

South Zone

The All India Coordinated Cotton Improvement Project (AICCIP) was assigned the task of evaluating Bt cotton hybrids in the South Zone as per directives of ICAR and GEAC, Government of India.

FIRST YEAR TRIAL (2006-07)

I. INTRA HIRSUTUM HYBRID TRIAL

Trial Entries

In the first year trial, 21 Bt cotton hybrids were evaluated along with three checks. The Bt entries were Ankur Jai Bt (Ankur Seeds pvt. Limited), BCHH 302 Bt (Bioseed India Research Pvt. Limited), KCH 135 Bt (Kaveri Seed Co. Pvt.Limited), Nandi 405 Bt (Nandi Seeds Pvt.Limited), NCS 929 Bt (Nuziveedu Seeds Limited), PCH 930 Bt (Prabhat Agri Bio Tech. Limited), IT 925 Bt (Pro Agro Seeds), Rudra Bt (Pravardhan seeds), Sigma Bt (Vibha Agro Tech. Limited), VCH 111 Bt (Vikki's Agro Tech Ltd.), ACH 33-2 BG II (Ajeet Seeds Limited), Akka BG II (Ankur Seeds pvt.Limited), BCHH 322-2 BG II (Bioseed India Research Pvt. Limited), Brahma BG II (Emergent Genetics India Pvt. Ltd), JK Gowri Bt (ET 1)(JK Agri Genetics Limited), KDCHH 441 BG II (Krishidhan Seeds), NCEH 13 Bt (FG)(Nath Seeds), NCS 145 BG II (Nuziveedu Seeds Limited), RCH 2 BG II (Rasi Seeds), Tulasi 9 BG II (Tulasi Seeds Pvt. Limited), and Dhruv Bt (FG) (Zuari Seeds). Hybrid RCH 2 Bt was the common Bt check and Bunny was the common Non Bt check. The local check hybrids were LAHH 5 - Warangal (I); DHH 11-Sirugappa (I), Raichur (I); B'gudi (I); RCH 20-Coimbatore (I), Srivilliputtur (I); LAHH 5-Lam, Guntur (R), Nandyal (R), Adilabad (R); DHH 11-Dharwad (R), Aruppukottai (R).

Trial locations

The following were the trial locations:

Irrigated (I)

1. Regional Agricultural Research Station, Warangal, Acharya N. G. Ranga Agricultural University, Andhra Pradesh,
2. Agricultural Research Station, Sirugappa, University of Agricultural Sciences, Karnataka,
3. Agricultural Research Station, Raichur, University of Agricultural Sciences, Karnataka,
4. Agricultural Research Station, Beemarayangudi, University of Agricultural Sciences, Karnataka,
5. Cotton Research Station, Tamil Nadu Agricultural University, Coimbatore, and
6. Cotton Research Station, Tamil Nadu Agricultural University, Srivilliputtur.

Rainfed (R)

1. Regional Agricultural Research Station, Lam, Guntur, Acharya N. G. Ranga Agricultural University, Andhra Pradesh,
2. Regional Agricultural Research Station, Nandyal, Acharya N. G. Ranga Agricultural University, Andhra Pradesh,
3. Regional Agricultural Research Station, Adilabad, Acharya N. G. Ranga Agricultural University, Andhra Pradesh,
4. Agricultural Research Station, Dharwad, University of Agricultural Sciences, Karnataka,
5. Agricultural Research Station, Tamil Nadu Agricultural University, Aruppukottai.

Trial Details

No. of Entries	:	21 + 3 checks
No. of Rows	:	Yield Trial: 6 Rows Screening Trials 2 & 3: 3 Rows
Row Length:	:	6m
Spacing:	Irrigated	: Andhra Pradesh - 90 x 90 cm Karnataka - 90 x 60 cm Tamil Nadu - 90 x 60 cm
	Rainfed	: Lam - 120 x 60 cm Nandyal - 90 x 60 cm Adilabad - 90 x 90 cm Dharwad - 90 x 60 cm Aruppukottai - 75 x 45 cm
No. of Replications:	:	Three
Design	:	Randomized Block Design
Fertilizers	:	As per recommendations

Trials

Evaluation under ETL Based Plant Protection

Against major sucking pests and boll worms, weekly observations were recorded from 45 DAS and insecticide were sprayed based on the threshold levels of pests. 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.

Evaluation under Unprotected Conditions for Boll worms

Against key pests of cotton, all the Bt Cotton hybrids and the controls were evaluated under unprotected conditions.

Pathological Evaluation

Reaction to major diseases was observed in all the entries in the trial.

Observations Recorded

The biometrical observations *viz.*, Germination Percentage, Final Plant Stand, Ginning Percentage, Lint Index, Seed Index, Seed Cotton Yield and Lint Yield were recorded in the ETL based plant protection plots..

In ETL based plant protection trial, observations on sap sucking pests, boll worm damages and natural enemies were recorded. The incidence of major diseases like *Alternaria* leaf spot, bacterial blight and grey mildew were recorded under natural conditions.

A. BIOMETRICAL EVALUATION.

Biometrical observations were recorded in the ETL based plant protection trial and are reported here.

Germination and Final Plant Stand

The germination was good in all the locations in all the entries and at all the locations in both irrigated and rainfed conditions (Table 1). Correspondingly, the stand at harvest was maintained in most of the locations in all the entries under both irrigated and rainfed situations (Table 2).

Boll Weight

Mean Boll weight of the Bt hybrids ranged from 4.1 to 5.6 g under irrigated conditions, while under rainfed conditions, it ranged between 4.0 and 5.0 g. Brahma BG II recorded the highest boll weight of 5.6 g in irrigated centres (Table 3).

Ginning Outturn (%)

The data on ginning outturn was recorded in nine centres (four irrigated conditions + five rainfed conditions). In general, higher ginning outturn was recorded in irrigated centres as compared to rainfed centres. The mean data ranged from 35.6 to 39.9 % in irrigated conditions and from 33.9 to 37.4 % in rainfed conditions (Table 4).

Lint Index and Seed Index

Data on lint index and seed index were also recorded in nine centres. Under irrigated conditions, the mean lint index ranged from 5.0 to 6.9 g, whereas in rainfed conditions, the range was between 4.9 and 6.4 g (Table 5). The mean seed index ranged from 8.5 to 11.6 g (Table 6).

Table 1. Germination (%)

Entry	Srivilliputhur (I)	Coimbatore (I)	Mean (I)	Aruppukottai (R)	Nandyal (R)	Mean (R)
Ankur Jai Bt	100.0	88.3	94.2	90.0	94.3	92.2
BCHH 302 Bt	98.3	83.9	91.1	95.0	89.3	92.2
KCH 135 Bt	85.0	80.6	82.8	93.3	65.1	79.2
Nandi 405 Bt	96.7	93.9	95.3	91.7	96.4	94.1
NCS 929 Bt	93.3	90.6	91.9	93.3	92.9	93.1
PCH 930 Bt	91.7	85.6	88.6	95.0	95.4	95.2
IT 925 Bt	98.3	88.3	93.3	98.3	94.4	96.4
Rudra Bt	100.0	91.1	95.6	91.7	93.3	92.5
Sigma Bt	100.0	90.0	95.0	90.0	94.7	92.4
VCH 111 Bt	96.7	95.6	96.1	95.0	97.9	96.5
ACH 33-2 BG II	100.0	80.6	90.3	93.3	94.9	94.1
Akka BG II	96.7	86.7	91.7	91.7	97.9	94.8
BCHH 322-2 BG II	91.7	80.6	86.1	90.0	65.1	77.6
Brahma BG II	100.0	93.9	96.9	95.0	95.4	95.2
JK Gowri Bt (ET 1)	100.0	87.2	93.6	93.3	96.9	95.1
KDCHH 441 BG II	100.0	88.3	94.2	91.7	96.4	94.1
NCEH 13 Bt (FG)	98.3	91.7	95.0	93.3	94.4	93.9
NCS 145 BG II	96.7	88.3	92.5	95.0	88.8	91.9
RCH 2 BG II	98.3	92.8	95.6	98.3	93.4	95.9
Tulasi 9 BG II	100.0	87.2	93.6	91.7	92.3	92.0
Dhruv Bt (FG)	98.3	95.0	96.7	90.0	95.9	93.0
RCH 2 Bt	98.3	97.8	98.1	95.0	95.4	95.2
Bunny	96.7	94.4	95.6	93.3	95.4	94.4
Local Check Hybrid	100.0	91.7	95.8	91.7	96.4	94.1

Table 2. Plant Stand at harvest

Entry	Srivilliputhur (I)	Coimbatore (I)	Mean (I)	Lam (R)	Nandyal (R)	Adilabad (R)	Mean (R)
Ankur Jai Bt	59.0	53.0	56.0	60.0	62.3	38.7	53.7
BCHH 302 Bt	59.0	50.3	54.7	60.0	59.3	39.3	52.9
KCH 135 Bt	51.0	38.3	44.7	60.0	43.0	37.7	46.9
Nandi 405 Bt	58.0	56.3	57.2	59.0	63.6	39.3	54.0
NCS 929 Bt	55.0	52.3	53.7	59.0	61.3	39.3	53.2
PCH 930 Bt	54.0	51.3	52.7	60.0	63.0	37.7	53.6
IT 925 Bt	57.0	54.3	55.7	60.0	62.3	38.0	53.4
Rudra Bt	58.0	52.7	55.3	59.0	61.6	38.3	53.0
Sigma Bt	58.0	54.0	56.0	59.0	62.6	39.3	53.6
VCH 111 Bt	58.0	57.3	57.7	59.0	64.6	40.0	54.5
ACH 33-2 BG II	59.0	45.7	52.3	60.0	62.6	38.7	53.8
Akka BG II	57.0	51.0	54.0	59.0	64.6	39.0	54.2
BCHH 322-2 BG II	54.0	43.0	48.5	59.0	43.0	38.7	46.9
Brahma BG II	58.0	56.3	57.2	60.0	63.0	40.0	54.3
JK Gowri Bt (ET 1)	59.0	52.3	55.7	60.0	64.0	38.0	54.0
KDCHH 441 BG II	59.0	52.7	55.8	59.0	63.6	38.7	53.8
NCEH 13 Bt (FG)	58.0	54.0	56.0	59.0	62.3	39.7	53.7
NCS 145 BG II	57.0	52.7	54.8	59.0	58.6	38.0	51.9
RCH 2 BG II	59.0	55.7	57.3	60.0	61.6	38.7	53.4
Tulasi 9 BG II	59.0	52.3	55.7	59.0	61.0	39.3	53.1
Dhruv Bt (FG)	58.0	57.0	57.5	59.0	63.3	39.7	54.0
RCH 2 Bt	59.0	58.7	58.8	59.0	63.0	40.0	54.0
Bunny	57.0	56.7	56.8	59.0	63.0	39.3	53.8
Local Check Hybrid	59.0	55.0	57.0	59.0	63.6	40.0	54.2

Table 3. Boll weight (g)

Entry	Srivilliputhur (I)	Coimbatore (I)	Warangal (I)	Raichur (I)	B'gudi (I)	Siruguppa (I)	Mean (I)	Dharwad (R)	Lam (R)	Adilabad (R)	Nandyal (R)	Aruppukottai (R)	Mean (R)
Ankur Jai Bt	4.3	6.1	6.2	5.5	5.2	4.9	5.3	5.5	6.0	4.8	4.1	3.7	4.8
BCHH 302 Bt	4.0	6.0	5.6	5.2	5.3	5.2	5.2	5.0	5.0	5.0	3.9	4.0	4.6
KCH 135 Bt	4.1	5.2	5.2	4.7	3.8	4.6	4.6	4.9	4.8	4.0	3.9	4.1	4.3
Nandi 405 Bt	4.4	5.3	5.6	5.0	4.5	4.7	4.9	4.9	5.5	5.0	4.2	3.9	4.7
NCS 929 Bt	4.3	5.2	5.0	5.4	4.1	4.8	4.8	4.9	5.2	4.7	3.7	4.1	4.5
PCH 930 Bt	4.6	4.6	4.5	4.8	3.7	4.5	4.5	4.3	5.2	3.7	3.8	4.0	4.2
IT 925 Bt	4.2	5.9	5.4	4.7	3.7	5.2	4.9	5.0	5.3	4.6	4.0	4.0	4.6
Rudra Bt	4.3	5.1	5.3	5.7	4.6	5.1	5.0	5.2	5.3	5.0	4.4	3.9	4.8
Sigma Bt	4.4	5.5	4.9	4.8	4.4	4.4	4.7	4.9	5.2	5.0	3.4	3.9	4.5
VCH 111 Bt	4.2	5.4	5.3	4.8	3.9	4.7	4.7	4.6	5.0	4.5	4.2	3.7	4.4
ACH 33-2 BG II	3.8	4.6	4.4	4.1	3.6	4.0	4.1	4.6	4.4	3.6	4.1	3.5	4.0
Akka BG II	4.3	3.7	5.7	5.5	4.5	5.2	4.8	5.0	5.1	4.3	4.0	4.1	4.5
BCHH 322-2 BG II	4.8	6.2	5.4	5.1	4.8	5.2	5.2	5.1	5.9	5.0	4.3	4.0	4.9
Brahma BG II	4.8	6.4	6.2	6.1	4.3	5.7	5.6	5.2	5.9	5.5	4.3	4.1	5.0
JK Gowri Bt (ET 1)	4.8	5.4	5.4	4.3	4.4	4.5	4.8	5.1	5.4	4.6	3.6	4.0	4.5
KDCHH 441 BG II	4.1	4.7	4.9	4.7	2.9	4.5	4.3	5.0	4.9	3.7	4.4	4.2	4.4
NCEH 13 Bt (FG)	4.2	5.7	5.1	4.8	4.4	4.7	4.8	5.4	5.3	4.6	3.7	3.6	4.5
NCS 145 BG II	5.2	6.2	5.7	5.4	4.9	5.2	5.4	5.7	5.4	5.3	4.2	4.0	4.9
RCH 2 BG II	4.2	5.8	5.7	4.8	3.6	4.7	4.8	5.0	5.2	4.1	4.0	4.2	4.5
Tulasi 9 BG II	5.0	5.8	5.7	5.5	4.8	4.9	5.3	4.9	5.7	5.0	4.3	3.2	4.6
Dhruv Bt (FG)	4.3	5.6	5.5	5.5	4.2	4.3	4.9	5.3	5.2	4.2	3.5	3.8	4.4
RCH 2 Bt	4.0	5.1	5.1	4.1	3.8	4.3	4.4	4.4	5.1	4.0	4.2	3.8	4.3
Bunny	4.0	5.8	5.5	4.8	4.9	4.2	4.8	5.0	5.8	4.7	3.9	3.9	4.7
Local Check Hybrid	4.5	6.0	5.5	4.0	3.2	4.2	4.6	5.0	4.5	4.0	3.7	3.9	4.2

Table 4. Ginning outturn

Entry	Srivilliputhur (I)	Coimbatore (I)	Raichur (I)	Siruguppa (I)	Mean (I)	Dharwad (R)	Lam (R)	Adilabad (R)	Nandyal (R)	Aruppukottai (R)	Mean (R)
Ankur Jai Bt	35.8	35.7	36.5	34.7	35.7	35.8	34.7	31.0	34.0	37.1	34.5
BCHH 302 Bt	39.5	37.1	39.5	37.7	38.5	37.6	35.1	37.0	36.0	38.9	36.9
KCH 135 Bt	35.3	36.6	35.5	36.4	35.9	34.7	33.5	37.0	36.0	36.5	35.5
Nandi 405 Bt	37.1	37.2	38.0	36.9	37.3	34.7	33.3	37.0	36.0	38.1	35.8
NCS 929 Bt	33.9	36.0	37.0	35.9	35.7	35.4	34.4	34.0	36.0	35.2	35.0
PCH 930 Bt	40.8	36.1	42.0	40.7	39.9	35.8	35.1	34.0	40.0	39.2	36.8
IT 925 Bt	35.4	36.0	39.5	35.2	36.5	37.7	33.4	41.0	34.0	36.5	36.5
Rudra Bt	35.6	36.7	41.5	37.1	37.7	36.0	33.1	35.0	38.0	36.6	35.8
Sigma Bt	35.9	35.6	38.0	36.7	36.6	34.3	34.3	37.0	36.0	37.2	35.8
VCH 111 Bt	38.7	37.2	38.0	38.3	38.0	38.2	35.4	36.0	38.0	39.5	37.4
ACH 33-2 BG II	36.5	37.4	38.0	37.4	37.4	36.7	34.1	39.0	36.0	37.2	36.6
Akka BG II	36.6	36.3	36.0	36.3	36.3	35.7	32.6	32.0	34.0	37.9	34.4
BCHH 322-2 BG II	37.7	37.1	37.5	37.6	37.5	35.2	33.7	38.0	34.0	38.3	35.8
Brahma BG II	37.1	38.1	39.0	35.6	37.4	36.4	34.7	33.0	36.0	38.1	35.7
JK Gowri Bt (ET 1)	35.8	35.5	37.0	36.2	36.1	34.5	34.1	36.0	34.0	37.4	35.2
KDCHH 441 BG II	39.2	38.4	40.0	37.6	38.8	36.1	35.5	38.0	36.0	38.6	36.8
NCEH 13 Bt (FG)	35.2	35.2	38.0	35.7	36.0	34.2	32.2	33.0	34.0	36.2	33.9
NCS 145 BG II	39.6	36.2	35.5	36.7	37.0	34.3	33.8	34.0	36.0	38.5	35.3
RCH 2 BG II	37.0	35.6	35.0	34.7	35.6	34.8	33.2	41.0	35.0	38.3	36.5
Tulasi 9 BG II	37.8	36.2	37.5	36.9	37.1	35.5	35.5	35.0	36.0	38.4	36.1
Dhruv Bt (FG)	35.1	36.4	39.5	35.6	36.7	34.9	34.0	36.0	36.0	36.4	35.5
RCH 2 Bt	35.0	36.6	39.0	36.3	36.7	30.6	34.3	37.0	34.0	36.0	34.4
Bunny	35.1	36.3	39.5	36.9	37.0	34.1	33.0	37.0	36.0	36.1	35.2
Local Check Hybrid	33.2	33.8	44.5	39.9	37.9	36.5	32.5	39.0	34.0	34.8	35.4

Table 5. Lint Index (g)

Entry	Srivilliputhur (I)	Coimbatore (I)	Raichur (I)	Siruguppa (I)	Mean (I)	Dharwad (R)	Lam (R)	Nandyal (R)	Adilabad (R)	Aruppukottai (R)	Mean (R)
Ankur Jai Bt	6.9	7.7	5.5	5.9	6.5	7.3	6.6	6.0	4.9	7.1	6.4
BCHH 302 Bt	7.0	7.2	6.4	7.0	6.9	4.8	5.7	5.9	6.3	7.8	6.1
KCH 135 Bt	6.5	6.3	4.7	6.2	5.9	4.2	5.2	4.2	4.9	6.6	5.0
Nandi 405 Bt	6.5	6.8	5.5	5.9	6.2	4.8	6.4	4.2	5.5	6.6	5.5
NCS 929 Bt	6.5	6.4	5.3	6.0	6.0	4.4	5.4	3.9	5.4	6.7	5.2
PCH 930 Bt	7.1	5.6	5.3	6.4	6.1	5.0	5.3	5.9	4.5	7.8	5.7
IT 925 Bt	7.3	6.5	6.1	6.7	6.7	5.4	6.2	4.1	6.1	7.5	5.9
Rudra Bt	6.8	6.8	6.6	7.0	6.8	5.1	6.0	6.0	5.6	7.0	5.9
Sigma Bt	7.1	6.4	4.7	5.7	6.0	4.9	6.0	3.9	5.6	7.3	5.5
VCH 111 Bt	7.7	6.0	4.2	5.9	5.9	5.0	5.9	6.0	5.6	7.9	6.1
ACH 33-2 BG II	5.5	5.3	4.5	4.9	5.0	4.8	5.0	4.1	4.8	5.7	4.9
Akka BG II	7.0	6.6	6.0	6.5	6.5	5.2	5.6	5.9	4.5	7.1	5.7
BCHH 322-2 BG II	7.2	7.2	4.9	6.2	6.4	4.7	5.8	4.1	6.1	7.4	5.6
Brahma BG II	7.1	7.0	5.8	6.0	6.5	5.3	5.7	4.0	5.2	7.3	5.5
JK Gowri Bt (ET 1)	6.6	6.2	4.8	5.5	5.8	4.6	5.5	6.0	4.9	6.7	5.5
KDCHH 441 BG II	6.2	5.7	5.4	5.9	5.8	5.1	6.0	4.0	4.9	7.8	5.6
NCEH 13 Bt (FG)	5.9	6.2	6.9	6.1	6.3	5.2	5.9	6.0	6.2	6.1	5.9
NCS 145 BG II	7.1	6.8	4.9	5.6	6.1	5.1	6.2	4.0	4.9	7.7	5.6
RCH 2 BG II	7.2	6.5	5.4	6.1	6.3	5.2	5.9	6.1	5.0	7.3	5.9
Tulasi 9 BG II	7.4	7.1	5.5	6.1	6.5	4.6	6.7	6.1	6.4	7.6	6.3
Dhruv Bt (FG)	6.2	6.3	5.5	5.6	5.9	5.2	5.7	4.1	5.1	6.4	5.3
RCH 2 Bt	6.5	6.5	6.1	5.8	6.2	4.0	6.4	6.0	5.1	6.7	5.6
Bunny	6.7	6.4	5.3	5.8	6.0	5.2	5.7	4.1	6.0	6.9	5.6
Local Check Hybrid	7.7	7.6	6.7	5.7	6.9	4.8	5.1	4.1	5.1	7.9	5.4

Table 6. Seed Index (g)

Entry	Srivilliputhur (I)	Coimbatore (I)	Raichur (I)	Siruguppa (I)	Mean (I)	Dharwad (R)	Lam (R)	Nandyal (R)	Adilabad (R)	Aruppukottai (R)	Mean (R)
Ankur Jai Bt	12.4	12.5	9.6	11.0	11.4	13.0	12.9	9.0	10.8	12.0	11.5
BCHH 302 Bt	10.7	12.2	9.8	11.4	11.0	8.0	10.5	10.1	10.8	12.2	10.3
KCH 135 Bt	11.9	10.8	8.6	10.9	10.5	8.0	10.3	8.2	8.5	11.5	9.3
Nandi 405 Bt	10.9	11.5	9.0	10.1	10.4	9.0	12.9	8.0	9.4	10.7	10.0
NCS 929 Bt	12.6	11.3	9.1	10.7	10.9	8.0	10.6	9.7	10.7	12.3	10.3
PCH 930 Bt	10.3	10.1	7.4	9.3	9.3	9.0	9.7	8.0	8.9	12.1	9.5
IT 925 Bt	13.2	11.4	9.4	12.3	11.6	9.0	12.2	8.0	8.8	12.9	10.2
Rudra Bt	12.3	11.7	9.3	11.8	11.3	9.0	12.1	9.9	10.4	12.1	10.7
Sigma Bt	12.6	11.6	7.7	9.8	10.4	9.3	11.5	9.8	9.8	12.3	10.5
VCH 111 Bt	12.3	9.8	6.9	9.6	9.7	8.0	10.5	10.0	8.2	12.1	9.8
ACH 33-2 BG II	9.6	8.8	7.4	8.2	8.5	8.3	9.8	8.0	7.5	9.6	8.6
Akka BG II	12.0	11.6	9.9	11.4	11.2	9.3	11.0	9.7	9.6	11.7	10.3
BCHH 322-2 BG II	12.0	12.2	8.2	10.3	10.7	8.7	11.3	8.0	10.2	11.9	10.0
Brahma BG II	12.0	11.1	9.2	10.8	10.8	9.3	10.7	10.0	10.5	11.8	10.5
JK Gowri Bt (ET 1)	11.8	11.2	8.0	9.8	10.2	8.7	10.7	10.0	8.6	11.2	9.8
KDCHH 441 BG II	9.7	9.2	8.1	9.8	9.2	9.0	10.6	8.1	8.7	12.3	9.7
NCEH 13 Bt (FG)	11.0	11.5	11.4	11.0	11.2	10.0	12.3	11.8	9.9	10.8	11.0
NCS 145 BG II	11.0	12.0	8.9	9.7	10.4	9.7	12.1	10.0	9.7	12.4	10.8
RCH 2 BG II	12.2	11.8	10.2	11.5	11.4	9.7	13.1	8.0	9.7	11.8	10.5
Tulasi 9 BG II	12.2	11.2	9.3	10.4	10.8	8.3	12.2	7.9	9.1	12.2	9.9
Dhruv Bt (FG)	11.5	11.0	8.5	10.3	10.3	9.7	11.2	9.9	9.6	11.1	10.3
RCH 2 Bt	12.1	11.3	9.6	10.2	10.8	9.0	11.8	9.9	9.0	11.9	10.3
Bunny	12.4	11.2	8.2	9.8	10.4	10.0	11.8	7.8	10.3	12.2	10.4
Local Check Hybrid	15.5	12.7	8.4	8.6	11.3	8.3	11.4	7.9	8.0	14.8	10.1

B. MEAN YIELD UNDER ETL BASED PLANT PROTECTION

Mean Seed Cotton Yield

Irrigated

Under irrigated conditions, the highest mean seed cotton yield recorded was 2560 kg/ha (Brahma BG II) with 22 % yield increase over RCH 2 Bt and 28 % increase over Bunny (Table 7). The lowest yield recorded was 1672 kg/ha as noted in local check hybrid. Twelve other test hybrids viz., Ankur Jai Bt, BCHH 302 Bt, Nandi 405 Bt, IT 925 Bt, Rudra Bt, Sigma Bt, ACH 33-2 BG II, Akka BG II, RCH 2 BG II, Tulasi 9 BG II and Dhruv Bt (FG) registered 2 to 17 % yield increase over RCH 2 Bt.

Table 7. Mean seed cotton yield under irrigated conditions

Entry	Srivilliputhur (l)	Coimbatore (l)	Warangal (l)	Raichur (l)	B'gudi (l)	Siruguppa (l)	Irrigated Mean	% Inc over RCH 2 Bt	% Inc over Bunny
Ankur Jai Bt	2410	2099	3259	1328	2446	1899	2240	6	12
BCHH 302 Bt	2162	2114	3320	1385	2408	2001	2232	6	12
KCH 135 Bt	1456	1595	2342	1362	2064	1478	1716	-18	-14
Nandi 405 Bt	2043	1764	3100	1512	2373	2388	2197	4	10
NCS 929 Bt	2609	1800	3032	1555	2060	1758	2136	2	7
PCH 930 Bt	2193	1027	3101	1070	1834	2487	1952	-7	-2
IT 925 Bt	2438	1996	3496	1405	2149	2348	2305	10	15
Rudra Bt	2343	2092	3132	1875	2375	2375	2365	12	18
Sigma Bt	2238	2011	3025	1770	2264	2193	2250	7	13
VCH 111 Bt	2533	1944	3007	1228	1661	2228	2100	0	5
ACH 33-2 BG II	2324	1800	2769	1715	1935	2713	2209	5	11
Akka BG II	2211	1605	2947	1779	2103	2584	2205	5	10
BCHH 322-2 BG II	1699	1790	3258	1341	1350	2623	2010	-4	1
Brahma BG II	2512	2294	3582	1924	2387	2661	2560	22	28
JK Gowri Bt (ET 1)	1982	1566	3066	688	2638	2014	1992	-5	0
KDCHH 441 BG II	2314	1648	2218	1342	1786	2747	2009	-5	1
NCEH 13 Bt (FG)	2029	1597	2963	1757	1995	2069	2068	-2	3
NCS 145 BG II	1937	1572	2492	1444	1732	1843	1837	-13	-8
RCH 2 BG II	2365	2325	2876	1282	1619	2495	2160	3	8
Tulasi 9 BG II	2350	2094	3360	1678	1841	1694	2169	3	9
Dhruv Bt (FG)	2435	2490	3421	1742	2226	2459	2462	17	23
RCH 2 Bt	2149	2523	2869	1430	1535	2119	2104	0	5
Bunny	1764	1940	2994	997	2439	1863	1999	-5	0
Local Check Hybrid	1295	1291	2909	796	1777	1962	1672	-21	-16
CD @ 5 %	276	356	613	496	244	243			
CV %	8	12	13	7	7	7			

Rainfed

Under rainfed conditions, the highest mean seed cotton yield recorded was 2328 kg/ha (Rudra Bt) with 14 % yield increase over RCH 2 Bt and 19 % yield increase over Bunny (Table 8). As in irrigated condition, under rainfed condition also, the local check hybrids had the lowest yield (1814 kg/ha). Thirteen other test hybrids recorded better yield over RCH 2 Bt viz., Ankur Jai Bt, BCHH 302 Bt, NCS 929 Bt, IT 925 Bt, Sigma Bt, ACH 33-2 BG II, Akka BG II, Brahma BG II, KDCHH 441 BG II, NCEH 13 Bt (FG), RCH 2 BG II, Tulasi 9 BG II, and Dhruv Bt (FG) with 1 – 12 % yield increase over RCH 2 Bt.

Table 8. Mean seed cotton yield under rainfed conditions

Entry	Dharwad (R)	Lam (R)	Nandyal (R)	Adilabad (R)	Aruppukottai (R)	Rainfed Mean*	% Inc over RCH 2 Bt	% Inc over Bunny
Ankur Jai Bt	1845	3878	2006	1703	1402	2167	6	10
BCHH 302 Bt	1198	4671	2028	2050	1495	2288	12	17
KCH 135 Bt	1352	4716	1321	822	1672	1977	-3	1
Nandi 405 Bt	1291	4061	1693	1532	1727	2061	1	5
NCS 929 Bt	895	4402	1724	1800	1732	2111	4	8
PCH 930 Bt	1709	3862	1052	1086	1731	1888	-7	-4
IT 925 Bt	1317	3995	1868	1770	1748	2140	5	9
Rudra Bt	1123	4735	1862	2101	1819	2328	14	19
Sigma Bt	1265	4638	2066	1631	1819	2284	12	16
VCH 111 Bt	1217	3858	1290	1267	1848	1896	-7	-3
ACH 33-2 BG II	1433	4099	2121	1658	1867	2236	10	14
Akka BG II	1538	3556	2223	1401	1843	2112	4	8
BCHH 322-2 BG II	947	4300	1191	1689	1871	2000	-2	2
Brahma BG II	1524	4226	1485	1546	1862	2129	4	9
JK Gowri Bt (ET 1)	808	3834	1193	1878	1774	1897	-7	-3
KDCHH 441 BG II	1641	3999	2186	1255	1966	2209	8	13
NCEH 13 Bt (FG)	1345	4266	1596	1739	1842	2158	6	10
NCS 145 BG II	1383	3939	1233	1344	1855	1951	-4	-1
RCH 2 BG II	1553	5107	1128	1670	1637	2219	9	13
Tulasi 9 BG II	1604	4288	1434	1488	1662	2095	3	7
Dhruv Bt (FG)	1324	4679	1875	1705	1742	2265	11	15
RCH 2 Bt	1215	4336	1381	1455	1797	2037	0	4
Bunny	1039	4031	1065	1798	1871	1961	-4	0
Local Check Hybrid	1199	3121	1408	1633	1707	1814	-11	-8
CD @ 5 %	347	591	497	379	226			
CV %	16	9	19	14	9			

*Due to even rainfall distribution and favourable growth condition in certain rainfed locations, the mean yield under rainfed conditions is high.

Mean lint yield

For lint yield also, similar trend was noticed.

Irrigated centres

Under irrigated conditions, the highest mean lint yield was recorded in Brahma BG II (874 kg/ha) with 16% yield increase over RCH 2 Bt and 46% increase over Bunny. In this case also, the lowest lint yield was recorded in local check hybrids under both irrigated and rainfed conditions. Six other test hybrids had registered better lint yield over the best check hybrid *viz.*, Rudra Bt, VCH 111 Bt, ACH 33-2 BG II, KDCHH 441 BG II, RCH 2 BG II, and Dhruv Bt (FG) with 1 – 8 % increase over RCH 2 Bt (Table 9).

Table 9. Mean lint yield (kg/ha) in irrigated centres

Entry	Srivilliputhur (l)	Coimbatore (l)	Raichur (l)	Siruguppa (l)	Irrigated Mean	% Inc over RCH 2 Bt	% Inc over Bunny
Ankur Jai Bt	862	750	485	659	689	-8	15
BCHH 302 Bt	853	787	547	755	736	-2	22
KCH 135 Bt	515	582	484	538	530	-29	-12
Nandi 405 Bt	759	656	575	882	718	-4	19
NCS 929 Bt	886	651	575	631	686	-9	14
PCH 930 Bt	894	369	449	1012	681	-9	13
IT 925 Bt	862	716	555	824	739	-2	23
Rudra Bt	834	766	778	881	815	8	36
Sigma Bt	804	719	673	805	750	0	25
VCH 111 Bt	979	724	467	852	755	1	26
ACH 33-2 BG II	848	671	652	1016	797	6	33
Akka BG II	809	587	640	937	743	-1	24
BCHH 322-2 BG II	641	664	503	986	698	-7	16
Brahma BG II	932	869	750	947	874	16	46
JK Gowri Bt (ET 1)	711	559	255	729	563	-25	-6
KDCHH 441 BG II	907	633	537	1033	777	4	29
NCEH 13 Bt (FG)	713	563	668	739	671	-11	12
NCS 145 BG II	765	565	513	677	630	-16	5
RCH 2 BG II	875	828	449	866	755	0	26
Tulasi 9 BG II	887	757	629	625	725	-4	21
Dhruv Bt (FG)	854	904	688	875	830	11	38
RCH 2 Bt	753	924	558	770	751	0	25
Bunny	620	705	394	687	601	-20	0
Local Check Hybrid	430	436	354	783	501	-33	-17

Rainfed centres

Under rainfed conditions, the highest lint yield was recorded in BCHH 302 Bt (831 kg/ha) with 18% increase over RCH 2 Bt and 22 % increase over Bunny (Table 10). Sixteen other test hybrids showed superior performance in terms of lint yield viz., Ankur Jai Bt, Nandi 405 Bt, NCS 929 Bt, IT 925 Bt, Rudra Bt, Sigma Bt, ACH 33-2 BG II, Akka BG II, BCHH 322-2 BG II, Brahma BG II, KDCHH 441 BG II, NCEH 13 Bt (FG), RCH 2 BG II, Tulasi 9 BG II and Dhruv Bt (FG) with 1-16 % increase over RCH 2 Bt.

Table 10. Mean lint yield (kg/ha) in rainfed centres

Entry	Dharwad (R)	Lam (R)	Nandyal (R)	Adilabad (R)	Aruppukottai (R)	Rainfed Mean*	% Inc over RCH 2 Bt	% Inc over Bunny
Ankur Jai Bt	660	1332	682	528	520	744	6	9
BCHH 302 Bt	451	1635	730	759	582	831	18	22
KCH 135 Bt	469	1579	476	304	611	688	-2	1
Nandi 405 Bt	448	1352	609	567	658	727	3	6
NCS 929 Bt	317	1513	621	612	610	734	4	8
PCH 930 Bt	612	1357	421	369	678	687	-2	1
IT 925 Bt	496	1333	635	726	638	766	9	12
Rudra Bt	405	1562	708	735	666	815	16	19
Sigma Bt	434	1592	744	603	676	810	15	19
VCH 111 Bt	465	1365	490	456	730	701	0	3
ACH 33-2 BG II	525	1402	764	647	695	807	15	18
Akka BG II	550	1162	756	448	698	723	3	6
BCHH 322-2 BG II	333	1449	405	642	717	709	1	4
Brahma BG II	555	1471	535	510	710	756	7	11
JK Gowri Bt (ET 1)	279	1308	406	676	662	666	-5	-2
KDCHH 441 BG II	593	1420	787	477	759	807	15	18
NCEH 13 Bt (FG)	460	1381	543	574	668	725	3	6
NCS 145 BG II	475	1331	444	457	714	684	-3	0
RCH 2 BG II	541	1705	395	685	627	790	12	16
Tulasi 9 BG II	570	1524	516	521	639	754	7	10
Dhruv Bt (FG)	462	1591	675	614	634	795	13	16
RCH 2 Bt	372	1494	470	538	647	704	0	3
Bunny	354	1338	383	665	674	683	-3	0
Local Check Hybrid	437	1008	479	637	595	631	-10	-8

*Due to even rainfall distribution and favourable growth condition in certain rainfed locations, the mean yield under rainfed conditions is high.

C. FIBRE QUALITY EVALUATION

Fibre Quality Evaluations were done in four centres (two each in irrigated and rainfed conditions) using High Volume Instrument.

Among the test entries, the fibre length ranged between 28.8 mm and 34.0 mm as compared to 33.3 mm recorded in the best check hybrid, Bunny under irrigated conditions (Table 11). Under rainfed conditions, the length ranged from 27.9 mm to 33.6 mm among the test entries as against 31.2 mm recorded in the best check hybrid, Bunny.

Table 11. 2.5% Span Length (mm)

Entry	Srivilliputhur (I)	Coimbatore (I)	Mean (I)	Aruppukottai (R)	Lam (R)	Mean (R)
Ankur Jai Bt	33.0	34.3	33.7	33.7	33.4	33.6
BCHH 302 Bt	32.7	32.3	32.5	30.1	31.4	30.7
KCH 135 Bt	33.2	30.6	31.9	30.2	31.7	30.9
Nandi 405 Bt	33.2	31.4	32.3	31.9	31.8	31.8
NCS 929 Bt	33.7	33.4	33.6	31.3	32.5	31.9
PCH 930 Bt	29.4	28.1	28.8	27.0	29.3	28.1
IT 925 Bt	34.3	33.8	34.0	32.1	32.5	32.3
Rudra Bt	32.6	32.6	32.6	30.8	32.0	31.4
Sigma Bt	34.3	33.4	33.8	32.2	32.5	32.3
VCH 111 Bt	31.3	30.8	31.0	30.4	30.9	30.6
ACH 33-2 BG II	30.6	29.2	29.9	28.9	29.6	29.2
Akka BG II	34.1	33.0	33.5	33.4	33.3	33.4
BCHH 322-2 BG II	33.6	33.9	33.8	32.0	34.0	33.0
Brahma BG II	31.7	32.0	31.9	31.0	32.4	31.7
JK Gowri Bt (ET 1)	33.3	31.9	32.6	30.8	32.5	31.7
KDCHH 441 BG II	30.3	28.4	29.4	27.4	28.4	27.9
NCEH 13 Bt (FG)	30.2	31.7	31.0	30.8	32.2	31.5
NCS 145 BG II	32.9	32.9	32.9	31.9	33.4	32.6
RCH 2 BG II	31.9	31.2	31.5	29.9	30.2	30.1
Tulasi 9 BG II	31.5	31.5	31.5	30.2	33.1	31.7
Dhruv Bt (FG)	30.8	30.3	30.6	29.5	30.0	29.7
RCH 2 Bt	32.1	31.9	32.0	30.3	30.8	30.5
Bunny	33.6	32.5	33.1	30.8	31.5	31.2
Local Check Hybrid	32.4	34.1	33.3	26.2	29.6	27.9

There was not much variation in U.R % and its value ranged between 46.8 and 50.8 per cent in irrigated conditions and from 46.4 to 51.4 per cent in rainfed conditions (Table 12). Micronaire varied from 4.1 to 5.0 under irrigated conditions and between 4.0 and 4.8 in rainfed conditions (Table 13).

Table 12. Uniformity Ratio

Entry	Srivilliputhur (I)	Coimbatore (I)	Mean (I)	Aruppukottai (R)	Lam (R)	Mean (R)
Ankur Jai Bt	47.0	46.7	46.8	48.0	47.4	47.7
BCHH 302 Bt	47.0	47.7	47.3	48.0	48.9	48.4
KCH 135 Bt	48.0	48.7	48.3	48.0	47.7	47.9
Nandi 405 Bt	48.0	48.3	48.2	50.0	48.0	49.0
NCS 929 Bt	48.0	47.7	47.8	46.0	48.7	47.3
PCH 930 Bt	49.0	48.7	48.8	47.0	48.7	47.9
IT 925 Bt	48.0	47.0	47.5	46.0	46.8	46.4
Rudra Bt	48.0	47.5	47.8	46.0	52.2	49.1
Sigma Bt	46.0	48.7	47.3	48.0	49.5	48.8
VCH 111 Bt	51.0	50.0	50.5	45.0	51.6	48.3
ACH 33-2 BG II	48.0	50.7	49.3	49.0	48.9	49.0
Akka BG II	48.0	48.7	48.3	47.0	48.0	47.5
BCHH 322-2 BG II	48.0	49.3	48.7	46.0	47.3	46.7
Brahma BG II	49.0	50.0	49.5	47.0	48.0	47.5
JK Gowri Bt (ET 1)	48.0	49.3	48.7	47.0	50.0	48.5
KDCHH 441 BG II	47.0	48.3	47.7	45.0	50.2	47.6
NCEH 13 Bt (FG)	51.0	50.7	50.8	49.0	50.3	49.6
NCS 145 BG II	50.0	46.3	48.2	49.0	48.8	48.9
RCH 2 BG II	50.0	50.7	50.3	49.0	49.9	49.5
Tulasi 9 BG II	49.0	47.3	48.2	49.0	48.2	48.6
Dhruv Bt (FG)	48.0	50.3	49.2	49.0	49.6	49.3
RCH 2 Bt	49.0	50.3	49.7	48.0	50.3	49.1
Bunny	52.0	46.7	49.3	46.0	48.6	47.3
Local Check Hybrid	49.0	47.3	48.2	50.0	52.8	51.4

Table 13. Micronaire ($\mu\text{g}/\text{tex}$)

Entry	Srivilliputhur (I)	Coimbatore (I)	Mean (I)	Aruppukottai (R)	Lam (R)	Mean (R)
Ankur Jai Bt	4.4	5.0	4.7	4.5	4.7	4.6
BCHH 302 Bt	4.4	4.7	4.6	4.4	5.0	4.7
KCH 135 Bt	4.1	4.5	4.3	4.1	4.4	4.2
Nandi 405 Bt	3.9	4.8	4.3	4.3	4.9	4.6
NCS 929 Bt	3.9	4.3	4.1	4.1	4.7	4.4
PCH 930 Bt	4.8	4.8	4.8	4.1	5.3	4.7
IT 925 Bt	4.1	4.3	4.2	3.6	4.3	4.0
Rudra Bt	4.6	4.5	4.6	4.5	4.6	4.6
Sigma Bt	3.7	4.4	4.1	4.2	4.6	4.4
VCH 111 Bt	4.1	4.4	4.3	4.7	4.6	4.7
ACH 33-2 BG II	4.1	4.4	4.3	4.5	4.5	4.5
Akka BG II	3.9	4.7	4.3	4.4	4.7	4.6
BCHH 322-2 BG II	4.3	4.8	4.5	4.2	4.5	4.3
Brahma BG II	4.0	4.9	4.5	4.2	4.5	4.3
JK Gowri Bt (ET 1)	4.6	4.8	4.7	4.4	4.6	4.5
KDCHH 441 BG II	4.0	4.3	4.2	4.6	4.5	4.5
NCEH 13 Bt (FG)	4.1	4.4	4.2	4.4	4.7	4.5
NCS 145 BG II	4.3	4.2	4.2	4.7	4.1	4.4
RCH 2 BG II	4.0	5.0	4.5	4.6	5.0	4.8
Tulasi 9 BG II	4.9	5.0	5.0	4.3	4.8	4.5
Dhruv Bt (FG)	4.0	4.8	4.4	4.3	5.0	4.6
RCH 2 Bt	4.5	4.9	4.7	3.8	5.0	4.4
Bunny	4.2	4.6	4.4	4.4	4.7	4.5
Local Check Hybrid	4.5	4.9	4.7	3.9	4.6	4.2

In general, the fibre strength was better under irrigated conditions as compared to rainfed conditions. The strength ranged between 23.9 and 19.7 g/tex under irrigated conditions and varied from 19.0 to 23.5 g/tex under rainfed conditions (Table 14).

Table 14. Bundle Strength (g/tex)

Entry	Srivilliputhur (I)	Coimbatore (I)	Mean (I)	Aruppukottai (R)	Lam (R)	Mean (R)
Ankur Jai Bt	22.7	20.6	21.7	21.7	22.2	21.9
BCHH 302 Bt	23.1	20.7	21.9	22.5	20.3	21.4
KCH 135 Bt	22.0	20.2	21.1	21.4	21.3	21.4
Nandi 405 Bt	21.3	21.2	21.3	23.1	23.3	23.2
NCS 929 Bt	22.4	21.6	22.0	20.5	22.5	21.5
PCH 930 Bt	20.3	19.1	19.7	19.9	21.0	20.5
IT 925 Bt	24.5	23.3	23.9	22.4	24.6	23.5
Rudra Bt	22.9	21.5	22.2	20.7	20.1	20.4
Sigma Bt	24.8	21.7	23.3	20.6	22.8	21.7
VCH 111 Bt	25.3	21.4	23.4	19.4	22.2	20.8
ACH 33-2 BG II	23.5	19.8	21.6	20.3	21.3	20.8
Akka BG II	26.6	20.5	23.6	20.9	22.5	21.7
BCHH 322-2 BG II	23.8	21.2	22.5	21.8	23.4	22.6
Brahma BG II	25.0	20.1	22.6	22.6	22.8	22.7
JK Gowri Bt (ET 1)	24.4	20.0	22.2	21.8	21.8	21.8
KDCHH 441 BG II	24.0	18.2	21.1	17.6	20.3	19.0
NCEH 13 Bt (FG)	23.4	22.6	23.0	22.1	21.7	21.9
NCS 145 BG II	22.4	21.4	21.9	20.8	22.8	21.8
RCH 2 BG II	23.9	20.3	22.1	20.2	21.1	20.6
Tulasi 9 BG II	22.8	20.6	21.7	19.8	21.1	20.5
Dhruv Bt (FG)	24.2	22.8	23.5	20.4	23.5	22.0
RCH 2 Bt	22.8	21.6	22.2	21.1	20.7	20.9
Bunny	25.5	21.3	23.4	19.8	21.4	20.6
Local Check Hybrid	24.5	21.4	23.0	17.3	21.4	19.4

D. ENTOMOLOGICAL EVALUATION

1. EVALUATION UNDER PLANT PROTECTION (ETL BASED)

Sucking pests

i) Jassids

Under irrigated and rainfed conditions, jassid incidence was observed in all the test centres and entries. However, under irrigated conditions, the jassid population was more in Siruguppa than in Srivilliputtur, Coimbatore and Beemaranagudi (Table 15). Mean number of jassid varied from 3.2 to 5.3 per 3 leaves. Under rainfed conditions, lesser number of jassids was recorded in LAM, Guntur than in other locations. The mean population varied from 1.8 to 3.7 per 3 leaves. No critical difference in jassid population was seen between the local checks and the test entries.

Table 15. Jassid

Entry	Srivilliputhur (I)	Coimbatore (I)	B' gudi (I)	Siruguppa (I)	Mean (I)	Lam (R)	Nandyal (R)	Dharwad (R)	Mean (R)
Ankur Jai Bt	2.5	2.5	3.1	7.1	3.8	1.3	2.6	2.4	2.1
BCHH 302 Bt	2.6	3.2	3.1	9.0	4.5	2.1	3.6	3.3	3.0
KCH 135 Bt	3.9	2.7	2.9	6.9	4.1	1.0	3.3	2.7	2.3
Nandi 405 Bt	2.3	2.5	3.5	5.9	3.5	1.3	3.2	3.1	2.6
NCS 929 Bt	2.3	2.7	3.4	6.9	3.8	0.4	3.5	3.1	2.3
PCH 930 Bt	4.8	3.1	4.0	5.9	4.5	0.9	4.9	2.8	2.9
IT 925 Bt	2.8	2.7	2.6	6.4	3.6	0.9	2.9	3.4	2.4
Rudra Bt	3.0	2.8	3.2	7.8	4.2	1.1	2.3	2.5	2.0
Sigma Bt	2.7	3.0	3.3	6.2	3.8	0.3	3.1	3.4	2.3
VCH 111 Bt	5.1	4.0	3.5	6.9	4.9	1.1	4.1	3.3	2.8
ACH 33-2 BG II	2.6	2.5	2.9	5.0	3.2	0.8	1.8	2.8	1.8
Akka BG II	2.8	2.7	2.7	8.5	4.2	0.3	2.9	3.0	2.1
BCHH 322-2 BG II	2.7	2.7	3.6	5.9	3.7	0.9	3.4	4.3	2.9
Brahma BG II	2.4	3.4	2.9	5.3	3.5	0.2	2.7	3.1	2.0
JK Gowri Bt (ET 1)	2.8	3.0	2.6	9.2	4.4	0.5	2.1	3.1	1.9
KDCHH 441 BG II	2.8	3.3	3.0	9.2	4.6	0.9	3.0	2.7	2.2
NCEH 13 Bt (FG)	2.9	3.0	2.5	7.4	4.0	0.6	2.8	3.0	2.1
NCS 145 BG II	3.7	2.7	2.9	5.9	3.8	1.3	3.2	3.0	2.5
RCH 2 BG II	3.9	2.4	3.8	7.9	4.5	1.2	5.0	2.5	2.9
Tulasi 9 BG II	2.8	2.6	3.1	7.2	3.9	0.8	3.5	2.9	2.4
Dhruv Bt (FG)	2.9	2.6	3.6	7.0	4.0	0.2	2.5	3.5	2.1
RCH 2 Bt	3.4	2.3	3.3	10.3	4.8	1.8	3.4	5.7	3.7
Bunny	5.6	3.6	2.6	9.4	5.3	0.8	2.8	3.4	2.4
Local Check Hybrid	2.9	2.8	3.3	5.7	3.7	0.5	2.6	3.0	2.0

ii) White fly

Minimum incidence of whitefly was recorded in all the centres under irrigated and rainfed conditions (Table 16). The mean population of white fly ranged from 0.8 to 1.6 . No variation could be seen in the mean population of whitefly between Bt test hybrids and non-Bt hybrids.

Table 16. Whitefly

Entry	Srivilliputhur (I)	Coimbatore (I)	Siruguppa (I)	Mean (I)	Lam (R)	Nandyal (R)	Mean (R)
Ankur Jai Bt	2.2	0.4	1.4	1.3	1.0	1.0	1.0
BCHH 302 Bt	2.0	0.2	1.8	1.3	1.1	0.7	0.9
KCH 135 Bt	2.1	0.2	1.3	1.2	1.0	0.7	0.8
Nandi 405 Bt	2.2	0.0	1.6	1.3	1.1	0.6	0.8
NCS 929 Bt	2.1	0.1	1.7	1.3	1.0	1.1	1.0
PCH 930 Bt	2.3	0.1	1.7	1.3	1.0	0.6	0.8
IT 925 Bt	2.0	0.0	1.6	1.2	1.1	1.0	1.0
Rudra Bt	2.3	0.1	1.3	1.3	1.1	0.7	0.9
Sigma Bt	1.9	0.0	1.3	1.1	1.1	0.8	1.0
VCH 111 Bt	2.0	0.2	1.3	1.2	1.0	0.9	0.9
ACH 33-2 BG II	2.5	0.1	2.1	1.6	1.1	0.8	0.9
Akka BG II	1.9	0.2	1.5	1.2	1.0	0.8	0.9
BCHH 322-2 BG II	2.0	0.0	1.9	1.3	1.1	0.4	0.7
Brahma BG II	2.0	0.1	2.3	1.5	1.1	0.7	0.9
JK Gowri Bt (ET 1)	1.5	0.0	1.5	1.0	1.1	0.5	0.8
KDCHH 441 BG II	2.6	0.2	0.5	1.1	1.0	0.9	1.0
NCEH 13 Bt (FG)	1.8	0.1	1.6	1.2	1.0	0.7	0.8
NCS 145 BG II	1.9	0.0	1.9	1.3	1.0	0.4	0.7
RCH 2 BG II	1.3	0.0	1.3	0.9	1.1	0.5	0.8
Tulasi 9 BG II	1.6	0.1	0.8	0.8	1.1	0.4	0.8
Dhruv Bt (FG)	1.5	0.2	1.6	1.1	1.0	0.4	0.7
RCH 2 Bt	1.6	0.0	0.7	0.8	1.0	0.5	0.8
Bunny	1.6	0.0	0.6	0.7	1.0	0.5	0.7
Local Check Hybrid	1.3	0.2	1.7	1.1	1.0	0.8	0.9

iii) Thrips

Thrips population was seen more under rainfed situation than under irrigated situation. Mean number of thrips per three leaves varied from 3.2 to 5.5 per three leaves under irrigated conditions, while higher incidence of thrips was noticed in all the hybrids varying from 11.5 – 23.1 per 3 leaves under rainfed situation (Table 17).

Table 17. Thrips

Entry	Srivilliputhur (I)	Coimbatore (I)	B' gudi (I)	Siruguppa (I)	Mean (I)	Lam (R)	Nandyal (R)	Dharwad (R)	Mean (R)
Ankur Jai Bt	1.7	0.3	11.1	4.5	4.4	30.4	13.7	13.8	19.3
BCHH 302 Bt	2.0	1.2	11.3	3.7	4.6	24.7	11.2	8.0	14.6
KCH 135 Bt	2.1	0.7	10.1	2.9	3.9	22.9	11.5	7.5	14.0
Nandi 405 Bt	4.2	0.3	9.6	2.9	4.2	28.3	11.0	7.4	15.6
NCS 929 Bt	2.4	0.4	11.8	4.5	4.8	20.9	12.6	7.1	13.5
PCH 930 Bt	2.2	0.2	11.1	2.8	4.1	22.9	10.1	8.0	13.7
IT 925 Bt	2.1	0.3	9.2	4.2	4.0	23.0	15.8	15.0	18.0
Rudra Bt	2.3	0.3	7.3	2.9	3.2	28.6	14.9	14.3	19.3
Sigma Bt	4.0	0.5	9.6	3.9	4.5	25.5	12.7	14.4	17.5
VCH 111 Bt	2.4	0.4	9.7	4.9	4.4	27.3	14.8	9.3	17.2
ACH 33-2 BG II	3.4	0.5	13.0	4.9	5.5	39.8	16.5	13.0	23.1
Akka BG II	2.8	0.2	8.3	3.9	3.8	22.5	14.6	8.7	15.3
BCHH 322-2 BG II	2.4	0.2	8.8	3.0	3.6	25.3	13.5	7.2	15.3
Brahma BG II	2.1	0.3	8.7	3.6	3.7	24.3	11.2	9.7	15.1
JK Gowri Bt (ET 1)	2.3	0.2	9.1	3.9	3.9	28.5	12.7	8.7	16.7
KDCHH 441 BG II	1.8	0.3	9.8	3.9	4.0	22.9	8.2	7.4	12.8
NCEH 13 Bt (FG)	3.9	0.4	7.0	5.1	4.1	21.9	11.8	14.3	16.0
NCS 145 BG II	1.9	0.2	8.1	3.2	3.3	27.3	11.6	16.1	18.3
RCH 2 BG II	1.7	0.5	9.8	3.1	3.8	21.3	6.9	6.3	11.5
Tulasi 9 BG II	1.7	0.4	8.7	3.6	3.6	19.7	11.5	8.5	13.2
Dhruv Bt (FG)	1.9	0.3	10.2	4.1	4.1	28.1	12.3	13.2	17.9
RCH 2 Bt	2.0	0.3	11.9	3.3	4.4	27.9	7.8	7.7	14.5
Bunny	1.9	0.2	9.0	4.1	3.8	32.5	12.5	12.7	19.2
Local Check Hybrid	1.9	0.2	9.8	3.9	3.9	38.2	15.4	13.5	22.4

iv) Aphids

Under irrigated conditions, maximum population of aphids was recorded with the mean population ranging from 16.5 – 34.4 per three leaves. On the other hand, population level was low in rainfed conditions (Table 18). No critical variation could be seen in aphid population between the check and test entries.

Table 18. Aphid

Entry	Srivilliputhur (I)	Coimbatore (I)	Mean (I)	Lam (R)	Dharwad (R)	Mean (R)
Ankur Jai Bt	4.6	64.3	34.4	0.3	2.6	1.4
BCHH 302 Bt	6.3	44.5	25.4	0.3	4.9	2.6
KCH 135 Bt	4.6	48.9	26.7	0.0	6.0	3.0
Nandi 405 Bt	15.7	29.0	22.4	0.0	3.1	1.6
NCS 929 Bt	5.5	38.8	22.1	0.5	4.5	2.5
PCH 930 Bt	5.7	38.0	21.8	0.1	4.2	2.2
IT 925 Bt	14.5	28.5	21.5	0.4	3.1	1.7
Rudra Bt	20.3	32.5	26.4	0.5	2.2	1.3
Sigma Bt	9.7	25.3	17.5	0.7	1.7	1.2
VCH 111 Bt	4.7	30.8	17.7	0.6	3.2	1.9
ACH 33-2 BG II	6.8	42.1	24.5	0.1	2.3	1.2
Akka BG II	5.7	40.4	23.0	0.0	2.4	1.2
BCHH 322-2 BG II	4.3	41.5	22.9	0.1	3.2	1.6
Brahma BG II	5.3	53.2	29.3	0.2	5.5	2.8
JK Gowri Bt (ET 1)	22.2	45.5	33.9	0.6	2.9	1.8
KDCHH 441 BG II	7.3	49.5	28.4	0.0	2.4	1.2
NCEH 13 Bt (FG)	4.0	39.3	21.7	0.2	2.0	1.1
NCS 145 BG II	15.8	37.7	26.8	0.1	2.1	1.1
RCH 2 BG II	5.6	42.5	24.0	0.0	4.1	2.1
Tulasi 9 BG II	7.3	29.6	18.5	0.3	3.8	2.1
Dhruv Bt (FG)	4.5	28.6	16.5	0.0	2.4	1.2
RCH 2 Bt	5.4	45.6	25.5	0.2	3.4	1.8
Bunny	6.8	42.3	24.5	0.1	3.2	1.7
Local Check Hybrid	5.1	34.3	19.7	0.1	3.6	1.9

Natural Enemies

Maximum predator population was observed at Srivilliputtur ranging from 1.3 – 5.7 and comparatively low in other centres. No variation was noticed in the mean population between the check and the test entries (Table 19).

Table 19. Predators

Entry	Srivilliputhur (I)	Coimbatore (I)	Mean (I)	Nandyal (R)
Ankur Jai Bt	1.8	0.1	0.9	0.3
BCHH 302 Bt	5.7	0.1	2.9	0.4
KCH 135 Bt	2.0	0.2	1.1	0.5
Nandi 405 Bt	4.3	0.1	2.2	0.2
NCS 929 Bt	2.1	0.0	1.1	0.4
PCH 930 Bt	2.0	0.0	1.0	0.3
IT 925 Bt	4.3	0.2	2.3	0.6
Rudra Bt	4.1	0.1	2.1	0.6
Sigma Bt	4.3	0.1	2.2	0.5
VCH 111 Bt	4.3	0.0	2.2	0.3
ACH 33-2 BG II	4.6	0.1	2.3	0.3
Akka BG II	4.7	2.2	3.5	0.3
BCHH 322-2 BG II	1.9	0.1	1.0	0.3
Brahma BG II	1.8	0.1	0.9	0.2
JK Gowri Bt (ET 1)	4.3	0.2	2.2	0.4
KDCHH 441 BG II	4.4	0.2	2.3	0.0
NCEH 13 Bt (FG)	2.0	0.1	1.1	0.3
NCS 145 BG II	4.3	0.1	2.2	0.2
RCH 2 BG II	2.6	0.1	1.3	0.2
Tulasi 9 BG II	4.7	0.1	2.4	0.2
Dhruv Bt (FG)	1.3	0.2	0.8	0.1
RCH 2 Bt	1.8	0.1	0.9	0.2
Bunny	4.6	0.2	2.4	0.1
Local Check Hybrid	1.7	0.1	0.9	0.1

Percent Square damage

In all the test centres, the square damage was comparatively minimum in Bt test entries than the non-Bt checks, except in Coimbatore and Guntur, wherein the square damage of less than 0.6 % was observed in all the Bt test hybrids and the checks. Among the test entries, JK Gowri Bt (ET 1) recorded the maximum percentage of square damage than all other entries in most of the centres tested (Table 20).

Table 20. Bollworm % Square Damage

Entry	Srivilliputhur (I)	Coimbatore (I)	Raichur (I)	Mean (I)	Lam (R)	Nandyal (R)	Dharwad (R)	Mean (R)
Ankur Jai Bt	1.0	0.0	7.6	2.9	0.0	2.7	1.8	1.5
BCHH 302 Bt	1.1	0.0	7.8	3.0	0.0	2.1	2.4	1.5
KCH 135 Bt	0.9	0.0	6.6	2.5	0.0	2.0	0.9	1.0
Nandi 405 Bt	0.5	0.1	3.5	1.4	0.0	2.9	2.1	1.6
NCS 929 Bt	0.4	0.0	6.3	2.2	0.0	4.1	0.8	1.6
PCH 930 Bt	0.5	1.6	4.7	2.3	0.0	2.1	1.8	1.3
IT 925 Bt	0.5	0.0	3.9	1.5	0.0	2.9	1.7	1.5
Rudra Bt	0.9	0.2	2.9	1.3	0.0	4.3	0.7	1.7
Sigma Bt	0.7	0.0	3.1	1.3	0.0	3.9	1.0	1.6
VCH 111 Bt	0.4	0.1	4.9	1.8	0.0	2.5	2.8	1.8
ACH 33-2 BG II	0.6	0.1	2.8	1.2	0.6	2.8	1.2	1.5
Akka BG II	0.5	0.0	3.5	1.4	0.6	2.1	4.8	2.5
BCHH 322-2 BG II	0.9	0.0	4.2	1.7	0.6	5.0	1.3	2.3
Brahma BG II	0.5	0.0	3.6	1.4	0.0	2.6	2.9	1.9
JK Gowri Bt (ET 1)	6.8	0.3	41.0	16.0	0.0	7.8	7.5	5.1
KDCHH 441 BG II	0.9	0.0	2.0	1.0	0.0	2.8	2.0	1.6
NCEH 13 Bt (FG)	0.8	0.1	3.4	1.4	0.0	2.2	3.1	1.8
NCS 145 BG II	0.1	0.1	2.8	1.0	0.0	3.1	1.4	1.5
RCH 2 BG II	0.2	0.2	1.2	0.5	0.0	3.3	2.5	1.9
Tulasi 9 BG II	0.4	0.0	4.2	1.5	0.0	2.9	1.3	1.4
Dhruv Bt (FG)	0.3	0.0	2.2	0.8	0.0	5.2	2.9	2.7
RCH 2 Bt	0.2	0.0	2.5	0.9	0.0	3.2	0.7	1.3
Bunny	7.2	0.0	29.8	12.3	0.0	7.1	5.2	4.1
Local Check Hybrid	6.8	0.6	34.5	13.9	0.0	7.4	7.1	4.8

Boll worms

Minimum number of pink bollworm (*P. gossypiella*) larvae per 20 bolls was recorded in all the test entries (except JK Gowri Bt ET 1) than the non-Bt checks at all locations (Table 21). Under irrigated conditions, minimum and maximum number of larvae was recorded at Coimbatore and Srivilliputtur and the mean population on Bt test entries varied from 0.3 to 1.2. Maximum population was recorded at Nandyal than Guntur (rainfed conditions) and the mean population varied from 0 – 3.7 in the test entries.

Pink boll worm damage

Maximum pink bollworm damage was recorded in the non-Bt hybrid check and the test hybrid JK Gowri Bt (ET1) under irrigated and rainfed conditions. However, several test entries also registered noticeable damage by the pest in Srivilliputtur (irrigated) and Nandyal (rainfed). Mean damage figures ranged from 3.3 – 11.4 % and 5.8 – 40.8 % under irrigated and rainfed situations, respectively (Table 21).

Table 21. Pink Bollworm

Entry	Larva/20 green bolls						Damage in green bolls (%)					
	Srivilliputhur (I)	Coimbatore (I)	Mean (I)	Lam (R)	Nandyal (R)	Mean (R)	Srivilliputhur (I)	Coimbatore (I)	Mean (I)	Lam (R)	Nandyal (R)	Mean (R)
Ankur Jai Bt	0.9	0.0	0.4	0.1	1.3	0.7	12.2	0.0	6.1	5.0	13.3	9.2
BCHH 302 Bt	1.3	0.0	0.7	0.1	2.0	1.1	7.8	0.0	3.9	6.7	23.3	15.0
KCH 135 Bt	1.1	0.0	0.6	0.3	0.0	0.2	6.7	0.0	3.3	10.0	13.3	11.7
Nandi 405 Bt	1.3	0.3	0.8	0.1	1.3	0.7	7.8	1.7	4.7	6.7	13.3	10.0
NCS 929 Bt	1.3	0.3	0.8	0.1	1.3	0.7	11.1	1.7	6.4	5.0	6.7	5.8
PCH 930 Bt	1.4	0.0	0.7	0.1	3.3	1.7	17.2	0.0	8.6	6.7	11.7	9.2
IT 925 Bt	1.3	0.3	0.8	0.2	2.7	1.4	7.2	1.7	4.4	8.3	10.0	9.2
Rudra Bt	1.3	0.0	0.7	0.0	0.0	0.0	6.7	0.0	3.3	3.3	10.0	6.7
Sigma Bt	1.5	0.0	0.7	0.5	0.0	0.2	8.3	0.0	4.2	20.0	18.3	19.2
VCH 111 Bt	1.1	0.3	0.7	0.1	1.3	0.7	6.7	1.7	4.2	5.0	10.0	7.5
ACH 33-2 BG II	1.4	0.3	0.9	0.2	1.3	0.8	8.9	1.7	5.3	8.3	6.7	7.5
Akka BG II	1.4	0.0	0.7	0.1	1.3	0.7	13.9	0.0	6.9	3.3	13.3	8.3
BCHH 322-2 BG II	1.3	0.7	1.0	0.7	0.0	0.4	7.2	3.3	5.3	20.0	5.0	12.5
Brahma BG II	1.2	0.3	0.8	0.0	2.7	1.3	6.7	1.7	4.2	0.0	33.3	16.7
JK Gowri Bt (ET 1)	2.0	0.3	1.2	2.5	4.8	3.7	21.1	1.7	11.4	38.3	43.3	40.8
KDCHH 441 BG II	1.3	0.3	0.8	0.0	6.0	3.0	11.1	1.7	6.4	0.0	15.0	7.5
NCEH 13 Bt (FG)	1.1	0.7	0.9	0.0	1.3	0.7	6.1	3.3	4.7	1.7	15.0	8.3
NCS 145 BG II	0.6	0.0	0.3	0.2	0.0	0.1	7.2	0.0	3.6	6.7	28.0	17.3
RCH 2 BG II	0.3	0.3	0.3	0.2	1.3	0.8	6.1	1.7	3.9	6.7	30.0	18.3
Tulasi 9 BG II	1.1	0.3	0.7	0.2	0.0	0.1	12.2	1.7	6.9	8.3	20.0	14.2
Dhruv Bt (FG)	1.6	0.7	1.1	0.0	2.0	1.0	12.2	3.3	7.8	0.0	11.7	5.8
RCH 2 Bt	0.7	0.3	0.5	0.1	0.0	0.1	6.7	1.7	4.2	5.0	23.3	14.2
Bunny	2.8	0.3	1.6	1.5	8.7	5.1	20.6	1.7	11.1	28.3	35.0	31.7
Local Check Hybrid	2.9	0.3	1.6	2.0	4.7	3.3	21.1	1.7	11.4	36.7	50.0	43.3

Open boll and locule damage

In general, Open boll damage was minimum in the Bt test entries than the non-Bt checks but more than in Bt check hybrid. However, the test hybrid JK Gowri Bt (ET1) recorded maximum percentage of boll damage ranging from 2.2 – 24.5 % in different locations. Similarly, PCH 930 Bt, NCS 929 Bt, ACH 33-2 BG II exhibited considerable boll damage across locations. (Table 22). Locule damage was less in the test entries than the non-Bt checks, but Bt test hybrid JK Gowri Bt (ET1) registered more mean locule damage (14.1 %) than that by non-Bt check (11.6-12.2%).

Table 22. Open boll damage (%)

Entry	Boll basis						Locule basis				
	Srivilliputhur (I)	Coimbatore (I)	B' gudi (I)	Raichur (I)	Mean (I)	Nandyal (R)	Srivilliputhur (I)	Coimbatore (I)	Siruguppa (I)	Mean (I)	Nandyal (R)
Ankur Jai Bt	8.7	0.0	0.0	8.3	4.3	8.8	6.38	2.2	16.7	8.4	8.4
BCHH 302 Bt	5.7	0.0	7.1	7.3	5.0	8.8	4.35	3.2	17.7	8.4	8.6
KCH 135 Bt	4.5	0.0	7.4	8.0	5.0	7.5	2.30	0.3	15.1	5.9	7.0
Nandi 405 Bt	4.9	0.0	2.4	7.8	3.8	8.1	3.09	3.4	10.5	5.7	7.0
NCS 929 Bt	8.2	0.3	2.1	14.6	6.3	9.9	2.32	3.7	15.6	7.2	9.5
PCH 930 Bt	12.3	0.0	2.7	7.6	5.6	11.6	3.74	2.2	19.9	8.6	12.1
IT 925 Bt	5.6	0.0	1.4	8.3	3.8	12.8	2.17	10.0	20.3	10.8	11.9
Rudra Bt	4.7	0.5	3.9	9.6	4.7	8.2	3.75	2.2	7.7	4.6	6.7
Sigma Bt	5.3	0.0	1.2	10.5	4.3	13.6	3.89	6.6	21.2	10.6	11.3
VCH 111 Bt	4.5	0.0	1.8	10.4	4.2	7.3	1.36	8.5	20.2	10.0	7.0
ACH 33-2 BG II	8.0	0.5	1.4	29.2	9.8	18.8	3.29	8.9	6.6	6.2	18.7
Akka BG II	9.1	0.0	1.5	13.5	6.0	11.9	4.07	7.2	5.6	5.6	11.5
BCHH 322-2 BG II	5.4	0.0	3.1	13.1	5.4	13.9	3.11	2.5	4.9	3.5	13.0
Brahma BG II	4.5	0.7	2.5	12.7	5.1	12.4	3.11	5.5	9.5	6.0	12.4
JK Gowri Bt (ET 1)	14.8	0.0	2.2	24.5	10.4	24.3	11.27	7.4	23.7	14.1	21.2
KDCHH 441 BG II	8.0	0.0	1.8	13.4	5.8	12.6	5.29	3.4	9.8	6.2	9.7
NCEH 13 Bt (FG)	4.7	0.0	1.4	8.7	3.7	7.8	2.78	3.7	19.2	8.6	7.4
NCS 145 BG II	2.3	0.3	2.9	7.4	3.2	10.6	2.06	5.3	18.1	8.5	9.1
RCH 2 BG II	2.0	0.0	1.8	8.6	3.1	14.1	1.93	2.2	8.6	4.2	13.1
Tulasi 9 BG II	5.4	0.0	3.0	9.7	4.5	8.9	4.84	4.5	16.1	8.5	7.9
Dhruv Bt (FG)	9.4	0.0	2.2	13.5	6.3	9.5	7.97	6.1	18.9	11.0	7.8
RCH 2 Bt	2.4	0.0	1.9	11.0	3.8	7.1	2.09	0.0	16.9	6.3	7.0
Bunny	16.0	0.0	1.0	28.3	11.3	25.9	11.06	4.2	21.2	12.2	22.5
Local Check Hybrid	14.9	0.0	1.8	29.3	11.5	19.9	9.90	4.1	20.9	11.6	17.6

Plant Protection

Occurrence of sucking pests was observed throughout the cropping season and the intensity varied with test entries and the locations. The number of sprays required to control sucking pests under irrigated conditions was minimum at Coimbatore (three sprays) and maximum at Srivilliputtur (5-7 sprays). However, the chemical interventions resorted to control sucking pests were seen to be equal between Bt entries and non-Bt checks (Table 23). Bollworm incidence was minimum throughout the season on all the entries and locations and a mean of 0.5 to 1.0 round of spray was resorted to in all the test entries under irrigated conditions, which was less than the non-Bt checks. Under rainfed conditions, no chemical intervention was needed. However, JK Gowri Bt (ET 1) required chemical sprays (mean 2.5) equivalent to non-Bt checks under irrigated conditions and two rounds of sprays in rainfed conditions compared to one spray for non-Bt checks.

Table 23. No. of Sprays

Entry	Sucking pests				Bollworms			
	Srivilliputhur (I)	Coimbatore (I)	Mean (I)	Nandyal (R)	Srivilliputhur (I)	Coimbatore (I)	Mean (I)	Nandyal (R)
Ankur Jai Bt	5.0	3.0	4.0	3.0	2.0	0.0	1.0	0.0
BCHH 302 Bt	5.0	3.0	4.0	3.0	2.0	0.0	1.0	0.0
KCH 135 Bt	6.0	3.0	4.5	3.0	2.0	0.0	1.0	0.0
Nandi 405 Bt	6.0	3.0	4.5	3.0	2.0	0.0	1.0	0.0
NCS 929 Bt	5.0	3.0	4.0	3.0	2.0	0.0	1.0	0.0
PCH 930 Bt	7.0	3.0	5.0	3.0	2.0	0.0	1.0	0.0
IT 925 Bt	5.0	3.0	4.0	3.0	2.0	0.0	1.0	0.0
Rudra Bt	5.0	3.0	4.0	3.0	2.0	0.0	1.0	1.0
Sigma Bt	6.0	3.0	4.5	3.0	2.0	0.0	1.0	0.0
VCH 111 Bt	7.0	3.0	5.0	3.0	2.0	0.0	1.0	0.0
ACH 33-2 BG II	6.0	3.0	4.5	3.0	2.0	0.0	1.0	0.0
Akka BG II	5.0	3.0	4.0	3.0	2.0	0.0	1.0	0.0
BCHH 322-2 BG II	5.0	3.0	4.0	3.0	2.0	0.0	1.0	1.0
Brahma BG II	5.0	3.0	4.0	3.0	2.0	0.0	1.0	0.0
JK Gowri Bt (ET 1)	5.0	3.0	4.0	3.0	5.0	0.0	2.5	2.0
KDCHH 441 BG II	5.0	3.0	4.0	3.0	2.0	0.0	1.0	0.0
NCEH 13 Bt (FG)	6.0	3.0	4.5	3.0	2.0	0.0	1.0	0.0
NCS 145 BG II	6.0	3.0	4.5	3.0	1.0	0.0	0.5	0.0
RCH 2 BG II	6.0	3.0	4.5	3.0	1.0	0.0	0.5	0.0
Tulasi 9 BG II	5.0	3.0	4.0	3.0	2.0	0.0	1.0	0.0
Dhruv Bt (FG)	5.0	3.0	4.0	3.0	2.0	0.0	1.0	2.0
RCH 2 Bt	5.0	3.0	4.0	3.0	1.0	0.0	0.5	0.0
Bunny	7.0	3.0	5.0	3.0	5.0	0.0	2.5	1.0
Local Check Hybrid	5.0	3.0	4.0	3.0	5.0	0.0	2.5	1.0

2. EVALUATION UNDER UNPROTECTED CONDITIONS

Germination and Plant Stand

Good germination and plant stand was maintained even under unprotected condition in both irrigated and rainfed trials (Table 24).

Table 24. Germination and Plant Stand

Entry	Germination (%)				Plant Stand			
	Coimbatore (I)	Srivilliputhur (I)	Mean (I)	Nandyal (R)	Aruppukottai (R)	Mean (R)	Coimbatore (I)	Nandyal (R)
Ankur Jai Bt	92.0	100.0	96.0	94.9	88.0	91.5	26.0	32.3
BCHH 302 Bt	87.0	94.4	90.7	98.9	91.0	95.0	22.0	33.0
KCH 135 Bt	89.0	60.0	74.5	97.9	85.0	91.5	25.0	32.7
Nandi 405 Bt	94.0	100.0	97.0	87.8	93.0	90.4	27.0	33.0
NCS 929 Bt	87.0	100.0	93.5	98.9	92.0	95.5	23.0	33.0
PCH 930 Bt	86.0	95.6	90.8	98.9	89.0	94.0	21.0	32.7
IT 925 Bt	91.0	97.8	94.4	98.9	87.0	93.0	25.0	32.3
Rudra Bt	87.0	98.9	92.9	76.7	93.0	84.9	22.0	31.7
Sigma Bt	92.0	100.0	96.0	88.8	91.0	89.9	26.0	33.0
VCH 111 Bt	88.0	100.0	94.0	93.9	87.0	90.5	24.0	33.0
ACH 33-2 BG II	94.0	95.6	94.8	93.9	92.0	93.0	27.0	33.0
Akka BG II	92.0	94.4	93.2	99.9	90.0	95.0	26.0	32.7
BCHH 322-2 BG II	87.0	88.9	87.9	98.9	86.0	92.5	23.0	33.0
Brahma BG II	96.0	95.6	95.8	95.9	84.0	90.0	24.0	32.3
JK Gowri Bt (ET 1)	87.0	100.0	93.5	98.9	91.0	95.0	22.0	32.3
KDCHH 441 BG II	90.0	100.0	95.0	97.9	82.0	90.0	23.0	33.0
NCEH 13 Bt (FG)	93.0	96.7	94.8	97.9	86.0	92.0	27.0	32.7
NCS 145 BG II	85.0	95.6	90.3	95.9	93.0	94.5	21.0	33.0
RCH 2 BG II	93.0	97.8	95.4	97.9	84.0	91.0	28.0	33.0
Tulasi 9 BG II	96.0	100.0	98.0	97.9	85.0	91.5	25.0	33.0
Dhruv Bt (FG)	85.0	96.7	90.8	94.9	94.0	94.5	21.0	33.0
RCH 2 Bt	88.0	100.0	94.0	99.9	90.0	95.0	24.0	33.0
Bunny	96.0	97.8	96.9	98.9	88.0	93.5	25.0	33.0
Local Check Hybrid	92.0	98.9	95.5	96.9	90.0	93.5	26.0	33.0

Open boll and Locule damage

Under irrigated conditions, the bollworm damage was less in the test entries as compared to the non-Bt check hybrids at Srivilliputtur, Raichur and on par with non-Bt and Bt checks at Coimbatore. The mean percentage of bollworm damage varied from 3.4 – 14.3 % in all the test entries. Under rainfed conditions, the percentage of bollworm damage was maximum at Nandyal than Aruppukottai and the mean percentage varied from 3.2 – 10.9 %, which is less than the check non-Bt hybrid. The test entry JK Gowri Bt (ET1) recorded bollworm damage on par with non-Bt checks across locations (Table 25).

Table 25. Open Boll Damage – Boll basis (%)

Entry	Srivilliputhur (I)	Coimbatore (I)	Raichur (I)	Mean (I)	Nandyal (R)	Aruppukottai (R)	Mean (R)
Ankur Jai Bt	12.9	2.3	9.0	8.1	3.9	6.7	5.3
BCHH 302 Bt	8.5	2.6	4.9	5.3	7.1	5.6	6.4
KCH 135 Bt	7.0	2.2	7.8	5.6	10.9	4.6	7.8
Nandi 405 Bt	8.2	1.6	3.8	4.5	8.5	4.3	6.4
NCS 929 Bt	12.2	1.8	5.4	6.5	7.7	3.9	5.8
PCH 930 Bt	16.7	3.3	2.8	7.6	3.3	4.1	3.7
IT 925 Bt	8.2	1.3	4.0	4.5	6.3	3.6	4.9
Rudra Bt	7.0	1.5	5.1	4.5	5.3	3.1	4.2
Sigma Bt	8.1	3.8	4.5	5.5	8.5	2.8	5.7
VCH 111 Bt	6.7	1.8	4.9	4.5	11.0	2.4	6.7
ACH 33-2 BG II	9.5	1.5	6.6	5.9	6.7	3.1	4.9
Akka BG II	12.9	3.2	4.3	6.8	5.3	1.1	3.2
BCHH 322-2 BG II	8.2	2.6	5.0	5.2	15.0	1.6	8.3
Brahma BG II	7.2	1.8	4.1	4.4	13.5	2.3	7.9
JK Gowri Bt (ET 1)	22.3	1.9	18.6	14.3	18.3	3.5	10.9
KDCHH 441 BG II	12.3	2.9	4.6	6.6	9.6	0.0	4.8
NCEH 13 Bt (FG)	6.9	1.9	4.6	4.5	10.5	2.6	6.6
NCS 145 BG II	3.0	1.5	5.6	3.4	9.2	1.3	5.2
RCH 2 BG II	2.9	1.1	7.0	3.7	11.7	5.3	8.5
Tulasi 9 BG II	8.7	2.2	4.0	4.9	8.0	4.8	6.4
Dhruv Bt (FG)	13.3	1.8	6.7	7.3	11.9	3.7	7.8
RCH 2 Bt	3.3	2.0	6.2	3.8	11.7	3.3	7.5
Bunny	22.7	2.6	18.1	14.5	28.5	1.8	15.2
Local Check Hybrid	22.0	2.0	17.4	13.8	11.5	4.4	8.0

Maximum locule damage was recorded in Srivilliputtur and Siruguppa and the mean damage in all the entries varied from 4.7 – 14.0, which is less than the non-Bt check hybrids. JK Gowri Bt (ET 1) exhibited higher locule damage equivalent to non-Bt checks. Under rainfed conditions, the mean percentage of locule damage was minimum and ranged from 2.0 – 6.2 % (Table 26).

Table 26. Open Boll Damage – Locule basis (%)

Entry	Coimbatore (I)	Srivilliputhur (I)	Siruguppa (I)	Mean (I)	Dharwad (R)	Aruppukottai (R)	Mean (R)
Ankur Jai Bt	1.4	13.5	19.7	11.5	4.6	6.0	5.3
BCHH 302 Bt	1.5	8.7	22.1	10.8	4.3	5.4	4.9
KCH 135 Bt	3.2	3.2	17.5	8.0	6.9	4.2	5.5
Nandi 405 Bt	2.8	5.6	13.3	7.2	5.3	3.8	4.5
NCS 929 Bt	1.4	4.0	17.9	7.7	3.6	3.5	3.6
PCH 930 Bt	2.0	7.9	21.9	10.6	3.8	3.6	3.7
IT 925 Bt	2.3	4.0	20.4	8.9	5.9	3.2	4.5
Rudra Bt	1.2	8.7	10.2	6.7	5.4	2.6	4.0
Sigma Bt	3.2	7.9	24.1	11.7	3.6	2.4	3.0
VCH 111 Bt	2.3	2.5	22.3	9.1	4.1	2.0	3.0
ACH 33-2 BG II	2.1	7.9	7.9	6.0	3.8	1.6	2.7
Akka BG II	3.3	9.5	7.6	6.8	4.8	0.6	2.7
BCHH 322-2 BG II	3.2	6.4	5.9	5.2	5.4	1.2	3.3
Brahma BG II	1.3	6.4	12.8	6.8	4.0	1.8	2.9
JK Gowri Bt (ET 1)	2.6	27.0	27.4	19.0	9.2	3.1	6.2
KDCHH 441 BG II	1.8	11.1	10.4	7.8	4.1	0.0	2.0
NCEH 13 Bt (FG)	1.8	4.8	19.9	8.8	7.6	2.2	4.9
NCS 145 BG II	1.8	2.0	20.4	8.1	6.7	0.9	3.8
RCH 2 BG II	2.1	2.2	9.9	4.7	5.6	5.2	5.4
Tulasi 9 BG II	2.5	11.1	19.3	11.0	4.6	4.4	4.5
Dhruv Bt (FG)	2.0	18.3	21.7	14.0	5.8	3.4	4.6
RCH 2 Bt	1.6	2.2	18.2	7.4	7.2	2.8	5.0
Bunny	2.8	27.0	25.7	18.5	5.7	1.4	3.6
Local Check Hybrid	2.0	22.2	27.3	17.2	10.9	4.0	7.5

Plant Protection: Maximum number of chemical interventions was given at Srivilliputtur (5 - 7); and the mean number of sprays given under irrigated conditions ranged from 4 - 5, while three sprays were given for sucking pest control under rainfed conditions. Bt test entries and non-Bt check hybrids required similar number of chemical interventions.

D. MEAN YIELD UNDER UNPROTECTED CONDITIONS

Mean Seed Cotton Yield – Irrigated Condition

Irrigated

Out of twenty one Bt test hybrids evaluated, eight Bt hybrid test entries recorded higher seed cotton yield ranging from 1473-1788 Kg/ha as compared to the Bt Check hybrid RCH 2 Bt, which recorded a mean seed cotton yield of 1467 kg/ha (Table 27).

Rainfed

Among the 21 Bt test hybrids evaluated under rainfed situation, 13 hybrids exhibited superiority in yield (0.9 to 18%) over the Bt check hybrid. As compared to Non-Bt check which yielded 1145 kg/ha, twenty Bt hybrids recorded higher yield ranging from 1151 – 1580 kg/ha (Table 27).

Table 27. Seed cotton yield (kg/ha)

Entry	Coimbatore (I)	Srivilliputhur (I)	Raichur (I)	Mean (I)	Dharwad (R)	Aruppukottai (R)	Nandyal (R)	Mean (R)
Ankur Jai Bt	960	1735	1469	1388	1293	1262	1474	1343
BCHH 302 Bt	1007	1648	1078	1244	1174	1345	1416	1312
KCH 135 Bt	745	1105	1420	1090	752	1683	845	1093
Nandi 405 Bt	840	1951	1518	1436	1262	1543	1445	1417
NCS 929 Bt	833	1981	1936	1583	1361	1559	1359	1426
PCH 930 Bt	473	1938	869	1093	1046	1557	867	1157
IT 925 Bt	917	2198	1618	1578	1003	1573	1379	1318
Rudra Bt	981	1864	1908	1584	1661	1637	1322	1540
Sigma Bt	920	1772	1570	1421	1151	1637	1241	1343
VCH 111 Bt	926	2179	942	1349	978	1663	1019	1220
ACH 33-2 BG II	859	2154	1581	1531	1334	1680	1726	1580
Akka BG II	751	1981	1751	1494	981	1728	1582	1430
BCHH 322-2 BG II	850	1660	1515	1342	1328	1684	1182	1398
Brahma BG II	1112	2062	2189	1788	1371	1676	1641	1563
JK Gowri Bt (ET 1)	715	1759	393	956	742	1597	1115	1151
KDCHH 441 BG II	810	2222	1309	1447	1215	1769	1350	1445
NCEH 13 Bt (FG)	720	1537	1955	1404	1030	1657	1675	1454
NCS 145 BG II	724	1599	1235	1186	1063	1725	1046	1278
RCH 2 BG II	1060	2259	1100	1473	970	1473	1365	1269
Tulasi 9 BG II	969	2247	1456	1557	1227	1496	1453	1392
Dhruv Bt (FG)	1157	1920	1320	1466	1262	1568	1798	1543
RCH 2 Bt	1183	1907	1310	1467	832	1617	1545	1331
Bunny	902	1630	633	1055	734	1683	1019	1145
Local Check Hybrid	558	1154	503	738	1131	1536	1232	1300

F. PATHOLOGICAL EVALUATIONS

The incidence of the foliar diseases varied from place to place. Grey mildew, alternaria leaf spot, bacterial leaf blight, helminthosporium leaf spot and rust were the major diseases noticed in the testing centres.

Grey mildew

Under irrigated conditions, all entries were found susceptible to grey mildew disease with mean PDI ranging from 9.1 to 38.5 (Table 28). The disease incidence was very high at Srivilliputhur. The entry Akka BG II showed the lowest incidence of 25.0 per cent, while the rest recorded over 50 per cent incidence.

Under rainfed conditions also, all the entries including the checks were found susceptible with very high disease incidence in three places of evaluation *viz.* Dharwad, Lam and Aruppukottai. The Bt entry, BCHH 322-2 BG II, had the least mean disease incidence of 14.7 and IT 925 Bt had the highest mean PDI of 46.1 (Table 28)

Alternaria leaf spot

Alternaria leaf spot was noticed at moderate level in three places *viz.* Siruguppa, Raichur and Beemarayangudi under irrigated conditions with the incidence ranging from 4.1 to 15.6 per cent. Among the test Bt entries, the highest disease incidence was noticed on KCH 135 Bt (12.1 percent) and the lowest of 4.1 percent on PCH 930 Bt (Table 29).

Under Rainfed conditions, high incidence of the disease was seen in Dharwad and Lam. All the test Bt entries were susceptible to the disease with the incidence ranging from 19.9 per cent (RCH 2 BG II) to 28.8 per cent (NCS 145 BG II). The check hybrids were also susceptible with the incidence ranging from 18.9 to 25.7 per cent (Table 29).

Bacterial leaf blight

There was very high disease incidence only at Srivilliputhur and low incidence at Siruguppa under irrigated condition. Among the test Bt entries Ankur Jai Bt, KCH 135 Bt, VCH 111 Bt and JK Gowri Bt (ET 1) had very low disease incidence of 1.56 – 2.38 per cent (Table 30).

Under rainfed conditions at Dharwad and Aruppukottai, all test entries as well as the checks were found susceptible to bacterial leaf blight with the mean disease incidence ranging from 16.6 (ACH 33-2 BG II) to 59.8 (RCH 2 BG II) (Table 30).

Helminthosporium leaf spot, myrothecium leaf spot and rust

The above mentioned three diseases were observed only in few centres and all Bt entries were susceptible to the diseases (Table 31).

Table 28. Incidence of grey mildew in the first year H x H Bt trial

Entry	Percent Disease Incidence							
	Irrigated				Rainfed			
	Srivilliputhur	Siruguppa	Coimbatore	Mean	Dharwad	Aruppukottai	Lam	Mean
Ankur Jai Bt	90.0	1.4	9.0	33.5	17.9	50.0	29.0	39.5
BCHH 302 Bt	75.0	1.6	9.6	28.7	17.7	58.3	29.3	35.1
KCH 135 Bt	90.0	1.8	0.0	30.6	17.4	33.3	16.2	22.3
Nandi 405 Bt	92.5	2.2	10.5	35.1	17.0	66.5	20.8	34.8
NCS 929 Bt	85.0	5.6	0.0	30.2	20.0	58.3	26.6	35.0
PCH 930 Bt	62.5	1.4	0.0	21.3	17.6	58.3	29.8	35.2
IT 925 Bt	80.0	1.8	0.0	27.3	21.0	75.0	42.1	46.1
Rudra Bt	82.5	0.9	0.0	27.8	20.2	41.5	22.0	27.9
Sigma Bt	77.5	1.7	0.0	26.4	17.5	41.5	31.3	30.1
VCH 111 Bt	100.0	1.3	11.5	37.6	19.6	66.5	23.3	36.5
ACH 33-2 BG II	90.0	1.5	15.5	35.7	19.5	0.0	30.0	16.5
Akka BG II	25.0	2.2	0.0	9.1	18.9	33.5	33.3	28.6
BCHH 322-2 BG II	62.5	0.5	0.0	21.0	20.1	8.3	15.5	14.7
Brahma BG II	100.0	1.1	0.0	33.7	20.8	50.0	34.6	35.1
JK Gowri Bt (ET 1)	87.5	1.4	12.5	33.8	18.3	33.3	20.0	23.9
KDCHH 441 BG II	100.0	1.0	14.5	38.5	19.1	16.5	15.8	17.1
NCEH 13 Bt (FG)	75.0	1.4	13.5	30.0	20.4	41.5	35.4	32.5
NCS 145 BG II	87.5	2.0	11.0	33.5	18.9	58.3	22.5	33.2
RCH 2 BG II	80.0	1.0	0.0	27.0	18.1	83.3	15.6	39.0
Tulasi 9 BG II	100.0	2.4	10.2	37.6	20.4	66.5	32.4	39.8
Dhruv Bt (FG)	67.5	1.1	0.0	22.9	19.1	75.0	37.9	44.0
RCH 2 Bt	50.0	0.7	0.0	16.9	19.7	75.0	21.8	38.9
Bunny	60.0	1.1	9.0	23.4	20.7	83.3	28.8	44.3
LC	55.0	1.0	5.0	20.3	18.1	58.3	20.6	32.3

Table 29. Incidence of Alternaria Leaf Spot in the First Year H X H Bt Trials

Entry	Percent Disease Incidence							
	Rainfed				Irrigated			
	Dharwad	Lam	Aruppukottai	Mean	Siruguppa	Raichur	Mean	BMG-Grade
Ankur Jai Bt	23.4	25.3	0.00	24.3	4.5	12.5	8.5	2.0
BCHH 302 Bt	21.9	25.4	0.00	23.7	7.9	7.9	7.9	2.0
KCH 135 Bt	25.0	30.3	0.33	27.7	2.5	21.7	12.1	2.0
Nandi 405 Bt	21.3	26.4	0.33	23.9	7.7	11.9	9.8	2.0
NCS 929 Bt	21.7	18.4	0.00	20.1	5.1	11.8	8.5	2.0
PCH 930 Bt	22.9	28.7	0.66	25.8	4.4	3.7	4.1	2.0
IT 925 Bt	25.5	19.8	0.33	22.6	5.6	6.9	6.3	2.0
Rudra Bt	22.4	27.6	0.00	25.0	8.2	12.5	10.4	2.0
Sigma Bt	23.2	27.4	0.00	25.3	5.4	8.6	7.0	4.0
VCH 111 Bt	21.4	27.3	0.33	24.4	5.2	18.3	11.8	2.0
ACH 33-2 BG II	21.3	21.9	0.00	21.6	7.3	7.2	7.2	2.0
Akka BG II	22.1	17.7	0.00	19.9	7.4	12.0	9.7	2.0
BCHH 322-2 BG II	23.3	18.9	0.33	21.1	4.2	10.1	7.1	3.0
Brahma BG II	22.1	29.7	0.00	25.9	3.3	12.6	8.0	2.0
JK Gowri Bt (ET 1)	21.5	22.3	0.33	21.9	5.2	4.7	4.9	2.0
KDCHH 441 BG II	22.4	27.2	0.00	24.8	7.3	14.0	10.7	4.0
NCEH 13 Bt (FG)	22.6	18.6	0.33	20.6	2.9	12.2	7.6	2.0
NCS 145 BG II	23.9	33.8	0.33	28.8	3.2	7.1	5.2	2.0
RCH 2 BG II	21.1	18.4	0.00	19.8	6.7	6.4	6.6	3.0
Tulasi 9 BG II	20.7	34.1	0.66	27.4	4.8	8.1	6.5	2.0
Dhruv Bt (FG)	21.7	24.1	0.33	22.9	8.2	6.5	7.3	1.0
RCH 2 Bt	21.4	29.9	0.33	25.7	5.8	17.0	11.4	1.0
Bunny	23.4	14.3	0.66	18.9	5.6	25.7	15.6	3.0
LC	21.6	25.3	0.33	23.4	6.5	13.3	9.9	1.0

Table 30. Incidence of Bacterial leaf blight in the First Year –H X H Trials

Entry	Rainfed			Irrigated		
	Dharwad	Aruppukotai	Mean	Siruguppa	Srivilliputhur	Mean
Ankur Jai Bt	24.0	41.5	32.8	3.1	0.0	1.6
BCHH 302 Bt	25.1	50.0	37.6	4.5	65.0	34.7
KCH 135 Bt	25.6	58.3	42.0	4.0	0.0	2.0
Nandi 405 Bt	24.9	91.5	58.2	6.1	47.5	26.8
NCS 929 Bt	29.5	50.0	39.8	3.9	62.5	33.2
PCH 930 Bt	23.6	41.5	32.6	4.9	10.0	7.5
IT 925 Bt	25.5	50.0	37.8	5.9	70.0	38.0
Rudra Bt	26.6	41.5	34.1	6.0	27.5	16.8
Sigma Bt	24.3	41.5	32.9	7.1	0.0	3.5
VCH 111 Bt	27.8	83.3	55.6	3.1	0.0	1.6
ACH 33-2 BG II	24.8	8.3	16.6	6.0	7.5	6.8
Akka BG II	29.4	41.5	35.5	6.7	95.0	50.9
BCHH 322-2 BG II	24.7	25.0	24.9	4.8	60.0	32.4
Brahma BG II	30.6	41.5	36.1	3.7	95.0	49.3
JK Gowri Bt (ET 1)	24.4	41.5	33.0	4.8	0.0	2.4
KDCHH 441 BG II	24.1	16.5	20.3	4.4	20.0	12.2
NCEH 13 Bt (FG)	28.9	50.0	39.5	4.6	100.0	52.3
NCS 145 BG II	27.3	58.3	42.8	5.7	65.0	35.3
RCH 2 BG II	28.1	91.5	59.8	6.6	90.0	48.3
Tulasi 9 BG II	27.9	66.5	47.2	4.3	7.5	5.9
Dhruv Bt (FG)	26.1	58.3	42.2	5.4	57.5	31.5
RCH 2 Bt	24.9	75.0	50.0	7.1	87.5	47.3
Bunny	25.5	66.5	46.0	5.6	15.0	10.3
LC	26.5	91.5	59.0	5.6	100.0	52.8

Table 31. Incidence of Myrothecium , Helminthosporium and rust leaf spots

Entry	HLS- Lam (PDI) Rainfed	MLS – Srivilliputhur - Irrigated	RUST		
			Lam (R)	Coimbatore(I)	B'gudi(G)
Ankur Jai Bt	21.5	22.5	28.8	65.5	3.0
BCHH 302 Bt	26.6	22.5	27.2	66.8	4.0
KCH 135 Bt	26.2	27.5	21.5	63.9	3.0
Nandi 405 Bt	20.8	20.0	30.4	68.2	4.0
NCS 929 Bt	27.4	17.5	27.8	62.0	4.0
PCH 930 Bt	16.8	32.5	18.9	60.7	3.0
IT 925 Bt	26.8	20.0	31.5	72.1	3.0
Rudra Bt	20.4	25.0	33.6	75.3	4.0
Sigma Bt	28.9	25.0	24.8	63.8	4.0
VCH 111 Bt	23.4	27.5	28.5	80.5	3.0
ACH 33-2 BG II	16.4	50.0	28.2	68.3	4.0
Akka BG II	27.6	22.5	29.9	56.2	3.0
BCHH 322-2 BG II	22.5	22.5	20.4	61.9	3.0
Brahma BG II	18.2	22.5	28.2	62.4	3.0
JK Gowri Bt (ET 1)	25.3	27.5	32.3	72.5	3.0
KDCHH 441 BG II	30.2	22.5	22.9	82.5	3.0
NCEH 13 Bt (FG)	24.2	25.0	36.1	61.3	3.0
NCS 145 BG II	24.8	45.0	18.4	71.5	3.0
RCH 2 BG II	14.9	27.5	24.8	70.0	3.0
Tulasi 9 BG II	20.9	27.5	25.3	68.2	3.0
Dhruv Bt (FG)	31.7	52.5	31.8	65.4	3.0
RCH 2 Bt	22.0	35.0	31.3	69.1	3.0
Bunny	24.5	27.5	30.3	59.6	3.0
LC	19.2	25.0	25.8	66.2	3.0

G. OVERALL ASSESSMENT

Irrigated centres

Of the 21 test hybrids evaluated along with RCH 2 Bt as Bt check hybrid and Bunny and local check hybrids, 13 test hybrids registered yield superiority over the best check hybrid with 2-17% yield increase over RCH 2 Bt (Table 32). Brahma Bt was found to be the best hybrid combining both yield (2560 kg/ha) and fibre quality (2.5% SL – 31.9 mm; Micronaire – 4.5; Bundle strength – 22.6 g/tex). As far as fibre quality is concerned, IT 925 Bt was the best hybrid (SL – 34.0 mm; Micronaire – 4.2; Bundle strength – 23.9 g/tex) recording a mean seed cotton yield of 2305 kg/ha, which was 10 % more than RCH 2 Bt and 15 % more than Bunny. Dhurv Bt (FG) (seed cotton yield - 2462 kg/ha; SL – 30.6 mm; Micronaire – 4.4; and Bundle strength – 23.5 g/tex) and Akka BG II (seed cotton yield - 2205 kg/ha; SL – 33.5 mm; Micronaire – 4.3; and Bundle strength – 23.6 g/tex) are the two other hybrids showing superior performance in terms of both yield and fibre quality.

Table 32. SUMMARY TABLE (BREEDING TRIAL) – IRRIGATED CONDITION

Entry	Seed cotton yield (kg/ha)	% Inc over RCH 2 Bt	% Inc over Bunny	2.5 % Span Length (mm)	Uniformity Ratio	Micronaire	Bundle Strength (g/tex)
Ankur Jai Bt	2240	6	12	33.7	46.8	4.7	21.7
BCHH 302 Bt	2232	6	12	32.5	47.3	4.6	21.9
KCH 135 Bt	1716	-18	-14	31.9	48.3	4.3	21.1
Nandi 405 Bt	2197	4	10	32.3	48.2	4.3	21.3
NCS 929 Bt	2136	2	7	33.6	47.8	4.1	22.0
PCH 930 Bt	1952	-7	-2	28.8	48.8	4.8	19.7
IT 925 Bt	2305	10	15	34.0	47.5	4.2	23.9
Rudra Bt	2365	12	18	32.6	47.8	4.6	22.2
Sigma Bt	2250	7	13	33.8	47.3	4.1	23.3
VCH 111 Bt	2100	0	5	31.0	50.5	4.3	23.4
ACH 33-2 BG II	2209	5	11	29.9	49.3	4.3	21.6
Akka BG II	2205	5	10	33.5	48.3	4.3	23.6
BCHH 322-2 BG II	2010	-4	1	33.8	48.7	4.5	22.5
Brahma BG II	2560	22	28	31.9	49.5	4.5	22.6
JK Gowri Bt (ET 1)	1992	-5	0	32.6	48.7	4.7	22.2
KDCHH 441 BG II	2009	-5	1	29.4	47.7	4.2	21.1
NCEH 13 Bt (FG)	2068	-2	3	31.0	50.8	4.2	23.0
NCS 145 BG II	1837	-13	-8	32.9	48.2	4.2	21.9
RCH 2 BG II	2160	3	8	31.5	50.3	4.5	22.1
Tulasi 9 BG II	2169	3	9	31.5	48.2	5.0	21.7
Dhruv Bt (FG)	2462	17	23	30.6	49.2	4.4	23.5
RCH 2 Bt	2104	0	5	32.0	49.7	4.7	22.2
Bunny	1999	-5	0	33.1	49.3	4.4	23.4
Local Check Hybrid	1672	-21	-16	33.3	48.2	4.7	23.0

Rainfed Centres

Under rainfed condition, 17 out of 21 test hybrids performed better than the check hybrids in terms of yield and the highest seed cotton yield was recorded in Rudra Bt with 2328 kg/ha which was 14 % more than RCH 2 Bt and 19 % higher than Bunny (Table 33). This hybrid was characterized by better fibre length (31.4 mm) also. The test hybrid IT 925 Bt was the best for fibre quality (SL – 32.3 mm; Micronaire – 4.0; and Bundle strength – 23.5 g/tex) recording better seed cotton yield also (2140 kg/ha – 5 % higher than RCH 2 Bt and 9 % more than Bunny). Nandi 405 Bt, Brahma BG II and Dhurv Bt (FG) also combined both yield and fibre quality.

Table 33. SUMMARY TABLE (BREEDING TRIAL) – RAINFED CONDITION

Entry	Seed cotton yield (kg/ha)*	% Inc over RCH 2 Bt	% Inc over Bunny	2.5 % Span Length (mm)	Uniformity Ratio	Micronaire	Bundle Strength (g/tex)
Ankur Jai Bt	2167	6	10	33.6	47.7	4.6	21.9
BCHH 302 Bt	2288	12	17	30.7	48.4	4.7	21.4
KCH 135 Bt	1977	-3	1	30.9	47.9	4.2	21.4
Nandi 405 Bt	2061	1	5	31.8	49.0	4.6	23.2
NCS 929 Bt	2111	4	8	31.9	47.3	4.4	21.5
PCH 930 Bt	1888	-7	-4	28.1	47.9	4.7	20.5
IT 925 Bt	2140	5	9	32.3	46.4	4.0	23.5
Rudra Bt	2328	14	19	31.4	49.1	4.6	20.4
Sigma Bt	2284	12	16	32.3	48.8	4.4	21.7
VCH 111 Bt	1896	-7	-3	30.6	48.3	4.7	20.8
ACH 33-2 BG II	2236	10	14	29.2	49.0	4.5	20.8
Akka BG II	2112	4	8	33.4	47.5	4.6	21.7
BCHH 322-2 BG II	2000	-2	2	33.0	46.7	4.3	22.6
Brahma BG II	2129	4	9	31.7	47.5	4.3	22.7
JK Gowri Bt (ET 1)	1897	-7	-3	31.7	48.5	4.5	21.8
KDCHH 441 BG II	2209	8	13	27.9	47.6	4.5	19.0
NCEH 13 Bt (FG)	2158	6	10	31.5	49.6	4.5	21.9
NCS 145 BG II	1951	-4	-1	32.6	48.9	4.4	21.8
RCH 2 BG II	2219	9	13	30.1	49.5	4.8	20.6
Tulasi 9 BG II	2095	3	7	31.7	48.6	4.5	20.5
Dhruv Bt (FG)	2265	11	15	29.7	49.3	4.6	22.0
RCH 2 Bt	2037	0	4	30.5	49.1	4.4	20.9
Bunny	1961	-4	0	31.2	47.3	4.5	20.6
Local Check Hybrid	1814	-11	-8	27.9	51.4	4.2	19.4

*Due to even rainfall distribution and favourable growth condition in certain rainfed locations, the mean yield under rainfed conditions is high.

OVERALL ASSESSMENT (PLANT PROTECTION TRIALS)

The intensity of sucking pests varied and the Bt hybrids evaluated showed varying degrees of susceptibility to sucking pests warranting chemical intervention for control with mean number of sprays ranging from 4 – 5 under irrigated and 3 under rainfed conditions. Chemical interventions resorted was on par between Bt and non-Bt hybrids.

Square damage was maximum at Raichur (irrigated), Nandyal and Dharwad (rainfed). Pink bollworm caused noticeable damage in several test entries and maximum damage was recorded under rainfed conditions (Table 34 & 35).

Twelve Bt hybrid test entries recorded higher seed cotton yield ranging from 1508-1872 Kg/ha with increase of 2 % -27% as compared to the Bt Check hybrid RCH 2 Bt which recorded a mean seed cotton yield of 1475 kg/ha. Eleven Bt hybrids recorded higher yield than the Bt Check hybrid (1331 kg/ha) under rainfed conditions.

All the trial entries, irrespective of Bt test hybrid or check hybrids, were showing susceptibility to various diseases as reflected by PDI. However, through proper chemical intervention, the disease can be managed without affecting the yield.

Table 34. SUMMARY TABLE – IRRIGATED CONDITION

Entry	Jassid / plant	White fly /plant	Mean PBW larvae damage in green bolls (%)	Open boll damage (%) - Boll basis	Open boll damage (%) - Locule basis	Grey Mildew (PDI)	Alternaria Leaf Spot (PDI)
Ankur Jai Bt	3.8	1.3	6.1	4.3	8.4	33.5	8.5
BCHH 302 Bt	4.5	1.3	3.9	5.0	8.6	28.7	7.9
KCH 135 Bt	4.1	1.2	3.3	5.0	7.0	30.6	12.1
Nandi 405 Bt	3.5	1.3	4.7	3.8	7.0	35.1	9.8
NCS 929 Bt	3.8	1.3	6.4	6.3	9.5	30.2	8.5
PCH 930 Bt	4.5	1.3	8.6	5.6	12.1	21.3	4.1
IT 925 Bt	3.6	1.2	4.4	3.8	11.9	27.3	6.3
Rudra Bt	4.2	1.3	3.3	4.7	6.7	27.8	10.4
Sigma Bt	3.8	1.1	4.2	4.3	11.3	26.4	7.0
VCH 111 Bt	4.9	1.2	4.2	4.2	7.0	37.6	11.8
ACH 33-2 BG II	3.2	1.6	5.3	9.8	18.7	35.7	7.2
Akka BG II	4.2	1.2	6.9	6.0	11.5	9.1	9.7
BCHH 322-2 BG II	3.7	1.3	5.3	5.4	13.0	21.0	7.1
Brahma BG II	3.5	1.5	4.2	5.1	12.4	33.7	8.0
JK Gowri Bt (ET 1)	4.4	1.0	11.4	10.4	21.2	33.8	4.9
KDCHH 441 BG II	4.6	1.1	6.4	5.8	9.7	38.5	10.7
NCEH 13 Bt (FG)	4.0	1.2	4.7	3.7	7.4	30.0	7.6
NCS 145 BG II	3.8	1.3	3.6	3.2	9.1	33.5	5.2
RCH 2 BG II	4.5	0.9	3.9	3.1	13.1	27.0	6.6
Tulasi 9 BG II	3.9	0.8	6.9	4.5	7.9	37.6	6.5
Dhruv Bt (FG)	4.0	1.1	7.8	6.3	7.8	22.9	7.3
RCH 2 Bt	4.8	0.8	4.2	3.8	7.0	16.9	11.4
Bunny	5.3	0.7	11.1	11.3	22.5	23.4	15.6
Local Check Hybrid	3.7	1.1	11.4	11.5	17.6	20.3	9.9

Table 35. SUMMARY TABLE – RAINFED CONDITION

Entry	Jassid / plant	White fly /plant	Mean PBW larvae damage in green bolls (%)	Open boll damage (%) - Boll basis	Open boll damage (%) - Locule basis	Grey Mildew	Alternaria Leaf Spot
Ankur Jai Bt	2.1	1.0	9.2	8.8	8.4	24.3	33.5
BCHH 302 Bt	3.0	0.9	15.0	8.8	8.6	23.7	28.7
KCH 135 Bt	2.3	0.8	11.7	7.5	7.0	27.7	30.6
Nandi 405 Bt	2.6	0.8	10.0	8.1	7.0	23.9	35.1
NCS 929 Bt	2.3	1.0	5.8	9.9	9.5	20.1	30.2
PCH 930 Bt	2.9	0.8	9.2	11.6	12.1	25.8	21.3
IT 925 Bt	2.4	1.0	9.2	12.8	11.9	22.6	27.3
Rudra Bt	2.0	0.9	6.7	8.2	6.7	25.0	27.8
Sigma Bt	2.3	1.0	19.2	13.6	11.3	25.3	26.4
VCH 111 Bt	2.8	0.9	7.5	7.3	7.0	24.4	37.6
ACH 33-2 BG II	1.8	0.9	7.5	18.8	18.7	21.6	35.7
Akka BG II	2.1	0.9	8.3	11.9	11.5	19.9	9.1
BCHH 322-2 BG II	2.9	0.7	12.5	13.9	13.0	21.1	21.0
Brahma BG II	2.0	0.9	16.7	12.4	12.4	25.9	33.7
JK Gowri Bt (ET 1)	1.9	0.8	40.8	24.3	21.2	21.9	33.8
KDCHH 441 BG II	2.2	1.0	7.5	12.6	9.7	24.8	38.5
NCEH 13 Bt (FG)	2.1	0.8	8.3	7.8	7.4	20.6	30.0
NCS 145 BG II	2.5	0.7	17.3	10.6	9.1	28.8	33.5
RCH 2 BG II	2.9	0.8	18.3	14.1	13.1	19.8	27.0
Tulasi 9 BG II	2.4	0.8	14.2	8.9	7.9	27.4	37.6
Dhruv Bt (FG)	2.1	0.7	5.8	9.5	7.8	22.9	22.9
RCH 2 Bt	3.7	0.8	14.2	7.1	7.0	25.7	16.9
Bunny	2.4	0.7	31.7	25.9	22.5	18.9	23.4
Local Check Hybrid	2.0	0.9	43.3	19.9	17.6	23.4	20.3

II. EVALUATION OF INTERSPECIFIC (*G. HIRSUTUM X G. BARBADENSE*) HYBRIDS

Trial entries

In the first year trial, six Bt hybrids of interspecific origin viz., NCHB 940 Bt, NCHB 945 Bt (Nuziveedu Seeds), Kashinath Bt (Nath Seeds), JK Chamundi Bt (JK seeds), MRC 7929 BG II, MRC 7918 BG II (Mahyco Seeds) were evaluated along with MRC 6918 Bt (Bt check) and DCH 32 (non Bt check).

Trial Locations

The trial was conducted at two locations

1. Agricultural Research Station, Amravati, Lam, Acharya N. G. Ranga Agricultural University, Andhra Pradesh,
2. Agricultural Research Station, Dharwad, University of Agricultural Sciences, Karnataka,
3. Agricultural Research Station, Beemarayangudi, University of Agricultural Sciences, Karnataka, and
4. Cotton Research Station, Tamil Nadu Agricultural University, Coimbatore.

Trial Details

No. of Entries	: 6 + 2 check	
No. of Rows	: Yield Trial	: 5 Rows
	: Screening trials	: 2 Rows
Row length	: 6 m	
Spacing:	: 120 x 60 cm	
No. of Replications	: Four	
Design	: Randomized Block Design	
Fertilizers	: As per recommendations	

Trials

Evaluation under ETL Based Plant Protection

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

Evaluation under Unprotected Conditions for Boll worms

All the Bt Cotton hybrids and the controls were evaluated against key pests of cotton under unprotected conditions.

Observations Recorded

All the biometrical observations were recorded in the ETL based plant protection plots. The biometrical observations recorded were germination percentage, Final Plant Stand, Ginning Percentage, Lint Index, Seed Index, Seed Cotton Yield and Lint Yield.

The entomological observations on sap sucking pests, boll worm damages and natural enemies were recorded under ETL based plant protection trial.

A. BIOMETRICAL EVALUATION.

Biometrical observations were recorded in the ETL based plant protection trial and are reported here.

Germination and Plant stand

Germination was satisfactory at Coimbatore and good plant stand was maintained till harvest at Coimbatore and Lam (Table 36).

Table 36. Germination and Plant stand

Entry	Germination (%)	Stand at harvest		
	Coimbatore	Coimbatore	Lam	Mean
NCHB 940 Bt	91.7	55.0	60.0	57.5
NCHB 945 Bt	95.0	57.0	60.0	58.5
Kashinath Bt	89.4	53.7	60.0	56.8
JK Chamundi Bt	87.8	52.7	60.0	56.3
MRC 7929 BG II	90.6	54.3	60.0	57.2
MRC 7918 BG II	97.8	58.7	59.0	58.8
MRC 6918 Bt	87.2	52.3	60.0	56.2
DCH 32	92.8	55.7	60.0	57.8

Boll weight

The boll weight ranged from 3.4 g to 3.9 g in the test hybrids whereas in check hybrids the mean boll weight was 3.6 g (Table 37).

Table 37. Boll Weight (g)

Entry	Dharwad	Coimbatore	Lam	B' gudi (I)	Mean
NCHB 940 Bt	3.7	4.2	4.7	2.8	3.9
NCHB 945 Bt	3.8	4.2	3.6	2.7	3.6
Kashinath Bt	3.4	3.8	4.0	2.5	3.4
JK Chamundi Bt	3.6	4.4	3.6	2.6	3.5
MRC 7929 BG II	3.8	5.0	4.0	3.0	3.9
MRC 7918 BG II	3.8	4.4	3.9	3.1	3.8
MRC 6918 Bt	3.7	4.3	3.8	2.7	3.6
DCH 32	3.7	4.6	3.7	2.3	3.6
CD @ 5%	NS	0.8	0.5	0.2	
CV %	2.1	10.9	8.0	5.0	

Ginning out turn

The ginning outturn data was recorded in Dharwad, Coimbatore and Lam and the mean data indicated superiority of few test hybrids (Table 38).

Table 38. Ginning Outturn (%)

Entry	Dharwad	Coimbatore	Lam	Mean
NCHB 940 Bt	33.8	34.6	33.7	34.0
NCHB 945 Bt	33.2	32.2	34.3	33.2
Kashinath Bt	29.1	31.6	33.4	31.3
JK Chamundi Bt	30.5	30.7	35.4	32.2
MRC 7929 BG II	29.5	29.5	33.9	31.0
MRC 7918 BG II	29.3	28.1	33.5	30.3
MRC 6918 Bt	32.7	32.0	33.5	32.7
DCH 32	32.1	32.4	33.2	32.6
CD @ 5%	1.6	4.0	0.9	
CV %	3.0	7.2	1.5	

Lint Index

The lint index ranged between 4.7 and 6.0 g in test hybrids as against 5.3 g in check hybrids (Table 39).

Table 39. Lint Index (g)

Entry	Dharwad	Coimbatore	Lam	Mean
NCHB 940 Bt	5.4	6.5	6.1	6.0
NCHB 945 Bt	5.0	5.3	6.0	5.4
Kashinath Bt	3.8	5.1	5.4	4.8
JK Chamundi Bt	4.4	4.9	5.5	4.9
MRC 7929 BG II	4.9	5.7	5.6	5.4
MRC 7918 BG II	4.7	4.9	4.7	4.7
MRC 6918 Bt	5.0	5.3	5.5	5.3
DCH 32	4.8	5.7	5.6	5.3
CD @ 5%	0.7	0.9	0.5	
CV %	8.0	9.5	5.5	

Seed Index

The range of seed index in test hybrids was between 10.8 and 12.6 g as against 10.8 g in MRC 6918 Bt and 11.0 g in DCH 32 (Table 40).

Table 40. Seed Index (g)

Entry	Dharwad	Coimbatore	Lam	Mean
NCHB 940 Bt	10.7	12.3	12.3	11.7
NCHB 945 Bt	10.0	11.2	11.3	10.8
Kashinath Bt	9.3	11.1	11.9	10.8
JK Chamundi Bt	10.0	11.2	13.2	11.5
MRC 7929 BG II	11.7	13.6	12.4	12.6
MRC 7918 BG II	11.3	12.4	11.0	11.6
MRC 6918 Bt	10.3	11.2	10.8	10.8
DCH 32	10.0	11.7	11.2	11.0
CD @ 5%	1.2	1.9	1.4	
CV %	6.4	9.4	7.0	

B. MEAN SEED COTTON YIELD UNDER ETL BASED PLANT PROTECTION

The data on mean seed cotton yield indicated that the test hybrid MRC 6918 BG II was the best one recording 2571 kg/ha with 57 % more yield than MRC 6918 Bt and 83 % higher yield than DCH 32 (Table 41). Except JK Chamundi Bt, all the other test hybrids showed yield superiority over both the check hybrids.

Table 41. Seed Cotton yield (kg/ha)

Entry	Dharwad	B' gudi	Coimbatore	Lam	Mean	% Inc over MRC 6918 Bt	% Inc over DCH 32
NCHB 940 Bt	1016	1875	1060	4076	2007	23	54
NCHB 945 Bt	1227	1380	1351	3776	1934	18	49
Kashinath Bt	823	1223	1130	4360	1884	15	45
JK Chamundi Bt	1056	1609	979	2785	1607	-2	24
MRC 7929 BG II	1304	2924	1986	3295	2377	45	83
MRC 7918 BG II	1268	3026	2424	3566	2571	57	98
MRC 6918 Bt	949	877	1204	3511	1635	0	26
DCH 32	414	877	1020	2894	1301	-20	0
CD @ 5%	178	88	193	606			
CV %	10	3	10	10			

Lint Yield

As observed in seed cotton yield, the test hybrid MRC 7918 BG II recorded the highest lint yield (750 kg/ha) with 20 % more yield than MRC 6918 and 58 % yield increase over DCH 32 (Table 42). In this case also, except JK Chamundi Bt, all the other test hybrids showed yield superiority over both the check hybrids.

Table 42. Lint yield (kg/ha)

Entry	Dharwad	Coimbatore	Lam	Mean	% Inc over MRC 6918 Bt	% Inc over DCH 32
NCHB 940 Bt	343	368	1373	695	11	46
NCHB 945 Bt	407	435	1295	712	14	50
Kashinath Bt	239	357	1454	684	10	44
JK Chamundi Bt	322	302	984	536	-14	13
MRC 7929 BG II	385	585	1118	696	12	47
MRC 7918 BG II	371	684	1194	750	20	58
MRC 6918 Bt	310	386	1177	624	0	31
DCH 32	133	329	962	475	-24	0
CD @ 5%	57	76	212			
CV %	10	13	10			

C. FIBRE QUALITY EVALUATION

The fibre length ranged between 33.3 mm and 36.4 mm in test hybrids and there was not much variation in uniformity ratio between hybrids (Table 43).

Table 43. Fibre Quality

Entry	2.5 % Span Length (mm)			Uniformity Ratio		
	Coimbatore	Lam	Mean	Coimbatore	Lam	Mean
NCHB 940 DCH 32	34.9	33.6	34.2	47.3	45.5	46.4
NCHB 945 DCH 32	33.9	34.4	34.1	48.0	46.6	47.3
Kashinath DCH 32	32.8	33.8	33.3	46.3	51.7	49.0
JK Chamundi DCH 32	36.7	34.7	35.7	46.0	48.0	47.0
MRC 7929 BG II	36.8	36.0	36.4	47.7	46.3	47.0
MRC 7918 BG II	37.3	35.5	36.4	47.0	47.6	47.3
MRC 6918 DCH 32	34.4	35.9	35.2	46.3	50.0	48.2
DCH 32 32	36.7	34.9	35.8	46.7	47.4	47.0

The check hybrid MRC 6918 had the highest micronaire value (3.6) and Kasinath had the lowest value (2.9). For bundle strength, the range observed was between 23.1 g/tex (Kasinath) and 26.9 g/tex (NCHB 940 Bt) (Table 44).

Table 44. Fibre Quality

Entry	Micronaire			Bundle Strength (g/tex)		
	Coimbatore	Lam	Mean	Coimbatore	Lam	Mean
NCHB 940 Bt	3.6	3.4	3.5	26.5	27.3	26.9
NCHB 945 Bt	3.7	3.4	3.5	24.5	28.2	26.4
Kashinath Bt	3.0	2.7	2.9	21.4	24.7	23.1
JK Chamundi Bt	3.5	3.0	3.2	24.3	27.0	25.7
MRC 7929 BG II	3.3	3.1	3.2	22.5	26.4	24.5
MRC 7918 BG II	3.5	2.9	3.2	22.6	28.4	25.5
MRC 6918 Bt	4.0	3.2	3.6	24.8	28.2	26.5
DCH 32	3.7	2.9	3.3	23.8	25.5	24.7

D. ENTOMOLOGICAL EVALUATION

1. EVALUATION UNDER PLANT PROTECTION (ETL BASED)

Sucking pests (Jassids, Thrips and Whitefly population)

Jassids: Jassid was predominant in all test locations and all the entries in the trial were found to be susceptible to jassids. The mean number of jassids per three leaves varied from 2.3 – 4.9 (Table 45).

Thrips: Population of thrips was less in all the test entries (ranging from 4.3 – 5.6 per plant except in MRC 7918 BG II - 7.1 per plant) than the Bt and non-Bt check hybrids (6.5 – 7.2 per plant) (Table 46).

White fly: White fly population was low at both the centres, viz., Lam and Coimbatore (Table 46).

Table 45. Jassid/plant

Entry	Dharwad	B' gudi	Lam	Coimbatore	Mean
NCHB 940 Bt	2.6	13.3	0.1	3.7	4.9
NCHB 945 Bt	2.8	4.2	1.5	4.0	3.1
Kashinath Bt	3.1	2.3	0.1	3.5	2.3
JK Chamundi Bt	2.6	4.0	0.8	3.1	2.6
MRC 7929 BG II	2.7	2.3	1.4	3.7	2.5
MRC 7918 BG II	2.3	3.4	0.5	3.8	2.5
MRC 6918 Bt	2.5	3.7	2.3	3.2	2.9
DCH 32	2.6	3.7	1.0	4.0	2.8

Table 46. Thrips and white flies / plant

Entry	Thrips/ plant					White fly/plant		
	Dharwad	B' gudi	Lam	Coimba-tore	Mean	Lam	Coimba-tore	Mean
NCHB 940 Bt	8.8	8.8	4.3	0.4	5.6	0.1	0.1	0.1
NCHB 945 Bt	8.6	7.3	1.9	0.5	4.6	0.1	0.0	0.1
Kashinath Bt	7.9	10.5	2.3	0.5	5.3	0.3	0.2	0.2
JK Chamundi Bt	8.3	7.8	2.0	0.3	4.6	0.0	0.2	0.1
MRC 7929 BG II	7.4	7.5	2.1	0.5	4.3	0.1	0.1	0.1
MRC 7918 BG II	14.6	10.0	3.5	0.2	7.1	0.1	0.1	0.1
MRC 6918 Bt	13.8	11.0	3.4	0.4	7.2	0.3	0.1	0.2
DCH 32	13.8	10.7	0.6	0.8	6.5	0.0	0.0	0.0

Natural Enemies

Natural enemies population was low at Coimbatore; however, minimum difference in the population level was recorded in few test entries and the Bt and non-Bt checks (Table 47).

Table 47. Population of Natural enemies

Entry	Coimbatore
NCHB 940 Bt	0.5
NCHB 945 Bt	0.2
Kashinath Bt	0.1
JK Chamundi Bt	0.3
MRC 7929 BG II	0.1
MRC 7918 BG II	0.2
MRC 6918 Bt	0.0
DCH 32	0.1

Boll worms

Square Damage: Noticeable difference was recorded in square damage between the Bt test hybrids and the non-Bt hybrid at Dharwad and Lam. The mean percentage of square damage varied from 0.2 – 0.7 in the test entries and 1.7 in non-Bt check hybrid DCH 32 (Table 48).

Table 48. Square damage (%)

Entry	Dharwad	Lam	Coimbatore	Mean
NCHB 940 Bt	1.6	0.0	0.6	0.7
NCHB 945 Bt	1.8	0.2	0.0	0.7
Kashinath Bt	0.8	0.0	0.6	0.5
JK Chamundi Bt	0.5	0.0	0.0	0.2
MRC 7929 BG II	1.7	0.0	0.0	0.6
MRC 7918 BG II	2.0	0.0	0.0	0.7
MRC 6918 Bt	0.6	0.2	0.0	0.3
DCH 32	4.8	0.3	0.0	1.7

Pink bollworm damage : Pink bollworm population was very low and there was no difference between Bt test entries and non-Bt checks. However, damage percentage due to pink bollworm was low in Bt entries ranging from 0.8 – 1.7 than non-Bt check with 3.3 (Table 49).

Table 49. Pink bollworm number and damage in green boll

Entry	Pink bollworm/20 green boll			Pink bollworm damage in green boll		
	Lam	Coimbatore	Mean	Lam	Coimbatore	Mean
NCHB 940 Bt	0.0	0.3	0.2	0.0	1.7	0.8
NCHB 945 Bt	0.0	0.7	0.3	0.0	3.3	1.7
Kashinath Bt	0.1	0.0	0.0	1.7	0.0	0.8
JK Chamundi Bt	0.0	0.3	0.2	1.7	1.7	1.7
MRC 7929 BG II	0.0	0.3	0.2	0.0	1.7	0.8
MRC 7918 BG II	0.0	0.3	0.2	0.0	1.7	0.8
MRC 6918 Bt	0.0	0.3	0.2	0.0	1.7	0.8
DCH 32	0.1	0.3	0.2	5.0	1.7	3.3

Open boll and Locule damage : Open boll damage was low at Coimbatore and there was moderate difference in the locule damage between the Bt test hybrids (4.2 – 5.3 %) and non-Bt check hybrid DCH 32 (6.8%) (except JK Chamundi Bt that registered 8.3 %) (Table 50).

Table 50. Open boll damage on boll and locule basis

Entry	Open boll damage (%)	Locule damage (%)		
	Coimbatore	Dharwad	Coimbatore	Mean
NCHB 940 Bt	0.0	10.6	0.0	5.3
NCHB 945 Bt	0.0	6.7	3.6	5.2
Kashinath Bt	0.0	8.3	1.6	5.0
JK Chamundi Bt	1.1	13.4	3.2	8.3
MRC 7929 BG II	0.0	7.6	2.1	4.9
MRC 7918 BG II	0.0	8.4	1.4	4.9
MRC 6918 Bt	0.0	7.3	1.2	4.2
DCH 32	0.7	11.5	2.1	6.8

Plant Protection:

At Coimbatore, all entries required three rounds of chemical intervention to control sucking pests and insecticide spray was not necessary for the control of bollworms since the ETL never crossed in any of the entry.

2. EVALUATION UNDER UNPROTECTED CONDITIONS

Germination and Plant Stand

Germination and plant stand were satisfactory at Coimbatore (Table 51).

Table 51. Germination and plant stand at Coimbatore

Entry	Germination	Plant Stand
NCHB 940 Bt	89.0	25.0
NCHB 945 Bt	87.0	23.0
Kashinath Bt	92.0	26.0
JK Chamundi Bt	90.0	24.0
MRC 7929 BG II	85.0	22.0
MRC 7918 BG II	88.0	24.0
MRC 6918 Bt	90.0	23.0
DCH 32	85.0	22.0

Open boll and locule damage

Major difference could not be noticed among the test entries and check hybrid regarding boll and locule damage ; however, NCHB 940 Bt registered higher boll damage compared to check hybrid (Table 52).

Table 52. Open boll damage on boll basis and locule basis at Coimbatore

Entry	Open boll damage	Locule damage
NCHB 940 Bt	8.9	4.5
NCHB 945 Bt	5.3	2.9
Kashinath Bt	5.4	2.9
JK Chamundi Bt	5.2	3.3
MRC 7929 BG II	3.2	2.3
MRC 7918 BG II	4.8	3.2
MRC 6918 Bt	5.0	3.4
DCH 32	4.5	3.0

E. MEAN SEED COTTON YIELD UNDER UNPROTECTED CONDITIONS

All the test Bt hybrids recorded higher seed cotton yield than the Bt and non-Bt check hybrid, except NCHB 940 Bt. All the Bt test hybrids recorded higher seed cotton yield than non-Bt check hybrid DCH 32, while five test hybrids recorded better yield than Bt check hybrid viz., MRC 6918 Bt (Table 53)

Table 53. Mean seed cotton yield (kg/ha)

Entry	Dharwad	B' gudi	Coimbatore	Mean
NCHB 940 Bt	880	1198	677	918
NCHB 945 Bt	841	1296	805	981
Kashinath Bt	946	1352	661	986
JK Chamundi Bt	1030	1198	558	929
MRC 7929 BG II	1462	1247	1083	1264
MRC 7918 BG II	1211	2148	1271	1543
MRC 6918 Bt	874	1179	714	922
DCH 32	349	784	611	581

F. PATHOLOGICAL EVALUATION

Six H x B Bt test Hybrids along with two checks (MRC 6918 Bt and DCH 32) were evaluated at Lam, Dharwad and Coimbatore for their reaction to various foliar diseases prevalent in the respective centres.

Grey mildew

Moderate to heavy incidence of grey mildew was observed and all test hybrids as well as the checks were found susceptible at varying intensities with the mean PDI ranging from 10.9 to 21.4. At Coimbatore, only the test Bt Hybrid – NCHB 940 Bt had grey mildew disease (15.8 per cent) and the rest were free from the disease (Table 54).

Table 54. Incidence of Grey Mildew (PDI)

ENTRY	Lam	Dharwad	Coimbatore	Mean
NCHB 940 Bt	29.0	19.3	15.8	21.4
NCHB 945 Bt	29.3	16.6	0.0	15.3
Kashinath Bt	16.2	16.4	0.0	10.9
JK Chamundi Bt	20.8	17.2	0.0	12.7
MRC 7929 BG II	26.6	16.8	0.0	14.5
MRC 7918 BG II	29.8	16.1	0.0	15.3
MRC 6918 Bt	42.1	15.8	0.0	19.3
DCH 32	22.0	16.3	0.0	12.8

Alternaria leaf spot

This disease was observed only in Dharwad and Lam. All the test Bt entries as well as the checks were susceptible to alternaria leaf spot with the mean disease incidence ranging from 21.4 to 30.1 percent (Table 55). The incidences of bacterial blight, helminthosporium leaf spot and rust were also noticed in few centres and all test hybrids were susceptible.

Table 55. Incidence of Alternaria leaf spot, Helminthosporium and Rust leaf spots

Entry	Alternaria leaf spot			HLS	Rust		
	Dharwad	Lam	Mean	Lam	Coimbatore	Lam	Mean
NCHB 940 Bt	24.9	35.4	30.2	32.5	81.5	32.8	57.2
NCHB 945 Bt	23.3	32.0	27.7	27.3	68.0	30.9	49.5
Kashinath Bt	23.5	25.0	24.3	32.0	68.9	25.1	47.0
JK Chamundi Bt	23.3	29.8	26.6	20.8	62.5	28.4	45.5
MRC 7929 BG II	25.0	36.3	30.7	17.8	67.8	30.3	49.0
MRC 7918 BG II	24.8	18.1	21.4	27.4	59.5	29.9	44.7
MRC 6918 Bt	26.1	28.8	27.5	21.8	65.5	29.8	47.6
DCH 32	20.2	35.0	27.6	29.0	70.5	26.6	48.5

G. OVERALL ASSESSMENT

Of the six test hybrids evaluated, all the hybrids showed yield superiority over DCH 32, the conventional check hybrid and over MRC 6918 (except JK Chamundi Bt). The test hybrid MRC 7918 BG II was the best hybrid in terms of seed cotton yield and its fibre quality was on par with DCH 32 (Table 56). Quality wise all the hybrids except Kasinath was either on par or superior than the check hybrids.

TABLE 56. SUMMARY TABLE (YIELD AND FIBRE QUALITY)

Entry	Seed cotton yield (kg/ha)	% Inc over MRC 6918 Bt	% Inc over DCH 32	2.5 % Span Length (mm)	Uniformity Ratio	Micronaire	Bundle Strength (g/tex)
NCHB 940 Bt	2007	23	54	34.2	46.4	3.5	26.9
NCHB 945 Bt	1934	18	49	34.1	47.3	3.5	26.4
Kashinath Bt	1884	15	45	33.3	49.0	2.9	23.1
JK Chamundi Bt	1607	-2	24	35.7	47.0	3.2	25.7
MRC 7929 BG II	2377	45	83	36.4	47.0	3.2	24.5
MRC 7918 BG II	2571	57	98	36.4	47.3	3.2	25.5
MRC 6918 Bt	1635	0	26	35.2	48.2	3.6	26.5
DCH 32	1301	-20	0	35.8	47.0	3.3	24.7

There were not much variation between Bt test hybrids and check hybrids in their reaction to sucking pests (Table 57). All the test hybrids, except JK Chamundi Bt, had lesser damage compared to conventional check hybrid DCH 32. As far as diseases are concerned, both the entries and checks showed different reactions to various diseases.

TABLE 57. SUMMARY TABLE (PEST AND DISEASES)

Entry	Jassid / plant	White fly /plant	Mean PBW larvae damage in green bolls (%)	Open boll damage (%) - Boll basis	Open boll damage (%) - Locule basis	Grey Mildew	Alternaria Leaf spot
NCHB 940 Bt	4.9	0.1	0.8	0.0	5.3	21.4	30.2
NCHB 945 Bt	3.1	0.1	1.7	0.0	5.2	15.3	27.7
Kashinath Bt	2.3	0.2	0.8	0.0	5.0	10.9	24.3
JK Chamundi Bt	2.6	0.1	1.7	1.1	8.3	12.7	26.6
MRC 7929 BG II	2.5	0.1	0.8	0.0	4.9	14.5	30.7
MRC 7918 BG II	2.5	0.1	0.8	0.0	4.9	15.3	21.4
MRC 6918 Bt	2.9	0.2	0.8	0.0	4.2	19.3	27.5
DCH 32	2.8	0.0	3.3	0.7	6.8	12.8	27.6

SECOND YEAR TRIALS (2006-07)

I. INTRA HIRSUTUM HYBRID TRIAL

Entries:

Seven Bt Cotton hybrids were evaluated for the second year in succession for confirmatory results. The hybrids evaluated were ACH 155-1 Bt (Ajeet Seeds); KDCHH 9810 Bt and KDCHH 621 BG II (Krishidhan Seeds); MRC 7160 BG II and MRC 7347 BG II (Mahyco Seeds); RCH 530 BG II and RCH 533 BG II (Rasi Seeds).

Trial Locations:

The trials were conducted at the following locations.

Irrigated trials

1. Agricultural Research Station, Siruguppa, University of Agricultural Sciences, Karnataka, and
2. Cotton Research Station, Tamil Nadu Agricultural University, Coimbatore.

Rainfed trials.

3. Regional Agricultural Research Station, Lam, Guntur, Acharya N. G. Ranga Agricultural University, Andhra Pradesh,
4. Regional Agricultural Research Station, Nandyal, Acharya N. G. Ranga Agricultural University, Andhra Pradesh, and
5. Agricultural Research Station, Dharwad, University of Agricultural Sciences, Karnataka

The trial details:

Number of Entries : 7+ 3 checks

Number of rows : Six

Row length : 6m

Spacing :

Irrigated: Karnataka	- 90 x 60 cm
Tamil Nadu	- 90 x 60 cm
Rainfed: Lam	- 120 x 60 cm
Nandyal	- 90 x 60 cm
Dharwad	- 90 x 60 cm

Checks: RCH 2 Bt, RCH 368 Bt and Bunny

No. of Replications : Three

Design : Randomized Block Design

Fertilizers : As per local recommendation

Trials

Evaluation under ETL Based Plant Protection

Weekly observations were recorded from 45 DAS against major sucking pests and boll worms. The spraying of insecticides was based on the threshold levels of sap sucking pests and boll worms. The sprayings were under taken in all the replications of an entry even if in one of the replications, the threshold level of infestation has exceeded. All the entries in the trial were screened against major diseases.

Evaluation under Unprotected Conditions for Boll worms

All the Bt Cotton hybrids and the controls were evaluated against key pests of cotton under unprotected conditions.

Observations Recorded

All the biometrical observations were recorded in the ETL based plant protection plots. The biometrical observations recorded were germination percentage, Final Plant Stand, Ginning Percentage, Lint Index, Seed Index, Seed Cotton Yield and Lint Yield.

The entomological observations on sap sucking pests, boll worm damages and natural enemies were recorded under ETL based plant protection trial. The pathological observations on incidence of major diseases like Alternaria leaf spot, bacterial blight and grey mildew were recorded under natural conditions.

A. BIOMETRICAL EVALUATION

Biometrical evaluation of all the entries was made in the ETL based plant protection trial. The trial was conducted at five locations. The results from four locations are discussed below.

Germination and Plant Stand

Germination of all the entries were good in both irrigated and rainfed locations (Table 58). Correspondingly, good plant stand was maintained in the testing locations till harvest.

Boll Weight

Boll weight was more in rainfed centres as compared to irrigated centres and it ranged from 4.3 to 4.8 g in irrigated centres and between 4.6 and 5.4 g in rainfed centres (Table 59).

Ginning out turn

The ginning outturn ranged between 35.4 and 39.2 % in irrigated centres and from 33.9 to 36.9% in rainfed locations (Table 60).

Table 58. Germination and Stand at harvest

Entry	Germination (%)		Stand at harvest			
	Coimbatore (I)	Nandyal (R)	Coimbatore (I)	Lam (R)	Nandyal (R)	Mean (R)
ACH 155-1 Bt	91.1	94.9	54.7	60	62.6	61.3
KDCHH 9810 Bt	91.1	85.8	54.7	60	56.6	58.3
MRC 7160 BG II	92.8	94.4	55.7	60	62.3	61.2
MRC 7347 BG II	90.6	89.3	54.3	60	59.0	59.5
KDCHH 621 BG II	83.3	89.3	50.0	59	59.0	59.0
RCH 530 BG II	93.3	93.7	56.0	60	62.0	61.0
RCH 533 BG II	92.8	93.9	55.7	59	62.0	60.5
RCH 2 Bt	93.3	84.3	56.0	60	56.0	58.0
RCH 368 Bt	94.4	91.3	56.7	60	60.3	60.2
Bunny	82.8	87.8	49.7	59	58.0	58.5

Table 59. Boll weight (g)

Entry	Coimbatore (I)	Siruguppa (I)	Mean (I)	Dharwad (R)	Lam (R)	Nandyal (R)	Mean (R)
ACH 155-1 Bt	4.3	5.1	4.7	5.1	5.4	3.9	4.8
KDCHH 9810 Bt	4.5	4.7	4.6	5.5	6.1	4.5	5.4
MRC 7160 BG II	3.8	5.4	4.6	5.5	5.9	4.2	5.2
MRC 7347 BG II	4.6	4.9	4.8	5.6	6.0	4.4	5.3
KDCHH 621 BG II	4.3	4.8	4.5	5.2	5.2	4.2	4.9
RCH 530 BG II	4.4	5.0	4.7	4.9	5.5	4.3	4.9
RCH 533 BG II	4.7	5.2	4.9	4.9	5.5	4.0	4.8
RCH 2 Bt	4.1	4.5	4.3	4.6	5.5	3.8	4.6
RCH 368 Bt	4.2	5.3	4.7	4.9	5.5	4.1	4.8
Bunny	4.4	4.9	4.7	5.2	5.6	3.5	4.8
CD @ 5 %	0.6	0.2		0.5	0.5		
CV %	8.4	1.9		3.2	5.0		

Table 60. Ginning outturn (%)

Entry	Coimbatore (I)	Siruguppa (I)	Mean (I)	Dharwad (R)	Lam (R)	Nandyal (R)	Mean (R)
ACH 155-1 Bt	39.3	39.1	39.2	38.7	36.1	36.0	36.9
KDCHH 9810 Bt	35.9	34.9	35.4	33.6	34.2	34.0	33.9
MRC 7160 BG II	38.6	37.4	38.0	36.4	34.6	34.0	35.0
MRC 7347 BG II	36.7	36.0	36.4	34.2	34.9	35.5	34.9
KDCHH 621 BG II	39.4	39.5	39.4	37.0	35.6	37.4	36.7
RCH 530 BG II	34.7	34.1	34.4	32.7	34.0	31.5	32.7
RCH 533 BG II	38.9	36.4	37.7	35.8	34.8	33.7	34.7
RCH 2 Bt	35.4	36.8	36.1	34.9	34.3	33.9	34.4
RCH 368 Bt	38.8	37.2	38.0	35.3	34.3	36.0	35.2
Bunny	36.8	35.5	36.2	35.4	33.9	34.3	34.5
CD @ 5 %	2.6	1.4		1.5	1.3		
CV %	4.0	2.2		2.5	2.2		

Lint Index

The test hybrid RCH 533 BG II had the highest mean lint index of 7.0 g in irrigated centres (Table 61), whereas, the check hybrid RCH 368 Bt recorded the highest lint index of 6.0 g under rainfed condition.

Table 61. Lint index (g)

Entry	Coimbatore (I)	Siruguppa (I)	Mean (I)	Dharwad (R)	Lam (R)	Nandyal (R)	Mean (R)
ACH 155-1 Bt	6.0	6.3	6.1	5.5	6.1	6.1	5.9
KDCHH 9810 Bt	5.7	5.7	5.7	5.1	6.0	6.0	5.7
MRC 7160 BG II	5.3	6.4	5.9	5.3	5.9	6.0	5.7
MRC 7347 BG II	5.6	6.0	5.8	5.0	6.3	4.0	5.1
KDCHH 621 BG II	5.4	6.4	5.9	5.3	6.3	3.9	5.2
RCH 530 BG II	6.6	6.7	6.6	5.8	6.4	3.8	5.4
RCH 533 BG II	6.9	7.1	7.0	5.7	7.1	4.0	5.6
RCH 2 Bt	5.7	6.1	5.9	5.0	6.2	4.1	5.1
RCH 368 Bt	6.5	6.8	6.7	5.3	6.6	6.1	6.0
Bunny	5.7	6.2	6.0	5.1	5.8	6.1	5.7
CD @ 5 %	1.0	0.6		0.5	0.7		
CV %	10.1	5.2		5.6	6.5		

Seed Index

For seed index, the range of variability was between 9.2 and 12.6 g in irrigated locations and between 9.2 and 12.5 in rainfed centres (Table 62).

Table 62. Seed index (g)

Entry	Coimbatore (I)	Siruguppa (I)	Mean (I)	Dharwad (R)	Lam (R)	Nandyal (R)	Mean (R)
ACH 155-1 Bt	9.2	9.8	9.5	8.7	11.2	7.9	9.2
KDCHH 9810 Bt	10.2	10.7	10.4	10.0	12.1	12.1	11.4
MRC 7160 BG II	8.5	10.6	9.6	9.3	11.6	10.0	10.3
MRC 7347 BG II	9.7	10.6	10.1	9.7	12.0	10.0	10.5
KDCHH 621 BG II	8.4	9.9	9.2	9.0	11.2	10.1	10.1
RCH 530 BG II	12.4	12.9	12.6	12.0	13.5	12.1	12.5
RCH 533 BG II	10.8	12.3	11.6	10.3	12.7	10.1	11.0
RCH 2 Bt	10.4	10.5	10.4	9.3	12.8	10.1	10.7
RCH 368 Bt	10.3	11.4	10.9	9.7	12.2	9.7	10.5
Bunny	9.8	11.2	10.5	9.3	11.9	10.0	10.4
CD @ 5 %	1.3	1.1		0.9	NS		
CV %	7.3	5.8		5.2	9.2		

B. MEAN SEED COTTON YIELD UNDER ETL BASED PLANT PROTECTION

The data on mean seed cotton yield under irrigated conditions indicated that the Bt check hybrid had the lowest yield and the highest yield was recorded in RCH 533 BG II (Table 63). All the test hybrids were better than both the RCH 2 Bt as well as conventional check hybrids.

Table 63. Mean Seed cotton yield (kg/ha) under irrigated conditions

Entry	Coimbatore (I)	Siruguppa (I)	Irrigated Mean	% Inc over RCH 2 Bt	% Inc over Bunny
ACH 155-1 Bt	1015	2330	1673	47.0	30.4
KDCHH 9810 Bt	660	2118	1389	22.1	8.3
MRC 7160 BG II	546	2986	1766	55.2	37.7
MRC 7347 BG II	958	1900	1429	25.6	11.4
KDCHH 621 BG II	767	1928	1347	18.4	5.0
RCH 530 BG II	828	2297	1563	37.3	21.8
RCH 533 BG II	1343	2920	2131	87.3	66.1
RCH 2 Bt	664	1612	1138	0.0	-11.3
RCH 368 Bt	790	2293	1541	35.4	20.1
Bunny	767	1799	1283	12.7	0.0
CD @ 5 %	224	438			
CV %	16	12			

Under rainfed situation, the mean seed cotton yield ranged between 2063 kg/ha (Bunny) and 2981 kg/ha (MRC 7160) (Table 64). All the test hybrids were better conventional check hybrid.

Table 64. Mean Seed cotton yield (kg/ha) under rainfed conditions

Entry	Dharwad (R)	Lam (R)	Nandyal (R)	Rainfed Mean*	% Inc over RCH 2 Bt	% Inc over Bunny
ACH 155-1 Bt	1410	5078	2059	2849	-2	38
KDCHH 9810 Bt	1269	4597	1842	2569	-12	25
MRC 7160 BG II	1479	5002	2461	2981	2	44
MRC 7347 BG II	1279	4264	1890	2478	-15	20
KDCHH 621 BG II	1632	5086	1759	2825	-3	37
RCH 530 BG II	1085	5227	2331	2881	-1	40
RCH 533 BG II	1290	5195	2481	2989	2	45
RCH 2 Bt	1109	5596	2051	2919	0	41
RCH 368 Bt	1290	4956	2468	2905	0	41
Bunny	757	4298	1134	2063	-29	0
CD @ 5 %	293	672	675			
CV %	14	8	19			

*Due to even rainfall distribution and favourable growth condition in certain rainfed locations, the mean yield under rainfed conditions is high.

Lint yield

For lint yield also, similar trend was noticed in both irrigated (Table 65) and rainfed conditions (Table 66).

Table 65. Mean lint cotton yield (kg/ha) under irrigated conditions

Entry	Coimbatore (I)	Siruguppa (I)	Irrigated Mean	% Inc over RCH 2 Bt	% Inc over Bunny
ACH 155-1 Bt	402	912	657	58.7	42.8
KDCHH 9810 Bt	237	739	488	17.9	6.1
MRC 7160 BG II	211	1118	664	60.5	44.5
MRC 7347 BG II	351	684	518	25.0	12.5
KDCHH 621 BG II	301	761	531	28.3	15.5
RCH 530 BG II	288	784	536	29.5	16.5
RCH 533 BG II	522	1065	793	91.7	72.5
RCH 2 Bt	235	594	414	0.1	-9.9
RCH 368 Bt	306	851	579	39.8	25.8
Bunny	282	638	460	11.2	0.0
CD @ 5 %	87	161			
CV %	16	12			

Table 66. Mean lint cotton yield (kg/ha) under rainfed conditions

Entry	Dharwad (R)	Lam (R)	Nandyal (R)	Rainfed Mean*	% Inc over RCH 2 Bt	% Inc over Bunny
ACH 155-1 Bt	546	1831	741	1039	4	48
KDCHH 9810 Bt	426	1570	626	874	-13	24
MRC 7160 BG II	538	1731	837	1036	3	47
MRC 7347 BG II	437	1487	671	865	-14	23
KDCHH 621 BG II	603	1811	656	1023	2	45
RCH 530 BG II	355	1778	734	956	-5	36
RCH 533 BG II	461	1808	836	1035	3	47
RCH 2 Bt	387	1921	695	1001	0	42
RCH 368 Bt	455	1699	888	1014	1	44
Bunny	268	1455	389	704	-30	0
CD @ 5 %	113	240				
CV %	15	8				

*Due to even rainfall distribution and favourable growth condition in certain rainfed locations, the mean yield under rainfed conditions is high.

C. FIBRE QUALITY EVALUATION

The fibre length ranged between 27.2 and 32.6 mm (Table 67). Most of the hybrids were inferior to the best check hybrid, RCH 368 Bt.

Table 67. 2.5 % Span Length (mm)

Entry	Coimbatore (I)	Lam (R)	Nandyal (R)	Mean (R)
ACH 155-1 Bt	29.1	27.7	26.7	27.2
KDCHH 9810 Bt	30.3	31.1	27.1	29.1
MRC 7160 BG II	27.7	29.2	25.4	27.3
MRC 7347 BG II	30.0	32.0	28.5	30.2
KDCHH 621 BG II	28.0	29.1	26.2	27.7
RCH 530 BG II	33.2	34.3	30.6	32.5
RCH 533 BG II	32.8	34.2	31.0	32.6
RCH 2 Bt	31.1	30.8	29.2	30.0
RCH 368 Bt	29.9	33.4	31.8	32.6
Bunny	31.4	30.8	30.1	30.4

For uniformity ratio and micronaire, there were not much variation and most of the hybrids were either on par or superior than the best check hybrid (Table 68 & 69).

Table 68. Uniformity Ratio

Entry	Coimbatore (I)	Lam (R)	Nandyal (R)	Mean (R)
ACH 155-1 Bt	49.7	51.2	49.1	50.2
KDCHH 9810 Bt	49.3	50.7	46.8	48.8
MRC 7160 BG II	47.0	48.6	48.7	48.7
MRC 7347 BG II	48.7	51.3	46.7	49.0
KDCHH 621 BG II	48.7	49.8	45.5	47.7
RCH 530 BG II	46.7	50.2	41.9	46.1
RCH 533 BG II	46.0	49.4	46.1	47.8
RCH 2 Bt	46.7	51.2	44.9	48.1
RCH 368 Bt	48.3	50.1	42.9	46.5
Bunny	48.0	47.8	46.9	47.4

Table 69. Micronaire

Entry	Coimbatore (I)	Lam (R)	Nandyal (R)	Mean (R)
ACH 155-1 Bt	4.2	4.8	4.7	4.7
KDCHH 9810 Bt	4.3	5.0	4.9	4.9
MRC 7160 BG II	4.2	5.0	4.9	4.9
MRC 7347 BG II	4.1	4.6	3.9	4.3
KDCHH 621 BG II	4.3	4.6	4.4	4.5
RCH 530 BG II	4.4	4.4	4.0	4.2
RCH 533 BG II	4.4	4.6	4.4	4.5
RCH 2 Bt	4.6	5.2	4.6	4.9
RCH 368 Bt	4.4	4.3	4.4	4.4
Bunny	4.4	4.9	4.2	4.5

For bundle strength, the test hybrid RCH 530 BG II was the best with 23.6 g/tex as compared to 23.4 g/tex recorded in the best check hybrid RCH 368 Bt (Table 70).

Table 70. Bundle Strength (g/tex)

Entry	Coimbatore (I)	Lam (R)	Nandyal (R)	Mean (R)
ACH 155-1 Bt	21.0	21.9	20.6	21.3
KDCHH 9810 Bt	21.6	22.5	22.1	22.3
MRC 7160 BG II	18.1	21.4	18.5	20.0
MRC 7347 BG II	22.3	21.4	21.5	21.5
KDCHH 621 BG II	19.1	20.8	20.3	20.6
RCH 530 BG II	24.8	24.2	23.0	23.6
RCH 533 BG II	22.7	23.0	21.3	22.2
RCH 2 Bt	22.8	21.6	20.3	21.0
RCH 368 Bt	22.9	24.2	22.6	23.4
Bunny	22.9	21.3	21.7	21.5

D. ENTOMOLOGICAL EVALUATION

1. EVALUATION UNDER PLANT PROTECTION (ETL BASED)

Jassids

Jassid population was low at Coimbatore and medium at Siruguppa under irrigated conditions. The mean population varied from 3.2 - 4.9 per three leaves. Under rainfed conditions, moderate level of population was recorded at Dharwad, Nandyal and Lam and the mean population varied from 1.6 - 3.2 per three leaves (Table 71).

Table 71. Mean number of Jassid nymphs/3 leaves/plant

Entry	Coimbatore (I)	Siruguppa (I)	Mean (I)	Dharwad (R)	Lam (R)	Nandyal (R)	Mean (R)	Overall mean
ACH 155-1 Bt	2.9	4.9	3.9	2.8	0.4	2.7	1.9	2.7
KDCHH 9810 Bt	2.8	5.1	4.0	2.6	0.9	2.8	2.1	2.8
MRC 7160 BG II	2.0	4.4	3.2	2.8	0.2	3.5	2.2	2.6
MRC 7347 BG II	3.2	3.7	3.5	1.9	0.6	2.4	1.6	2.4
KDCHH 621 BG II	2.7	4.3	3.5	3.9	0.4	3.5	2.6	2.9
RCH 530 BG II	3.3	5.4	4.4	3.5	1.8	4.2	3.2	3.7
RCH 533 BG II	3.0	5.4	4.2	2.2	1.0	3.2	2.1	3.0
RCH 2 Bt	2.9	6.8	4.9	3.4	1.5	3.5	2.8	3.6
RCH 368 Bt	2.8	4.4	3.6	2.4	0.5	2.9	1.9	2.6
Bunny	2.8	4.4	3.6	2.4	1.0	3.7	2.4	2.9

Whitefly population

Whitefly population was low under both the cropping situation throughout the season at different locations (Table 72).

Table 72. Mean number of Whitefly adults/ 3 leaves / plant

Entry	Coimbatore (I)	Siruguppa (I)	Mean (I)	Lam (R)	Nandyal (R)	Mean (R)	Overall mean
ACH 155-1 Bt	0.2	1.5	0.9	0.0	0.6	0.3	0.6
KDCHH 9810 Bt	0.3	1.5	0.9	0.4	1.0	0.7	0.8
MRC 7160 BG II	0.2	2.3	1.3	1.1	1.0	1.0	1.1
MRC 7347 BG II	0.2	1.3	0.8	0.3	0.6	0.4	0.6
KDCHH 621 BG II	0.3	1.7	1.0	0.6	0.9	0.7	0.9
RCH 530 BG II	0.1	0.6	0.4	0.1	0.8	0.5	0.4
RCH 533 BG II	0.2	1.4	0.8	0.4	1.0	0.7	0.8
RCH 2 Bt	0.1	0.6	0.4	0.4	0.5	0.4	0.4
RCH 368 Bt	0.3	1.1	0.7	0.1	0.4	0.3	0.5
Bunny	0.1	1.7	0.9	0.1	0.9	0.5	0.7

Thrips

Under irrigated conditions, the thrips population was low at Coimbatore and Siruguppa with the mean population ranging from 1 - 7.9 per three leaves. At three rainfed centres, namely, Dharwad, Lam and Nandyal, thrips population was high ranging from 6.8 – 13.1 per three leaves (Table 73).

Table 73. Thrips/ plant

Entry	Coimbatore (I)	Siruguppa (I)	Mean (I)	Dharwad (R)	Lam (R)	Nandyal (R)	Mean (R)	Overall mean
ACH 155-1 Bt	0.3	2.3	1.3	14.7	12.3	12.2	13.1	8.4
KDCHH 9810 Bt	0.4	3.3	1.9	10.3	10.7	8.7	9.9	6.7
MRC 7160 BG II	0.4	3.3	1.9	9.9	9.5	10.6	10.0	6.7
MRC 7347 BG II	0.3	2.0	1.2	8.6	13.0	12.2	11.3	7.2
KDCHH 621 BG II	0.2	2.8	1.5	7.4	6.6	6.3	6.8	4.7
RCH 530 BG II	0.4	1.5	1.0	9.5	15.3	12.9	12.6	7.9
RCH 533 BG II	0.0	3.2	1.6	9.4	13.4	11.8	11.6	7.6
RCH 2 Bt	0.2	3.5	1.9	7.6	16.5	10.3	11.5	7.6
RCH 368 Bt	0.2	2.0	1.1	13.2	14.6	11.1	13.0	8.2
Bunny	0.3	4.3	2.3	13.0	14.1	13.0	13.4	8.9

Aphid

Aphid population was high under irrigated condition with a range from 24.7 – 38.9 per three leaves and comparatively low under rainfed ranging from 1.0 to 2.7 per three leaves (Table 74).

Table 74. Aphid/ plant

Entry	Coimbatore (I)	Dharwad (R)	Lam (R)	Mean (R)	Overall mean
ACH 155-1 Bt	38.1	2.7	1.1	1.9	13.9
KDCHH 9810 Bt	31.2	2.7	0.9	1.8	11.6
MRC 7160 BG II	27.6	3.1	0.4	1.7	10.4
MRC 7347 BG II	30.8	1.9	0.1	1.0	10.9
KDCHH 621 BG II	24.7	2.3	0.4	1.4	9.2
RCH 530 BG II	38.9	2.6	2.7	2.7	14.7
RCH 533 BG II	27.6	2.7	0.8	1.8	10.4
RCH 2 Bt	33.3	0.8	0.0	0.4	11.4
RCH 368 Bt	27.7	1.8	0.7	1.2	10.1
Bunny	38.7	2.1	1.1	1.6	14.0

Natural Enemy

Natural enemies recorded commonly were *Coccinellids*, *Spiders*, *Syrphids* and *Chrysopa spp.* (Table 75). Low level of population was recorded at Coimbatore and Nandyal.

Table 75. Mean number of Predators / 5 plants

Entry	Coimbatore (I)	Nandyal (R)	Overall mean
ACH 155-1 Bt	0.1	0.4	0.3
KDCHH 9810 Bt	0.0	0.5	0.2
MRC 7160 BG II	0.2	0.3	0.3
MRC 7347 BG II	0.1	0.5	0.3
KDCHH 621 BG II	0.2	0.5	0.4
RCH 530 BG II	0.1	0.6	0.4
RCH 533 BG II	0.2	0.8	0.5
RCH 2 Bt	0.1	0.3	0.2
RCH 368 Bt	0.2	0.3	0.3
Bunny	0.1	0.8	0.4

Bollworm

Mean number of spotted bollworm (*Earias spp*) was recorded in Coimbatore / 5 plants and it was found that there was no incidence of Bollworms in the centre in all the entries.

Square damage was low in Bt test hybrids and in Bt check hybrids as compared to Bunny, the conventional check hybrid in both irrigated and rainfed centres (Table 76).

Table 76. Per cent square damage

Entry	Coimbatore (I)	Dharwad (R)	Lam (R)	Nandyal (R)	Mean (R)	Overall mean
ACH 155-1 Bt	0.0	2.0	0.0	3.4	1.8	1.3
KDCHH 9810 Bt	0.0	5.5	0.0	2.7	2.8	2.1
MRC 7160 BG II	0.0	2.0	0.0	2.1	1.4	1.0
MRC 7347 BG II	0.0	2.0	0.0	2.0	1.3	1.0
KDCHH 621 BG II	0.0	3.2	0.0	1.4	1.5	1.1
RCH 530 BG II	0.0	3.0	0.0	2.8	1.9	1.4
RCH 533 BG II	0.0	4.2	0.0	2.4	2.2	1.6
RCH 2 Bt	0.0	2.9	0.0	3.0	2.0	1.5
RCH 368 Bt	0.0	3.1	0.0	3.5	2.2	1.7
Bunny	0.0	5.0	0.0	4.9	3.3	2.5

Pink bollworm damage both in terms of larvae/boll and green boll damage was assessed from 20 green bolls by destructive sampling (Table 77). Pink bollworm larval incidence was minimum (0.3 per 10 green bolls) at Coimbatore and Lam, when compared to Nandyal (1.3 – 4.0 larvae per 20 green bolls). However, the number of larvae in the Bt entries was less than in the Non-Bt check which recorded high incidence.

Table 77. Mean number of PBW larvae/20 green bolls

Entry	Coimbatore (I)	Lam (R)	Nandyal (R)	Mean (R)	Overall mean
ACH 155-1 Bt	0.3	0.0	1.3	0.7	0.6
KDCHH 9810 Bt	0.0	0.0	4.0	2.0	1.3
MRC 7160 BG II	0.3	0.2	2.7	1.4	1.1
MRC 7347 BG II	0.3	0.2	4.0	2.1	1.5
KDCHH 621 BG II	0.3	0.0	2.7	1.3	1.0
RCH 530 BG II	0.3	0.0	1.3	0.7	0.6
RCH 533 BG II	0.3	0.0	1.3	0.7	0.6
RCH 2 Bt	0.3	0.1	2.7	1.4	1.0
RCH 368 Bt	0.3	0.0	0.0	0.0	0.1
Bunny	0.7	2.8	5.3	4.1	2.9

Irrespective of testing condition i.e., either irrigated or rainfed conditions, the pink bollworm damage in green bolls was less in Bt hybrids as compared to the conventional check hybrid Bunny (Table 78).

Table78 . Mean PBW larvae damage in green bolls (%)

Entry	Coimbatore (I)	Lam (R)	Nandyal (R)	Mean (R)	Overall mean
ACH 155-1 Bt	1.7	0.0	6.7	3.3	2.8
KDCHH 9810 Bt	0.0	3.3	20.0	11.7	7.8
MRC 7160 BG II	1.7	3.3	13.3	8.3	6.1
MRC 7347 BG II	1.7	5.0	13.3	9.2	6.7
KDCHH 621 BG II	1.7	1.7	20.0	10.8	7.8
RCH 530 BG II	1.7	0.0	13.3	6.7	5.0
RCH 533 BG II	1.7	0.0	13.3	6.7	5.0
RCH 2 Bt	1.7	3.3	20.0	11.7	8.3
RCH 368 Bt	1.7	1.7	6.7	4.2	3.3
Bunny	3.3	60.0	20.0	40.0	27.8

Open Boll Damage

Open boll damage was almost negligible at Coimbatore and comparatively high at Nandyal ranging from 10.7-20.8% which was less than the Non-Bt check (29.5 %) (Table 79). All the Bt hybrids, except KDCHH 9810 Bt, recorded minimum locule damage than the Non-Bt check hybrid under irrigated conditions, while all the test hybrids recorded less locule damage than check non-Bt hybrid under rainfed condition. The low population level and less damage in Bt test entries in turn indicated the efficacy of Bt toxin in reducing the bollworm damage.

Table 79. Open boll damage (%)

Entry	Boll basis			Locule basis						
	Coimbatore (I)	Nandyal (R)	Overall mean	Coimbatore (I)	Siruguppa (I)	Mean (I)	Dharwad (R)	Nandyal (R)	Mean (R)	Overall mean
ACH 155-1 Bt	0.4	11.4	5.9	5.2	9.8	7.5	6.1	10.1	8.1	7.8
KDCHH 9810 Bt	0.0	10.8	5.4	4.7	20.3	12.5	12.0	9.1	10.6	11.5
MRC 7160 BG II	0.0	12.4	6.2	1.3	6.8	4.0	6.0	12.0	9.0	6.5
MRC 7347 BG II	0.4	10.7	5.6	2.1	17.1	9.6	8.2	10.0	9.1	9.4
KDCHH 621 BG II	0.0	11.6	5.8	8.5	13.9	11.2	9.0	10.6	9.8	10.5
RCH 530 BG II	0.0	13.5	6.8	0.0	19.1	9.6	10.0	12.5	11.2	10.4
RCH 533 BG II	1.0	20.8	10.9	8.3	3.6	5.9	5.7	19.9	12.8	9.4
RCH 2 Bt	0.0	10.8	5.4	3.1	19.6	11.4	4.4	11.0	7.7	9.5
RCH 368 Bt	0.0	12.9	6.4	3.5	11.2	7.3	7.7	13.3	10.5	8.9
Bunny	0.0	29.5	14.7	5.1	18.1	11.6	7.1	24.8	16.0	13.8

Plant protection

Sucking pests

For controlling the sucking pests, three chemical interventions were necessary under both irrigated and rainfed conditions in all the entries. No spray was required for controlling bollworms (Table 80).

Table 80. Number of Sprays given for Sucking Pests Control

Entry	Sucking Pests			Bollworms		
	Coimbatore (I)	Nandyal (R)	Overall mean	Coimbatore (I)	Nandyal (R)	Overall mean
ACH 155-1 Bt	3.0	3.0	3.0	0.0	0.0	0.0
KDCHH 9810 Bt	3.0	3.0	3.0	0.0	0.0	0.0
MRC 7160 BG II	3.0	3.0	3.0	0.0	0.0	0.0
MRC 7347 BG II	3.0	3.0	3.0	0.0	0.0	0.0
KDCHH 621 BG II	3.0	3.0	3.0	0.0	0.0	0.0
RCH 530 BG II	3.0	3.0	3.0	0.0	0.0	0.0
RCH 533 BG II	3.0	3.0	3.0	0.0	0.0	0.0
RCH 2 Bt	3.0	3.0	3.0	0.0	0.0	0.0
RCH 368 Bt	3.0	3.0	3.0	0.0	0.0	0.0
Bunny	3.0	3.0	3.0	0.0	0.0	0.0

2. EVALUATION UNDER UNPROTECTED CONDITIONS

Satisfactory germination was recorded in all the entries including check hybrids and good stand was maintained till the harvest (Table 81)

Table 81. Germination Percentage and plant stand

Entry	Germination Percentage			Plant stand		
	Coimbatore (I)	Nandyal (R)	Overall mean	Coimbatore (I)	Nandyal (R)	Overall mean
ACH 155-1 Bt	88.0	99.5	93.7	24.0	65.0	44.5
KDCHH 9810 Bt	85.0	98.0	91.5	22.0	65.7	43.8
MRC 7160 BG II	92.0	99.5	95.7	26.0	66.0	46.0
MRC 7347 BG II	90.0	98.5	94.2	23.0	64.3	43.7
KDCHH 621 BG II	93.0	99.0	96.0	27.0	65.7	46.3
RCH 530 BG II	88.0	99.5	93.7	24.0	65.0	44.5
RCH 533 BG II	85.0	97.5	91.2	22.0	65.7	43.8
RCH 2 Bt	87.0	99.5	93.2	23.0	65.0	44.0
RCH 368 Bt	89.0	98.5	93.7	25.0	65.0	45.0
Bunny	90.0	98.0	94.0	24.0	65.0	44.5

Open Boll Damage

Moderate variation in open boll damage was seen in the Bt test entries as compared to Bt hybrid checks under irrigated condition. Minimum boll damage was recorded in Bt test entries than check hybrid under rainfed situation varying from 3.6 – 13.1 as against 16.3 recorded by check hybrid (Bunny). Similar trend was noticed for locule damage by the test entries (Table 82).

Table 82. Open boll damage

Entry	Boll basis			Locule basis						
	Coimbatore (I)	Nandyal (R)	Overall mean	Coimbatore (I)	Siruguppa (I)	Mean (I)	Dharwad (R)	Nandyal (R)	Mean (R)	Overall mean
ACH 155-1 Bt	4.6	7.9	6.3	7.6	11.9	9.8	6.1	7.4	6.7	8.3
KDCHH 9810 Bt	6.4	11.3	8.9	8.3	23.3	15.8	5.3	11.5	8.4	12.1
MRC 7160 BG II	3.5	3.6	3.6	8.9	6.7	7.8	5.8	3.5	4.6	6.2
MRC 7347 BG II	3.9	9.4	6.7	6.5	20.4	13.4	5.3	9.5	7.4	10.4
KDCHH 621 BG II	7.7	12.9	10.3	8.1	17.7	12.9	3.7	12.0	7.8	10.4
RCH 530 BG II	4.2	7.9	6.0	6.5	20.2	13.3	8.4	7.5	7.9	10.6
RCH 533 BG II	6.5	13.1	9.8	9.6	5.1	7.3	6.2	12.4	9.3	8.3
RCH 2 Bt	3.9	9.6	6.7	7.2	22.2	14.7	9.0	9.7	9.3	12.0
RCH 368 Bt	7.1	14.2	10.6	8.3	13.2	10.7	4.6	14.6	9.6	10.2
Bunny	3.8	16.3	10.0	6.6	21.7	14.2	12.4	14.4	13.4	13.8

E. MEAN SEED COTTON YIELD UNDER UNPROTECTED CONDITIONS

Under irrigated situation, Bt test entries namely, MRC 7347 BG II (1016 kg/ha-12.38% increase), KDCHH 621BG II (1116 Kg/ha-23.45% increase), ACH 155-1Bt (1297 kg/ha-43.47% increase), MRC 7160 BG II (1316 Kg/ha-45.57%increase), RCH 533 BG II (1620 kg/ha-79.20% increase) recorded higher yield than the best Bt check RCH 368 Bt (904 kg/ha) with the non-Bt check recording only 525 kg/ha (Table 83).

Table 83. Seed cotton yield (kg/ha) under irrigated condition

Entry	Coimbatore (I)	Siruguppa (I)	Mean (I)	% Inc over RCH 368 Bt	% Inc over Bunny
ACH 155-1 Bt	703	1891	1297	43	147
KDCHH 9810 Bt	415	797	606	-33	15
MRC 7160 BG II	369	2262	1316	46	151
MRC 7347 BG II	614	1418	1016	12	94
KDCHH 621 BG II	527	1706	1116	23	113
RCH 530 BG II	504	1270	887	-2	69
RCH 533 BG II	913	2327	1620	79	209
RCH 2 Bt	411	928	669	-26	28
RCH 368 Bt	536	1272	904	0	72
Bunny	494	557	525	-42	0

Under rainfed conditions, four test entries recorded higher yield than the Bt check hybrid RCH 368 Bt and all were superior in yield than the Non-Bt check hybrid (Table 84).

Table 84. Seed cotton yield (kg/ha) under rainfed condition

Entry	Dharwad (R)	Nandyal (R)	Mean (R)	% Inc over RCH 368 Bt	% Inc over Bunny
ACH 155-1 Bt	1441	1208	1325	11	78
KDCHH 9810 Bt	1022	939	981	-18	32
MRC 7160 BG II	1215	1419	1317	10	77
MRC 7347 BG II	1048	1235	1142	-4	53
KDCHH 621 BG II	1369	1041	1205	1	62
RCH 530 BG II	843	1072	958	-20	29
RCH 533 BG II	1104	1306	1205	1	62
RCH 2 Bt	783	1094	939	-21	26
RCH 368 Bt	674	1713	1194	0	60
Bunny	861	626	744	-38	0

F. PATHOLOGICAL EVALUATIONS

Seven test Bt hybrids along with three checks (RCH 2 Bt, RCH 368 Bt and Bunny) were assessed for the second year for their reaction to various foliar diseases at Coimbatore and Siruguppa (Irrigated condition) and Dharwad and Lam (Rainfed condition).

Grey mildew

There was low incidence of grey mildew in the two centres (Coimbatore and Siruguppa) where the hybrids were screened under irrigated conditions. Only two test hybrids *viz.* ACH 155-1 Bt (8.4 per cent) and KDCHH 621 BG II (8.8 per cent) and the two checks *viz.* RCH 368 Bt (7.9 per cent) and Bunny (8.6 per cent) had higher disease incidences and the rest had incidences below one per cent.

Under rainfed conditions higher incidence of grey mildew was noticed in both the centres and all hybrids under test including the checks were susceptible with the mean disease incidence ranging from 21.8 to 33.0 per cent (Table 85).

Table 85. Incidence of grey mildew (PDI)

ENTRY	Rainfed			Irrigated		
	Dharwad	LAM	Mean	Coimbatore	Siruguppa	Mean
ACH 155-1 Bt	21.2	21.8	21.2	15.8	0.9	8.4
KDCHH 9810 Bt	18.0	26.6	22.3	0.0	0.3	0.2
MRC 7160 BG II	22.0	33.0	27.5	0.0	0.9	0.5
MRC 7347 BG II	26.6	28.6	27.6	0.0	0.5	0.3
KDCHH 621 BG II	15.9	25.8	20.9	17.5	0.1	8.8
RCH 530 BG II	23.0	31.8	27.4	0.0	0.5	0.3
RCH 533 BG II	19.2	28.0	23.6	0.0	1.2	0.6
RCH 2 Bt	24.0	32.3	28.2	0.0	0.7	0.4
RCH 368 Bt	19.2	25.4	22.3	14.8	1.0	7.9
Bunny	19.2	29.5	24.4	16.5	0.7	8.6

Alternaria leaf spot

Under irrigated conditions, alternaria leaf spot was noticed at very low intensity only in Siruguppa with the disease incidence ranging from 2.0 to 4.4 percent. However, under rainfed condition, the disease incidence was higher with the mean disease incidence ranging from 20.9 to 27.0 per cent and all hybrids tested were susceptible to this disease (Table 86).

Table 86. Incidence of alternaria leaf spot (PDI)

ENTRY	Rainfed			Irrigated
	Dharwad	Lam	Mean	Siruguppa
ACH 155-1 Bt	22.4	19.3	20.9	3.3
KDCHH 9810 Bt	22.9	28.4	25.7	3.7
MRC 7160 BG II	22.3	21.1	21.7	3.1
MRC 7347 BG II	21.6	24.0	22.8	3.6
KDCHH 621 BG II	23.1	21.8	22.4	2.6
RCH 530 BG II	21.6	24.3	23.0	2.7
RCH 533 BG II	23.2	20.6	21.9	4.3
RCH 2 Bt	23.5	23.1	23.3	2.0
RCH 368 Bt	22.4	21.3	21.9	3.9
Bunny	22.9	31.1	27.0	4.4

Bacterial leaf blight

Higher incidence of bacterial leaf blight was noticed only at Dharwad under rainfed conditions with the disease ranging from 18.3 to 24.7 per cent. All hybrids tested were susceptible. Under irrigated conditions at Siruguppa, all entries had very low incidence of the disease (Table 87).

Helminthosporium leaf spot and Rust

At Lam under rainfed condition, moderate levels of helminthosporium leaf spot and rust were noticed on all entries. Under irrigated conditions in Coimbatore, there was very high incidence of rust disease on all hybrids (Table 87).

Table 87. Incidence of bacterial leaf blight, helminthosporium leaf spot and rust (PDI)

ENTRY	Bacterial leaf blight		Rust		HLS
	Dharwad (R)	Siruguppa- (I)	Lam- (R)	Coimbatore (I)	Lam (R)
ACH 155-1 Bt	20.7	4.5	32.1	65.8	24.1
KDCHH 9810 Bt	18.3	6.7	28.2	68.7	18.7
MRC 7160 BG II	24.7	5.1	24.6	60.5	27.2
MRC 7347 BG II	22.1	4.0	32.8	58.0	21.9
KDCHH 621 BG II	23.3	5.6	26.3	75.8	25.2
RCH 530 BG II	23.1	5.8	28.1	70.0	21.8
RCH 533 BG II	20.0	5.6	31.8	71.5	29.3
RCH 2 Bt	18.3	5.9	25.3	54.6	18.6
RCH 368 Bt	19.1	5.9	29.3	55.8	17.6
Bunny	23.3	6.6	18.9	59.0	22.0

G. OVERALL ASSESSMENT

All the test hybrids showed superior performance for seed cotton yield as compared to Bunny and four hybrids were better than the best check hybrid, RCH 368 Bt (Table 88) under irrigated condition. Quality wise, test hybrids were on par with the best check hybrid, except RCH 533 BG II, which was better in terms of 2.5% span length (33.2 mm) and bundle strength (24.8 g/tex).

Table 88. SUMMARY TABLE – IRRIGATED CONDITONS

Entry	Seed cotton yield (kg/ha)	% Inc over RCH 2 Bt	% Inc over Bunny	2.5 % Span Length (mm)	Uniformity Ratio	Micronaire	Bundle Strength (g/tex)
ACH 155-1 Bt	1673	47	30	29.1	49.7	4.2	21.0
KDCHH 9810 Bt	1389	22	8	30.3	49.3	4.3	21.6
MRC 7160 BG II	1766	55	38	27.7	47.0	4.2	18.1
MRC 7347 BG II	1429	26	11	30.0	48.7	4.1	22.3
KDCHH 621 BG II	1347	18	5	28.0	48.7	4.3	19.1
RCH 530 BG II	1563	37	22	33.2	46.7	4.4	24.8
RCH 533 BG II	2131	87	66	32.8	46.0	4.4	22.7
RCH 2 Bt	1138	0	-11	31.1	46.7	4.6	22.8
RCH 368 Bt	1541	35	20	29.9	48.3	4.4	22.9
Bunny	1283	13	0	31.4	48.0	4.4	22.9

As far as reaction to pest and diseases, there was not much difference between the entries for sucking pest and foliar diseases (Table 89). However, there was a marked difference in the test entries for boll damage. All the test entries had lesser boll damage as compared to conventional check hybrid, Bunny.

Table 89. SUMMARY TABLE – IRRIGATED CONDITONS

Entry	Jassid / plant	White fly /plant	Mean PBW larvae damage in green bolls (%)	Open boll damage (%) - Boll basis	Open boll damage (%) - Locule basis	Grey Mildew (PDI)	Alternaria leaf spot (PDI)
ACH 155-1 Bt	3.9	0.9	0.3	0.4	7.5	8.4	3.3
KDCHH 9810 Bt	4.0	0.9	0.0	0.0	12.5	0.2	3.7
MRC 7160 BG II	3.2	1.3	0.3	0.0	4.0	0.5	3.1
MRC 7347 BG II	3.5	0.8	0.3	0.4	9.6	0.3	3.6
KDCHH 621 BG II	3.5	1.0	0.3	0.0	11.2	8.8	2.6
RCH 530 BG II	4.4	0.4	0.3	0.0	9.6	0.3	2.7
RCH 533 BG II	4.2	0.8	0.3	1.0	5.9	0.6	4.3
RCH 2 Bt	4.9	0.4	0.3	0.0	11.4	0.4	2.0
RCH 368 Bt	3.6	0.7	0.3	0.0	7.3	7.9	3.9
Bunny	3.6	0.9	0.7	0.0	11.6	8.6	4.4

Under rainfed condition also, similar trend was noted in terms of yield and fibre quality (Table 90). All the test hybrids were better than the conventional check hybrid, however, only two test hybrids outperformed the best Bt check hybrid. In this case also, RCH 530 BG II was the best one for fibre quality.

Table 90. SUMMARY TABLE – RAINFED CONDITONS

Entry	Seed cotton yield (kg/ha)*	% Inc over RCH 2 Bt	% Inc over Bunny	2.5 % Span Length (mm)	Uniformity Ratio	Micronaire	Bundle Strength (g/tex)
ACH 155-1 Bt	2849	-2	38	27.2	50.2	4.7	21.3
KDCHH 9810 Bt	2569	-12	25	29.1	48.8	4.9	22.3
MRC 7160 BG II	2981	2	44	27.3	48.7	4.9	20.0
MRC 7347 BG II	2478	-15	20	30.2	49.0	4.3	21.5
KDCHH 621 BG II	2825	-3	37	27.7	47.7	4.5	20.6
RCH 530 BG II	2881	-1	40	32.5	46.1	4.2	23.6
RCH 533 BG II	2989	2	45	32.6	47.8	4.5	22.2
RCH 2 Bt	2919	0	41	30.0	48.1	4.9	21.0
RCH 368 Bt	2905	0	41	32.6	46.5	4.4	23.4
Bunny	2063	-29	0	30.4	47.4	4.5	21.5

*Due to even rainfall distribution and favourable growth condition in certain rainfed locations, the mean yield under rainfed conditions is high.

For reaction to pest and disease also, similar trend was noted (Table 91). All the test hybrids were better than the conventional check hybrid for boll damage.

Table 91. SUMMARY TABLE – RAINFED CONDITONS

Entry	Jassid / plant	White fly /plant	Mean PBW larvae damage in green bolls (%)	Open boll damage (%) - Boll basis	Open boll damage (%) - Locule basis	Grey Mildew (PDI)	Alternaria leaf spot (PDI)
ACH 155-1 Bt	1.9	0.3	3.3	11.4	8.1	21.2	20.9
KDCHH 9810 Bt	2.1	0.7	11.7	10.8	10.6	22.3	25.7
MRC 7160 BG II	2.2	1.0	8.3	12.4	9.0	27.5	21.7
MRC 7347 BG II	1.6	0.4	9.2	10.7	9.1	27.6	22.8
KDCHH 621 BG II	2.6	0.7	10.8	11.6	9.8	20.9	22.4
RCH 530 BG II	3.2	0.5	6.7	13.5	11.2	27.4	23.0
RCH 533 BG II	2.1	0.7	6.7	20.8	12.8	23.6	21.9
RCH 2 Bt	2.8	0.4	11.7	10.8	7.7	28.2	23.3
RCH 368 Bt	1.9	0.3	4.2	12.9	10.5	22.3	21.9
Bunny	2.4	0.5	40.0	29.5	16.0	24.4	27.0

COMBINED REPORT OF TWO YEAR TRIALS (2005-06 & 2006-07)

I. INTRA HIRSUTUM HYBRID TRIAL

Seven Bt cotton hybrids were evaluated for two successive years during 2005-06 and 2006-07 in South Zone. The hybrids were evaluated at five locations in Dharwad (R), lam, Guntur (R), Nandyal (R), Coimbatore (I), Sirugappa (I). The hybrids evaluated were ACH 155-1 Bt (Ajeet Seeds); KDCHH 9810 Bt and KDCHH 621 BG II (Krishidhan Seeds); MRC 7160 BG II and MRC 7347 BG II (Mahyco Seeds); RCH 530 BG II and RCH 533 BG II (Rasi Seeds). The check Bt hybrids were RCH 2 Bt, RCH 368 Bt and non-Bt check hybrid was Bunny.

A. BIOMETRICAL EVALUATION

Germination and Plant Stand

Germination and Plant Stand were satisfactory at all the locations during the two years (Table 92).

Table 92. Germination Percentage and Plant Stand

Entry	Germination (%)			Stand at harvest		
	2005-06	2006-07	Mean	2005-06	2006-07	Mean
ACH 155-1 Bt	97.0	93.0	95.0	66.5	59.1	62.8
KDCHH 621 BG II	96.1	86.3	91.2	65.2	56.0	60.6
KDCHH 9810 Bt	96.7	88.5	92.6	68.1	57.1	62.6
MRC 7160 BG II	95.7	93.6	94.7	63.2	59.3	61.3
MRC 7347 BG II	93.7	89.9	91.8	68.8	57.8	63.3
RCH 530 BG II	95.1	93.5	94.3	67.0	59.3	63.2
RCH 533 BG II	95.3	93.3	94.3	68.8	58.9	63.8
RCH 2 Bt	96.4	88.8	92.6	67.5	57.3	62.4
RCH 368 Bt	94.7	92.9	93.8	67.7	59.0	63.3
Bunny	95.1	85.3	90.2	68.7	55.6	62.1

Boll Weight

Boll development was normal during both the seasons and the mean boll weight of different entries ranged from 4.7 to 5.1 g. (Table 93).

Ginning out turn

Ginning out turn was consistent during both the years. ACH 155-1 Bt recorded the highest ginning out turn of 37.3 per cent (Table 93).

Table 93. Boll weight (g) and Ginning Outturn (%)

Entry	Boll weight (g)			Ginning Outturn (%)		
	2005-06	2006-07	Mean	2005-06	2006-07	Mean
ACH 155-1 Bt	4.7	4.8	4.7	36.8	37.8	37.3
KDCHH 621 BG II	4.8	4.7	4.7	36.0	37.8	36.9
KDCHH 9810 Bt	4.7	5.1	4.9	34.9	34.5	34.7
MRC 7160 BG II	5.8	5.0	5.4	36.1	36.2	36.2
MRC 7347 BG II	5.1	5.1	5.1	34.2	35.5	34.9
RCH 530 BG II	4.5	4.8	4.7	35.5	33.4	34.5
RCH 533 BG II	4.9	4.9	4.9	35.1	35.9	35.5
RCH 2 Bt	4.7	4.5	4.6	34.9	35.1	35.0
RCH 368 Bt	4.8	4.8	4.8	35.9	36.3	36.1
Bunny	4.7	4.7	4.7	33.7	35.2	34.4

Lint Index

There were not much variation in lint index was in both the years. However, all the entries tested recorded a mean lint index of 5.0 g and above (Table 94).

Seed Index

Similar trend was noticed for Seed Index also (Table 94).

Table 94. Lint index (g) and Seed Index (g)

Entry	Lint Index (g)			Seed Index (g)		
	2005-06	2006-07	Mean	2005-06	2006-07	Mean
ACH 155-1 Bt	5.9	6.0	5.9	10.1	9.3	9.7
KDCHH 621 BG II	6.3	5.5	5.9	11.2	9.7	10.5
KDCHH 9810 Bt	5.8	5.7	5.7	10.4	11.0	10.7
MRC 7160 BG II	6.2	5.8	6.0	11.9	10.0	11.0
MRC 7347 BG II	6.1	5.4	5.7	11.9	10.4	11.1
RCH 530 BG II	5.9	5.9	5.9	11.5	12.6	12.0
RCH 533 BG II	6.3	6.2	6.2	11.6	11.3	11.4
RCH 2 Bt	5.9	5.4	5.7	11.2	10.6	10.9
RCH 368 Bt	6.3	6.3	6.3	12.0	10.7	11.3
Bunny	5.8	5.8	5.8	11.4	10.4	10.9

B. MEAN SEED COTTON YIELD UNDER ETL BASED PLANT PROTECTION

All the seven test entries evaluated for two consecutive years showed consistently improved performance over the non Bt check hybrid Bunny (Table 95). Among the check hybrids, RCH 368 Bt (2077 kg/ha) was the best in irrigated centres whereas, RCH 2 Bt was the best in rainfed centres (2517 kg/ha).

Table 95. Seed cotton yield (kg/ha)

Entry	Irrigated conditions					Rainfed conditions				
	2005-06	2006-07	Mean	% Inc. over RCH 368 Bt	% Inc. over Bunny	2005-06	2006-07	Mean*	% Inc. over RCH 2 Bt	% Inc. over Bunny
ACH 155-1 Bt	2912	1673	2292	10	43	1771	2849	2310	-8.2	38.6
KDCHH 621 BG II	1890	1347	1619	-22	1	1032	2825	1929	-23.4	15.7
KDCHH 9810 Bt	2431	1389	1910	-8	19	1627	2569	2098	-16.6	25.9
MRC 7160 BG II	2066	1766	1916	-8	19	1802	2981	2391	-5.0	43.4
MRC 7347 BG II	2239	1429	1834	-12	14	1574	2478	2026	-19.5	21.5
RCH 530 BG II	2242	1563	1903	-8	18	1605	2881	2243	-10.9	34.6
RCH 533 BG II	2406	2131	2269	9	41	1957	2989	2473	-1.7	48.4
RCH 2 Bt	2363	1138	1750	-16	9	2115	2919	2517	0.0	51.0
RCH 368 Bt	2613	1541	2077	0	29	1851	2905	2378	-5.5	42.7
Bunny	1934	1283	1609	-23	0	1271	2063	1667	-33.8	0.0

*Due to even rainfall distribution and favourable growth condition in certain rainfed locations, the mean yield under rainfed conditions is high.

C. FIBRE QUALITY EVALUATION

Across the years, there was not much variation in fibre length (Table 96). RCH 530 BG II was the best entry recording 32.3 mm fibre length followed by RCH 368 Bt with 31.9 mm.

Uniformity ratio showed a slight decline during the second year and overall the test entries were on par with the check hybrids (Table 96).

Table 96. 2.5% Span length (mm) and Uniformity Ratio (%)

Entry	2.5 % Span Length (mm)			Uniformity Ratio		
	2005-06	2006-07	Mean	2005-06	2006-07	Mean
ACH 155-1 Bt	27.5	27.8	27.7	51.3	50.0	50.6
KDCHH 621 BG II	29.1	27.8	28.5	48.9	48.0	48.4
KDCHH 9810 Bt	28.8	29.5	29.1	49.1	48.9	49.0
MRC 7160 BG II	28.1	27.4	27.8	49.5	48.1	48.8
MRC 7347 BG II	31.6	30.1	30.9	46.5	48.9	47.7
RCH 530 BG II	31.9	32.7	32.3	49.1	46.3	47.7
RCH 533 BG II	30.3	32.6	31.5	48.8	47.2	48.0
RCH 2 Bt	29.6	30.4	30.0	48.7	47.6	48.1
RCH 368 Bt	32.1	31.7	31.9	48.7	47.1	47.9
Bunny	32.6	30.8	31.7	47.7	47.6	47.6

Micronaire did not show much variation across the years. The Bt check hybrid RCH 368 Bt recorded the lowest Micronaire during both the years (Table 97).

The Bt test entry RCH 530 BG II was the best hybrid for bundle strength recording a mean value of 23.5 g/tex (Table 97).

Table 97. Micronaire ($\mu\text{g}/\text{inch}$) and Fibre Strength (g/tex)

Entry	Micronaire			Bundle Strength (g/tex)		
	2005-06	2006-07	Mean	2005-06	2006-07	Mean
ACH 155-1 Bt	4.2	4.6	4.4	22.2	21.2	21.7
KDCHH 621 BG II	4.5	4.4	4.5	21.6	20.1	20.8
KDCHH 9810 Bt	4.4	4.7	4.5	22.7	22.1	22.4
MRC 7160 BG II	4.8	4.7	4.8	21.4	19.3	20.4
MRC 7347 BG II	4.3	4.2	4.3	22.3	21.7	22.0
RCH 530 BG II	4.6	4.3	4.4	23.0	24.0	23.5
RCH 533 BG II	4.6	4.5	4.6	22.3	22.3	22.3
RCH 2 Bt	5.0	4.8	4.9	22.0	21.6	21.8
RCH 368 Bt	4.0	4.4	4.2	23.5	23.3	23.4
Bunny	4.2	4.5	4.3	22.8	22.0	22.4

D. ENTOMOLOGICAL EVALUATION**1. EVALUATION UNDER PLANT PROTECTION (ETL BASED)****Sucking pests**

Jassids, white fly, thrips and aphids were the main sucking pests present in all the test Bt hybrids and no critical difference could be observed between the Bt test entries and non-Bt check hybrid. The sucking pests could be managed through appropriate chemical interventions at varying intervals (Table 98 & 99).

Table 98. Number of Jassids / plant and White flies / plant

Protected	Mean number of Jassid nymphs/3 leaves/plant			Mean number of Whitefly adults/3leaves/plant		
	2005-06	2006-07	Mean	2005-06	2006-07	Mean
Hybrid						
ACH 155-1 Bt	3.3	2.7	3.0	2.2	0.6	1.4
KDCHH 9810 Bt	3.7	2.8	3.3	2.0	0.8	1.4
MRC 7160 BG II	3.6	2.6	3.1	2.7	1.1	1.9
MRC 7347 BG II	3.5	2.4	2.9	1.7	0.6	1.1
KDCHH 621 BG II	3.7	2.9	3.3	2.5	0.9	1.7
RCH 530 BG II	4.3	3.7	4.0	1.7	0.4	1.1
RCH 533 BG II	4.3	3.0	3.7	1.6	0.8	1.2
RCH 2 Bt	4.5	3.6	4.1	1.4	0.4	0.9
RCH 368 Bt	3.5	2.6	3.1	1.7	0.5	1.1
Bunny	4.2	2.9	3.5	1.6	0.7	1.1

Table 99. Number of Thrips / plant and Aphids / plant

Protected	Thrips/ plant			Aphid/ plant		
	2005-06	2006-07	Mean	2005-06	2006-07	Mean
Hybrid						
ACH 155-1 Bt	22.2	8.4	15.3	8.6	13.9	11.3
KDCHH 9810 Bt	16.5	6.7	11.6	5.7	11.6	8.7
MRC 7160 BG II	24.9	6.7	15.8	8.6	10.4	9.5
MRC 7347 BG II	16.0	7.2	11.6	10.8	10.9	10.9
KDCHH 621 BG II	20.5	4.7	12.6	10.1	9.2	9.6
RCH 530 BG II	16.5	7.9	12.2	8.7	14.7	11.7
RCH 533 BG II	13.8	7.6	10.7	8.1	10.4	9.3
RCH 2 Bt	12.6	7.6	10.1	7.6	11.4	9.5
RCH 368 Bt	19.4	8.2	13.8	10.0	10.1	10.0
Bunny	17.6	8.9	13.3	10.2	14.0	12.1

Natural Enemies

No difference could be seen in the level of population of natural enemies recorded in Bt hybrids and non-Bt check (Table 100).

Table 100. Number of Predators / 5 plants

Protected	Mean number of Predators/5 plants		
	2005-06	2006-07	Mean
Hybrid			
ACH 155-1 Bt	0.4	0.3	0.3
KDCHH 9810 Bt	0.5	0.2	0.3
MRC 7160 BG II	0.6	0.3	0.4
MRC 7347 BG II	0.4	0.3	0.3
KDCHH 621 BG II	0.5	0.4	0.4
RCH 530 BG II	0.2	0.4	0.3
RCH 533 BG II	0.3	0.5	0.4
RCH 2 Bt	0.4	0.2	0.3
RCH 368 Bt	0.4	0.3	0.3
Bunny	0.4	0.4	0.4

Boll worms

Square Damage: Minimum percentage of square damage was seen in all the Bt test hybrids. However, marginal difference was observed between the Bt hybrids and non-Bt hybrid (Table 101).

Pink bollworm incidence: Low population level of pink bollworm larvae was recorded in all the test hybrids compared to check hybrid. Similarly, the damage due to Pink bollworm larvae and open boll damage recorded were low in Bt test entries compared to check hybrid Bunny (Table 101).

Table 101. Per cent square damage, number of Pink boll worm larvae / 20 bolls and Pink boll worm larvae damage in green bolls (%)

Protected Hybrid	Per cent square damage			Mean number of PBW larvae/20 green bolls			Mean PBW larvae damage in green bolls (%)		
	2005-06	2006-07	Mean	2005-06	2006-07	Mean	2005-06	2006-07	Mean
ACH 155-1 Bt	5.1	1.3	3.2	0.3	0.6	0.4	5.5	2.8	4.1
KDCHH 9810 Bt	4.4	2.1	3.2	0.2	1.3	0.8	4.6	7.8	6.2
MRC 7160 BG II	3.9	1.0	2.4	0.2	1.1	0.6	4.4	6.1	5.3
MRC 7347 BG II	5.1	1.0	3.0	0.8	1.5	1.1	5.8	6.7	6.2
KDCHH 621 BG II	4.9	1.1	3.0	0.4	1.0	0.7	5.7	7.8	6.8
RCH 530 BG II	4.6	1.4	3.0	0.3	0.6	0.4	4.9	5.0	4.9
RCH 533 BG II	4.7	1.6	3.2	0.2	0.6	0.4	5.3	5.0	5.2
RCH 2 Bt	4.9	1.5	3.2	0.3	1.0	0.7	6.6	8.3	7.5
RCH 368 Bt	4.5	1.7	3.1	0.6	0.1	0.4	6.8	3.3	5.1
Bunny	6.0	2.5	4.2	1.9	2.9	2.4	12.9	27.8	20.3

Open boll and locule damage during both the years was high on non Bt check hybrid Bunny as compared to Bt hybrids (Table 102).

Table 102. Open boll damage (%) - Boll and locule basis

Protected Hybrid	Boll basis			Locule basis		
	2005-06	2006-07	Mean	2005-06	2006-07	Mean
ACH 155-1 Bt	14.8	5.9	10.4	7.4	7.8	7.6
KDCHH 9810 Bt	15.4	5.4	10.4	5.6	11.5	8.6
MRC 7160 BG II	16.3	6.2	11.2	7.2	6.5	6.9
MRC 7347 BG II	15.5	5.6	10.5	6.6	9.4	8.0
KDCHH 621 BG II	21.2	5.8	13.5	9.5	10.5	10.0
RCH 530 BG II	14.3	6.8	10.5	6.9	10.4	8.7
RCH 533 BG II	18.3	10.9	14.6	9.1	9.4	9.3
RCH 2 Bt	14.8	5.4	10.1	6.3	9.5	7.9
RCH 368 Bt	15.0	6.4	10.7	6.0	8.9	7.4
Bunny	26.3	14.7	20.5	12.6	13.8	13.2

Plant Protection

All the entries in the trial showed susceptibility to sucking pests and required 2 to 3 rounds of chemical intervention to effectively control them (Table 103).

There was no bollworm incidence at all during 2006-07. Considering the mean data, the test entries were better than conventional check (Table 103).

Table 103. Number of sprays for sucking pest and for boll worm control

Protected	For Sucking Pests Control			For Boll Worm control		
	2005-06	2006-07	Mean	2005-06	2006-07	Mean
ACH 155-1 Bt	2.3	3.0	2.6	1.4	0.0	0.7
KDCHH 9810 Bt	2.5	3.0	2.8	1.0	0.0	0.5
MRC 7160 BG II	2.5	3.0	2.8	1.2	0.0	0.6
MRC 7347 BG II	2.3	3.0	2.6	1.6	0.0	0.8
KDCHH 621 BG II	2.3	3.0	2.6	1.4	0.0	0.7
RCH 530 BG II	2.3	3.0	2.6	1.0	0.0	0.5
RCH 533 BG II	2.3	3.0	2.6	0.8	0.0	0.4
RCH 2 Bt	2.3	3.0	2.6	1.4	0.0	0.7
RCH 368 Bt	2.7	3.0	2.8	1.2	0.0	0.6
Bunny	2.7	3.0	2.8	1.8	0.0	0.9

2. EVALUATION UNDER UNPROTECTED CONDITIONS

Open boll damage and locule damage during both the years was moderately less on Bt test hybrids than non Bt check hybrid (Table 104).

Table 104. Open boll damage (%) - Boll and locule basis

Unprotected	Boll basis			Locule basis		
	2005-06	2006-07	Mean	2005-06	2006-07	Mean
ACH 155-1 Bt	16.8	6.3	11.5	8.5	8.3	8.4
KDCHH 9810 Bt	18.6	8.9	13.7	7.1	12.1	9.6
MRC 7160 BG II	20.1	3.6	11.8	7.2	6.2	6.7
MRC 7347 BG II	19.8	6.7	13.2	8.1	10.4	9.3
KDCHH 621 BG II	26.7	10.3	18.5	11.8	10.4	11.1
RCH 530 BG II	17.5	6.0	11.8	7.5	10.6	9.1
RCH 533 BG II	23.2	9.8	16.5	10.4	8.3	9.3
RCH 2 Bt	18.3	6.7	12.5	7.1	12.0	9.6
RCH 368 Bt	21.0	10.6	15.8	8.5	10.2	9.3
Bunny	27.1	10.0	18.6	14.3	13.8	14.1

E. MEAN SEED COTTON YIELD UNDER UNPROTECTED CONDITIONS

Under irrigated conditions, all the Bt test entries recorded higher seed cotton yield ranging from 11.0 to 58.0 per cent compared to check hybrid Bunny (Table 105). However, as compared to the best Bt check hybrid RCH 368 Bt (1578 kg/ha), only two hybrids viz, ACH 155-1 Bt (1864 kg/ha) and RCH 533 BG II (1841 kg/ha) recorded higher yield of 17 to 18 per cent yield increase.

Under rainfed conditions, all the Bt test entries recorded higher yield than the non-Bt check hybrid (Table 105), Bunny with a range of 37 to 94 per cent increase. As compared to the best Bt check, only one Bt hybrid MRC 7160 BG II with 1503 kg/ha exhibited superiority by 6 per cent.

Table 105. Mean seed cotton yield (kg/ha)

Unprotected	Irrigated Condition					Rainfed Condition				
	Hybrid	2005-06	2006-07	Mean	% Inc. over RCH 368 Bt	% Inc. over Bunny	2005-06	2006-07	Mean	% Inc. over RCH 2 Bt
ACH 155-1 Bt	2432	1297	1864	18	58	1499	1325	1412	-1	82
KDCHH 9810 Bt	2094	606	1350	-14	14	1602	981	1291	-9	67
MRC 7160 BG II	1722	1316	1519	-4	29	1689	1317	1503	6	94
MRC 7347 BG II	2000	1016	1508	-4	28	1367	1142	1254	-12	62
KDCHH 621 BG II	1506	1116	1311	-17	11	912	1205	1058	-26	37
RCH 530 BG II	1794	887	1340	-15	14	1570	958	1264	-11	63
RCH 533 BG II	2063	1620	1841	17	56	1511	1205	1358	-5	75
RCH 2 Bt	1974	669	1322	-16	12	1907	939	1423	0	84
RCH 368 Bt	2252	904	1578	0	34	1233	1194	1213	-15	57
Bunny	1835	525	1180	-25	0	805	744	774	-46	0

F. PATHOLOGICAL EVALUATIONS**Irrigated**

Under irrigated conditions, the three major diseases *viz.* alternaria leaf spot, grey mildew and bacterial leaf blight were observed at moderate level over two years on the seven test Bt hybrids as well as the check hybrids with the mean disease incidence in the range of 8.0 - 10.5 per cent (alternaria leaf spot); 8.2 – 15.7 per cent (grey mildew) and 6.7 – 8.7 per cent (bacterial leaf blight). There was no difference among the entries tested (Table 106).

Table 106. Incidence of foliar diseases during 2005-06 and 2006-07 (Irrigated)

Entry	Alternaria Leaf Spot			Grey Mildew			Bacterial Leaf Blight		
	2005-06	2006-07	Mean	2005-06	2006-07	Mean	2005-06	2006-07	Mean
MRC 7160 BG II	16.9	3.1	10.0	17.8	0.5	9.1	12.2	5.1	8.7
MRC 7347 BG II	16.2	3.6	9.9	16.6	0.3	8.4	11.1	4.0	7.6
ACH 155-1 Bt	15.8	3.3	9.6	23.1	8.4	15.7	8.8	4.5	6.7
KDCHH 9810 Bt	15.6	3.7	9.6	17.6	0.2	8.9	8.7	6.7	7.7
KDCHH 621 BG II	15.0	2.6	8.8	17.2	8.8	13.0	8.6	5.6	7.1
RCH 530 BG II	14.0	2.7	8.4	16.2	0.3	8.2	9.1	5.8	7.5
RCH 533 BG II	13.2	4.3	8.8	17.1	0.6	8.8	8.0	5.6	6.8
Bunny (Check)	15.0	4.4	9.7	20.9	8.6	14.8	8.0	6.6	7.3
RCH 368 Bt (Check)	17.0	3.9	10.5	17.2	7.9	12.5	7.9	5.9	6.9
RCH 2 Bt (Check)	14.0	2.0	8.0	16.5	0.4	8.4	8.6	5.9	7.3

Rainfed

The seven test Bt hybrids as well as the three checks were susceptible to alternaria leaf spot, grey mildew and bacterial leaf blight under rainfed conditions. The mean disease incidence over two years ranged from 23.6 to 26.6 per cent (alternaria leaf spot); 23.0 – 27.5 percent (grey mildew) and 22.7 – 26.1 (bacterial leaf blight) (Table 107).

Table 107. Incidence of foliar diseases during 2000-06 and 2006-07 (Rainfed)

Entry	Alternaria Leaf Spot			Grey Mildew			Bacterial Leaf Blight		
	2005-06	2006-07	Mean	2005-06	2006-07	Mean	2005-06	2006-07	Mean
MRC 7160 BG II	27.8	21.7	24.7	22.4	27.5	24.9	27.3	24.7	26.0
MRC 7347 BG II	30.4	22.8	26.6	26.3	27.6	26.9	29.1	22.1	25.6
ACH 155-1 Bt	26.3	20.9	23.6	27.3	21.2	24.3	31.5	20.7	26.1
KDCHH 9810 Bt	26.9	25.7	26.3	24.9	22.3	23.6	29.1	18.3	23.7
KDCHH 621 BG II	30.7	22.4	26.6	25.2	20.9	23.0	28.2	23.3	25.8
RCH 530 BG II	28.6	23.0	25.8	21.8	27.4	24.6	22.8	23.1	23.0
RCH 533 BG II	27.5	21.9	24.7	27.8	23.6	25.7	28.7	20.0	24.4
Bunny (Check)	21.4	27.0	24.2	30.5	24.4	27.4	26.1	23.3	24.7
RCH 368 Bt (Check)	27.2	21.9	24.5	24.4	22.3	23.4	26.3	19.1	22.7
RCH 2 Bt (Check)	25.8	23.3	24.6	26.9	28.2	27.5	27.4	18.3	22.9

G. OVERALL ASSESSMENT

All the seven Bt test hybrid were found better than the conventional check hybrid Bunny under both irrigated and rainfed conditions (Table 108). The test hybrid ACHH 155-1 Bt was the best under irrigated situation recording a mean seed cotton yield of 2292 kg/ha, while the Bt check hybrid RCH 2 Bt recorded the highest seed cotton yield under rainfed conditions. However, under both irrigated and rainfed conditions, all the test hybrids outperformed the conventional check hybrid Bunny. Similar trend was noted for lint yield also. Quality wise RCH 530 BG II was the best recording a mean fibre length of 32.3 mm and fibre strength of 23.5 g/tex. For micronaire, all the test hybrids were comparable with the check hybrids.

For reaction to pest and diseases, all the test hybrids as well as check hybrids required pesticides spray for sucking pest control as reflected by presence of jassids and white flies (Table 109). Similarly, both test and check hybrids showed varying degree of disease incidence for foliar diseases. However, they can be managed by following suitable management practices.

The test hybrids as well as Bt check hybrids showed their superiority in terms of lesser boll damage by all kinds of bollworms as reflected in green boll damage, open boll damage both on boll basis as well as locule basis. Bunny had 20.3 per cent green boll damage as compared to 4.1 to 6.8 per cent damage in test hybrids. As far as open boll damage is concerned, Bt test hybrids had nearly half the damage as compared to the conventional check hybrid Bunny in both boll and locule basis.

Table 108. SUMMARY TABLE (YIELD AND FIBRE QUALITY)

Entry	Seed cotton yield (kg/ha)								Lint yield (kg/ha)		2.5 % Span Length (mm)	Mic	BS (g/tex)
	Irrigated	% Inc over RCH 2 Bt	% Inc. over RCH 368 Bt	% Inc. over Bunny	Rainfed*	% Inc over RCH 2 Bt	% Inc. over RCH 368 Bt	% Inc. over Bunny	Irrigated	Rainfed			
ACH 155-1 Bt	2292	31	10	42	2310	-8	-3	39	865	846	27.7	4.4	21.7
KDCHH 621 BG II	1619	-7	-22	1	1929	-23	-19	16	606	697	28.5	4.5	20.8
KDCHH 9810 Bt	1910	9	-8	19	2098	-17	-12	26	669	721	29.1	4.5	22.4
MRC 7160 BG II	1916	9	-8	19	2391	-5	1	43	706	843	27.8	4.8	20.4
MRC 7347 BG II	1834	5	-12	14	2026	-20	-15	22	642	702	30.9	4.3	22
RCH 530 BG II	1903	9	-8	18	2243	-11	-6	35	667	763	32.3	4.4	23.5
RCH 533 BG II	2269	30	9	41	2473	-2	4	48	819	861	31.5	4.6	22.3
RCH 2 Bt	1750	0	-16	9	2517	0	6	51	620	870	30	4.9	21.8
RCH 368 Bt	2077	19	0	29	2378	-6	0	43	758	839	31.9	4.2	23.4
Bunny	1609	-8	-23	0	1667	-34	-30	0	556	566	31.7	4.3	22.4

*Due to even rainfall distribution and favourable growth condition in certain rainfed locations, the mean yield under rainfed conditions is high.

Table 109. SUMMARY TABLE

Entry	Jassid / plant	White fly /plant	Mean PBW larvae damage in green bolls (%)	Open boll damage (%) - Boll basis	Open boll damage (%) - Locule basis	Alternaria Leaf Spot (PDI)	Grey Mildew (PDI)	Bacterial leaf blight (PDI)
ACH 155-1 Bt	3.0	1.4	4.1	10.4	7.6	16.6	20.0	17.4
KDCHH 9810 Bt	3.3	1.4	6.2	10.4	8.6	17.7	18.0	16.6
MRC 7160 BG II	3.1	1.9	5.3	11.2	6.9	18.0	16.3	16.4
MRC 7347 BG II	2.9	1.1	6.2	10.5	8.0	17.4	17.0	15.7
KDCHH 621 BG II	3.3	1.7	6.8	13.5	10.0	18.3	17.7	16.5
RCH 530 BG II	4.0	1.1	4.9	10.5	8.7	17.1	16.4	15.3
RCH 533 BG II	3.7	1.2	5.2	14.6	9.3	16.8	17.3	15.6
RCH 2 Bt	4.1	0.9	7.5	10.1	7.9	16.3	18.0	16.0
RCH 368 Bt	3.1	1.1	5.1	10.7	7.4	17.5	18.0	14.8
Bunny	3.5	1.1	20.3	20.5	13.2	17.0	21.1	15.1