (Hisar and Sirsa - Screening nursery & Screen house) and at three locations in Punjab (Faridkot, Ludhiana and Bhatinda) as per the protocol. Observations on the incidence of bacterial blight, fungal foliar diseases, cotton leaf curl virus, parawilt etc. were recorded at fortnightly interval. **As decided in the meeting held on 11<sup>th</sup> April, 2008 at PAU, Ludhiana to review the screening system of cotton leaf curl virus disease, only one reaction i.e., the highest reaction of an entry at any location is reported.** The incidence of cotton leaf curl virus disease in general was very low in the zone and the Hisar centre has reported nil incidence of disease. The incidence of bacterial blight and fungal foliar disease was more due to more rain fall during the season. The results of screening are presented in Tables 18 and 19.

In case of bacterial blight no entry showed resistant reaction, whereas there were 29 and 13 entries in MR and MS category. Similarly in case of fungal foliar spots 13 entries were observed in MR category and there were 29 entries in MS. Eleven, twenty one, four and six entries were grouped in Resistant (R), Moderately resistant (MR), Moderately Susceptible (MS) and Susceptible (S) categories, respectively to cotton leaf curl virus disease. Parawilt incidence was recorded at Sirsa centre and it ranged from 0.0 to 52.39%. Similarly grey mildew incidence was recorded for the first time on Bt hybrids in north zone late in the season in October at Sirsa centre which may not have any impact on yield at the moment. However the percent incidence ranged from 3.80 to 34.57% (Table 19).

**Table 18. Bacterial blight and Fungal foliar leaf spots**

Entry	Bacterial blight					Fungal foliar leaf spot leaf spot				
	Grade (LDH)	Grade (FDK)	Grade (SRS)	Final grade	Reaction	Grade (LDH)	Grade (FDK)	Grade (SRS)	Final grade	Reaction
SBCH 308 (Fusion)	3	2	3	3	MS	1	2	2	2	MR
ACH 155-2 BG II	1	2	0	2	MR	0	2	0	2	MR
RCH 605 BG II	2	2	0	2	MR	1	2	2	2	MR
SDS 6003 BG II	2	1	3	3	MS	1	1	2	2	MR
ZCH 193 Bt (Fusion)	2	2	0	2	MR	3	3	3	3	MS
Krishna BG II	1	2	0	2	MR	0	3	0	3	MS
VBCH 1516 BG II	3	2	0	3	MS	0	2	0	2	MR
VICH 303 BG II	1	2	0	2	MR	1	2	0	2	MR
KDCHH 516 BG II	2	2	0	2	MR	0	3	0	3	MS
NCEH 145 (Fusion)	1	2	3	3	MS	1	3	2	3	MS
Sarju BG II	2	3	2	3	MS	1	2	3	3	MS
SDS 27 BG II	2	2	0	2	MR	2	3	3	3	MS
SP 1169 B2	2	2	2	2	MR	3	3	0	3	MS
MRC 7361 BG II	0	2	2	2	MR	0	2	0	2	MR
VBCH 1518 BG II	2	2	3	3	MS	1	3	3	3	MS
Goldstar BG II	1	2	3	3	MS	1	3	2	3	MS
KDCHH 08 Bt	0	2	0	2	MR	0	3	0	3	MS
PRCH 333 BG II	1	2	2	2	MR	2	3	2	3	MS
Ankur 3028 BG II	1	2	3	3	MS	1	3	2	3	MS
15 K 39 BG II	1	2	0	2	MR	1	3	2	3	MS
RCH 134 BG II (C)	2	2	2	2	MR	1	3	2	3	MS
SWCH 4711 BG II	2	2	3	3	MS	2	3	2	3	MS
Tulasi 162 BG II	1	2	0	2	MR	2	3	3	3	MS
SP 7017 B2	1	2	1	2	MR	0	3	2	3	MS
CSHH 198 (C)	0	2	1	2	MR	1	2	2	2	MR
ACH 1005 Bt (Fusion)	1	3	0	3	MS	1	2	2	2	MR
Jai BG II	1	2	0	2	MR	1	2	0	2	MR
VICH 305 BG II	0	2	0	2	MR	1	2	0	2	MR
PRCH 302 BG II	1	2	0	2	MR	1	2	3	3	MS
Tulasi 225 BG II	2	2	3	3	MS	2	3	2	2	MR
RCH 314 BG II	1	2	0	2	MR	3	3	3	3	MS
JKCH 1950 (Event 1)	1	2	0	2	MR	3	3	3	3	MS
SBCH 311 (Fusion)	0	2	0	2	MR	1	3	0	3	MS
14 K 59 BG II	1	2	2	2	MR	1	3	2	3	MS
BCHH 6488 BG II	2	2	2	2	MR	2	2	3	3	MS
JKCH 1974 (Event 1)	2	2	0	2	MR	3	2	3	3	MS
ABCH 7399 BG II	2	2	2	2	MR	2	2	2	2	MR
ACH 177-2 BG II	2	2	0	2	MR	1	3	2	3	MS
ABCH 1299 BG II	2	2	3	3	MS	1	3	3	3	MS
MRC 7365 BG II	2	2	2	2	MR	2	3	3	3	MS
SWCH 4707 BG II	3	2	3	3	MS	3	3	2	3	MS
RCH 134 Bt (C)	2	2	2	2	MR	1	3	0	3	MS
LH 2076 / H 1226 (C)	0	2	0	-		1	3	0	-	
Check**	0	2	0	-		1	2	2	-	
Check***	0	2	2	-		1	3	2	-	

Checks-Punjab\*-LH-2076,\*\*-LHH-144,\*\*\*RST-9,Haryana\*H-1117\*\*,CSHH-238, \*\*\*HS-6

**Table 19. Screening Bt hybrids against Cotton leaf curl disease**

Entry	CLCuD pooled Reaction	Sirsa	
		Parawilt (%)	Grey mildew (%)
SBCH 308 (Fusion)	MR	6.02	22.67
ACH 155-2 BG II	MS	14.73	24.39
RCH 605 BG II	R	8.20	14.10
SDS 6003 BG II	MS	31.02	15.29
ZCH 193 Bt (Fusion)	R	0.00	4.82
Krishna BG II	R	41.1	21.69
VBCH 1516 BG II	MR	3.92	34.57
VICH 303 BG II	MR	2.38	30.95
KDCHH 516 BG II	S	46.48	15.85
NCEH 145 (Fusion)	MR	8.43	21.69
Sarju BG II	S	52.39	31.17
SDS 27 BG II	MS	7.19	17.95
SP 1169 B2	S	19.30	29.17
MRC 7361 BG II	MR	21.40	20.24
VBCH 1518 BG II	S	14.66	29.11
Goldstar BG II	R	14.93	20.25
KDCHH 08 Bt	R	34.85	27.16
PRCH 333 BG II	MR	1.33	16.00
Ankur 3028 BG II	MR	9.95	23.68
15 K 39 BG II	MR	4.96	31.91
RCH 134 BG II (C)	MR	39.83	12.82
SWCH 4711 BG II	S	11.36	10.98
Tulasi 162 BG II	MR	2.49	14.86
SP 7017 B2	R	42.50	29.41
CSHH 198 (C)	MR	11.97	10.00
ACH 1005 Bt (Fusion)	R	12.28	9.88
Jai BG II	MR	20.25	28.92
VICH 305 BG II	R	3.25	32.93
PRCH 302 BG II	R	28.45	16.25
Tulasi 225 BG II	S	9.39	21.69
RCH 314 BG II	R	13.57	11.25
JKCH 1950 (Event 1)	MR	2.95	3.80
SBCH 311 (Fusion)	MR	28.37	28.57
14 K 59 BG II	MR	16.62	22.78
BCHH 6488 BG II	MR	19.21	17.07
JKCH 1974 (Event 1)	MR	13.98	6.02
ABCH 7399 BG II	MR	35.49	22.50
ACH 177-2 BG II	MR	39.15	30.49
ABCH 1299 BG II	MR	42.02	3.80
MRC 7365 BG II	R	6.04	22.50
SWCH 4707 BG II	MS	37.47	11.25
RCH 134 Bt (C)	MR	47.74	9.33
LH 2076 / H 1226	R	0.00***	21.62***
Check**	R	9.33****	22.89****

Checks-Punjab\*-LH-2076,\*\*-LHH-144,Haryana\*-H1117, \*\*CSHH-238,\*\*\*CSHH-238,\*\*\*\*-CSHH243

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## OVERALL ASSESSMENT

Thirty nine Bt cotton hybrids were evaluated during 2008-09 in North Zone through AICCIP of ICAR with RCH 134 Bt and RCH 134 BG II as the Bt check hybrids, CSHH 198 as the non Bt check hybrid and non Bt local check variety (LH 2076 for Punjab and H 1226 for Haryana state). They were evaluated at five locations under ETL based protected conditions.

Seven out of 39 Bt test hybrids were found superior to the best check hybrid RCH 134 Bt with an yield increase of 2 – 16 per cent. The highest mean seed cotton yield of 3249 kg/ha was recorded in BCHH 6488 BG II with 16 and 28 per cent yield increase over RCH 134 BG I and BG II, respectively. The other superior Bt hybrids are RCH 605 BG II, PRCH 333 BG II, 14 K 59 BG II, Ankur 3028 BG II, KDCHH 516 BG II and Jai BG II. For lint yield also, the test hybrid BCHH 6488 BG II was the best recording 1194 kg/ha with 18 % increase over RCH 134 BG I and 32 % increase over RCH 134 BG II. However, only two other hybrids were found superior to the best Bt check hybrid *viz.*, KDCHH 516 BG II and SP 7017 B2.

There is a good amount of variability in respect of fibre quality in Bt test hybrids for fibre length and strength. Most of the hybrids tested were on par with fibre quality of check hybrids.

Jassids, whitefly thrips and mealy bugs were the major sucking pests noticed during the season. All the entries including the check hybrids and varieties were affected in varying degrees warranting chemical intervention. The overall boll infestation was low during the year. Square damage, spotted bollworms and pink bollworm incidence was low on Bt cotton hybrids as compared to the non Bt check hybrids and varieties. However, open boll damage was considerable at Sirsa location.

**SUMMARY TABLE**

Entry	Seed cotton yield (kg/ha)	% Inc over RCH 134 Bt	% Inc over RCH 134 BG II	Lint yield (kg/ha)	% Inc over RCH 134 Bt	% Inc over RCH 134 BG II	2.5 % Span Length (mm)	Uniformity Ratio	Micronaire	Bundle Strength (g/tex)
BCHH 6488 BG II	3249	16	28	1194	18	32	29.1	50.5	4.9	20.6
RCH 605 BG II	3153	12	24	1010	0	12	27.7	49.5	4.1	21.8
PRCH 333 BG II	2946	5	16	933	-8	3	30.2	49.0	4.8	22.9
14 K 59 BG II	2879	3	13	981	-3	8	30.4	49.5	5.1	22.1
Ankur 3028 BG II	2869	2	13	895	-12	-1	31.0	50.0	4.6	22.8
KDCHH 516 BG II	2862	2	13	1034	2	14	27.1	50.5	5.0	23.0
Jai BG II	2855	2	12	975	-4	8	32.3	47.5	5.0	22.6
RCH 134 Bt (C)	2803	0	10	1012	0	12	27.3	51.0	4.6	21.2
SP 7017 B2	2799	0	10	1029	2	14	28.1	50.5	4.7	21.7
MRC 7365 BG II	2798	0	10	961	-5	6	29.4	47.0	4.3	20.6
PRCH 302 BG II	2773	-1	9	993	-2	10	26.9	51.5	4.7	21.1
NCEH 145 (Fusion)	2645	-6	4	845	-17	-7	27.3	49.5	4.3	21.0
SP 1169 B2	2609	-7	3	923	-9	2	28.1	50.5	4.8	20.4
Goldstar BG II	2607	-7	3	865	-14	-4	29.7	50.5	4.3	22.4
ACH 155-2 BG II	2584	-8	2	920	-9	2	27.1	51.5	4.6	22.4
Krishna BG II	2552	-9	0	862	-15	-5	25.6	50.5	4.4	20.1
RCH 134 BG II (C)	2541	-9	0	904	-11	0	27.1	52.0	4.4	22.8
RCH 314 BG II	2438	-13	-4	825	-18	-9	28.2	48.5	4.7	21.2
15 K 39 BG II	2414	-14	-5	798	-21	-12	32.0	47.0	5.0	23.2
VBCH 1518 BG II	2352	-16	-7	754	-25	-17	30.1	50.5	4.4	22.7

Entry	Seed cotton yield (kg/ha)	% Inc over RCH 134 Bt	% Inc over RCH 134 BG II	Lint yield (kg/ha)	% Inc over RCH 134 Bt	% Inc over RCH 134 BG II	2.5 % Span Length (mm)	Uniformity Ratio	Micro naire	Bundle Strength (g/tex)
ACH 1005 Bt (Fusion)	2320	-17	-9	764	-24	-15	26.2	52.5	4.4	21.3
ABCH 1299 BG II	2319	-17	-9	808	-20	-11	29.0	49.0	4.6	22.8
VBCH 1516 BG II	2314	-17	-9	780	-23	-14	30.3	48.0	4.5	22.6
KDCHH 08 Bt	2290	-18	-10	778	-23	-14	25.6	52.5	5.0	22.2
ABCH 7399 BG II	2284	-19	-10	717	-29	-21	30.9	49.0	4.7	22.3
ACH 177-2 BG II	2269	-19	-11	766	-24	-15	30.3	49.0	4.7	22.3
ZCH 193 Bt (Fusion)	2188	-22	-14	793	-22	-12	26.4	50.5	4.5	21.5
Tulasi 162 BG II	2177	-22	-14	705	-30	-22	30.2	50.5	4.6	22.8
Sarju BG II	2168	-23	-15	763	-25	-16	29.2	51.5	4.7	21.4
JKCH 1950 (Event 1)	2164	-23	-15	766	-24	-15	26.6	51.0	4.8	20.3
SBCH 311 (Fusion)	2155	-23	-15	729	-28	-19	31.2	47.0	4.3	23.2
MRC 7361 BG II	2133	-24	-16	718	-29	-21	30.1	49.5	4.6	21.3
SDS 6003 BG II	2127	-24	-16	739	-27	-18	28.1	50.0	4.3	21.5
JKCH 1974 (Event 1)	2102	-25	-17	759	-25	-16	27.5	51.0	4.8	20.8
VICH 305 BG II	2089	-25	-18	746	-26	-17	29.0	49.5	4.5	22.3
SWCH 4707 BG II	2071	-26	-18	712	-30	-21	30.1	48.0	5.0	21.7
VICH 303 BG II	2051	-27	-19	632	-38	-30	30.7	49.0	4.9	23.1
CSHH 198 (C)	1925	-31	-24	611	-40	-32	27.4	51.0	4.5	22.0
SBCH 308 (Fusion)	1895	-32	-25	695	-31	-23	28.9	48.5	4.6	22.6
SWCH 4711 BG II	1867	-33	-27	633	-37	-30	28.8	48.0	4.9	20.8
LH 2076 / H 1226 (C)	1785	-36	-30	603	-40	-33	25.4	52.0	4.2	20.5
Tulasi 225 BG II	1692	-40	-33	574	-43	-37	27.6	50.0	4.8	21.9
SDS 27 BG II	1467	-48	-42	523	-48	-42	28.6	48.5	4.7	20.9