ANNUAL PROGRAME OF RESEARCH WORK COTTON RESEARCH STATION, VEHARI 2015-16

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: 180(five 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 175 local and exotic genotypes were maintained at CRS, Vehari during 2014-15. Data were recorded for CLCuV intensity and other parameters also. Selfing was done to maintain characters. 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 – 8
No. of Sympodial Branches	4 - 42
Nodes to first fruiting branch	4 – 10
Leaf Shape	Okra – Narrow
Leaf size	Small – Large
GOT %	30 – 50
Staple Length (mm)	22 - 33
Fiber Fineness (µg/inch)	3.6 - 6
Fiber Strength (g/tex)	27-34

List of gene pool entries given as Annexure-I

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-II
Entries: 45 (annexure-II)
Plot Size: Single Row (10m)
P x P: 30cm
R x R: 75cm
Sowing Dates: 15th March & 1st May
Standard agronomic and plant protection practices will be adopted.

PREVIOUS YEAR'S RESULTS 50 crosses were attempted (Annexure III)

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, Dr. Saeed Ahmad and Abdul Manan Khan

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	60	Large Population of each Progeny. Single plant selection on the basis of desired traits
3.	F_3	50	Non replicated, selection on the basis of row performance
4.	F_4	48	Non replicated, selection on the basis of row performance
5.	F_5	8	Non Replicated, selection on the basis of row performance
6.	F_6	7	Promising lines will be tested in PYT

PREVIOUS YEAR'S RESULTS

Sr. No.	Generations	Crosses	
		Entries Studied	Crosses/PSS Selected
1	F_1	60	62 Crosses
2	F_2	58	135 plants
3	F_3	170	139 plants
4	F_4	18	18 families
5	F_5	14	14 families
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 9 in each trial
Check FH-142
Layout RCBD
Plot Size 9m x 3m
Sowing Date May-2015
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	1061.6	100.0
	VH-341	862.5	100.0
	VH-343	1267.8	100.0
	VH-344	1383.7	100.0
	VH-349	935.5	100.0
	VH-359	1568.8	100.0
	VH-360	1397.4	100.0
	VH-361	742.8	100.0
	FH-142 (Std)	1615.1	100.0
	LSD(0.05)	**391.22**	
PYT-2	VH-351	679.4	100.0
	VH-354	1346.6	86.9
	VH-355	136.6	100.0
	VH-362	644.6	100.0
	VH-363	2620.3	75.0
	VH-364	467.5	100.0
	VH-365	500.9	85.7
	VH-366	1054.3	92.5
	FH-142 (Std)	1747.6	84.1
	LSD(0.05)	**482.73**	

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	8
Check	FH-142
Layout	RCBD
Plot Size	15m x 3m
Sowing Date	May-2015.
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	CLCuV %
AYT	VH-305	1757	1.6	38.2	100
	VH-311	1152	1.1	25.9	89.6
	VH-319	1137	1.3	29.9	91.2
	VH-324	988	1.3	30.8	93.8
	VH-326	592	1.3	31.3	92.9
	VH-327	2028	1.0	23.7	90.8
	VH-335	1347	1.1	26.6	97.9
	VH-340	1113	1.4	34.5	96.6
	VH-348	1947	1.7	40.3	97.0
	VH-356	1046	1.1	21.6	80.7
	VH-357	1948	1.4	31.0	88.0
	VH-358	1556	1.4	26.8	77.8
	FH-142 (Std)	1659	1.2	27.9	90.3
	VH-259	1651	1.5	33.4	89.1
	LSD (0.05)	**601.43**			

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 along with 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) SET-A**

Variety	PCCT Code	Yield (kg/ha)	Mike	SL(in)	Strength(g/tex)	CLCuV %
	PC-18	3031.8	5.08	0.965	29.2	100
	PC-17	2985.7	5.2	1.017	34	98.8
	PC-1	2834.6	5.16	0.958	31.9	97.1
	PC-28	2746.2	5.53	0.968	31	91.7
	PC-2	2500	5.73	1.056	34.2	95
	PC-11	2493.6	5.39	1.027	24.8	100
	PC-22	2483.5	5.89	1.05	30.9	94.8
	PC-15	2308.3	5.62	1.028	27	108.6
	PC-5	2291.9	5.23	0.944	32.6	98.7
	PC-12	2217.3	5.1	1.002	29.3	98.9
	PC-27	2153.1	5.8	1.023	36.5	100
	PC-19	2096.8	5.84	0.928	26.5	98.6
	PC-20	2080.6	4.86	0.983	25.3	100
	PC-9	2063	4.71	0.972	36.5	91.8
	PC-21	2045.1	5.26	1.02	29.6	97.7
	PC-25	2032.7	5.25	0.974	27.4	98.5
	PC-23	2010.7	5.33	1.006	32.5	98.6
	PC-3	1957.6	5.31	0.991	28.8	98.7
	PC-30	1885.1	5.83	1.048	24.1	97.3
	PC-14	1799	5.58	0.94	29.9	95.7
	PC-13	1781.6	4.72	0.988	29.3	97.3
	PC-10	1618.1	5.52	0.974	45.1	100
	PC-8	1488.8	5.38	1.111	28	100
	PC-7	1388	5.31	1.021	26.8	98.5
	PC-16	1228.1	5.78	1.025	27.5	100
	PC-24	1216.5	5.43	0.988	30.7	96.7
	PC-4	1202.7	4.95	0.923	26.1	100
	PC-6	953.7	4.46	1.025	29.7	100
	PC-29	739.1	4.86	0.951	40.3	98
	PC-26	536	4.95	0.991	24.4	97.6

LSD(0.05)= 668.0

PCCT(Bt) SET-B

S. No.	PCCT Code	Yield (kg/ha)	Mike	SL(inch)	Strength (g/tex)	CLCuV %
10	PC-10	2587	5.39	0.966	31.4	91.3
1	PC-1	2464.7	5.9	0.902	32.2	95.1
8	PC-8	2249.2	5.93	0.979	28.6	93.6
4	PC-4	2211.9	5.03	0.965	27.5	94
6	PC-6	2140	5.42	0.994	28.5	89.6
5	PC-5	1976.9	5.02	1.076	38.6	84.2
3	PC-3	1935.8	5.63	1.017	36.1	95.7
11	PC-11	1458.3	5.26	1.122	34.2	84.7
7	PC-7	988.6	5.51	1.024	27.5	97.1
2	PC-2	864.5	5.14	0.93	29.6	100
12	PC-12	593.8	5.34	1.046	29.1	100
9	PC-9	410.8	5.66	0.921	32	100

LSD (0.05): 277.34

PCCT (Non Bt)

S. No.	PCCT Code	Yield (kg/ha)	Mike	Sl (in)	Strength (g/tex)	CLCuV %
1.	V-2	2446.7	5.11	0.957	31.1	100
2.	V-1	1885.4	5.14	1.03	30.1	95.8
3.	V-3	1242.3	5.9	0.853	25.8	100
4.	V-4	1202.1	5.7	1.036	26.7	100

LSD (0.05): 620.19

PCCT Desi Cotton

S. No.	PCCT Code	Yield (kg/ha)
1	V-4	3983
2	V-2	3842
3	V-1	3796
4	V-3	3760

LSD (0.05)= 2720.9

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 of NCVT (Set A)

Code	Av. Yield Kg/ha	CLCuV %age	GOT %	Mic (µg/inch)	Staple Length (mm)	Strength (g/tex)
A-9	2252	99.5	37.3	5.46	0.878	25.4
A-8	2030	99.4	37.3	5.2	0.99	30.5
A-11	2017	61.9	44	5.99	1.077	28.6
A-4	1763	98.7	42.6	6.09	1.055	22.4
A-3	1648	99.7	39.3	6.03	1.034	34.9
A-12	1386	97.9	40.6	5.79	0.967	28.1
A-7	1372	98.9	42.6	5.23	1.056	36.5
A-10	1261	100	42.6	6.18	1.015	35.3
A-6	1218	99.7	40.6	5.37	1.142	28.3
A-1	1213	99	39.3	5.39	0.947	28.5
A-5	1184	100	46	6.06	1.047	24.6
A-13	573	100	40.6	4.9	0.99	27.5
A-2	136	100	39.3	4.85	0.988	32.7
LSD (0.05)= 352.16						

Average Yield Kg/ha of NCVT (Set B)

Code	Name	Av. Yield (kg/ha)	CLCuV %age	GOT %	Mic (µg/inch)	Length (mm)	Strength (g/tex)
B-18		3332	80.4	39.3	5.45	1.164	28.4
B-4		3108	71.6	40	4.91	1.13	32.7
B-13		2767	93.9	44	5.12	1.112	28.9
B-20		2726	93.2	44	5.14	1.118	27.5
B-11		2458	97.3	44	5.51	1.128	29.7
B-9		2256	95.5	42.6	5.22	1.141	35.9
B-7		2226	97.3	40.6	4.87	1.127	29.4
B-6		2224	98.5	42.6	5.47	1.065	34.2
B-10		2209	89.5	44	5.98	1.04	32.4
B-1		2165	96.3	44	5.13	1.005	28
B-15		2130	96.5	42.6	5.48	0.979	26.1
B-2		2082	92.9	42.6	5.58	1.078	41.8
B-8		2040	96.6	46	5.35	1.132	30.8
B-19		1993	93.8	46	5.01	1.017	28.6
B-16		1987	92.7	44	5.21	1.096	29.8
B-5		1888	98.8	42.6	5.94	1.154	32.9
B-17		1861	90.7	40.6	5.49	1.121	39.5

B-24		1763	99	42.6	5.96	1.032	37
B-14		1440	98.8	44	5.84	1.056	33
B-3		1436	96.9	43.2	5.54	1.115	28.1
B-22		1385	97.7	42.2	5.28	1.135	31.1
B-23		1296	96.4	42.6	5.1	1.19	25.7
B-12		1282	82	40.6	4.73	1.033	36.5
B-21		893	94	44	5.43	1.002	31.1

LSD (0.05)=642.67

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 at PCSI, Vehari and CRS, Multan.

PREVIOUS YEAR'S RESULTS

Sr. No.	Trial	No. of samples
1	Gene pool	35
2	F_1	-
3	F_2	186 PSS
4	F_3	140 PSS
5	F_4	10PSS
6	F_5	6 progenies
7	DC	75 progenies
8	PYTs	90 Strains
9	AYTs	85 Strains
10	PCCT	26 Strains
11	NCVT	27 Strains
12	Desi	138 (PSS)
13	Others PSS	128
	Total	**1129**

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-363)
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-327	VH-305	VH-327	VH-305
T_1 (15 cm)	3402.55	2810.44	100	100
T_2 (30 cm)	2802.79	2158.66	100	99.0
T_3 (45 cm)	3070.08	2194.30	97	100
T_4 (60 cm)	2803.39	1665.58	96.6	98.5
LSD (0.05) 628.15				

10-TITLE SOWING DATE TRIAL

OBJECTIVE To determine the optimum sowing time of promising strains to obtain maximum yield

RESEARCH WORKERS Mr. Khalid Mahmood & Dr. Ghulam Sarwar

LOCATION Cotton Research Station, Vehari

PROJECT DURATION 2014-16 (Continuous Nature)

METHODOLOGY

Varieties:	2 viz. (VH-363, VH-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 16th Feb to 16th June at an interval of 15 days
Characters to be studied:	CLCuV incidence, No. of Bolls/Plant, Boll Weight, Plant Height, Seed Cotton Yield

PREVIOUS YEAR'S RESULTS

S. No.	Sowing Dates	Varieties	Average Yield kg/hac
1.	D1 (16 February)	VH-305	2752.426
		VH-319	2395.687
		VH-327	2662.387
2.	D2 (1 March)	VH-305	1862.287
		VH-319	1819.574
		VH-327	2890.816
3.	D3 (16 March)	VH-305	2311.457
		VH-319	2292.834
		VH-327	3519.551
4.	D4 (1 April)	VH-305	1623.094
		VH-319	1539.377
		VH-327	2836.143
5.	D5 (16 April)	VH-305	1961.381
		VH-319	1759.776
		VH-327	1746.107
6.	D6 (1 May)	VH-305	495.4708
		VH-319	785.9192
		VH-327	821.7981
7.	D7 (16 May)	VH-305	392.9596
		VH-319	572.3542
		VH-327	563.8116
8.	D8 (1 June)	VH-305	350.2466
		VH-319	341.704
		VH-327	341.704
LSD (0.05)= 837.52			

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, Ghulam Mustfa Siddiqui and Abdul Manan Khan

LOCATION Cotton Research Station, Vehari

PROJECT DURATION Continuous

METHODOLOGY Ratooning of 600 *G. hirsutum* and 50 *G. arboreum* existing germplasm. New accessions of G. hirsutum will be sown and studies will be conducted according to the protocols.

PREVIOUS YEAR'S RESULTS 200 Ratoon and 600 new Tetrapoid and 50 Diploid entries were evaluated. None of the diploid entries showed CLCuV symptoms and 33 tetraploid entries showed CLCuV resistance but only 5 produced flowers but no boll formation

Summary of plant mapping data of USDA Material 2013-14

S. No	PARAMETER	OBServations	MAX	MIN	AV.
1	Seeds planted/hole	600 Set-N	7	02	4.218
2	No. of seeds germinated/hole	600	6	01	3.59
3	Germination %age	600	100	50	87
4	Plant Pop/plot	600	26	2	15
5	Plants in zero rating scale	1011	24	00	2
6	Plants in 1 rating scale	787	17	00	1.32
7	Plants in 2 rating scale	1090	19	00	1.82
8	Plants in 3 rating scale	2988	20	00	5.01
9	Plants in 4 rating scale	3362	26	00	5.653
10	Disease percentage	600	100	00	90
11	Av. Disease severity	600	4.00	00	2.89
12	Disease index	600	100	00	70.25
13	Resistant Entries	600	33	--	--
14	Resistant & Flowering	33	5	-	-
15	Highly Tolerant	600	74	--	--
16	Tolerant	600	192	--	--
17	Susceptible	600	198	-	-
18	Highly Susceptible	600	102		
19	Entries Missing	600	1		

12-Title: SCREENING OF PREVIOUS YEARS TOLERANT/RESISTANT RATOON ACCESSIONS BY GRAFTING

OBJECTIVE To reconfirm the resistance of US lines by improved bottle shoot grafting

RESEARCH WORKERS Dr. Ghulam Sarwar, Dr. Saeed Ahmad, Ghulam Mustfa Siddiqi, Mrs Sadia Munir

LOCATION Cotton Research Station, Vehari

PROJECT DURATION 2013-2015

METHODOLOGY

- Highly tolerant/resistant genotypes will be graft inoculated with symptomatic scions by improved bottle shoot grafting method.
- Re-grafting of unsuccessful grafts.
- Keeping the scions alive by extensive look after.
- Recording of CLCuD data after 30, 60, 90 and 120 days after grafting.

PREVIOUS YEAR'S RESULTS

Graft inoculation of resistant genotypes in ratoon crop

S. #	Description/Activity	No
1	Tetraploid Entries Resistant Last Year	27/200
2	Resistant Tetraploid Entries Re-sprouted	24/27
3	Resistant Tetraploid Entries Grafted	23/27
4	No. of Grafts attempted per Entry	3
5	Total No. of grafts attempted	67
6	Successful Grafts	54
7	Plants re-grafted	13

13-TITLE SOWING OF F2 POPULATION FROM THE CROSSES US RESISTANT X LOCAL GERMPLASM IN THE FIELD

OBJECTIVE To select desirable plants from the crosses with reference to CLCuV tolerance, yield and yield parameters and fibre quality traits

RESEARCH WORKERS LOCATION Dr. Ghulam Sarwar, Dr. Saeed Ahmad and Abdul Manan Khan
Cotton Research Station, Vehari

PROJECT DURATION 2013-2015

METHODOLOGY

- Seed harvesting From F_1s sown in the green house from crosses of tolerant *local G. hirsutum lines* X US *G. hirsutum*
- Planting of F_2 under field conditions.
- Selection of desirable plants from the crosses with reference to CLCuV tolerance, yield and yield parameters and fibre quality traits.
- Growing of F_3 Population from the PSS

PREVIOUS YEAR'S RESULTS

HYBRIDIZATION DATA OF USDA X LOCAL CROSSES

Generation	Cross #	Total Plants	Avg. Bolls per Plant	CLCuV free plants (%)	Boll Wt (g)		
					Min	Max	AV.
F_1	1035	10	41	27.2	1.40	6.00	2.85
	1038	9	53.6	71.4	1.14	2.46	1.71
F_2	2034	19	10.5	-	1.55	2.80	1.83
	2035	10	29.8	27.7	2.28	6.66	3.03
	2041	9	11	-	1.20	2.85	2.34
	2043	2	7	75	1.25	1.33	0.78
Double Crosses	DC-16	1	70	0	-	2.00	2.00
	DC-30	5	28.6	0	1.85	3.32	2.67
	DC-42	7	42	0	1.18	2.55	1.78
	DC-43	6	17.5	0	0.72	2.82	2.20
	DC-44	14	16.6	0	1.77	3.42	3.20
	DC-48	18	12.7	0	1.5	4	2.50
	DC-49	6	12.3	50	0.83	7	2.89
	DC-50	4	9	0	1.50	2.51	2.17
	DC-51	8	26.5	0	1.00	3.10	2.28
	DC-52	5	11	0	2.00	3.10	2.24
	DC-56	3	30.7	0	2.50	4.00	2.86
	DC-64	10	15.1	9	2.00	5.00	3.38
	DC-66	1	11	0	-	2	2.00

FIBER ANALYSIS OF USDA × LOCAL CROSSES F1, F2 & DOUBLE CROSS

S.No.	Trial	ENTRY	RANGE OF			
			GOT %age	SL (mm)	Mike(g/tex)	Strength (TPPSI)
1	DC	DC-16	42.2	24.7	4.7	28.2
2	DC	DC-30	38.7-42.6	27----30.5	4.2----4.6	28.1----32.4
3	DC	DC-42	37.6-45.1	27----28.8	3.5----5.4	36.3----32.5
4	DC	DC-43	39.6-51.3	25.1---28.6	4.4----5.4	27.3----30.8
5	DC	DC-44	38.5-50	26.4----30.8	3.9----5.2	27.3----32.5
6	DC	DC-48	36.5-44.6	24.6----28	3.2----5.7	27.3----33.5
7	DC	DC-49	39.1-44.5	27.1----30.8	3-----4.8	27.2----33.5
8	DC	DC-50	40-50		single sample	under wt
9	DC	DC-51	38.9-46.6	27.4-----30.2	4.4----5.1	28-----32.4
10	DC	DC-52	34.2-47.8	26.4-----27.4	4.4----5.0	25.2----28
11	DC	DC-56	41.1-44.5	27	4	31.7
12	DC	DC-64	32.3-43.5		single sample	under wt
13	DC	DC-66	38.2			
14	F1	1035	31.5-36.1	25-----30	3----5.4	
15	F1	1038	32-45.8	30.2-----31.5	3----5.4	27.2----33.9
16	F2	2034	35.9-46.1	22.1----26.8	3----4.2	29.8----36.2
17	F2	2035	31.1-42.8	25.8----30.6	3.9---5.3	23.8----32.1
18	F2	2041	38.5-45.9	25.4----30.1	4.1----5.2	25.8----30.5
19	F2	2043	34.4-43.4			under wt

14-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

Organization	Date of Sowing	Total entries	Remarks
NIBGE	18.06.14	1479	Screening of germplasm against CLCuV infestation
CEMB	07.08.14	96	Varietal response of transgenic cotton towards weedicide and army worm
Entomology Department	10.06.14	46	To see the response of Pest on different genotypes
IAGS-PU Set-1 &2	12.04.14 18.06.14	4 4	Resurgence or transmission of CLCuV on host plant
CRS-Multan	02.06.14	5	To see the response of CLCuV
CRI-FSD	23.04.14	12	To see water stress effect on cotton germplasm
USDA	02.06.14	650	Screening of CLCuV resistance lines from *G. hirsutum*, *G. herbaceum* and *G. arboretum*

GREEN HOUSE STUDIES

15-TITLE HYBRIDIZATION AND OBTAINING ONE ADDITIONAL GENERATION DURING OFF-SEASON

OBJECTIVE To cross elite lines and achieve one additional generation under greenhouse conditions.

RESEARCH WORKERS Dr. Ghulam Sarwar, Dr. Saeed Ahmad, Mrs. Saadia Muneer and Abdul Manan Khan

LOCATION Cotton Research Station, Vehari

PROJECT DURATION Continuous nature.

METHODOLOGY

- Fresh crosses will be attempted and 50 F_1s will be sown in pots under greenhouse conditions.
- Propagation by stem cuttings of 5 US germplasm entries resistant to CLCuV. USG-14-2270, USG-14-2281, USG-14-2463, USG-14-2476 & USG-14-2480
- Multiplication of 4 Wild Species: *G. aridium*, *G. barbadense*, *G. herknessii* and *G*. *annomalun*
- Multiplication of 14 elite/extra oridinary performing line from F_2, F_3 & DC.
- Crossing will be done during March-2015 among extra oridinary local/USDA germplams to create maximum variability.

PREVIOUS YEAR'S RESULTS

- Crosses Attempted in pots: 52
- No. of F_1s sown: 40
- Detection of F_2s for Bt gene: 37
- Stem propagations of USDA Material: 23
- Confirmation of CLCuV Res By Grafting: 23

16-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 2014-15 to 2015-16

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

17-TITLE To evaluate promising strains of Desi germplasm for CLCuV susceptibility, yield and improvement in fibre traits

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 2015-16

METHODOLOGY Varieties: 9+1(std)
Plot size: 6m x 1.5m

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

PREVIOUS YEAR'S RESULTS New Experiment

18-TITLE EFFECT OF DUSKY COTTON BUG ON SEED COTTON YIELD, QUALITY TRAITS AND SEED GERMINATION %AGE

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-305, FH-142, VH-327, VH-363
Sowing Time	May-2015
Layout	Split Pot Design

Plot size 4.5 m x 1.5m
Replications 3
Treatments 1)Coverd 2)uncoverd 3)Pesticide Application

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

Varieties	Yield per plant (g)		Seed Index		GOT %		Av No of Bolls		Avg Boll Wt (g)		Seed Germ %	
	Uncov	Cov	Uncov	Cov	Uncov	cov	uncov	cov	Uncov	Cov	Uncov	Cov
VH-305	72	34	7.7	9.43	42.27	38.07	28.27	10.33	2.56	3.02	64.67	86.67
VH-327	118.3	30.6	6.73	8.5	35.58	32.84	51.47	8.83	2.31	3.27	51.33	84.00
FH-142	83	33.3	7.75	8.6	40.57	38.26	31.53	11.83	2.64	3.08	56.67	86.00
LSD	43.70	16.63	1.48	0.93	2.51	2.94	19.17	5.58	0.59	0.25	26.61	14.41

19-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 2015-16

METHODOLO Variety: VH-327, VH-363
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 Weight, Seed Cotton Yield and Fiber traits

PREVIOUS YEAR'S RESULTS New experiment

20 -TITLE **IMPACT OF GROWTH REGULATORS ON COTTON CROP BEHAVIOUR AND YIELD**

OBJECTIVE To regulate the crop growth and enhancement of flowers/ boll retention

RESEARCH WORKER (S) Dr. Ghulam Sarwar Dr. Saeed Ahmad. Khalid Mahmood, Ghulam Mustfa Siddiqui

PROJECT DURATION 2015-17

LOCATION CRS, Vehari

TREATMENTS/ METHODOLOGY Variety = FH-118 and FH-Lalazar
Sowing time = May 1st, 2015
No. of Sprays = 02 (1st July, 1st August)
Treatments:
T1: Flumetralin,
T2: PIX (Mepiquat Chloride),
T3: Control (no spray)

Layout	split plot
Plot size	3m x 1.5m
Replications	3

Recommended dose of NPK will be applied. Plant spacing will be kept 30cm. Data regarding agronomic traits(Fortnightly Plant height, Shedding %age, Boll Size, average Boll weight, seed cotton Yield and Quality traits) will be recorded.

PREVIOUS YEAR'S RESULTS First year of experiment

21-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

METHODOLOG *G. hirsutum*: VH-305, VH-363, 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-363, VH-305 and VH-327 will be planted to produce pre-basic seed.

PREVIOUS YEAR'S RESULTS: Single plant progenies of VH-327, VH-363 and VH-305 were studied.

S. No.	Variety	No. of Single Plants	Pre- Basic seed (kg)

1.	VH-305	27	2
2.	VH-327	22	2
3.	VH-363	25	3

SELECTION OF PROGENIES

S. No.	Variety	No. of Progenies sown	No. of progenies Selected
1.	VH-327	27	10
2.	VH-311	32	10
3.	VH-305	16	8
4.	FH-142	10	4

22-TITLE **PERFORMANCE OF DIFFERENT ADVANCE LINES UNDER DROUGHT CONDITIONS**

OBJECTIVE To study the yield, physiological parameters and quality traits

RESEARCH WORKERS Dr. Ghulam Sarwar, Dr. Saeed Ahmad

LOCATION Cotton Research Station, Vehari

PROJECT DURATION Continuous

PREVIOUS YEAR'S RESULT:

SR NO.	VARIETIES	Yield kg/ha (Drought)	Yield kg/ha (Normal)
1	D-1	1859.617	2134.85
2	D-2	1787.149	2243.766
3	D-3	1708.511	2032.104
4	D-4	1763.615	1878.846
5	D-5	1493.548	1903.671
6	D-6	1270.836	1755.579
7	D-7	1445.045	1701.91
8	D-8	1178.996	1674.645
9	D-9	1849.715	2497.474
10	D-10	2261.847	2527.035
11	D-11	1992.641	2409.365
12	D-12	1421.224	2250.654
13	VH-327	2099.405	2021.628
		LSD(0.05)= 571.09	**LSD(0.05)= 747.08**

PAKISTAN AGRICULTURE RESEARCH BOARD PROJECT NO. 191

23-TITLE GENETIC IMPROVEMENT OF COTTON AGAINST INSECT RESISITANCE AND HERBICIDE TOLERANCE

OBJECTIVE Evaluation of Transgenic cotton Cultivars transformed with CEMB-Bt and GT-gene in VH-281,VH-289, VH-290 and MNH-786.

RESEARCH WORKERS Dr. Ghulam Sarwar, Dr. Saeed Ahmad and Abdul Manan Khan

LOCATION Cotton Research Station, Vehari

PROJECT DURATION 2013-14 to 2015-16

ENTRIES 4

Methodology

1. All the transformed entries along with control (non-transformed version) will be sown in the field.
2. Glyphosate will be sprayed at the recommended dose at 2-4 true leaf stage.
3. Data will be collected on the basis of mortality rate and infestation of Armyworm.

PREVIOUS YEAR'S RESULT:

During current crop season, CEMB supplied seed of transformed version of VH-281, VH-289, VH-290 and MNH-786 varieties to CRS Vehari for Evaluation against Glyphosat tolerance in coded form. The results are given below

Results after 1st Spray: Data was taken after 10 days.

- Dose: 1900 ml/acre
- Total transformed Entries = 75
- Totally damaged entries = 32
- Entries un-effected = 43 (Transformed and Non transformed)
- Effect on Control = No effect of weedicide
- In non-Transformed = 2-4 plants/12 plants per entry unaffected
- All the weeds in the field were killed.

Results after 2nd spray): Data was taken after 35 days.

Dose: 2000 ml/acre
Unaffected entries =22/43 (14 transgenic+ 08 Control)
Entries damaged =21/43 (Transgenic+ Control)

Percentage of plant showing glyphosate tolerance in selected 22 entries:

Sample #	%age of tolerant plants after 1st Spray	%age of tolerant plants after 2nd Spray
21/14	53.8	53.8
Control	56.2	43.7
21/15	75.0	58.3
21/16	55.0	18.1
21/17	44.4	22.2
21/18	83.3	66.6
19/1	80.0	60.0
Control	62.5	62.5
19/2	45.4	27.2
Control	75.0	66.6
19/3	42.9	42.9
Control	100.0	90.0
19/4	11.7	23.5
Control	57.1	100
19/6	66.6	100
19/7	66.6	26.6
Control	92.3	84.6
19/8	50.0	37.5
Control	75.0	66.6
19/9	50.0	25.0
19/10	50.0	15.0
Control	28.5	71.4

Annexure: 1 Gene pool Entries

S. No	Name	S. No	Name	S. No	Name	S. No	Name	S. No	Name
1	Bt-211	37	Bt-213	73	S-9	109	S-11	145	VH-363
2	AC-252	38	CH-38	74	SPCHAR-586	110	M-1	146	PSSIH- BIG BOLL
3	F-124	39	NIA-78	75	A33-57	111	M-2	147	URS-BIG BOOL
4	VH-286	40	DROV-TO1	76	CHINA-11	112	M-3	148	DGS-4
5	F-47/1B-195	41	N-449/3	77	CH-18	113	M-4	149	BI II BOLL3
6	VH-297	42	326/1	78	CH-54	114	M-5	150	CHINA-16
7	UCD-581	43	VH-225	89	RED LEAF	115	M-6	151	CHINA21
8	ACALA-1 517/75	44	GN-2085P1	80	LP-A-5166	116	M-7	152	MV-1
9	CHINA	45	AC-134	81	AMST-38	117	M-8	153	MV-2
10	MC-1	46	CHINA-45	82	PR-1	118	M-9	154	MV-3
11	CHINA-6	47	ANMOL	83	CH-33	119	CHINA-1	155	FH-142
12	BTA-1	48	N-112	84	CHINA-26	120	VH-292	156	IUB-222
13	CHINA-2	49	CHINA-14	85	VH-282	121	43-NO	157	MM-58
14	VH-268	50	CHINA-9	86	ACALA57-1	122	AV-4	158	Silkee
15	CH-52	51	LAOKRA-548	87	Ghauri-3	123	MNH-886	159	CIM-599
16	VH-289	52	B-69	88	NIAB-111	124	CH-59	160	CIM-602
17	VH-295	53	VH-257	89	CH-27	125	DJ-15A3	161	A-011
18	VH-296	54	CH-19	90	TMA-1	126	BJA-HL27-20/163	162	Sitara11-M
19	MS-40	55	PCCT12/07	91	CH-41	127	CARO LINE QUEN	163	NCVT D1/12
20	COKER	56	CHINA-7	92	BT-555	128	VH-137	164	NCVT D2/12
21	321-TA11	57	LSS	93	CH-43	129	VH-264	165	NCVT D4/12
22	CHINA-5	58	CH-21	94	CHINA-3	130	CH-20	166	NCVT D7/12
23	CHINA-20	59	326/2008	95	CH-42	131	4074	167	NCVT C1/12
24	CH-57	60	326/2	96	NEX-12	132	D2-CHSE1 PETOR	168	NCVT C3/12
25	CH-24	61	CHINA-15	97	CHINA-12	133	4049/04	169	NCVT C10/12
26	CH-49	62	268-F	98	324-TALL	134	7-Oct	170	NCVT C12/12
27	CHINA-10	63	AC-12	99	MG-6	135	BT-1507	171	NCVT C13/12
28	CH-48	64	VH-260	100	CH-32	136	ACALA P3	172	NCVT C14/12
29	VH-206	65	CH-25	101	VH-261	137	VH-240	173	NCVT C17/12
30	H-3	66	2077/09	102	41/5-1	138	IRMA-2364	174	NCVT C19/12
31	326/3	67	LUMAMA-H	103	CH-19	139	CH-8	175	NCVT C27/12
32	CHINA-24	68	VH-148	104	H406-7	140	VH-291	176	NCVT C28/12
33	VH-285	69	NT-1401	105	CH-58	141	CHINA-22	177	MNH-986
34	7-Sep	70	CLEN CLC88	106	A-637	142	FH-930	178	DGS-1
35	FG-4074P5 8 LINE	71	PRS-72	107	CS-55	143	VH-281	179	DGS-2
36	DELTA PINE -57	72	BIG BOLL	108	DR-2	144	CHINA-25	180	DGS-3

Annexure II: CROSSES TO BE ATTEMPTED DURING 2015-16

S#	Entry #	Origin	S#	Entry #	Origin
1	C-1	FH-142XUSDA-1112	26	C-26	VH-319XCYTO-179
2	C-2	VH-327SXUSDA-1112	27	C-27	VH-319X1031(F_1)
3	C-3	VH-305X USDA-1112	28	C-28	VH-327XCYTO-179
4	C-4	LALAZARXUSDA-1112	29	C-29	LALAZARXCYTO-179
5	C-5	USDA-1066XVH-319	30	C-30	VH-327X1031(F_1)
6	C-6	USDA-1066VH-327	31	V-4	
7	C-7	USDA-1066XFH-142	32	C-31	1029(F_1)XDC-49
8	C-8	1035XFH-142	33	C-32	VH-327X1031(F_1)
9	C-9	1035XVH-327S	34	C-33	VH-319X1031(F_1)
10	C-10	1035XVH327	35	C-34	2006(F_2)XVH-363
11	C-11	2031XLALAZAR	36	C-35	VH-289XVH-363
12	C-12	2031XFH-142	37	C-36	VH-300XLALAZAR
13	C-13	FH-142X1031(F_1)	38	C-37	CHINA-42XUSDA-1023
14	C-14	1038(F_1)XVH-327S	39	C-38	CHINA-18XUSDA-1023
15	C-15	2031(F_2)XFH-142	40	C-39	V-1X1140
16	C-16	2031(F_2)XLALAZAR	41	C-40	VH-327XFH-142
17	C-17	1038(F_1)XVH-327	42	C-41	VH-327XVH-319
18	C-18	1038(F_1)XFH-142	43	C-42	VH-363XLALAZAR
19	C-19	1035(F_1)XFH-142	44	C-43	VH-363XVH-260
20	C-20	1035(F_1)XVH-327	45	C-44	VH-363XVH-319
21	C-21	FH-142XCYTO-179	46	C-45	VH-327XLALAZAR
22	C-22	VH-319XCYTO-179	47	C-46	VH-281xFH-142
23	C-23	USDA-1066XLALAZAR	48	C-47	V-2xPC-29
24	C-24	USDA-1066XVH-327	49	C-48	LSSxFH-142
25	C-25	LALAZARX1031(F_1)	50		

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

Annexure III: CROSSES ATTEMPTED DURING PREVIOUS YEAR

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