

MM 1.3: Genetic Improvement through Introgression of useful genes in cultivated species of Cotton

Principal Investigator: B.M. Khadi, CICR, Nagpur

Activities –

A-1. Screening of segregating materials from different crosses for yield, fibre properties, biotic stress and abiotic stress

A-2. Evaluation of advance generation (stable line) Introgressed entries for biotic & abiotic stresses and fibre properties

A-3. To effect crosses between wild and cultivated species

NORTH ZONE

CICR, SIRSA

- ◆ 19 introgressed lines were evaluated in 3 Replications (6 rows each). Four introgressed lines (F1378 x Anjali P4-P2, ARCHH 650 P3, G.Cot 16 x GISV 61 P5, G.Cot 16 x GISV 61 P7) recorded the higher seed cotton yield over the check variety H 1117.
- ◆ The highest ginning out turn of 40.0 % was recorded by 25 F P16 P3 followed by 38.67 % in F1378 x Anjali P2-P1. The 2.5 % span length was found to be maximum in TM 1312 x Surya P10 (29.2 mm) followed by TM 1312 x Surya P8 (29.1 mm). Uniformity Ratio ranged from 46 % (TM 1312 x Surya P10) to 54 % (G.Cot 16 x GISV 61 P3 P1, G.Cot 16 x GISV 61 P3 and G.Cot 16 x GISV 61 P4). The highest fibre strength of 24.8 g/tex was recorded by 25 F P16 P1 followed by 24.4 g/tex in ARCHH 650 P3 and G.Cot 16 x GISV 61 P3 P1
- ◆ In another experiment, 34 introgressed lines were tested in 2 Replications (3 rows each, spacing 67 x 25 cm). The data on plant height, no. of monopods, sympods, no. of bolls per plant, GOT, boll weight and seed cotton yield were recorded. 10 introgressed lines viz. PSB-18, PSB-19, IH-35, IGM-106, GISV-216, GISV-238, MSH-SP-91, TCH-1648, TCH-1653 and IS-30/68 recorded the higher seed cotton yield over the check variety H-1117.
- ◆ The highest ginning out turn of 39.8 % was recorded by GISV-216 followed by 39.7 % in GISV-240. The 2.5 % span length was found to be maximum in TCH-1696 (29.8 mm) followed by Rai-7B-2 (29.0 mm). Uniformity Ratio ranged from 46 % (GISV-33) to 53 % (AKH-8828). The highest fibre strength of 25.6 g/tex was recorded in TCH-1696 followed by 23.6 g/tex in TCH-1669
- ◆ The data on jassids (per leaf), whitefly (per leaf), cotton leaf curl virus, Bollworm and loculi damage were recorded. For jassid, white fly, bollworm and loculi damage reaction most of the entries were found to be susceptible. For CLCV reaction, the entries IGMH-8, GISV-33, GISV-61, GISV 216, GISV 240, Rai-7B-2, Rai-9, TCH 1648, TCH 1652, TCH 1653 and IS-14/21 were found to be resistant.

Experiment 3	:	Evaluation of new introgressed lines
Date of sowing	:	22-05-2006
No. of Entries	:	57+1
No. of replications	:	1
No. of rows	:	1/2
Spacing	:	67.5 x 45 cm

- ◆ In this experiment, 57 introgressed lines were evaluated in a single replication (½ row each in spacing 67.5 x 45 cm). 17 introgressed lines (SPC11XSPC-69 P1-2, SPC1XCIR-26 P2-1, SPC1XCIR-26 P2-2, SPC1XCIR-26 P2-3, (IS-376/4/1-24XRS-875)XRS875), (IS-376/4/1-24XRS-875)-2XRS875), (IS-376/4/1-24XRS-875)-3XRS875, (IS-376/4/2-24XRS-875)-1XRS875, (IS-376/4/1-24XRS-875)-2XRS875, (IS-376/4/1-15XRS-875)-2XRS-875,(IS-376/4/1-15XRS-875)-3XRS875, (IS-376/4/1-15XRS-875)-4XRS-875, RHAC-033, DWRa-0-5-1, DWRh-0-5-2, DWRh-0-5-1, DWRh-0-5-3 and L798 recorded the higher seed cotton yield over the check variety H1117 The data on fibre quality are presented in Table 1G)
- ◆ Out of 58 entries, all the entries except SPC 1 X CIR 26-P2-P2, RHRAC-033 and DWRa-0-5-1 were found to be susceptible to jassid and white fly reaction and 18 entries were found to be resistant to bollworm complex. However, most of the introgressed lines received from CICR, Sirsa and ARS, Sriganganagar were found to be resistant to CLCuV.

Experiment 4	:	Evaluation of F ₁ cross combinations.
Date of sowing	:	22-05-2006
No. of Entries	:	8+1
No. of replications	:	1
No. of rows	:	2
Spacing	:	67.5 x 45 cm

- ◆ Out of eight F₁ crosses, only one F₁ cross (K34007XPIL-8) recorded (able 1 I) seed cotton yield over the check hybrid CSHH 198. For CLCuV all the entries were found to be resistant. All the entries except PHP1A X GISV-216, PHP5 X GISV-216, K 34007 X PIL-8 were found to be resistant for bollworm.

Experiment 5	:	Evaluation of new introgressed segregating lines
Date of sowing	:	22-05-2006
No. of Entries	:	26+3
No. of replications	:	1
No. of rows	:	
Spacing	:	67.5 x 45 cm

- ◆ 3 introgressed lines (IGNH 15 F2, Rai -12A and IGMH 13 F2) recorded the higher seed cotton yield over the check variety RS-875. All the entries were found to be susceptible against jassid and white fly, whereas for CLCuV and bollworm most of the introgressed lines were found to be resistant.

Experiment 6	:	Evaluation of old introgressed segregating lines
Date of sowing	:	22-05-2006
No. of Entries	:	50
No. of replications	:	1
No. of rows	:	4
Spacing	:	67.5 x 45 cm

- ◆ All the entries were found to be susceptible against jassid and white fly, whereas for CLCuV most of the F₃ progenies except VHM X TCH 1648-P4, VHM X TCH 1653-P1, VHF X IH -35-P1, PF X IH 35-P1, H 1098 X Rai 11-3, H 1098 X Rai 4A-P1, H 1098 X Rai 7B 5P1-2-P1, LRA 5166X TCH 1653-P1, NHI 5-2 X H-1117-P1 and NHH 03 X H 1098-P1 were found to be resistant.

Achievements

Identification of wild and cultivated sources for superior fibre properties:

- ◆ The introgressed lines viz. TCH 1648, TCH 1649, TCH 1652, TCH 1696, 25 F1P161, ARCHH 650P3, G. Cot 16x GISV 61 P3-1 were identified to possess high fibre strength.
- ◆ 2. The introgressed lines F 1378 x Anjali P2-1, 25FP16P3, PHP4x PSS-18, AKH 0302 x H 1098F3, GISV 33, GISV 206, IGMH 15F2 were identified with GOT more than 40 per cent.

Identification of wild and cultivated sources for biotic stresses:

- ◆ The introgressed lines IGMH 8, GISV 33, GISV 203, GISV 216, GISV 240, Rai 7B2, Rai-9, TCH 1648, TCH 1652 TCH 1653, IS 14/21 were found to be resistant to CLCuV.
- ◆ The introgressed lines IGMH 8, AKH 8828, and TCH 1653 were found to be tolerant to bollworms.
- ◆ The introgressed lines DWRHIR-1, IH 35, GISV 206, Rai 7B-2, TCH 1693 and IS30/68 were found to be tolerant to whitefly.

Crossing of wild and cultivated species

- ◆ Thirty five crosses were attempted between introgressed lines (TCH 1648, TCH 1652, BTCH 1653, Rai4A-2, IH 35, Rai11-3, Rai) and germplasm lines/varieties RS 2013, BM, BF, CNH 911, F 505, PF, H 1098) and distributed among the participating centres.
- ◆ Eight new crosses among introgressed lines and germplasm lines were attempted and evaluated for fibre quality traits and tolerance against jassid, whitefly, bollworms and CLCuV.

Development of new introgressed lines.

- ◆ Twenty five introgressed lines were developed by crossing *G. harknessii* and *G. hirsutum* lines and were distributed among the participating centres,

RAU. SRIGANGANAGAR

Trial A: Evaluation of introgressed materials developed/selected at this center

Set I: Evaluation of Bulk selected for quality traits & resistance against CLCV

In this set 35 bulks selected during *Kharif 2005-06* on the basis lint quality and resistance against CLCV from the introgressed materials were evaluated in non- replicated design.

Agronomical Traits:

In this trial 33 (Bulk) were evaluated in non- replicated trials for agronomical traits and stresses against biotic stress. Out of 33, one genotype VHF x TCH-1648-2 failed to germinate. The mean seed cotton yield in the trial was 11.9 q/ha with a range from 1.4 to 17.8q/ha. The mean for ginning out turn in the trial was 35.2 with a range from 30.5 to 41.5 percent. The mean for seed index in the trial was 8.2g with a range from 5.0 to 10.4 g. Lint samples have been sent to CIRCOT lab, and on the basis of quality report and yield performance, these bulks will be evaluated in replicated trial in coming season.

Screening against CLCV:

The introgressed material is being screened regularly for resistance against CLCV. was Out of 33 genotypes screened 22 showed resistance whereas 11 were found tolerant.

Bollworm Damage:

American bollworm, *Helicoverpa armigera*, (Hubn.) could not make its appearance in the experimental plots. Spotted bollworm, *Eriasis insulana* (Boisd.) made regular appearance during the crop season and caused damage to squares and developing bolls of cotton plants. Pink bollworm, *Pectinophora gossypiella* cause severe damage in the experimental plots. The mean bollworm damage in the trial was 13.03 percent with a range from 4.4 to 20.5 percent.

Set II: Evaluation of SPS selected for quality traits & resistance against CLCV from the material developed at this center.

Agronomical Traits :In this trial 68 SPS selected during 2005-06 were evaluated in non- replicated trials. The mean seed cotton yield in the trial was 13.5 q/ha with a range from 1.7 to 29.6 q/ha. 30 genotypes gave more than 20 q/ha seed cotton yield. The mean boll weight of the trial was 2.66g and ranged from 1.8 to 3.50g. Similarly, there was range for ginning out turn also (26.6 to 40.91%).

Screening against CLCV:Out of Sixty-eight genotypes screened, 62 showed resistance whereas only 6 were found susceptible.

Bollworm Damage:Spotted bollworm, *Erias insulana* (Boisd.) made regular appearance during the crop season and caused severe damage to squares and developing bolls of cotton plants. Boll damage during the crop season ranged from 5.32 to 25.33 percent.

Trial B: Evaluation of introgressed material received during 2006-07

Set I: Experimental Details:

1.	No. of Entries	: 10
2.	Experimental design	: Non-replicated
3.	Plot size	
	No of rows per plot	: 2
	Row length	: 6m
	Plant geometry	: 67.5 X 30 cm
4.	Date of sowing	: 31-5-2006
5.	Fertilizer applied @ kg/ha	: N:90, P ₂ O ₅ : 40
6.	No. of irrigations	: 5
7.	No. of sprays	: 5

Agronomical Traits:Out of 10 genotypes one genotype SPC-526-P2 failed to germinate. Seed cotton yield of genotypes evaluated was varying from 6.52 to 52.0 gm per plant with a mean of 35.76 gm per plant (Table-2C). Genotype H-974-1 (52.00 gm/plant) gave higher yield followed by H-1098-1 (51.30 gm / plant) and (IGM-100 x CWROK165 F3) x H-1098 F3 (50.00 gm / plant). The mean boll weight of the trial was 2.62g and range from 2.4 to 2.8g. Similarly, range for ginning out turn also (29.80 to 38.67%).

Screening against CLCV:Out of 10 genotypes screened, 3 showed resistance whereas 5 were susceptible and one highly susceptible.

Bollworm Damage:Pink bollworm, *Pectinophora gossypiella* and Spotted bollworm, *Erias insulana* (Boisd.)caused severe damage to squares and developing bolls of cotton plants. Boll damage during the crop season ranged from 9.8 to 22.2 percent.

Set II:

Introgressed materials received from PAU, Ludhiana during *Kharif* 2006-07 were evaluated.

Agronomical Traits: Out of 16 genotypes four failed to germinate. The mean seed cotton yield of the trial was 5.7 q/ha with a range of 3.00 to 14.2 q/ha. The mean for GOT%, boll weight and seed index were 36.2%, 2.09g and 4.19 g, respectively.

Bollworm Damage:Boll damage during the crop season ranged from 8.6 to 20.8 percent.

Set III:

Introgressed material received from Surat, Dharwar, Guntur, Rahuri, TANU and Orrisa centers during *Kharif* 2006-07 were evaluated.

Experimental Details:

1. No. of Entries : 28
2. Experimental design : Non-replicated
3. Plot size
No of rows per plot : 2
Row length : 6m
Plant geometry : 67.5 X 30 cm
4. Date of sowing : 31-5-2006

Agronomical Traits: The yield performance of the most of the genotypes was not good. Seed cotton yield of genotypes evaluated was varying from 6.07 to 36.50 gm per plant with a mean of 18.91 gm per plant. The mean of average boll weight of the trial was 2.50g and range from 2.1 to 2.9g. Similarly, there was wide range for ginning out turn also (31.25 to 38.97%).

Screening against CLCV: Out of 12 genotypes screened, 4 showed resistance whereas 5 susceptible and 3 were found highly susceptible.

Bollworm Damage: Boll damage by Pink bollworm, *Pectinophora gossypiella* and Spotted bollworm, *Earias insulana* (Boisd.) during the crop season ranged from 8.6 to 25.8 percent.

3. IARI, NEW DELHI

The introgressed entries of F₂, F₃, F₄, F₅ generations received from different centres were evaluated.

From F₃ generation

1GM 100 x CWROK 165 F₃ for seed cotton yield and boll wt

G. hirsutum GISV 206 x GSB-6 for GOT

G. hirsutum IGM 100 x CWROK 165 F₃) x H 1098, SPC 97-PI-I, DwRHO-5-1,

L-799, (IS 376/4/1 x RS-875)-1 x RS-875 for GOT and boll no/plant

G. arboreum (IS-376/4/2-14 x RS-875)-1 x RS-875 for boll wt

G cot 23 x AH 36, IGMA 9, DWRARB-2, AK-0312, RAC 023, HD 453, LAS 10 for GOT

PAU, Ludhiana

During *kharif* 2006, 58 introgressed lines in different segregating generations were received from different centers for evaluation. The yield potential of the lines could not be estimated as the material was sown late due to late receipt of the material. The introgressed lines like (IS 376/4/1-24 x RS 875)RS 875, (IS 376/4/1 x RS 875)-1 x RS 875, (IS 376/4/1 x RS 875)-2 x RS 875, G. Cot 16 x Stoneville-20, GISV 203 x GSB 6, GISV 33, GISV 206, G. Cot 23 x AH-10-3, G. Cot 23 x AH-36-1, G. Cot 11 x AH-36-1, AH-10-3 x 4011, SPC 97 P1-3, DWRH 05-1 (*hirsutum*), DWRH 05-3 (*hirsutum*), DWRH 05-1 (*arboreum*), NHH 03 P₂ x H 1117, H 974-1, IS 376/4/1/1 x NISD-5, MSH 126, LAS 10, IGM 11 (L 602 x L603), AKH 0502, IS 376/4/1-18-12 and IGM 11 (LAS 2 x BRUGAS) LAS 2 bear very poor number of bolls which were also damaged due to heavy rains followed by strong wind in the last week of August.

Among the backcross progenies received from Sriganganagar, the fibre length ranged from 22.3 mm to 26.0 mm. Two backcross progenies (IS 376/4/2-14 x RS 875)-4 x RS 875 and (IS 376/4/2-15 x RS 875)-2 x RS 875 gave mean halo length of 26.0mm with 33.0 per cent ginning outturn. The F₂ population of a cross G. Cot 16 x NHIS 6 recorded a mean halo length of 25.0mm with 32.0 per cent ginning outturn and 7.0g seed index. Two plants were selected from this F₂ population on the basis of boll bearing and plant type. Among these one plant gave the same halo length of 25.0mm but lower ginning outturn (30.0 %). Second plant gave 33.5 per cent ginning outturn but lower value of halo length (20.0mm). Among the lines received from CICR Nagpur, (SPC 126 P₃, SPC 526 P₁, SPC 526 P₂ and SPC 97-P₁-1). Two lines (SPC 126 P₃ and SPC 526 P₂) recorded maximum halo length of 26.0mm with 33.5 and 32.0 per cent ginning outturn, respectively. Though these progenies were in F₅ generation but still the variation in plants was observed. Four plants were selected from SPC 126 P₃. All the four plants depicted different fibre length ranging between 25.7 to 28.0mm. though the mean halo length of SPC 126 P₃ was 26.0mm but two plants selected recorded 27.7 and 28.0mm halo length but

with 33.0 per cent ginning outturn as compared to 33.5 per cent ginning outturn of SPC 126 P₃ progeny. Similarly one plant selected from a progeny SPC 526 P₁ gave better halo length (27.0mm) as compared to 25.3mm mean halo length of SPC 526 P₁. Among the four lines received from Dharwar, a line DWRH 05-2 of *arboreum* recorded mean halo length of 16.7mm with 33.0 per cent ginning outturn but the single plant selected recorded 19.7mm halo length but with 33.0 per cent ginning outturn. Similarly progeny row of a cross (IGM 100 x CWROK 165 F3) H 1098 (received from CCS HAU Hisar) recorded 26.3mm halo length with 32.0 per cent ginning outturn and 6.7g seed index. Three plants were selected from this cross whose halo length ranged from 25.0 to 30.0mm. Among the three plants one plant gave 30.0mm halo length with 33.0 per cent ginning outturn. All the three selected plants have better ginning outturn (33.0 to 34.0 per cent). Similarly two plants were selected from line H 1098-1 whose halo lengths were 26.0 and 22.3mm whereas the mean halo length of H 1098-1 line was 23.3mm. This indicated that there is a good scope to get progenies with better fibre properties after selection. On the whole among the introgressed lines received for evaluation during *kharif* 2006, L 799 recorded the maximum halo length of 30.3mm followed by L 798 with 30.0mm halo length. Among the *hirsutum* lines the halo length ranged between 22.0 to 30.3mm and ginning outturn ranged between 32.0 to 34.0 percent.

Some of the introgressed lines (both *hirsutum* and *arboreum*) which were received in the previous years were again evaluated especially for halo length and ginning outturn against the check varieties. Among the eight *hirsutum* lines IS 376/4/1-27 and Surat 9 gave maximum halo length of 27.3mm followed by PSS 19 (26.7mm), CH 6 and Surat 5 with 26.3mm halo length as compared to our local check variety F 1861 (26.0mm) (Table 3). PSS 18, PSS 21 and IS 376/4-27 gave comparatively better ginning outturn and boll weight than the check variety F 1861. Among the six *arboreum* lines DWRARB-1 and IGMA 8 recorded maximum halo length of 25.0mm each as compared to the check variety LD 694. None of the entry gave better ginning outturn and boll weight but IGMA 8 have better seed index.

Single plant selections were made from some of the introgressed lines to get better progenies for fibre traits and other agronomic traits. An introgressed line LK 861 x IGM 4 was evaluated in *kharif* 2004 which was in F₂ generation at that time. During *kharif* 2004 this line recorded a mean halo length of 26.0mm and 33.0 per cent ginning outturn. Single plants were selected from this cross. After final selection on the basis of halo length and ginning outturn, progeny rows of two plants which have better fibre length than the cross, were grown during *kharif* 2005 and again plants were selected from these progeny rows. From one progeny, two plants selected recorded 30.0 and 25.7mm halo length. So significant improvement in the fibre length has been observed in this cross (i.e. from 26.0mm to 30.0mm) following single plant selection.

In another cross IGM 120 x Wild which recorded 26.7mm mean fibre length and 32.5 per cent ginning outturn in 2004, significant improvement has been achieved for fibre length following single plant selection. In *kharif* 2006, the progeny in F₄ generation gave a mean halo length of 27.0mm with 32.0 per cent ginning outturn and again four plants were selected in which halo length ranged between 25.0mm to 29.3mm, and ginning outturn ranged between 30.0 to 34.0 percent. The plant with maximum halo length of 29.3mm recorded 33.0 per cent ginning outturn.

In 2004, a cross IGM 42 x HS 258 recorded 25.3mm mean fibre length and 34.0 per cent ginning outturn. After repeated selection promising plants with good boll bearing and superior fibre properties have been identified in 2006. As compared to fibre length of parental progeny, a plant having 27.0mm halo length and 33.0 per cent ginning outturn has been identified. Similarly from the F₂ population of a cross IGM 52 x HS 258 evaluated in 2004 with 24.7mm fibre length and 34.5 per cent ginning outturn, plants with 27.0mm halo length and 33.0 per cent ginning outturn has been identified in 2006 with good boll bearing. From IGM 100 x AV 3649, three plants with good boll bearing were selected and out of these one plant recorded better fibre length (27.5mm) than the mean fibre length of actual cross evaluated in 2004.

The progeny of a cross IS 376/4/1-23 x RS 2013 recorded 22.9mm fibre length and 32.7 per cent ginning outturn in 2004. After repeated selection six plants with better fibre length (ranging between 23.3 to 25.7mm) were selected in 2006 which have also good boll bearing. Similarly from a cross (G. Cot 10 x GISV 79)RS 2013 evaluated in 2004 with fibre length of 25.6mm and 32.7 per cent ginning outturn, three plants selected in 2006 recorded 27.0, 28.0 and 27.7mm halo lengths. Significant improvement in the fibre length of cross Abadhita x IV-2 was observed after selection in 2006. The mean fibre length of this cross in 2004 was 22.5mm and the two selected plants in 2006 showed 25.0 and 26.0mm halo length.

Single plant selection from Abadhita x MSH-P 53, evaluated in 2004 with mean fibre length of 23.7mm and ginning outturn of 33.2 per cent, showed significant improvement upto 26.0mm in 2006. In another cross CISV-1 x IH 35 which recorded 26.7mm mean fibre length and 33.0 per cent ginning outturn in 2004, significant improvement has been achieved for fibre length following single plant selection. In kharif 2006, among the three plants selected one plant recorded 30.0mm halo length and 33.5 per cent ginning outturn. Though in some of the crosses like Abadhita x MSH-SP-91, Abadhita x MSH 345, H 1098 x IBSP 12 and BF x TCH 1652, improvement for fibre length and ginning outturn has not been achieved but the plant with suitable plant type and good boll bearing has been identified in 2006 crop season.

5. CCS, HAU, Hissar

- 77 genotypes received during this year were evaluated in different trials and promising single plants / progenies were selected.
- 141 old selected single plants/ progenies were again evaluated in replicated trials. Forty superior single plant and 22 progenies were selected and they will be evaluated in initial evaluation trials in 2007-08.
- Six new crosses have been attempted with superior genotypes.
- The genotypes namely IH 63 P2, PM x TCH 1653, RS 2013 x TCH 1653, NHIS 2P2, TCH1653 x RS 2013 and H 1098 P11 had very good fibre equality parameters
- Keeping different aspects in view the genotypes namely IH 63 P2, RS 2013 x TCH 1653, TCH 1653 x RS 2013 and H 1098 P11 seems to very promising as they had high seed cotton yield, resistance to CLCV disease and less jassid attack and tolerance to boll worm damage.

CENTRAL ZONE

6. CICR, Nagpur

Activity 1 : Evaluation of selected stabilized Introgressed derivatives for biotic & abiotic stresses and fibre properties

Trial I (A) : *G. hirsutum* entries

G. hirsutum based thirty eight introgressed advance generation derivatives received from cooperating centers were included in the evaluation, along with three zonal checks, namely, NHH 44 (*G. hirsutum*: hybrid), LRA 5166 (*G. hirsutum*: pure line) and NH 545 (*G. hirsutum*: pure line). Each entry was planted in two row plot of 6 m length keeping inter and intra-row spacing of 60 cm.

The perusal of the data revealed that there was highly significant variation for all the traits under study. Although there was wide variation among the introgressed entries for plant height ranging from 24.0 cm to 65.5 cm, none of the entries exceeded the best check NHH 44. However, introgressed entries, namely, GISV – 201, TCH 1695, GISV 33 and AKH 0301 SB were *at par* with the check. Branching pattern contributes in seed cotton yield and thus routinely evaluated in breeding researches. There was variation in branching pattern among the Introgressed entries, with only seven, namely, IH 63, GISV 33, DWRH –1, NHIS 7, TCH 1653, TCH 1691, AKH 0504 had less monopodial and more fruiting branches. The introgressed derivatives presented highly significant variation for boll number and boll weight. Introgressed entries namely, AKH 0301 SB, AKH 0502, H 1098-1, NHIS 5, IS 30/68, IS 376/4/3, GISV 201, TCH 1691 and TCH 1695 bear more number of boll with average boll weight ranging from 2.9 – 3.5 g. AKH 0301 SB and H 974-1 had big bolls with average weight of 3.5 g. Among the entries, distribution of introgressed entries based on seed cotton yield per plant (g) and yield per ha (q) showed highly significant variation. Entries, viz., AKH 0301 SB, AKH 0303 SB, DWRH 1, IH-63, NHIS 5, GISV – 201, GISV – 33, GISV – 206, TCH 1695, H 1098-1 and H 974-1 transgressed the check and also general mean of population offering selection for desired introgressed entries. However, only five entries, namely, AKH 0301 SB, IH 63, H 1098-1, GISV 201 and TCH 1695 were identified to be high yielder at par with the best check.

Evaluation for biotic & abiotic stresses

Continuous rains in the initial growth period kept the incidence of sucking pest below threshold level. There was wide variation in reaction to sucking pest, with majority of entries falling in resistance to moderately resistant grade. Entries viz. AKH 0301 SB, AKH 0302 SB, IH 63 possessed highly resistant

score to all the three major sucking pests. Similarly as many as seven entries, namely, AKH 0304, MSH 11, NHIS 5, GISV 238, Rai 9, Rai 11-1 and Rai 53 were found to exhibit resistant score against sucking pest. TCH entries contributed from TNAU, namely, TCH 1648, TCH 1652, and TCH 1653 were highly susceptible showing injury grade IV with curling leaves symptoms.

Selected stabilized introgressed entries were evaluated against bollworm damage in le damage (%) under natural epiphytotic conditions. There was wide variation for percent locule damage with lowest damage of 9.2% observed in IS 376-4/1/2. Majority of entries showed heavy damage extending upto 27.5 %. Entries namely, AKH 0502, H 198-1, GISV – 33, NHIS 7, AKH 0303SB, H 974-1, IS 376/4/3 and IH-63 found to show low damage extending up to 15%.

Screening exercise was conducted on three commercially important foliar diseases namely, Alternaria leaf spot (ALB), Bacterial blight (BLB) and Grey Mildew (GM) and disease score of each entry is given in Table 5B adopting standard scale/ grade. The population was also classified into five different grades viz. disease free, resistant, moderately resistant, moderately susceptible and susceptible as per disease score. Though none of the entries were free from all three diseases, as many as, 6 entries were immune to grey mildew and resistant – moderately resistant to both alternaria leaf spot and bacterial blight.

Evaluation for fiber properties

There was highly significant variation for fiber quality traits among the introgressed derivatives. Fiber length (mm) ranged from 19.3 to 28.3 with general mean of 23.6. Five derivatives, namely, TCH-1648, TCH-1653, TCH 1695 AKH 0302 SB and GISV 201 had long fibre (25.9 – 28.3 mm) deserving critical evaluation for consistency in behaviour. Range in bundle strength tenacity ((g/tex) at 3.2 mm gauge) was highly variable in the sampled population ranging from 14.3 to 22.0 with general mean of 18.6. Among the evaluated entries only four entries namely, AKH 0302 SB, DSFH 1, TCH 1695 and TCH-1648 were identified to possess good bundle strength, while all remaining entries were low to average in bundle strength. Though the general mean for fiber fineness was 3.7 there was highly significant variation ranging from 2.9 – 4.7 micronaire. TCH 1648 had very fine fiber, while six entries namely, AKH 0303 SB, MSH 11, NHIS 7, TCH 1649, TCH 1653, TCH 1695 had fine fiber. AKH 0304 had coarse fiber. Entries, namely, IS 30/68, GISV 216, GISV 33, GISV 206 and IS 14/12 recorded excellent fiber uniformity score.

Attempts were made to identify entries possessing multiple traits of economic worth and the following deserves critical evaluation.

Although most of the TCH lines evolved at TNAU, had long to superior long staple length (24.2 – 28.3 mm) with fine to average fiber these lines, however, had average bundle strength with average uniformity ratio. Among these, TCH 1648 was identified to possess superior fiber quality having very fine fiber with fiber length of 28.3 mm and bundle strength of 20.4 g/tex but average uniformity ratio. TCH 1653 had very long and fine fiber but average bundle strength. TCH 1695 had fine fiber with good fiber strength of 20.9 g/tex and average fiber length of 26.6 mm. TCH 1691 and TCH 1649 however, recorded good fiber length and strength had average uniformity ratio and fineness. GISV 201 and GISV 206 evolved at Gujarat center, recorded good uniformity ratio with average length and strength. IS lines annexed by Nanded center, possessed short to medium fiber with low to average bundle strength but the uniformity ratio was good to excellent. Among the AKH lines donated by Akola centre, only AKH 0302 SB and AKH 0304 scored to have good fiber quality with average uniformity and coarse fiber. IH 35 though had good uniformity ratio had average fiber length and strength with coarse fiber. DSFH 1 had good fiber length and strength but average uniformity ratio and fiber fineness.

Among the introgressed entries developed at CICR, Nagpur Rai 11-1 had medium fiber length and strength with fine fiber. Rai 9 and MSH 11 recorded excellent fiber uniformity score with medium fiber length and strength.

Activity 2

Screening of segregating material from different crosses for yield, fiber properties, biotic stress and abiotic stress

Trial II (A) (*G. hirsutum*)

A total 75 segregating entries of introgressed material was raised to study further behavior of genotypes in terms of their yield performance and fiber quality parameters. During the crop season 2006-07, four F₂ segregating material received from 2 cooperating centers were included in the evaluation. Besides, promising 37 F₃, 16 F₄ and 11 F₅ segregating generations that were selected based on last years performance were raised to study their further behaviour. Along with these, 11 backcrosses attempted at Coimbatore were also raised for further agronomic evaluation. These test entries were evaluated in Non-replicated trial maintaining a minimum plant population of 50 plants/ entry along with three zonal checks, namely, NHH 44, LRA 5166 and Surabhi. Each entries was planted keeping row to row distance of 60 cm and intra-row spacing of 60 cm, adopting rod row unreplicated field layout. Individual plant selection in these segregating generations was practiced based on initial plant growth, plant type and other morpho-agronomic characters including fiber quality. These segregating populations were subjected to agronomic evaluation.

Screening of segregating material for yield parameters

Data indicated wide variation among the segregating generation of the crosses. The overall performance of F₂ segregating generation of G. Cot 16 × Stonville 20 was found to exceed the general mean. This cross exhibited heterosis for yield traits, bearing maximum number of bolls with average boll weight of 3.3g and per plant yield of 80g, yielding about 22 q/ha. F₂ segregating generation of TCHH 101103 and G. Cot 16 × NHIS 6 cross gave average performance.

Among the F₃ Segregating generation, NHH 03 × H 1117 was identified to be the best cross bearing 52 numbers of bolls with average boll weight of 3.3 g and single plant yield of 95.9 g which also exceeded the best check. Apart from these, plant selected from five crosses AKH 0302 × H 1098, GISV 203 × GSB 6, L 603 × L 755, GISV 203 × NH 194 and GISV 201 × TCH 1648 transgressed the check and also general mean of population offering selection for desired introgressed entries. Plant selected from cross GISV 201 × TCH 1653 had big bolls with average boll weight of 4.2g. The crosses involving *G. barbadense* var. Suvin, however exhibited heterosis for morphological characters gave poor plant yield.

Among the F₄ segregating generations, cross Rai × NH 545 was superior than the check in terms of yield contributing characters. This cross bears maximum numbers of bolls with an average boll weight of 3.2 g and average plant yield of 72.5g. The performance of this cross has improved over the years, although in second filial generation it did not perform well. Cross D7 × S7-1-2 also recorded highest average yield of 11.8 q/ha with average boll weight of 3.9g. Crosses, viz., Abadhita × MSH 345 and TCH 1649 × CNH 120 M also performed well but were not *at par* with the best check. However, the cross TCH 1649 × CNH 120 M performed consistently for three years.

Among the F₅ segregating generation, none of the entries was *at par* with the best check for yield; however, cross GISV 213 × MCU 5VT bear maximum number of boll with average boll weight of 3.2g and per plant yield of 102.4g. Abadhita × Rai, IS-376/4/2/15 × NHH 44 and Abadhita × TCH 2 gave yield above the general mean. Cross SPC 526-P1 had maximum boll weight of 4.2 g.

Eleven Backcross generations was obtained by backcrossing Introgressed crosses attempted at RAU, Sriganagar. The backcross generations exhibited wide variation for the yield attributing traits and as a whole gave poor performance. However, among the backcross generations, the performance of (IS 376/4/1 × RS 875) 3 × RS 875, (IS 376/4/2-15 × RS 875) 23 × RS 875 and (IS 376/4/1/24 × RS 875) × RS 875 was found to exceed the general mean. Backcross IS 376/4/2-15 × RS 875) 23 × RS 875 bear maximum number of bolls with average yield of 52.1g, while backcross (IS 376/4/1/24 × RS 875) × RS 875 bear big bolls with average boll weight of 3.1 g.

Screening of segregating material for fiber quality parameters

Fiber length and strength varied from 21.3 to 29.7 mm and 17.0 to 26.4 g/ tex, respectively. Uniformity ratio and fiber fineness also varied ranging from 46 to 55 % and 1.3 to 4.8 10⁻⁶ g/in, respectively.

Most of the TCH lines evolved at TNAU, had long to superior long staple length (22.4 – 28.6 mm) with fine to very fine fiber; these lines, however, had average bundle strength with poor to fair uniformity ratio. These lines were exploited to incorporate their fiber length and were also crossed to improve its fiber strength. Plants selected from cross GISV 201 × TCH 1653 had long fiber with strong bundle strength; the uniformity ratio and fiber fineness, however, was average. Among other crosses, only two crosses, namely, JK 276-4 × TCH 1699 and GISV 201 × TCH 1653 were identified to have multiple traits with long staple and strong fiber, uniformity ratio and fiber fineness was average. *G. barbadense* has markedly improved the fiber quality when used in different combinations. Plants selected from cross 8-6 P12×56 × Suvin and NHH 02 × Suvin had fine fiber with superior long and strong fiber but had average uniformity ratio.

Among F4 segregating generations, crosses MSH × NISD 3 and Abadhita × MSH 345 had strong and fine fiber with average staple length. The uniformity ratio was also good. F5 segregating generation of cross IS-376-4/2/15 × NHH 44 had very fine fiber with superior long staple length but average bundle strength and uniformity ratio. Abadhita × TCH 2 had good bundle strength and uniformity ratio but had coarse fiber and short staple length.

Activity 3: Introgression breeding for the improvement of tetraploid and diploid genotypes through conventional and non-conventional approaches

To fulfill the cited objectives, introgression breeding was carried out using a wide array of sources of resistance to major biotic and abiotic factors available in the gene pool maintained at Nagpur centre. During the year, 17 crosses were affected between the cultivated species using about 10 wild species & 6 races as pollinators. Information on pollinations made, bolls set, and percent success is tabulated in Table 1.3.1. This exercise was attempted from September through November. Boll set was good in crosses attempted in September-October when temperature was favourable.*+

Seventeen crosses involving *G. hirsutum* and *G. arboreum* cultivars and 10 wild species were attempted with percent success ranging from 13.5 to 51.9%. The percent success with B genome group was more compared to other genomes varying from 20.0 % to 48.4 %. This could be attributed to more pollen viability ranging up to 88.88%. *G. hirsutum* varieties were found to be more compatible with D genome group with percent success ranging from 18.2 to 40.7%. Cross compatibility was good in crosses involving *G. klotzianum* (D3-k) (40.7%), *G. barbadense* (AD₂) (39.1%) and *G. davidsonii* (D3-d) (29.4%). While *G. arboreum* varieties was found to be more compatible with B genome group with percent success ranging from 48.4% followed by D genome group with percent success ranging from 13.5% - 51.9%. Maximum number of bolls was set using *G. armourianum* (D2-1) as male parent with percent success of 51.9%.

7. MPKV, RAHURI

A1: Evaluation of the existing interspecific derivatives.

a) Common Trial I (Tetraploid cotton)

Details of the Experiment

Design	:	RBD (Two replications)
Entries	:	18+2
Plot size	:	Gross: 6.00 x 1.20 m ²
Spacing	:	60 x 60 cm ²
Fertilizer applied	:	80:40:40 NPK kg/ha
Soil type	:	Medium black
Sowing date	:	20/6/2006

The differences for seed cotton yield among 20 entries tested were statistically significant. The entry AKH-0501 (1383 kg/ha) recorded significantly highest seed cotton yield than the check LRA 5166 (1012 kg/ha), followed by AKH-0502 (1273 kg/ha). The mean halo length varied between 21.7mm (NISC-33) to 28.3mm(AKH-503).

b) Common Trial II: (Diploid cotton)

Details of the Experiment

Design	:	RBD (Two replication)
Entries	:	12+2
Plot size	:	Gross: 6.00 x 0.90 m ² Net : 5.40 x 0.90 m ²
Spacing	:	45 x 22.5 cm ²
Sowing date	:	20/6/2006

The differences for seed cotton yield among 14 entries tested were statistically significant. The entry RHRAC- 024 (1058 kg/ha) produced highest seed cotton yield followed by RHRAC- 032 (1016 kg/ha) than the check JLA-794 (780 kg/ha). The lint index (3.71) and mean halo length (26.5mm) was of high magnitude for Turab. The ginning out turn was higher for RHRAC-041 (39.68) followed by RHRAC-030 (39.20) and RHRAC-043 (39.05)

c) Tetraploid cotton (Introgressed derivatives)

Details of the Experiment

Design	:	RBD (Two replications)
Entries	:	18+2
Plot size	:	Gross: 6.00 x 1.20 m ² Net : 4.80 x 1.20 m ²
Spacing	:	60 x 60 cm ²
Sowing date	:	20/6/2006

The entry RHRHC- 061 (1094 kg/ha) recorded highest seed cotton yield followed by D1 x S7-1 (1089 kg/ha) and NISC-36 (1026 kg/ha) than the check LRA-5166 (778 kg/ha). The halo length variation varied between 24.0 mm (IGMH-15 F₂) and 27.5 mm (AKH-0302 x H-1098 F₃). The entry (IGM 100 x CWROK 165 F₃) x H 1098 F₃ exhibited highest lint index (4.87).

d) Diploid cotton (Introgressed derivatives)

Details of the Experiment

Design	:	RBD (Two replication)
Entries	:	12+2
Plot size	:	Gross: 6.00 x 0.90 m ² Net : 5.40 x 0.90 m ²
Spacing	:	45 x 30 cm ²
Sowing date	:	20/6/2006

The entry RHRAC- 046 (1010 kg/ha) recorded highest seed cotton yield followed by AH-10-3 x 4011 F₅ (934 kg/ha), IGMA-12 F₂ (912 kg/ha) and RHRAC- 047 (897 kg/ha) than the check Turab (564 kg/ha). The entry AH-10-3 x 4011 F₅ (934 kg/ha), exhibited highest lint index (3.66).

Activity A2: Screening of inter-specific derivatives

In all 73, single plant selections (F₅ generation) obtained from introgressed tetraploid cotton were evaluated during 2006-07. The seed cotton yield varied between 16.9 g (RHRIT-12) and 63.0 g / plant (RHRIT-24). Sixteen selections recorded significantly higher seed cotton yield over the trial mean of 33.9 g/ plant. The selection RHRIT-24 (63.0 g/plant) recorded highest seed cotton yield followed by RHRIT-15 (59.6 g/plant) and RHRIT-70 (58.5 g/plant) than the checks LRA-5166 (30.6 g/pl) and JLH-168 (33.2 g/pl). The boll numbers per plant varied between 14 (RHRIT-54) and 43 (RHRIT-47). The selection RHRIT-47 (43) recorded highest boll numbers per plant followed by RHRIT-15 (40) and RHRIT-2 (39).

Activity A3: Screening of inter-specific derivatives for biotic stress.

A) Screening against sucking pests and bollworm complex.

a) Common Trial I (stable genotype of tetraploid cotton)

The jassid population among different derivatives of tetraploid cotton ranged from 0.33 to 2.33 per 3 leaves with injury grade ranging from I to IV. Out of 20 entries including check, eighteen entries were found resistant as they recorded injury grade I. In case of locule damage, the rage of infestation varied from 22.5 % (H-974-1) to 34.5 % (AKH-0501 and AKH-0502).

b) Common Trial II: (stable genotype of diploid cotton)

The jassid population among different derivatives of diploid cotton ranged from 0.03 to 2.17 per 3 leaves with injury grade ranging from I to IV. Out of 14 entries including check, thirteen entries were found resistant as they recorded injury grade I. In case of locule damage, the rage of infestation varied from 22.0% (RHRAC-035) to 42.0% (RHRAC-033).

c) Tetraploid cotton (introgressed derivatives)

The jassid population among different derivatives of tetraploid cotton ranged from 0.50 to 3.00 per 3 leaves with injury grade ranging from I to IV. Out of 18 entries including check, seven entries were found resistant as

they recorded injury grade I. In case of locule damage, the rage of infestation varied from 19.0% (AKH 0302 x H 1098 F3) to 26.5% (RHRHC-061).

d) Diploid cotton (introgressed derivatives)

The jassid population among different derivatives of tetraploid cotton ranged from 0.01 to 1.00 per 3 leaves with injury grade ranging from I to IV. Out of 14 entries including check, all the entries were found resistant as they recorded injury grade I. In case of locule damage, the rage of infestation varied from 24.5% (IGMA-12 F2) to 42.5% (IGMA-11 F2).

B) Screening against major diseases.

a) Common Trial I (stable genotype of tetraploid cotton)

20 entries were screened for disease reaction under natural condition in field. Ten entries were found resistant to BLB, seven entries were found moderately resistant to BLB, the entry TCHH 35102 was susceptible to BLB and the entry TCHH 101103 was highly susceptible. The incidence of ALB and dahiya were not found.

b) Common Trial II: (stable genotype of diploid cotton)

14 entries were screened for disease reaction under natural condition in field. Three entries viz., RHRAC-021, RHRAC-024 and DWRa-05-1 were found disease free reaction to dahiya where as twelve entries were found resistant to dahiya. No incidence of ALB and BLB was observed.

c) Tetraploid cotton (introgressed derivatives)

18 entries were screened for disease reaction under natural condition in field. Entry AKH 0302 x H 1098 F3 was found disease free to BLB, twelve entries were found resistant to BLB and five entries were moderately susceptible. The incidence of ALB and dahiya were not found.

d) Diploid cotton (Introgressed derivatives)

14 entries were screened for disease reaction under natural condition in field. Seven entries were found disease free reaction to dahiya, five entries were found resistant to dahiya and two entries were found to susceptible to dahiya. No incidence of ALB and BLB was observed.

8. PDKV, Akola

Pest situation

Sucking pests:

The incidence of aphids was observed from 2nd week of July and continued till the end of crop season. Peak incidence of aphids was observed during the month of August and from 3rd week of November till the end (14.70 to 69.20/leaf) The incidence of jassids observed from last week of July till the end. Maximum during last week of September to 1st of October (1.33 to 1.50/leaf). The incidence of thrips was observed from 3rd week of August and continued till the end of crop season. Maximum during 2nd week of September (11.6/leaf). The population of mites and white flies was low through the crop season.

Bollworms

The infestation of *H. armigera* was observed from 1st week of September till last week of November in the range of 0.68 to 5.07% with maximum (5.07%) during 3rd week of September. The infestation of spotted bollworm was observed from 2nd week October till the end of crop season in the range of 1.54 to 25.96%. Maximum during 1st week of January (25.96%). The infestation of pink bollworm in green bolls was observed from last week of September till the end of crop season in the range of 5.03 to 85.51%. Highest during the month of December and January (47.24 to 85.51%).

Disease situation:

Bacterial blight was maximum in 2nd week of October. Similarly gray mildew was observed in 2nd week of October but intensity was very less. Necessary plant protection measures were undertaken for the management of these pests. Reddening of leaves was observed in some Bt cotton genotypes but intensity was very low. All the picking were completed in 3rd week of January 2007. On an average, the Kharif season of 2006 was satisfactory for cotton crop but low yield levels were observed compared to last year (2005-06).

Activity A1: Identification of sources of resistance against biotic and abiotic stresses and fibre properties.

During this year 26 genotypes including local checks AKH-8828 and PKV Rajat were grown to evaluate their yield performance, reaction to sucking pests and test their fibre properties.

Experimental details:

a.	No. of treatments :	26
b.	Design :	R.B.D
c.	Replication :	Two
d.	Date of Sowing :	06/07/2006
e.	Spacing :	Gross: 1.20 x 6.00m
f.	Plot size :	Net: 1.20 x 5.40m

Biotic stresses

Jassids: It was observed that 12 genotypes recorded resistant grade, 10 genotypes recorded moderately resistant grade and 4 genotypes recorded susceptible grade as compared to check AKH-8828 PKV Rajat (resistant grade)

Bollworm complex: 26 genotypes were evaluated on the basis of loculi damaged. The loculi damaged due to sbollworm complex in different genotypes ranged from 05 to 35.3%. the lowest locule damage for bollworm complex was noticed in IS 376-4-430-12 (0%) followed by L799 (6.0%), IS 376-4-1-68-1 (8.3) and NISC 33 (9.1%).

Pink bollworm: The infestation due to pink bollworm in terms of locule damage was studied in all 26 genotypes. The locule damage ranged from 0% to 25%. The highest locule damage was recorded in GISV 33 (25.1%) followed by GISV 206 (22.4%), LAP 10 (19.6%), TCHH 101-102 (19.3%) and H-1098-1 (16.8%) while lowest infestation was recorded in IS 376-4-1-30-12 (0%).

Activity: Screening of already available interspecific derivatives for biotic and abiotic stress and fibre traits.

Segregating genotypes received from different centers were evaluated. 13 are of F2 generation, 6 of F3 generation, 2 of F4 generation and 1 is of F3 generation. Desirable single plant selections have been made from each segregation population for evaluation during next year.

Activity: To effect crosses between wild and cultivated species.

Interspecific cotton breeding using wild species was carried out with two main objectives.

- 1.To transfer the desirable genes for resistant to different pests and diseases.
- 2.To transfer the desirable genes for fibre properties including ginning outturn.

During this year the 5 F1 plants of *G. hirsutum* x *G. anomalum* were maintained. These plants have been utilized for large no. of crosses by using both as ovule and as male parent on both diploid and tetraploid cotton, but no setting were observed. Hence, their cytology and colchicines treatment will be undertaken.

The following derivatives of interspecific combinations were studied and selection of desirable types have been made for,each selected line of respective combinations for evaluation during coming season.(Table-1.3.2)

Table 1.3.2 : Interspecific combinations studied for selection of desirable types.

Sl.no	Interspecific combinations	No. of lines studied
1	<i>G.arboreum</i> x <i>G. herbacium</i>	80
2	<i>G.arboreum</i> x <i>G. anomalum</i>	8
3	<i>G.arboreum</i> x <i>G. raimondii</i>	12
4	<i>G.arboreum</i> x <i>G. thurberi</i>	4

5	<i>G. hirsutum</i> x <i>G. barbadence</i>	16
6	<i>G. hirsutum</i> x <i>G. barbadence</i>	70
7	<i>G. hirsutum</i> x <i>G. aridum</i>	55
8	<i>G. hirsutum</i> x <i>G. anomalum</i>	7

Activity A4: Evaluation of identified existing interspecific derivatives and new F1s

Under this activity, the following interspecific derivatives has been grown and evaluated during this year for selecting desirable types.

G. hirsutum x *G. raimondii* 50 lines

G. hirsutum x *G. aridum* 48 lines (B)

G. hirsutum x (*G. anomalum* x *G. thurbei*) 85 lines

The top ranking 15 genotypes of the interspecific combinations of *G. hirsutum* x *G. raimondii* for staple length and ginning outturn are presented in the Table 1.3.3.

Table 1.3.3 :-Staple length and ginning outturn of *G. hirsutum* x *G. raimondii* derivatives.

Sr. No	Entry Name	Halo length(mm)	Ginning %
1	<i>G. hirsutum</i> x <i>G. raimondii</i> SPS 24-3	29.3	35.6
2	<i>G. hirsutum</i> x <i>G. raimondii</i> SPS 33	28.3	37.3
3	<i>G. hirsutum</i> x <i>G. raimondii</i> SPS 22	28.3	37.6
4	<i>G. hirsutum</i> x <i>G. raimondii</i> SPS 9-1	30.6	36.5
5	<i>G. hirsutum</i> x <i>G. raimondii</i> SPS 6	28.3	38.2
6	<i>G. hirsutum</i> x <i>G. raimondii</i> SPS 4-1	30.3	34.2
7	<i>G. hirsutum</i> x <i>G. raimondii</i> SPS 9-1	29.0	36.5
8	<i>G. hirsutum</i> x <i>G. raimondii</i> SPS 28	30.0	35.3
9	<i>G. hirsutum</i> x <i>G. raimondii</i> SPS 21	29.0	36.2
10	<i>G. hirsutum</i> x <i>G. raimondii</i> SPS 53	31.0	33.5
11	<i>G. hirsutum</i> x <i>G. raimondii</i> SPS 17-2	28.3	37.2
12	<i>G. hirsutum</i> x <i>G. raimondii</i> SPS 5	30.6	36.5
13	<i>G. hirsutum</i> x <i>G. raimondii</i> SPS 7-14	29.6	37.0
14	<i>G. hirsutum</i> x <i>G. raimondii</i> SPS 49	31.0	35.0

9. MAU, NANDED

Activity A1 : Identification of sources of resistance against biotic and abiotic stresses and fibre properties.

Experimental details:

No. of Crosses	:	74
No. of replications	:	Non-replicated
Population size	:	40 plants /entry
Spacing (cm)	:	60 x 60
Sowing date	:	06.07.2006

The segregating population of the cross Abhadita x Surat- 4 exhibited highest seed cotton yield (68.16 g / plant) with high GOT (39.15 %) followed by the genotypes TCHH-101104 (62.12 g / plant) seed cotton yield with 37.55 % ginning outturn.

The highest fibre length was observed in entry TCHH-35102 (30.5 mm) followed by the segregating population of the cross LK-861 x H-96 (29.5 mm). The maximum no of single plant selection was made from NISC-37. Wide range for boll weight was observed in entries NISC-37 and IGMA-12 (3.15 to 4.20 g / boll). Above selected single plants will be evaluated in *Kharif* 2007 by plant to progeny.

Activity A 2 : Screening of already available interspecific derivatives for fibre properties and biotic stresses.

Experimental details:

No of entries	:	21+2 =23 (Checks NH-545 & NH-615)
Design	:	R.B.D.
No of replications	:	Two
Plot size	:	Two rows of 6 m length (10 dibbles/row)
Spacing (cm)	:	60 x 60
Date of sowing :		07.07.2006

Genotypes LAS-10 (2383.3 kg/ ha), DWR a 05-02 (2277.8 kg/ha) and DWR a 05-01 (2222.2 kg/ha) had recorded significantly superior seed cotton yield over the checks NH -545 (1380 kg/ha) and NH-615 (Local check 1638.8 kg/ha). However, the genotypes L -799 (2027.8 kg / ha) and IS-376-4-9-68-2 (2011 kg / ha) were significantly superior over the check NH-545. The highest GOT was recorded by the genotype GISV-206 (40.72 %) followed by GISV-33 (40.41 %). Genotypes LAS-10 and DWR-H-05-03 exhibited multiple disease resistance for Bacterial blight, Alternaria and Grey mildew diseases. In all, four genotypes were disease free and four were found resistant to Bacterial blight. Whereas, three genotypes were found resistant to Alternaria and seventeen were showed disease free reaction to Grey mildew. For entomological screening total thirteen genotypes were tested. Significantly lowest jassid incidence was recorded by LAS- 10 (2.5) followed by RHRAC-33 (2.70) over check NH-545 (3.90). For Aphid infestation, seven genotypes exhibited significantly lowest infestation over check NH-545 (10.90), amongst which genotype H-1098-1 (6.90) exhibited lowest Aphid infestation followed by LAS - 10 (7.20), L-799 (7.30), IS-376-4-1-9-68-2 (8.00), RHRAC -33(8.50), IS- 376-4-1-30-12 (8.75) & L- 798(9.30).

For thrips and whitefly infestation only two genotypes viz., LAS-10 and RHRAC-33 could show significantly lowest incidence over check NH-545. Thus genotypes LAS-10 and RHRAC-33 exhibited multiple sucking pest resistance to all the mentioned pest complex.

In the bollworm infestation evaluation, only one genotype (RHRAC- 33, 6.85) exhibited significantly lowest infestation of bollworm to fruiting bodies whereas nine genotypes could show significantly lowest bollworm infestation to locule.

In general study, RHRAC-33 exhibited multiple pest resistance to sucking pests as well as bollworm infestation.

Other activities:

Evaluation of genotypes developed by using apomictic gene

Derivatives of 10 three-way hybrids developed by Cotton Research Station, Nanded were evaluated during *Kharif* 2006-07.

Experimental details:

No of entries	:	10+1 (PHH-316 check)
Design	:	R.B.D.
No of replications	:	Two
Plot size	:	Two rows of 6 m length (10 dibbles/row)
Spacing (cm)	:	60 x 60
Date of sowing	:	06.07.2006

The genotypes NAP-14 (1845 kg/ha) and NAP-13 (1720 kg/ha) had recorded significantly superior seed cotton yield over check PHH-316 (1538 kg/ha). NAP-14 had recorded highest staple length (29.0 mm) as compared to other genotypes.

Evaluation of stable Apomictic entries in multilocation trial

In this experiment, Three genotypes viz., NAP -5, NAP-7 and NAP-10 derived from three way crosses using Apomictic gene were tested along with other nine genotypes at two locations i.e. Parbhani and Nanded in MAU trials (MAU-05b1 set-II).

NAP-7 had recorded 19.24 % more seed cotton yield over check PHH-316 followed by NAP-10 (11.71 %). The genotypes NAP-7 had recorded highest fiber length (30.3 mm), micronaire value (3.8) with 21.1 g/tex strength. The genotypes NAP-5 had recorded highest strength (21.3 g/tex) as compared to check PHH-316 (19.2 g/ tex).

Evaluation of IS lines developed by CRS, Nanded.

Experiments details	:	
No of entries	:	6 + 1 (NH-545 check)
Design	:	R.B.D.
No of replications	:	Three
Plot size	:	Two rows of 6 m length (10 dibbles/row)
Spacing (cm)	:	60 x 60
Date of sowing	:	06.0706 at Nanded, 01.0.06 at Parbhani

Genotypes IS-376-9-68-2 exhibited highest seed cotton yield (1643.97 kg / ha) and staple length of 26.40 mm with 36.50 % ginning outturn. The line IS-376-4-1-30-12 (26.40 mm) and IS-376-4-1-2-29 (25.02 mm) exhibited superior mean staple length over check NH-545 (24.14 mm).

Important contribution of Cotton Research Station, Nanded is Development of Introgressed Strain (IS-376-4-1-14-21), which is registered at NBPGR- New Delhi with INGR-No 04106 dated 23 December 2004. An important characteristic of this is resistant to sucking pest complex.

NAU, SURAT

Due to unprecedented floods in Surat during 8th to 11th August caused heavy damage to all experiments. The mortality was 70 to 100% in all the trials. However, efforts were made to save the genetic material with available seeds. Despite these efforts, plant population and growth were heterogeneous; therefore all the experiments were vitiated.

Evaluation of germplasm for yield and fiber quality.

The trial was laid out at different locations with different objectives, Viz., Surat for yield, fibre quality and biotic stress, at Achhalia for grew mildew and fiber quality and at Thasra for root rot disease and fiber quality.

Achhalia: Numericaly, the entry 40-2 (2133 Kg/ha) recorded maximum seed cotton yield followed by Girija (1848 Kg/ha) as against checks G.Cot-10 (1103 Kg/ha). The maximum lint yield (850 Kg/ha) recorded by the genotype Girija. The maximum GOT value 46.0% recorded by Girija as against 36.0% of G.Cot-10. Grey mildew disease was not observed during the season.

Activity : 2. Screening of already available interspecific derivatives for superior fibre properties, biotic and abiotic stresses

Trial: 4 Evaluation of multispecies derivatives for different biotic and abiotic stresses, yield and fibre quality.

The trial was conducted at different locations with different objectives.

Achhalia

The trial was conducted with an objective to isolate the genotypes with resistance against grew mildew disease and fibre quality. Numericaly, the entry GISV-216 (2278 Kg/ha) recorded maximum seed cotton yield followed by GISV-248 (2174 Kg/ha) and GISV-103 (2013 Kg/ha) as against checks G.Cot-10 (1459 Kg/ha) and G.Cot-16 (1350 Kg/ha). Top yielding genotypes maintained their superiority in lint yield (875 Kg/ha) also. The maximum GOT value 42.8% recorded by GISV-103 as against 36.4% of G.Cot-10 and 32.6% of G.Cot-16. Grew mildew disease was not observed during the season.

To effect crosses between wild and cultivated species, tetraploid and diploid species.

During 2006-07 four (*G.thur* x *G.rai*), (*Co2* x *G.sturtii*), (*G.67* x *MOCCO*) x *G.Cot-11* and (*Sanjay* x *G.thur*) were crossed with *G.Cot-10*, *G.Cot-16*, *G.Cot-11*, and *Digvijay*, but no crossed boll were harvested, but the reciprocal cross of these wild species with *Digvijay* the following cross boll are in green boll stage

- (1) *Digvijay* x {(*G.67* x *MOCCO*) x *G.Cot-11*}
- (2) *Digvijay* x *G.aridum*
- (3) *Digvijay* x (*G.thur* x *G.rai*)
- (4) *Digvijay* x (*CO2* x *G.sturtii*)

Screening under drought and water logging conditions.

Evaluation of multispecies derivatives for different biotic and abiotic stresses, yield and fibre quality Bharuch

None of the entries were significantly superior to check G.Cot-16 (1624 Kg/ha) in seed cotton yield.

Evaluation of germplasm for abiotic stresses.

Bharuch

Only one genotype, IH-315 (1271 Kg/ha) was significantly superior to check G.Cot-10 (755 Kg/ha) in seed cotton yield. The genotype IH-315 found tolerant to drought.

Crossing Programme

The crossing programme was taken during 2006-07 with an object to produce high yielding hybrids with resistance against boll worm and sucking pests in tetraploid cotton and diploid cotton. The potential parents of released hybrids, viz., G.Cot-10, G.Cot-100, BC-68-2, G.Cot-16, and GISV-17 were used as female parents and male parents was GISV-203, GISV-103, GISV-69, GISV-208, GISC-95-10, SA-169, SA-1756, EC-232177. The cross bolls were harvested for further breeding programme.

JNKVV, KHANDWA

Activity 1 (A)

Evaluation of introgressed *G. hirsutum* materials received from different centers

Number of entries	:	11
Number of replications	:	3
Plot Size	:	4 rows of 6 m each
Spacing (cm)	:	60 x 60Cm
Date of sowing	:	1/7/06

Activity 1 (B)

Evaluation of introgressed *G. arboreum* / *herbaceum* materials received from different centers

Number of entries	:	7
Number of replications	:	3
Plot Size	:	3 rows of 6 m each
Spacing (cm)	:	60 x 60cm
Date of sowing	:	3/7/06

Activity 2 To evaluate the cultures of *G. hirsutum* derived from introgressed material developed at this center

No of Materials	:	21
Row length	:	6m
Spacing	:	60x60cm
Date of sowing	:	4/7/06]

Activity 3

Single Plant Selections for plant type, yield, and resistance to biotic and abiotic stresses and fibre qualities

Total SPS : 55 (Selections made for SCY and Quality).

All the results are depicted in the the tables (Tables 11A – 11J)

SOUTH ZONE

LAM, GUNTUR

Season and Crop condition at RARS, Lam

Activity A1: Identification of sources of resistance against biotic and abiotic stress and fibre Properties.

A total 26 introgressed genotypes including 4 checks (2 checks for *G. hirsutum* and 2 checks for *G. arboreum* entries) received from different centers were evaluated. The results indicated that the yield and its contributing characters were statistically significant. The highest seed cotton yield was recorded in L-798 (254 g/plant) followed by L-799 (240 g/plant), NISC-34 (206 g/plant). The seed cotton yield ranged from 87 to 254 g/plant. Ginning out-turn ranged from 23.6 to 35.3 %. Highest ginning out-turn was observed in DWRA05-1 (35.3%), followed by GISV-33 (35.0%) and H-1974-1(34.2%). Boll weight ranged from 3.1 to 4.9 (g). Highest boll weight was recorded in GISV 33 and GISV203 (4.9g) followed by L-799 and NISC-35 (4.8 g). Highest 2.5% span length coupled with high strength was observed in L-798 (29.8 mm, 21.3 g/tex).

None of the entries were found resistant to the sucking pests and boll worms. But some of the entries viz., GIDV -33, GISV-203, H-1998-1, L-798, L-799, AKH-05-04 and IS-376-4-1-30-12 were found to be moderately resistant to jassids. Regarding *G. arboreum*, all the entries were moderately resistant to jassids. Percentage of damaged bolls was low in *G. arboreum* entries when compared to *G. hirsutum* entries.

A total of 12 IGM interspecific derivatives received from different cooperative centres were evaluated. Yield and its attributing characters were found to be significant. Highest seed cotton yield per plant was recorded in TCHH 101103 (248 g/plant) followed by NHH0302P2 X H-1117 (244 g/plant), TCHH 35105 (227 g/plant) and NISC-36 (226 g/plant). IGMHH -15 recorded highest boll weight (5.3 g) flowed by GISV 203 X GSB-6 (5.2 g), Gcot-12 x Stoneville (4.9 g), AKH-0302 and NISC-37 (4.8 g). More number of bolls recorded in IGMHH-12, IGMHH-13 and NISC-36 (73 bolls/plant). Highest 2.5 % span length coupled with high bundle strength was observed in D7 x S7-1-2 (30 mm, 20.8 g/tex) followed by TCHH 10103 (29.1mm, 20.8 g/tex) and IGMHH-15 (29 mm, 21.4 g/tex).

All the interspecific derivatives were moderately resistant to jassids and white fly. Regarding boll worms damage, NISC -37 recorded lowest boll damage (1.77 %) compared to other entries. However, this has to be confirmed in the ensuing season.

Activity A2 : Screening of already available interspecific derivatives for biotic and abiotic stresses and fibre traits

Target: Evaluation of the interspecific derivatives for yield performance and abiotic stresses.

A total of 34 segregating populations of inter specific derivatives were raised to study the behavior of genotypes resistance to biotic stress and fibre quality traits. The highest seed cotton yield was recorded in LK-861 X H-96 (195 g/plant) followed by JK-276-4 x Mocco (195 g/plant), Abhadita X Rai F3 (193 g/plant) and Abhadita X MSH 345 F3 (193.0 g/plant). Highest 2.5 % Span length coupled with high strength was observed in L- 604 X Palmeri (29.86 mm , 22.7 g/tex) flowed by Abadita x TCH-3 (27.92 mm, 21.8 g/tex) and highest bundle strength was recorded in (Gcot 10 X GISV 61)x RS-875 (24.2 g/tex)

12 genotypes recorded resistant grade, 15 genotypes recorded moderately resistant grade, and seven genotypes recorded susceptible grade. Regarding bollworm incidence the entry HD 463 and L 603 X Somalense F2 have recorded nil incidence of square and boll damage. However it has to be reevaluated in the ensuing crop season.

Activity-3

The following crosses (F₁s) were effected utilizing wild species/races with locally adoptable cultivars during 2006-07.

Name of the cross	Traits aimed for the improvement
(L-796 2005 X Palmeri) Palmeri	Sucking pests and boll worms
(L 602X L 603)X Palmeri	Sucking pests and boll worms
(L-798 X Palmeri) X Palmeri	Sucking pests and boll worms
(L-799 X Palmeri) X Palmeri	Sucking pests and boll worms
L-798 X Afican	Drought tolerance
L-796X Bengalense	Pink boll worm, <i>Helicoverpa</i>
L-799 X Anomolum	Fibre quality improvement, boll worm and sucking pest tolerance and Bacterial blight
L-755X Anomolum	Fibre quality improvement, boll worm and sucking pest tolerance and Bacterial blight
L -765X Thurberi	Fibre quality improvement and boll worm and sucking pests tolerance
L- 763 X Bengalense	Pink boll worm, <i>Helicoverpa</i>
L-788 X Anomolum	Fibre quality improvement, boll worm and sucking pest tolerance and Bacterial blight
L-768 X Palmeri	Sucking pests and boll worms

A total of 32 wild crosses effected during 2005-06 utilizing wild species / races with locally adoptable cultivars were evaluated during 2006-07. The results indicated that, highest seed cotton yield was observed in NDLH-1678 x Bengalense (245 g/plant) flowed by HS-267 x Palmeri , csh-35 x Palmeri, (NDLH-1678 x L-755) x Palmeri, L-604 x Thurberi (220 g/plant). High 2.5 % span length and bundle strength was recorded in HYP-152 X Thurberi (33.1 mm, 21.7 g/tex) flowed by L-603 x Thurberi (31.0 mm, 20.3 g/tex) and CSH-35 x Talmeri (30.1 mm, 20.8 g/tex).

Activity 4 : Evaluation of identified existing interspecific and new F₁s for superior trait and back crossing to the adopted genotypes

Study of interspecific crosses (F₁s) for superior traits during 2006-07

A total of 39 F₁ hybrids were evaluated for yield and yield attributing characters. The results indicated that, the yield and its attributing characters were found statistically significant. The entries viz., LAIHH-17 (260g/plant) recorded highest seed cotton yield per plant followed by LAIHH -10 (256 g/plant) and LAIHH-2 (220g/plant). LAIHH-25 recorded highest boll weight (5.2 g) followed by LAIHH – 27 and LAIHH-29 (5 g). Highest 2.5% span length coupled with high bundle strength was recorded in LAIHH-17 (32.8 mm, 23.6 g/tex), followed by LAIHH-11 (31.9 mm, 24.1 g/tex), LAIHH-5 (31.3 mm, 20.4 g/tex) and LAIHH-19 (31.4 mm, 20.7 g/tex).

Technology Developed:

The following lines / hybrids identified and developed at this centre are presented here :

S.No	Name of the entry	Salient features
<i>Gossypium hirsutum</i>		
1	L-755	High Yielding, highly adaptable, tolerant to Jassids , white fly, Cercospora leaf spots. Resistant to Black arm disease and CLCV virus. Entry already completed minkit testing also and ready to release.
2.	L-798	High yielding, highly adaptable, moderately tolerant to Jassids and white fly. Resistant to black arm disease
3.	L-799	High yielding, highly adaptable, moderately tolerant to Jassids and white fly. Resistant to black arm disease with desirable fibre qualities.
4.	LAIHH -10	High yielding, tolerant to Jassids and white fly and containing desirable fibre qualities.

5.	LAIHH-17	High yielding, tolerant to Jassids and white fly and containing desirable fibre qualities.
<i>Gossypium arboreum</i>		
6.	LAS-10	High yielding, highly adaptable, Resistant to Jassids ,white fly, moderately resistant to boll worm with superior fibre qualities

UAS, DHARWAD

IPS Hirsutum Trial

33 genotypes developed from the introgressed materials received from various centres, which have been selected for superior fibre qualities, intermated and stabilized for four generation are evaluated under replicated trials. The entry HD-219/08 x PA 3041 IPS 2 recorded highest boll weight of 4.5gm and also highest seed index of 10. Highest GOT % of 40 is observed in the entry Abadhita x MSNP-53 IPS 1 and has also recorded highest lint index of 6.00. Though none of the genotypes have produced significantly higher seed cotton yield compared to check Sahana, the genotype 376/412-19 x Rs-2013 IPS-1 produced maximum seed cotton yield of 1873.68 kg/ha which is numerically superior to the check Sahana (1722.05 kg/ha).

Hirsutum Trial – II

Crosses between selected cultivars and the F₂ segregants based on yield and fibre qualities and advanced were evaluated this season. 13 genotypes including Sahana, Surabhi and MCU-5 were evaluated under RBD with two replications. Three entries Abadhita x Surat 5 P2 (1883.67 kg/ha), LRA-5166 x MSH-345 (1991.34 kg/ha) and Abadhita x TCH-2 (19480.05 kg/ha) have recorded significantly superior seed cotton yield over check MCU-5 (1209.9 kg/ha). These entries are also numerically superior for seed cotton yield compared to check Sahana and Surabhi. Highest seed index of 10 and lint index of 6.05 was observed in entry (G. cot -10 x GISV -79) x Rs-875 P.

An exercise was done to improve the selected parental lines through introgression breeding. Superior F₂ segregants were advanced based on per plant yield and fibre quality. In the F₃ generation of introgression crosses using races like Moralli, Rachmondii, Palmeri, Puntatum etc., 17 entries including Sahana (check) were evaluated under replicated trials. Entry DC-57 x Moralli recorded highest boll weight (4.78 g) and also highest seed index (9.00). None of the entries were observed to be significantly superior for seed cotton yield over the check Sahana. Highest GOT % of 39.30 and highest lint index of 5.18 and also good boll weight of 4.70 gm was observed in (DC-59 x Richmondii) x CPD 420 P2.

Common *hirsutum* Trial

This trial consists of entries contributed by co-operating centers for the year 2006-07. 20 genotypes including check Sahana were evaluated under RBD with two replications. Among the test entries, four entries AKH-0503 (2065.71 kg/ha), DWR H05-1 (2142.30 kg/ha), L-799 (2232.21 kg/ha), GISV-33 (2253.30 kg/ha) recorded numerically superior seed cotton yield over the check Sahana (1922.30 kg/ha). However none of the entries have recorded significantly superior seed cotton yield over the check sahana. Entry GISV-206 has recorded highest GOT % of 38.5. Average GOT % observed is 36.04 % ranging from 33.3 percent (NISC-33) to 39.5 percent (GISV-206).

Hirsutum Trial – III

Under this trial eleven genotypes were evaluated under replicated trial. Genotypes Arb x MSH 346-1 recorded highest boll weight of 4.6 gm, and also recorded seed cotton yield of 2050.17 kg/ha which is on par with check Sahana and also good lint index of 5.22. Highest GOT% of 39.30 was observed in Arb x W-12. However, none of the genotypes produced significantly superior seed cotton yield compared to check Sahana (2096.24 kg/ha).

Advanced Common Trial - I

During the year 2005-06 upon evaluation of entries received for common trial, superior entries have been re-evaluated in replicated trial during 2006-07. 21 genotypes including Sahana (check) were evaluated under

randomized block design with two replications. Among 22 entries, one entry DWRHIR-1 (1960.82) has recorded seed cotton yield numerically superior over check Sahana. But none of the entries have recorded significantly superior seed cotton yield over the check. Entries L 797 and L 796 have recorded highest boll weight of 4.9 gm. and highest GOT% was observed in L797.

Common *arboreum* Trial

Seven *arboreum* genotypes contributed by co-operating centers and check DLSa 17 were evaluated under replicated trial. AKS 0404 (790.88 kg/ha) recorded significantly superior seed cotton yield over the check DLSa 17 (632.65 kg/ha). Entry AKA 0404 along with high seed cotton yield, recorded highest boll weight of 2.7g and highest seed index and good GOT (%) of 37.7.

Evaluation of F₂-F₃ *hirsutum* lines

Of the 16 F₃ populations advanced from F₂, IPS were done for different desirable characters. Also on population basis the seed cotton yield ranged from 305.5g to 683.09. Mean boll weight observed is 4.09 ranging from (G.cot - 16x5 Stonville – 20 F₂). Genotypes ASC 40302 x 41098 F₃ which recorded highest yield of 683 gm per row has also recorded high boll weight of 4.7 gm. A total of 54 IPS were done in this season.

Evaluation of F₂ IPS *Hirsutum* lines in F₃ generation tab 9

F₃ lines advanced from IPS in F₂ generation of the 19 TCHH 10235 P2 recorded highest seed cotton yield of 715g per row and also highest boll weight of 5.2g promising entries L-603 x L-755 P1, GISV-1 x IH 35, TCHH 10235P, TCHH 10326P, JK-276-4 x TCH-699 p₂ PF x CH 150 gave > 600 gm/ha seed cotton yield. Two entries had > 5gms, 2 entries > 4.5 and 7 entries >4 g boll weight. A total of 51 IPS were done in this trial.

Improved *arboreum* selection evaluated in replicated trial

Under this trial 15 genotypes including checks viz., DLSa 17 and PA 225 were evaluated under RBD with two replications. Genotypes Dela-6 (936.29 kg/ha), Dela-5 (939.07), AKA 0312 (947.94 kg/ha) and Dela-2 (939.60kg/ha) observed to be numerically superior for seed cotton yield over the checks DLSa-17 (933.51 kg/ha) and PA 225 (47.49 kg/ha). But none of the entries were significantly superior for seed cotton yield compared to both the checks. Average GOT observed is 34.87% ranging from 31.0 percent to 36.7 percent. Maximum boll weight of 2.6g was recorded in Dela-6 which also has recorded high yield and highest seed index of 7.

Diploid species improvement programme

In an effort to improve the fibre quality and diversity, the diploid germplasm wild species and races have been utilized. The distant crosses in F₂ and F₃ generations have been screened for identification of desirable genotypes. These 15 selections and DLSa-17 (check) were evaluated under replicated trial. Genotype from the cross indicum x F₁ GMP 1 (883.56 kg/ha) was observed to be numerically superior for seed cotton yield over the check DLSa-17 (859.70 kg/ha). and also recorded good GOT (%) of 34.30. However, none of the genotypes produced significantly superior seed cotton yield over the check DLSa-17 (859.70). However as these belong to *G. herbaceum* entries need to be compared with DDhC-11.

Evaluation of *arboreum* stabilized IPS entries in replicated trial.

Under this trial 8 genotypes were evaluated under RBD with two replications. Genotypes Sarvottam x PA – 405 IPS 53 (27g) recorded highest boll weight. However, none of the genotypes recorded significantly superior seed cotton yield over the check DLSa-17.

Evaluation of intra-*hirsutum* hybrid combinations

F₁s produced in the previous year by intermating different genotypes selected in introgressed populations and were evaluated in replicated trials. Among the 33 entries including checks viz., DHH-11 and Bunny, entry HH-26 (2089.02 kg/ha) recorded significantly superior seed cotton yield compared to both the checks DHH-11 (1404.15 kg/ha) and Bunny (1560.66 kg/ha). This entry HH-26 has also recorded good GOT of 39.2 per cent.

Two entries HH-14 and HH-21 are numerically superior for seed cotton yield over both the checks DHH-11 and Bunny (Table 13). HH-2 and HH-27 had maximum seed index of 9.

CICR, COIMBATORE

Screening and evaluation of inter-specific derivatives, germplasm lines and other breeding materials for biotic and abiotic stresses and fibre properties

In two separate common trials, 18 stable introgressed lines in *G. hirsutum* and nine lines in *G. arboreum* obtained from various cooperating centres were evaluated for yield and other characters along with check varieties. The crops are in advanced stage of boll bursting and so far one picking has been completed in *G. hirsutum* and two pickings were completed in *G. arboreum*. In case of *G. arboreum* lines, the highest yield was recorded in the check variety DLSA 17 with 1257 kg/ha followed by IGMA 12. The culture IGMA 12 also had big bolls with 3.8 g/boll as compared to 2.8 g/boll recorded in the check variety. The culture is also characterized by high lint index (7.2 g) as well as seed index (14.4 g). The highest ginning outturn of 54.7 % was recorded in the culture IGMA 1.

Select germplasm lines were evaluated in a station trial along with Sumangala and Surabhi as check varieties and the data was recorded on various agronomic and yield characters. In this trial, the highest seed cotton yield was recorded in Sumangala (1758 kg/ha) followed by ICGH 722-1. This germplasm line is also characterized by high ginning outturn (38.6 %). Though the yield was poor in ICGH 218, the line had the highest boll weight (6.8 g), lint index (7.5 g) and seed index (13.8 g).

Apart from these trials, some of the near stable introgression derivatives with superior yield and fibre quality were evaluated in a replication station trial. In this trial, the highest seed cotton yield was recorded in Sumangala (2442 kg/ha) followed by MM - 02 - 6 - 1 with 2300 kg/ha. The long staple check variety recorded a mean seed cotton yield of only 1197 kg/ha. Most of these cultures have very good fibre quality in terms of 2.5% span length, bundle strength and micronaire. Several cultures had more than 28 mm fibre length and fibre strength of above 25 g/tex.

Advancement of the introgressed materials along with identification of sources for desirable characters in their respective stations

Several superior progenies have been selected morphologically from segregating population and advanced for further evaluation and utilization in breeding programme. The performance of select F3, F4 and F5 plants are furnished in Tables 13F-13H). In case of F3 plants, yield per plant ranged between 48 and 122 g/plant with the mean being 83.6 g/plant. In an interspecific derivative the 2.5% span length was as high as 37.3 mm. In case of F4 plants, the yield ranged between 66 and 154 g/plant with a mean seed cotton yield of 102.7 g/plant. Several plants had more than 30 mm of fibre length and as high as 32.1 mm fibre length was recorded in TCH 1649-8. Similarly, several derivatives had better fibre strength and upto 27.0 g/tex was recorded in Abadhita X Rai [F3]-[6]. Similarly, in case of F5 also, several plants were observed to have better fibre quality. The yield levels as high as 130 g/plant were recorded in IH 63 [MR] - 8 - [1]. Fibre length of 33.9 mm (IH 63 [MR] - 8 - [3]) and strength of 27.8 g/tex (TCH 1691 -7 - [5]) was observed to be the highest recorded value in these progenies.

TNAU, Coimbatore

Screening and evaluation of inter-specific derivatives, germplasm lines and other breeding materials for biotic, abiotic stresses and fibre quality

In all centres advancement of the introgressed material along with identification of sources for desirable characters in their respective stations

16. OUAT, Bhowanipatna

The selved seeds of twelve single plants selected for tolerance to aphids obtained from segregating generations of different centres were sown for seed multiplication in observation strips. The results reveals that the seed cotton yield varied from 1740 kg/ha (HGMS-1 X NHIS-2-2) to 2390 kg/ha (PAIG-8 x HD-123-1) with the mean being 2140 kg/ha. The staple length of the entries ranged from 25.4 mm (NHIS-2X H-1117-2) to 30.3 mm (NHIS-2X H-1117-1) with the mean being 27.5 mm. The fibre strength varied from 20.2 g/tex. (HGMS-1 X

NHIS2-2) to 23.5 g/tex. (GISV-203 X GISV-178-1) with a mean of 22.2 g/tex. Considering the fibre quality parameters and tolerance to aphids the introgressed genotypes i.e. NHIS-2 X H-1117-1, PAIG-8X HD-123-1 and GISV-203 X GISV-178-1 are found to be most promising. These genotypes will be further evaluated during kharif 2007-08.

Objective 4: Evaluation of introgressed genetic material for desirable traits and utilization of these in transferring to the superior agronomic based genotypes.

Activity 1: Evaluation of identified existing inter-specific derivatives and new F₁s for superior traits and back crossing to adopted genotypes.

Experiment – 1 : Common evaluation trial

Twenty-three introgressed lines obtained from different centres were evaluated for superior fibre quality parameters and seed cotton yield.

Design	: RBD
Replication	: 3
Spacing	: 90 cm X 60 cm
No of Rows	: 2
Entries	: 23
Fertilizer dose	: 90:45:45
Date of sowing	: 12.07.2007

The results reveals that entries like AKH 05-6, H-1098-1, NISC-35, and H-974-1 recorded highest strength of 27.3, 26.7, 26.4 and 26.2 respectively. These entries will be sown in replicated trial in kharif 2007-08 for multiplication of their seeds and for further varietal evaluation and utilization in future breeding programs for development of high strength varieties /hybrids. These will be maintained as high strength germplasm cultures. Considering both yield and fibre quality parameters only one entry i.e. H 974-1 proved to be the most promising culture exhibiting seed cotton yield of 2229 kg/ha with fibre length 31.1 mm, strength 26.2 and micronaire of 4.2 which is mostly desired by the industry .