# ANNUAL PROGRAME OF RESEARCH WORK COTTON RESEARCH STATION, VEHARI 2014-15

## BREEDING TRIAL

***1-TITLE*** **MAINTENANCE & ENRICHMENT OF GENE POOL**

***OBJECTIVE*** To Maintain and enrich the local as well as exotic genotypes for utilization in hybridization program for higher yield potential, CLCuV resistance/ tolerance, insect pest resistance, heat tolerance and better fiber traits.

***RESEARCH WORKERS*** Mr. Khalid Mahmood and Dr. Ghulam Sarwar

***LOCATION*** Cotton Research Station, Vehari

***PROJECT DURATION*** Continuous nature

***METHODOLOGY***

**Entries:** 185(six new) Annexure I:-
**Layout:** Single line
**Plot size:** 9.0 m x 0.75m

- True to type plants of each entry will be maintained through selfing.
- The gene pool will be strengthened by collecting local and exotic lines from different cotton research centers of Pakistan.

***PREVIOUS YEAR'S RESULTS*** 179 local and exotic genotypes were maintained at CRS, Vehari during 2013-14. Data were recorded for CLCuV intensity and other parameters also. All the entries showed CLCuV symptoms but the intensity varied.

**Characters of gene pool entries along with their range is given in the table below**

| Character | Range |
|---|---|
| Plant Yield (g) | 40 – 375 |
| Plant Height (cm) | 45 – 220 |
| No. of Bolls/Plant | 5 – 150 |
| Boll weight (g) | 2.0 - 6.0 |
| CLCuV infection (Rating) | 0 – 4 |
| No. of Monopodial Branches | 0 – 5 |
| No. of Sympodial Branches | 4 - 42 |
| Nodes to first fruiting branch | 4 – 10 |
| Leaf Shape | Okra – Broad |
| Leaf size | Small – Large |
| GOT % | 34 – 48 |
| Staple Length (mm) | 26 - 31 |
| Fiber Fineness (µg/inch) | 3.6 - 6 |
| Fiber Strength (g/tex) | 27-34 |

**List of gene pool entries given as Annexure-II**

***2-TITLE*** **CROSSING BLOCK**

***OBJECTIVE*** To facilitate the crossing of desirable parents

***RESEARCH WORKERS*** Dr. Ghulam Sarwar, Dr. Saeed Ahmad, Khalid Mahmood, Ghulam Mustafa Siddiqi,

Saadia Muneer

***LOCATION*** Cotton Research Station, Vehari

***PROJECT DURATION*** Continuous

***METHODOLOGY***

50 new crosses will be attempted as detailed in annexure-III
Entries: 50 (annexure-II)
Plot Size: Single Row (10m)
P x P: 30cm
R x R: 75cm
Sowing Dates: 15th March & 1st May
Standard agronomic and protection practices will be adopted.

***PREVIOUS YEAR'S RESULTS*** 52 crosses were attempted (Annexure IV)

***3-TITLE*** **RAISING AND HANDLING OF FILIAL GENERATIONS**

***OBJECTIVE*** Creation and exploitation of genetic variability for the development of high yielding, CLCuV tolerant, short duration, transgenic & non-transgenic and quality cotton genotypes.

***RESEARCH WORKERS*** Dr. Ghulam Sarwar and Dr. Saeed Ahmad

***LOCATION*** Cotton Research Station, Vehari

***PROJECT DURATION***

Continuous nature

***METHODOLOGY*** Crossing germplasm of diverse sources and making advancement through selections.

**MATERIALS**

| Sr.No. | Generation | Entries | Methodology |
|---|---|---|---|
| 1. | $F_1$ | 50 | Single row of each cross will be sown along with parents |
| 2. | $F_2$ | 62 | Large Population of each Progeny. Single plant selection on the basis of desired traits |
| 3. | $F_3$ | 40 | Non replicated, selection on the basis of row performance |
| 4. | $F_4$ | 8 | Non replicated, selection on the basis of row performance |
| 5. | $F_5$ | 10 | Non Replicated, selection on the basis of row performance |
| 6. | $F_6$ | 6 | Promising lines will be tested in PYT |

***PREVIOUS YEAR'S RESULTS***

| Sr. No. | Generations | Crosses | |
|---|---|---|---|
| | | Entries Studied | Crosses/PSS Selected |
| 1 | $F_1$ | 62 | 62 Crosses |
| 2 | $F_2$ | 46 | 256 plants |
| 3 | $F_3$ | 11 | 90 plants |
| 4 | $F_4$ | 17 | 10 families |
| 5 | $F_5$ | 10 | 6families |
| 6 | $F_6$ | 8 | out of 08 strains 06 were advanced in PYT |

***4-TITLE*** **PRELIMINARY YIELD TRIALS (PYTs)**

***OBJECTIVE*** To evaluate promising strains for CLCuV resistance/tolerance, yield potential and fibre traits.

***RESEARCH WORKERS*** Mrs. Saadia Muneer and Dr. Ghulam Sarwar

***LOCATION*** Cotton Research Station, Vehari

***PROJECT DURATION*** Continuous

***METHODOLOGY***

| | |
|---|---|
| **Total PYTs: 2** | PYT-I, PYT-II |
| **Entries** | 10 in each trial |
| **Check** | VH-259 and FH-142 |
| **Layout** | RCBD |
| **Plot Size** | 9m x 3m |
| **Sowing Date** | May-2014 |
| **Replications** | 3 |

The data regarding CLCuV %age, No. of Monopodial Branches, No. of Sympodial Branches, No. of Bolls per Plant, Plant Height, Boll Weight, Plant Population and seed cotton Yield will be recorded. The fibre characteristics will be studied in the laboratory.

**PREVIOUS YEAR'S RESULTS**

| TRIAL | STRAINS / VARIETIES | YIELD (kg/ha) | CLCuV % age |
|---|---|---|---|
| **PYT-1** | VH-338 | 2400 | 100 |
| | VH-340 | 1928 | 100 |
| | VH-341 | 1844 | 99.5 |
| | VH-343 | 1368 | 100 |
| | VH-344 | 1410 | 98.6 |
| | VH-348 | 2623 | 100 |
| | VH-349 | 1562 | 100 |
| | VH-350 | 728 (Poor PP) | 100 |
| | MNH-886 (Std) | 1888 | 100 |
| | **LSD(0.05)** | **730.24** | |
| **PYT-2** | VH-351 | 530 (Poor PP) | 100 |
| | VH-352 | 60 (Poor PP) | 33.3 |
| | VH-353 | 1355 | 66.7 |
| | VH-354 | 543 (Poor PP) | 100 |
| | VH-355 | 1545 | 100 |
| | VH-356 | 2388 | 100 |
| | VH-357 | 2435 | 100 |
| | VH-358 | 2043 | 100 |
| | MNH-886 (Std) | 1281 | 100 |
| | **LSD(0.05)** | **494.30** | |

***5-TITLE*** **ADVANCED YIELD TRIALS (AYTs)**

***OBJECTIVE*** To assess the performance of promising strains for CLCuV tolerance/resistance, yield and fibre traits.

***RESEARCH WORKERS*** Mr. Khalid Mahmood and Dr. Ghulam Sarwar

***LOCATION*** Cotton Research Station, Vehari

***PROJECT DURATION*** Continuous Nature

***METHODOLOGY***

| | |
|---|---|
| Total AYT: | 1 |
| Entries | 10 |
| Check | (VH-259 and FH-142) |
| Layout | RCBD |
| Plot Size | 15m x 3m |
| Sowing Date | May-2014. |
| Replications | 3 |

The data regarding CLCuV %age, No. of Monopodial Branches, Sympodial Branches, No. of Bolls per Plant, Plant Height, Boll Weight, Plant Population and Yield will be recorded. The fibre characteristics will be studied in the laboratory.

**PREVIOUS YEAR'S RESULTS**

| TRIAL | STRAINS / VARIETIES | YIELD (Kg/ha) | Av Dis severity | Disease Index |
|---|---|---|---|---|
| AYT | VH-303 | 2020 | 2.7 | 65.1 |
| | VH-305 | 1777 | 2.9 | 68.4 |
| | VH-311 | 2346 | 2.7 | 64.0 |
| | VH-319 | 2679 | 1.6 | 33.6 |
| | VH-324 | 1653 | 3.6 | 86.8 |
| | VH-326 | 1031 | 2.6 | 56.3 |
| | VH-327 | 2717 | 2.5 | 56.2 |
| | VH-335 | 1998 | 3.7 | 92.8 |
| | MNH-886 (std) | 1253 | 3.2 | 79.5 |
| | **LSD (0.05)** | **379.75** | | |

***6-TITLE*** **PROVINCIAL COORDINATED COTTON TRIAL (PCCT -1, 2 & 3)**

***OBJECTIVE*** To evaluate most promising strains of different research stations all over Punjab under Vehari conditions.

***RESEARCH WORKERS*** Dr. Ghulam Sarwar, Khalid Mahmood

***LOCATION*** Cotton Research Station, Vehari

***PROJECT DURATION*** Continuous nature

***METHDOLOGY*** Seed alongwith complete protocol will be provided by the Director, CRI Faisalabad. The data will be recorded according to the given protocol.

***PREVIOUS YAER'S RESULTS***

**PCCT**(Bt)

| Variety | PCCT Code | Yield (kg/ha) | CLCuV %age |
|---|---|---|---|
| FH-Lalazar | PC-7 | 3229 | 91.9 |
| FH-142 | PC-14 | 3082 | 75.3 |
| AGC-999 | PC-22 | 3078 | 82.5 |
| MNH-988 | PC-5 | 2842 | 91.1 |
| ACG-777 | PC-21 | 2834 | 90.0 |
| MNH-886 | PC-16 | 2721 | 87.0 |
| VH-305 | PC-4 | 2403 | 100 |
| CA-919 | PC-19 | 789 | 100 |
| **LSD (0.05)** | | **677.45** | |

**PCCT** (Non Bt)

| S. No. | PCCT Code | Yield (kg/ha) | CLCuV %age |
|---|---|---|---|
| 1 | V-1 | 2296.25 | 12.0 |
| 2 | V-2 | 1614.55 | 100.0 |
| 3 | V-3 | 1817.86 | 97.2 |
| 4 | V-4 | 1937.46 | 97.8 |
| 5 | V-5 | 1901.58 | 98.7 |
| **LSD (0.05)** | | **332.10** | |

**PCCT Desi Cotton**

| S. No. | PCCT Code | Yield (kg/ha) |
|---|---|---|
| 1 | V-1 | 2395.06 |
| 2 | V-2 | 2338.54 |
| 3 | V-3 | 2116.86 |
| 4 | V-4 | 2092.94 |
| **LSD (0.05)** | | **323.70** |

***7-TITLE*** **NATIONAL COORDINATED VARIETAL TRIAL (NCVT)**

***OBJECTIVE*** To test and evaluate the performance of new promising strains under Vehari conditions.

***RESEARCH WORKERS*** Ghulam Mustfa Siddiqui , Dr. Ghulam Sarwar & Mr. Khalid Mahmood

***LOCATION*** Cotton Research Station, Vehari

***PROJECT DURATION*** Continuous nature

***METHODOLOGY*** Seed along with protocol will be supplied by the Director Research (HQ), PCCC, Karachi. The data will be recorded in accordance with the given protocol.

***PREVIOUS YEAR'S RESULTS***

**Average Yield Kg/ha and Fibre Traits of NCVT (Set A)**

| Code | Hybrid Name | Av. Yield Kg/ha | CLCuV %age | GOT % | Mic (µg/inch) | Staple Length (mm) | Strength (g/tex) |
|---|---|---|---|---|---|---|---|
| A-2 | MNH-886 | 2556 | 97.5 | 44.5 | 5.7 | 26.9 | 36.8 |
| A-3 | CIM-598 | 1144 | 96.6 | 43.3 | 5.7 | 26.5 | 38.6 |
| A-1 | Al Seemi H Bt.209 | 2870 | 99.6 | 44.1 | 4.3 | 27.5 | 38.6 |
| **LSD (0.05)** | | **873.75** | | | | | |

**Average Yield Kg/ha and Fibre Traits of NCVT (Set B)**

| Code | Ranking | Name | Av. Yield (kg/ha) | CLCuV %age | GOT % | Mic (µg/inch) | Length (mm) | Strength (g/tex) |
|---|---|---|---|---|---|---|---|---|
| B-4 | 1 | BS-52 | 3682 | 93.5 | 41.3 | 4.9 | 27.2 | 37.4 |
| B-15 | 2 | AGC-999 | 3383 | 96.6 | 43.1 | 4.5 | 27.3 | 36.8 |
| B-21 | 3 | LS-62 | 3369 | 97.2 | 40.0 | 5.7 | 24.8 | 37.5 |
| B-2 | 4 | BGC-09 | 3194 | 99.0 | 45.3 | 5.7 | 26.1 | 35.5 |
| B-9 | 5 | Leader-3 | 3060 | 95.1 | 43.3 | 5.6 | 26.7 | 40.8 |
| B-5 | 6 | Trend-1 | 3043 | 96.5 | 41.0 | 5.6 | 27.3 | 36.7 |
| B-6 | 7 | Leader-1 | 3025 | 92.0 | 42.0 | 5.9 | 26.9 | 33.7 |
| B-24 | 8 | MNH-886 | 2972 | 95.8 | 40.0 | 5.8 | 26.8 | 43.0 |
| B-23 | 24 | CIM-598 | 1555 | 100 | 42.0 | 4.4 | 27.0 | 38.5 |
| **LSD (0.05)** | | | **449.81** | | | | | |

***8-TITLE*** **FIBRE ANALYSIS OF BREEDING MATERIAL**

***OBJECTIVE*** To evaluate the breeding material for fibre characters

***LOCATION*** **CRS, VEHARI**

***RESEARCH WORKER(S)*** Mrs. Saadia Muneer, Dr. Saeed Ahmad and Dr. Ghulam Sarwar

***LOCATION*** Cotton Research Station, Vehari

***PROJECT DURATION*** Continuous

***TREATMENTS/ METHODOLOGY***

| Sr. No | MATERIAL TO BE STUDIED |
|---|---|
| 1. | New entries in Gene pool |
| 2. | $F_2$ |
| 3. | $F_3$ |
| 4. | $F_4$ |
| 5. | $F_5$ |
| 6. | $F_6$ |
| 7. | PYT |
| 8. | AYT |
| 9. | PCCT |
| 10. | NCVT |
| 11. | Desi Cotton |

Lint samples will be analyzed for staple length, micron air and strength by HVI strength at

Vehari and CRS, Multan.

***PREVIOUS YEAR'S RESULTS***

| Sr. No. | Trial | No. of samples |
|---|---|---|
| 1 | Gene pool | 40 |

| | | |
|---|---|---|
| 2 | $F_1$ | - |
| 3 | $F_2$ | 256 PSS |
| 4 | $F_3$ | 90 PSS |
| 5 | $F_4$ | 10PSS |
| 6 | $F_5$ | 6 progenies |
| 7 | $F_6$ | 6 progenies |
| 8 | PYTs | 16 Strains |
| 9 | AYTs | 9 Strains |
| 10 | PCCT | 26 Strains |
| 11 | NCVT | 27 Strains |
| 12 | Desi | 138 (PSS) |
| 13 | Others PSS | 120 |
| | **Total** | **739** |

# AGRONOMIC TRIALS

***9-TITLE*** **PLANT SPACING TRIAL**

***OBJECTIVE*** To study the effect of plant spacing on yield and yield components of promising strains developed at CRS, Vehari.

***RESEARCH WORKERS*** Dr. Ghulam Sarwar and Saadia Muneer

***LOCATION*** Cotton Research Station, Vehari

***PROJECT DURATION*** 2013-15

***METHODOLOGY***

| | |
|---|---|
| Varieties: | 2 (VH-327and VH-305) |
| Layout: | Split plot Design |
| Repeats: | 3 |
| Plot size: | 9m x 3m |
| Treatments: | 4 viz. P x P 15 cm, 30 cm, 45 cm, 60 cm |
| **Characters to be studied:** | No. of Bolls/Plant, Boll Weight, Plant Height, CLCuV incidence, Seed Cotton Yield, No. of Monopodia/plant, No. of sympodia/plant, h/n ratio |

***PREVIOUS YEAR'S RESULTS***

| Treatment | Yield (kg/ha) | | CLCuV %age | |
|---|---|---|---|---|
| | VH-303 | VH-305 | VH-303 | VH-305 |
| $T_1$ (15 cm) | 2653 | 2505 | 38.4 | 50.4 |
| $T_2$ (30 cm) | 2466 | 2793 | 79.9 | 77.9 |
| $T_3$ (45 cm) | 2132 | 2355 | 89.9 | 86 |
| $T_4$ (60 cm) | 2256 | 2362 | 95.1 | 92.1 |
| Average | 2377 | 2504 | | |
| **LSD (0.05)** | **325.17** | | | |

***10-TITLE*** **SOWING DATE TRIAL**

***OBJECTIVE*** To determine the optimum sowing time of promising strains

***RESEARCH WORKERS*** Mr. Khalid Mahmood & Dr. Ghulam Sarwar

***LOCATION*** Cotton Research Station, Vehari

***PROJECT DURATION*** 2014-16

***METHODOLOGY***

| | |
|---|---|
| Varieties: | 3 viz. (VH-305, VH-327&327) |
| Plot Size: | 9 m x 3 m |
| Layout: | Split Plot Design |
| Repeats: | 3 |
| Treatments: | 9 viz. D1, D2, D3, D4, D5, D6, D7, D8, D9<br>16th Feb to 16th June at an interval of 15 days |
| Characters to be studied: | Germination %age, CLCuV incidence, No. of Bolls/Plant, Boll Weight, Plant Height, Seed Cotton Yield |

***PREVIOUS YEAR'S RESULTS***

| S. No. | Sowing Dates | Yield (Kg)/ha | | |
|---|---|---|---|---|
| | | VH-300 | VH-306 | MNH-886 |
| 1. | D1 (16 February) | 1604 | 1270 | 1722 |
| 2. | D2 (1 March) | 1532 | 1120 | 1265 |
| 3. | D3 (16 March) | 2767 | 1640 | 1930 |
| 4. | D4 (1 April) | 933 | 1019 | 1109 |

| | | | | |
|---|---|---|---|---|
| 5. | D5 (16 April) | 1461 | 1263 | 1661 |
| 6. | D6 (1 May) | 879 | 628 | 951 |
| 7. | D7 (16 May) | 1256 | 1281 | 1586 |
| 8. | D8 (1 June) | 481 | 718 | 592 |
| 9. | D9 (16 June | 335 | 360 | 313 |
| **Average** | | **1250** | **1033** | **1237** |
| **LSD (0.05)** | | **402.67** | | |

| S. N. | Variety | Germination Percentage | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | D1 16 Feb | D2 1 March | D3 16 March | D4 1 April | D5 16 April | D6 1 May | D7 16 May | D8 1 June | D9 16 June |
| 1 | VH-300 | 35.6 | 60.0 | 69.3 | 73.0 | 54.6 | 46.0 | 56.0 | 53.3 | 45.0 |
| 2 | VH-306 | 34.6 | 28.6 | 58.3 | 54.0 | 74.6 | 30.0 | 45.6 | 49.0 | 38.0 |
| 3 | MNH-886 | 36.0 | 57.3 | 52.0 | 51.0 | 76.0 | 29.6 | 62.6 | 58.6 | 50.6 |

***11-TITLE*** **COTTON LEAF CURL VIRUS, YIELD AND YIELD COMPONENTS STUDIES IN DIPLOID AND TETRAPLOID SPP. FROM USDA GERMPLASM**

***OBJECTIVE*** To Screen out cotton germplasm against CLCuV response, yield and fibre traits.

***RESEARCH WORKERS*** Dr. Ghulam Sarwar and Ghulam Mustfa Siddiqui

***LOCATION*** Cotton Research Station, Vehari

***PROJECT DURATION*** Continuous

***METHODOLOGY*** Ratooning of 200 *G. hirsutum* and 100 *G. arboreum* existing germplasm. 600 new accessions of G. hirsutum will be sown and studied according to the protocol provided.

***PREVIOUS YEAR'S RESULTS*** 678 Ratoon and 100 new Diploid and 200 tetraploid entries were evaluated. None of the diploid entries showed CLCuV symptoms and 11tetraploid entries showed CLCuV resistance

**Summary of plant mapping data of USDA Material 2013-14**

| S.No | PARAMETER | NO. OF OBS. | MAX VALUE | MIN VALUE | AV. |
|---|---|---|---|---|---|
| 1 | Seeds planted/hole | 200+100 | 7 | 2 | 4.15 |
| 2 | No. of seeds germinated/hole | 200+100 | 6 | 1 | 3.6 |
| 3 | Germination %age | 200+100 | 100 | 50 | 87.8 |
| 4 | Plant Pop/plot | 200+100 | 34 | 4 | 24 |
| 5 | Plants in zero rating scale | 1362 | 33 | 0 | 7 |
| 6 | Plants in 1 rating scale | 30 | 8 | 0 | 0.19 |
| 7 | Plants in 2 rating scale | 93 | 12 | 0 | 0.52 |
| 8 | Plants in 3 rating scale | 306 | 31 | 0 | 1.67 |
| 9 | Plants in 4 rating scale | 2999 | 33 | 0 | 15 |
| 1 | Disease percentage | 200+100 | 100 | 00 | 74 |
| 1 | Av. Disease severity | 200+100 | 4.00 | 00 | 3.16 |
| 1 | Disease index | 200+100 | 100 | 00 | 70.63 |
| 1 | Resistant Entries | 200 (Set-D) | 11 | | |
| 1 | R/S Entries | 200 (Set-D) | 38 | | |
| 1 | Resistant &flowering | 200 (Set-D) | 2 | | |
| 1 | R/S Entries flowering | 200 (Set-D) | 12 | | |
| 1 | Av. Plant Height (cm) | 200 (Set-D) | 214.2 | 25.8 | 92.23 |
| | | 100 (Set-E) | 236.8 | 50.8 | 179.03 |
| 1 | Av. No. of Nodes/plant | 200 (Set-D) | 8.8 | 0.6 | 3.33 |
| | | 100 (Set-E) | 8.8 | 1.6 | 6.41 |
| 1 | Av. h/n ratio | 200 (Set-D) | 117 | 8.6 | 30.48 |
| | | 100 (Set-E) | 56.4 | 8.9 | 29.27 |

| | | | | | |
|---|---|---|---|---|---|
| 2 | Av. No. of monoppodial Branches | 200 (Set-D) | 9 | 0.6 | 3.07 |
| | | 100 (Set-E) | 9 | 1.8 | 4.48 |
| 2 | Av. No. of sympodial Branches | 200 (Set-D) | 33 | 3.4 | 15.25 |
| | | 100 (Set-E) | 40 | 6.8 | 24.54 |
| 2 | Av. No. of bolls/plant | 200 (Set-D) | 28 | 00 | 0.75 |
| | | 100 (Set-E) | 83 | 00 | 29.17 |

***12-TITLE*** **FACILITATING TESTING OF OUT -STATION GERMPLASM AGAINST CLCuV**

***OBJECTIVE*** To facilitate other R&D organizations in testing their promising strains against CLCuV response, under Vehari conditions

***RESEARCH WORKERS*** Dr. Ghulam Sarwar, Dr. Saeed Ahmad

***LOCATION*** Cotton Research Station, Vehari

***PROJECT DURATION*** Continuous

***METHODOLOGY*** Germplasm will be provided by different institutions along with protocol.

**PREVIOUS YEAR'S RESULTS**

| **R&D ORGANIZATION** | **No. of entries Sown** |
|---|---|
| USDA Material | 678+200+100+100+100=1178 |
| Cotton Research Institute, Faisalabad | 17 |
| IAGS, Punjab University, Lahore | 04 |
| Entomological Research Institute, Faisalabad | 07 |
| (ABRI) NIBGE, Faisalabad | 1479 |
| CRS, Multan | 12 |
| **TOTAL** | **2697** |

# GREEN HOUSE STUDIES

***13-TITLE*** **HYBRIDIZATION AND OBTAINING ONE ADDITIONAL GENERATION DURING OFF-SEASON**

***OBJECTIVE*** To cross elite lines and achieve one additional generation under green house conditions.

***RESEARCH WORKERS*** Dr. Ghulam Sarwar, Dr. Saeed Ahmad & Mrs. Saadia Muneer

***LOCATION*** Cotton Research Station, Vehari

***PROJECT DURATION*** Continuous nature.

***METHODOLOGY***

- Fresh crosses will be attempted and 55 $F_1$s will be sown in pots under green house conditions.
- Propagation by stem cuttings of US germplasm entries resistant to CLCuV but not flowering. Reconfirmation of CLCuV resistance.

***PREVIOUS YEAR'S RESULTS***

Crosses Attempted in pots: 20
No. of $F_1$s sown: 40
Detection of $F_2$s for Bt gene: 15

***14-TITLE*** **EFFECT OF Bt. GENE AND SOWING TIME ON GERMINATION PERCENTAGE AND YIELD COMPONENTS OF COTTON**

***OBJECTIVE*** To determine the impact of Bt gene and sowing time on seed germination percentage and yield components of upland cotton

***RESEARCH WORKERS*** Dr. Ghulam Sarwar and Dr. Saeed Ahmad

***LOCATION*** Cotton Research Station, Vehari

***PROJECT DURATION*** 2013-14 to 2014-15

***METHODOLOGY***

**Varieties:** **5** (Bt.) VH-305, VH-327, FH-142
(Non Bt.) VH-289, VH-300

**Plot size:** 9m x 3m

**Replications:** 3

**Treatments:** 2 T1 (April Sowing), T2 (May Sowing)

**Traits to be studied:**

Seed Germination (%), Boll Weight, Seeds per Boll
No. of Bolls per Plant, Seed Index and Seed Cotton Yield

***PREVIOUS YEAR'S RESULTS***

| Sr. No. | Variety | Germination %age | |
|---|---|---|---|
| | | SET-A(16-4-2013) | SET-B(16-5-2014) |
| 1 | VH-289 (Non Bt) | 32 | 43 |
| 2 | VH-300 (Non Bt) | 51 | 56 |
| 3 | VH-303 (Bt) | 35 | 41 |
| 4 | VH-306 (Bt) | 40 | 44 |
| 5 | MNH-886 (Bt) | 31 | 40 |
| LSD (0.05) | | 4.72 | 4.65 |

***15-TITLE*** **SCREENING, MAINTENANCE, MULTIPLICATION AND DEVELOPMENT OF LINES FROM *G. ARBOREUM* GERMPLASM WITH BETTER FIBER QUALITY AND SEED COTTON YIELD**

***OBJECTIVE*** Evaluation of Desi germplasm (Both exotic and indigenous)

***RESEARCH WORKERS*** Dr. Ghulam Sarwar and Dr. Saeed Ahmad

***LOCATION*** Cotton Research Station, Vehari

***PROJECT DURATION*** 2013-15

***METHODOLOGY*** Varieties: 40
Plot size: 6m x 1.5m

Traits to be studied**:** Boll weight, No of Bolls per plant, Seed cotton yield, Staple length & Fineness.

***PREVIOUS YEAR'S RESULTS*** New Experiment

***16-TITLE*** **EFFECT OF DUSKY COTTON BUG ON SEED COTTON YIELD, QUALITY TRAITS AND SEED GERMINATION**

***OBJECTIVE*** To investigate the effect of Dusky Cotton Bug on yield and yield components, fiber quality, oil contents and seed germination in cotton.

***RESEARCH WORKERS*** Mr. Ghulam Mustfa Siddiqui, Dr. Ghulam Sarwar and Dr. Saeed Ahmad

***LOCATION*** Cotton Research Station, Vehari

***PROJECT DURATION*** 2014-16

***METHODOLOGY*** Entries VH-306, FH-142, VH-327

Sowing Time May-2013
Layout RCBD
Plot size 4.5 m x 1.5m
Replications 3
Ten plants of each entry in each replication will be covered by cotton cloth from trifoliate stage to harvesting
**Traits to be studied**: Seed cotton yield, average boll weight, seed index, fibre traits and seed germination percentage

***PREVIOUS YEAR'S RESULTS*** **New Experiment**

***17-TITLE*** **EFFECT OF FOLIAR APPLICATION OF PLANT HORMONES ON BOLL RETENTION PERCENTAGE, AV. BOLL WEIGHT, CLCUV INCIDENCE AND SEED COTTON YIELD**

***OBJECTIVE*** To determine the impact of different plant hormones on the incidence of Cotton Leaf Curl Virus Disease, fruit retention and yield components in cotton.

***RESEARCH WORKERS*** Dr. Saeed Ahmad, Dr. Ghulam Sarwar, Mr. Khalid Mahmood

***LOCATION*** Cotton Research Station, Vehari

***PROJECT DURATION*** 2013-15

***METHODOLO*** Variety: VH-282 & VH-319
Plot size: 6m x 3m
Design: Split plot design
Replications: 3
Concentration: 1gm/l
Treatment: 3 i. Cytokinin
ii. Auxin
iii. Cytokinin + Auxin
vi. Control
Times of application: 2 (squaring and peak flowering)
Sowing Time: Mid May
Traits to be studied:
CLCuV intensity, Earliness, Boll retention %age, Plant Height, No. of bolls/plant, Av. Boll

Seed Cotton Yield and Fiber traits

***PREVIOUS*** Two sprays were done at squaring and peak flowering at 30 days interval

***RESULTS***

| S.No | Trts | PGRs with dose | Av. yield (Kg/ha) | Av boll wt. | Boll retention %age | GOT | CLCuV %age |
|---|---|---|---|---|---|---|---|
| 1 | T1 | Cytokinin @10ml/a | 3154 | 3.8 g | 72 | 38.6 | 46 |
| 2 | T2 | Auxin @ 15ml/a | 2586 | 3.4 g | 64.5 | 38 | 56 |
| 3 | T3 | Cytokinin+Auxin @15ml/a | 2168 | 3.3 g | 55.7 | 38 | 67 |
| 4 | T4 | Control | 1973 | 3.1 g | 50.2 | 39.1 | 89 |
| | | LSD (0.05) | 475.35 | | | | |

***18-TITLE*** **PRODUCTION OF PRE BASIC SEED**

***OBJECTIVE*** I. Multiplication of pure and true to type candidate/ approved varieties.

II. Maintenance of the purity of candidate / approved varieties according to their specified/approved characteristics.

***RESEARCH WORKERS*** Dr. Ghulam Sarwar, Dr. Saeed Ahmad and Mr. Ghulam Mustfa Siddiqui

***LOCATION*** Cotton Research Station, Vehari

***PROJECT DURATION*** Continuous

***METHODOLOGY*** *G. hirsutum*: VH-259, VH-303, VH-305, VH-327

1. The single plant progenies of approved/ candidate varieties will be sown in rows. The progeny lines showing uniformity will be harvested in bulk.
2. Maximum number of true to type single plants will be selected to produce BNS seed. The bulk seed of varieties i.e., VH-259, VH-303, VH-305 and VH-327 will be planted to produce pre-basic seed.

***PREVIOUS YEAR'S RESULTS:*** Single plant progenies of VH-259, VH-303 and VH-305 were studied.

| S. No. | Variety | No. of Single Plants Selected | Pre- Basic seed (kg) |
|---|---|---|---|
| 1. | VH-259 | 75 | 7 |
| 2. | VH-303 | 100 | 10 |
| 3. | VH-305 | 200 | 20 |

**SELECTION OF PROGENIES**

| S. No. | Variety | No. of Progenies sown | No. of progenies Selected |
|---|---|---|---|
| 1. | VH-282 | 40 | 20 |
| 2. | VH-289 | 35 | 12 |
| 3. | VH-305 | 28 | 20 |
| 4. | FH-142 | 18 | 10 |

**Annexure-I**

| **Symptoms** | **Rating / Disease severity** | **Disease reaction** |
|---|---|---|
| No disease symptoms | 0 | Immune |
| Vein thickening in top 3-4 leaves, no curling/cupping of leaves | 1 | Highly tolerant |
| Vein thickening, no curling/cupping of leaves of 1/3$^{rd}$ part of the plant | 2 | Tolerant |
| Vein thickening, curling/cupping of leaves with enation affecting 2/3$^{rd}$ part of the plant with reduced boll size and boll number | 3 | Susceptible |
| Vein thickening, curling/cupping of leaves with enation affecting 2/3$^{rd}$ part of the plant with no or little boll setting and reduced boll size | 4 | Highly Susceptible |

**Annexure II: GENE POOL ENTRIES AT CRS, VEHARI, 2013-14**

| S. No | Name | S. No | Name | S. No | Name | S. No | Name | S. No | Name |
|---|---|---|---|---|---|---|---|---|---|
| 1 | AC-252 | 36 | CH-38 | 71 | SPCHAR-586 | 106 | M-1 | 141 | PSSIH- BIG BOLL |
| 2 | F-124 | 37 | NIA-78 | 72 | A33-57 | 107 | M-2 | 142 | URS-BIG BOOL |
| 3 | VH-286 | 38 | DROV-TO1 | 73 | CHINA-11 | 108 | M-3 | 143 | DGS-4 |
| 4 | F-47/1B-195 | 39 | N-449/3 | 74 | CH-18 | 109 | M-4 | 144 | BI II BOLL3 |
| 5 | VH-297 | 40 | 326/1 | 75 | CH-54 | 110 | M-5 | 145 | CHINA-16 |
| 6 | UCD-581 | 41 | VH-225 | 76 | RED LEAF | 111 | M-6 | 146 | CHINA21 |
| 7 | ACALA-1 517/75 | 42 | GN-2085P1 | 77 | LP-A-5166 | 112 | M-7 | 147 | MV-1 |
| 8 | CHINA | 43 | AC-134 | 78 | AMST-38 | 113 | M-8 | 148 | MV-2 |
| 9 | MC-1 | 44 | CHINA-45 | 79 | PR-1 | 114 | M-9 | 149 | MV-3 |
| 10 | CHINA-6 | 45 | ANMOL | 80 | CH-33 | 115 | CHINA-1 | 150 | FH-142 |
| 11 | BTA-1 | 46 | N-112 | 71 | CHINA-26 | 116 | VH-292 | 151 | IUB-222 |
| 12 | CHINA-2 | 47 | CHINA-14 | 82 | VH-282 | 117 | 43-NO | 152 | MM-58 |
| 13 | VH-268 | 48 | CHINA-9 | 83 | ACALA57-1 | 118 | AV-4 | 153 | Silkee |
| 14 | CH-52 | 49 | LAOKRA-548 | 84 | Ghauri-3 | 119 | MNH-886 | 154 | CIM-599 |
| 15 | VH-289 | 50 | B-69 | 85 | NIAB-111 | 120 | CH-59 | 156 | CIM-602 |
| 16 | VH-295 | 51 | VH-257 | 86 | CH-27 | 121 | DJ-15A3 | 157 | A-011 |
| 17 | VH-296 | 52 | CH-19 | 87 | TMA-1 | 122 | BJA-HL27-20/163 | 158 | Sitara11-M |
| 18 | MS-40 | 53 | PCCT12/07 | 88 | CH-41 | 123 | CARO LINE QUEN | 159 | NCVT D1/12 |
| 19 | COKER | 54 | CHINA-7 | 89 | BT-555 | 124 | VH-137 | 160 | NCVT D2/12 |
| 20 | 321-TA11 | 55 | LSS | 90 | CH-43 | 125 | VH-264 | 161 | NCVT D4/12 |
| 21 | CHINA-5 | 56 | CH-21 | 91 | CHINA-3 | 126 | CH-20 | 162 | NCVT D7/12 |
| 22 | CHINA-20 | 57 | 326/2008 | 92 | CH-42 | 127 | 4074 | 163 | NCVT C1/12 |
| 23 | CH-57 | 58 | 326/2 | 93 | NEX-12 | 128 | D2-CHSE1 PETOR | 167 | NCVT C3/12 |
| 24 | CH-24 | 59 | CHINA-15 | 94 | CHINA-12 | 129 | 4049/04 | 168 | NCVT C10/12 |
| 25 | CH-49 | 60 | 268-F | 95 | 324-TALL | 130 | 10/07 | 169 | NCVT C12/12 |
| 26 | CHINA-10 | 61 | AC-12 | 96 | MG-6 | 131 | BT-1507 | 170 | NCVT C13/12 |
| 27 | CH-48 | 62 | VH-260 | 97 | CH-32 | 132 | ACALA P3 | 171 | NCVT C14/12 |
| 28 | VH-206 | 63 | CH-25 | 98 | VH-261 | 133 | VH-240 | 172 | NCVT C17/12 |
| 29 | H-3 | 64 | 2077/09 | 99 | 41/5-1 | 134 | IRMA-2364 | 173 | NCVT C19/12 |
| 30 | 326/3 | 65 | LUMAMA-H | 100 | CH-19 | 135 | CH-8 | 174 | NCVT C27/12 |
| 31 | CHINA-24 | 66 | VH-148 | 101 | H406-7 | 136 | VH-291 | 175 | NCVT C28/12 |
| 32 | VH-285 | 67 | NT-1401 | 102 | CH-58 | 137 | CHINA-22 | 176 | MNH-986 |
| 33 | 9/07 | 68 | CLEN CLC88 | 103 | A-637 | 138 | FH-930 | 177 | DGS-1 |
| 34 | FG-4074P5 8 LINE | 69 | PRS-72 | 104 | CS-55 | 139 | VH-281 | 178 | DGS-2 |
| 35 | DELTA PINE -57 | 70 | BIG BOLL | 105 | DR-2 | 140 | CHINA-25 | 179 | DGS-3 |

**Annexure III: CROSSES TO BE ATTEMPTED DURING 2014-15**

| S. No | Female | Male | S. No. | Female | Male |
|---|---|---|---|---|---|
| 1 | NIAB-112 | MNH-886 | 26 | VH-289 | VH-307 |
| 2 | NIAB-112 | VH-259 | 27 | MNH-456 | VH-257 |
| 3 | NIAB-112 | VH-292 | 28 | VH-300 | VH-325 |
| 4 | NIAB-112 | VH-282 | 29 | VH-300 | VH-326 |
| 5 | NIAB-112 | CH-301 | 30 | VH-300 | VH-329 |
| 6 | NIAB-112 | VH-303 | 31 | VH-300 | PK (exotic) |
| 7 | NIAB-112 | VH-306 | 32 | VH-300 | NIBGE-315 |
| 8 | BH-176 | MNH-456 | 33 | VH-300 | VH-347 |
| 9 | BH-176 | AGC-777 | 34 | VH-300 | VH-342 |
| 10 | BH-176 | Sitara-11M | 35 | VH-300 | VH-340 |
| 11 | BH-176 | PGC-9 | 36 | VH-148 | IUB-222 |
| 12 | BH-176 | VH-301 | 37 | VH-148 | MNH-886/P3 |
| 13 | BH-176 | VH-303 | 38 | CIM-599 | VH-148 |
| 14 | BH-176 | VH-306 | 39 | CIM-599 | VH-300 |
| 15 | Cyto-124 | VH-357 | 40 | CIM-599 | VH-289 |
| 16 | Cyto-124 | VH-259 | 41 | VH-309 | VH-257 |
| 17 | Cyto-124 | VH-300 | 42 | VH-309 | MNH-456 |
| 18 | Cyto-124 | VH-289 | 43 | MNH-886 | VH-300 |
| 19 | China-14 | VH-257 | 44 | MNH-886 | VH-148 |
| 20 | China-14 | VH-300 | 45 | MNH-886 | GN-2085 |
| 21 | China-14 | VH-289 | 46 | VH-257 | MV-1 |
| 22 | China-14 | IUB-222 | 47 | VH-257 | MV-2 |
| 23 | China-14 | VH-281 | 48 | MV-1 | VH-306 |
| 24 | VH-289 | VH-306 | 49 | MV2 | VH-148 |
| 25 | VH-289 | VH-301 | 50 | MV-3 | VH-257 |

*Note:* Promising lines from NCVT, PCCT and USDA germplasm will also be included in the crossing work.

## Annexure IV: CROSSES ATTEMPTED DURING PREVIOUS YEAR

| Cross No. | Female | Male | Cross No. | Female | Male |
|---|---|---|---|---|---|
| C-1 | BTS-3 | M-6 | C-27 | FH-142 | 1044/13 |
| C-2 | BTS-3 | M-7 | C-28 | FH-142 | 1017/13 |
| C-3 | BTS-3 | M-8 | C-29 | FH-142 | PCCT-1(NON BT/2013) |
| C-4 | FH-930 | M-9 | C-30 | FH-142 | LALAZAR ( REVISED) |
| C-5 | FH-930 | VH-282 | C-31 | VH-327 | VH-311 |
| C-6 | VH-326 | VRS-BIG BOLL | C-32 | (F2) NO.2 | USDA-1140(2013) |
| C-7 | VH-326 | KZ-181 | C-33 | (F2) NO.6 | USDA-1140(2013) |
| C-8 | VH-326 | GN-2085 | C-34 | FH-930 | VRS-1 |
| C-9 | LALAZAR | VH-319 | C-35 | VH-252 | LALAZAR |
| C-10 | LALAZAR | VH-324 | C-36 | PCCT-1/13(NON BT) | VH-305 |
| C-11 | LALAZAR | MNH-886 | C-37 | PCCT-1/13(NON BT) | VH-303 |
| C-12 | 1001/13 | LALAZAR | C-38 | (F2) NO.11 | BT-370 |
| C-13 | 1017/13 | LALAZAR | C-39 | PCCT-1/13(NON BT) | VH-319 |
| C-14 | 1044/13 | LALAZAR | C-40 | PCCT-1/13(NON BT) | FH-142 |
| C-15 | LALAZAR | 1035/13 | C-41 | VH-327 | VH-311 |
| C-16 | LALAZAR | OKRA | C-42 | (F4) 2088/11 | LALAZAR |
| C-17 | VH-319 | 1035/13 | C-43 | PCCT-1/13(NON BT) | 4074/P3( F6) |
| C-18 | VH-319 | VH-260 | C-44 | PCCT-1/13(NON BT) | LALAZAR |
| C-19 | VH-319 | FH-114 | C-45 | OKRA/FR | VH-319 |
| C-20 | VH-319 | 1027/13 | C-46 | DS-1 | VH-259 |
| C-21 | VH-311 | VR-1 | C-47 | VH-356 | 4074/P3 |
| C-22 | FH-142 | DS-1 | C-48 | M-9 | 6028/13 |
| C-23 | FH-142 | FH-114 | C-49 | ST | USDA-1140/13 |
| C-24 | FH-142 | 1035/13 | C-50 | VH-319 | USDA-1066 |
| C-25 | FH-142 | VH-311 | C-51 | VH-319 | (SSH×H7) |
| C-26 | FH-142 | LALAZAR | C-52 | VH-319 | VH-305 |