Annual Program of Research Work

RABI 2016 – 17

PULSES RESEARCH INSTITUTE, FAISALABAD

AYUB AGRICULTURAL RESEARCH INSTITUTE, FAISALABAD

CONTENTS

INTRODUCTION

Pulses are an important source of proteins and sustain soil fertility through biological nitrogen fixation. In Pakistan pulses are grown on an area of about 1170 thousand hector with more than 87% being contributed by Punjab (Bureau of Statistics, Pakistan 2013-14). Similarly more than 80% of the total production of Pakistan is being produced in Punjab.

Among rabi pulses chickpea is the main crop being grown on about (936 thousand ha) with more than 90% being grown in Punjab (857.9 thousand ha). Punjab contributed in the same fashion for production. Lentil is also an important crop among Rabi pulses in Pakistan, being grown on about 17.7 thousands hector and with about 7000 tons production. Most of the lentil requirements are being fetched through import with ever increasing import bill. The situation necessitates increasing its production by increasing area and per acre yield. Being rainfed crop, pulses show abrupt fluctuations in production due to uncertain and erratic rainfall.

Area, production and yield of rabi pulses during 2014-15 is as under:

Year	Punjab			Pakistan		
	Area 000 ha	Production 000 tons	Yield Kg / ha	Area 000 ha	Production 000 tons	Yield Kg / ha
Gram						
2014-15	857.9	322.4	376	936.2	379.2	405
Lentil						
2014-15	11.3	3.3	292	17.7	7.0	395

Salient Achievements of Pulses Research Institute during 2015-16 is as under:

Chickpea Desi (*Cicer arietinum* L.)

- Chickpea desi Advance line D-03009 was approved as a variety with the name **"Bittal-2016"** for general cultivation. This variety has high yield potential of more than 4000 kg/ha. It has bold seed size with attractive shape and color.
- Two Advance line D-010008 (1964 kg/ha) and D-09027 (1895 kg/ha) contributed by this institute secured top two positions In National Uniform Yield Trials (NUYT). National Coordinator Pulses has reported that these lines also remained tolerant to disease Ascochyta Blight in the field.
- Advance line D-12011 with (1108 kg/ha) ranked 2nd in Co-operative Yield Trial conducted at twelve different locations.
- In the Advance Yield Trial entry D-13030 (2576 kg/ha) produced highest grain yield.
- Twenty one +2 reciprocal) successful crosses out of attempted twenty five crosses were harvested.
- More than one thousand (1000) single plant progenies from F_2 to F_5 generations were selected for generation enhancement.
- Thirty six (36) uniform Advance lines were selected from F_6 for future studies / evaluation in yield trials.
- Four (4) advance lines viz., 15033, 15034, 15035 and 15036 showed resistance to *Ascochyta* blight.

Chickpea Kabuli (*Cicer arietinum* L.)

- **Four advance lines viz. K-09012, K-09015, and K002-10 contributed by this institute occupied top three positions In National Uniform Yield Trials 2015-16.**
- Advance lines K-01211 (1205 kg/ha) and K-01209 (1184 kg/ha) out-yielded all other genotypes contributed by sister organizations in Cooperative yield trial conducted at ten locations.
- Advance lines K-01242 (1837 kg/ha) and K-01248 (1821 kg/ha) out-yielded other genotypes including both the checks Noor-2013 and Noor-2009 in Micro Yield Trials.
- Advance lines K-01402 (1988 kg/ha) and K-01403 (1817 kg/ha) trial produced more grain yield than the checks in Advance yield trials while genotypes K-01510 (1988 kg/ha) in PYT Set-I and K-01530 (1790 kg/ha) In PYT Set-II remained at top.
- Nineteen (19) successful F_0 crosses were developed.
- Three hundred and forty (340) single plant progenies from F_3 to F_5 generations were selected for generation advancement. In F_2, twenty two (22) crosses were bulked separately.
- Thirty two (32) uniform Advance lines were selected from F_6 for evaluation in yield trials.
- Ten (10) advance lines viz., K-01514, K-01515, K-01516, K-01518, K-01519, K-01528, K-01530, K-01401, K-01402 and K-01403 of this institute exhibited resistance to *Ascochyta blight*.

LENTIL (*Lens culinaris* Medik)

- Two Advance line V- 11508 (1222 kg/ha) and V- 11513 (1187 kg/ha) occupied top two position in National Uniform Yield Trials.
- Advance lines V-13514 (778 kg/ha) and V-13516 (776 kg/ha) ranked 1st and 2nd respectively in Micro Yield Trial.
- Advance lines V-14501 (443 kg/ha) and V-14503 (363 kg/ha) gave higher yield in contrast with other genotypes in Advance Yield Trial. Entries V-15510 and V-15502 gave significantly higher yield than checks in Preliminary Yield Trials.
- Fifteen (15) successful new cross combinations were harvested.
- Two hundred and Fifty (250) progenies were selected for further studies from F_2- F_6 generations.
- Ten (10) uniform desirable lines were selected for preliminary yield testing.

BREEDING GROUP

CHICKPEA (DESI) (*Cicer arietinum* L.) 2n = 16

1. TITLE — **GERMPLASM STUDIES**

OBJECTIVES

To collect, maintain, characterize and evaluate gene pool entries

RESEARCH WORKERS

Dr. Anwar-ul-Haq, Muhammad Shafiq, Irfan Rasool, Mushtaq Ahmad & Ch. Muhammad Rafiq

PROJECT DURATION

2016-17

LOCATION

PRI, Faisalabad

TREATMENTS/ METHODLOGY

Set -I Faisalabad

Entries	=	280 (Pr. 275 + New 5)
Checks	=	Bittal-2016, Bhakkar-2011, Punjab-2008, Punjab-2000 & Bittal-98
Design	=	Augmented
Plot size	=	1.75 x 0.6 m
Inter/intra row space	=	30/15 cm
Planting time	=	2nd fortnight of October

Set-II Kallurkot

Entries	=	426 (Received from PGRI, Islamabad)
Checks	=	Bittal-2016, Bhakkar-2011, Punjab-2008, Punjab-2000 & Bittal-98
Design	=	Augmented
Plot size	=	1.75 x 0.6 m
Inter/intra row space	=	30/15 cm
Planting time	=	2nd fortnight of October

PREVIOUS YEAR'S RESULTS

Set 1: Entries studied & maintained = 275

Set II: Entries studied & maintained = 426

Range of some morphological traits in chickpea desi germplasm (Faisalabad)

TRAIT	RANGE	
	Minimum	Maximum
Plant height (cm)	45	100
Leaflets/ leaf (No.)	12	20
Primary branches/ Plant	2	5
Secondary branches/ Plant	6	32
Pods/ plant	12	105
Seeds/ pod	1-2	2-3
100- grain weight (g)	15	38
Grain yield /Plant (g)	15	45

2. TITLE — HYBRIDIZATION PROGRAMME

OBJECTIVES To create variability for the selection of desirable recombinants

RESEARCH WORKERS Dr. Anwar-ul-Haq, Muhammad Saleem, Muhammad Shafiq and Irfan Rasool

PROJECT DURATION 2016-17

LOCATION PRI, Faisalabad

TREATMENTS/ METHODLOGY Four high yielding varieties imported from Australia are being included in hybridization program.

CHICKPEA (Desi) NEW CROSS COMBINATIONS (Rabi 2016-17)

Sr.#	Female Parent		Male Parent	Sr.#	Female Parent		Male Parent
1.	Bittal-2016	X	Amber	16.	E-26	X	"
2.	Punjab-2008	X	"	17.	D-10008	X	CH 104/06
3.	C-44	X	"	18.	D-09027	X	"
4.	E-26	X	"	19.	D-10039	X	"
5.	Bittal-2016	X	Neelam	20.	D-10008	X	CH 39/08
6.	Punjab-2008	X	"	21.	D-09027	X	"
7.	C-44	X	"	22.	D-10039	X	"
8.	E-26	X	"	23.	D-10008	X	DCD-1
9.	Bittal-2016	X	PBA Striker	24.	D-09027	X	"
10.	Punjab-2008	X	"	25.	D-10039	X	"
11.	C-44	X	"	26.	Amber	X	E-26
12.	E-26	X	"	27.	Neelam	X	"
13.	Bittal-2016	X	Almaz	28.	PBA Striker	X	"
14.	Punjab-2008		"	29.	Amber	X	Punjab-2008
15.	C-44		"	30.	Neelam	X	Bittal-2016

Sr. #	Variety	Salient Character
1.	Amber	High Yielding Australian Desi variety
2.	Neelam	"
3.	PBA Striker	"
4.	Almaz	High Yielding Australian Kabuli variety
5.	Bittal-2016	High Yielding and Blight resistant
6.	Punjab-2008	High Yielding
7.	C-44	High Yielding and Blight resistant
8.	CH 104/06	High Yielding
9.	D-10039	High Yielding
10.	E-26	Double Poded
11.	D-10008	High Yielding and Blight resistant
12.	D-09027	High Yielding and Blight resistant
13.	DCD-1	Blight Resistant
14.	CH 39/08	Blight Resistant

Cross combinations = 30

Sowing time = 2nd fortnight of October

Parental lines will be planted in paired (male and female) 4 meter long and 60cm apart rows to facilitate crossing

PREVIOUS YEAR'S RESULTS Seeds of 23 successful crosses were harvested.

3. TITLE — STUDY OF FILIAL GENERATIONS

OBJECTIVES
To select recombinants with desirable traits in segregating population

RESEARCH WORKERS
Dr. Anwar-ul-Haq, Muhammad Shafiq, Irfan Rasool and Mushtaq Ahmad

PROJECT DURATION
2016-17

LOCATIONS
2 (Faisalabad & Kallurkot)

TREATMENTS/ METHODLOGY
Crosses / plant progenies to be studied:

Filial generation	Crosses/progenies
F_1	23
F_2	16
F_3	23/63
F_4	17/120
F_5	18/150
F_6	13/80

Breeding method = Pedigree
Checks = Bittal-2016, Bhakkar-2011, Pb-2008 & Bittal-98
Plot size = 4 × 0.30 m
Inter/intra row spacing = 30/15 cm
Sowing time = 2nd fortnight of October

PREVIOUS YEAR'S RESULTS
Filial generations studied and selected:

Filial generation	Crosses/ progenies studied	Crosses/progenies selected/harvested	Uniform lines selected
F_0	27	23	
F_1	16	16	
F_2	23	23/63	
F_3	19/90	17/120	
F_4	20/120	18/150	
F_5	21/140	13/80	
F_6	14/70		36

4. TITLE — PRELIMINARY YIELD TRIAL

OBJECTIVES
To evaluate promising lines for yield potential and disease tolerance

RESEARCH WORKERS
Irfan Rasool, Dr. Anwar-ul-Haq and Muhammad Shafiq

PROJECT DURATION
2016-17

LOCATIONS
2 (Faisalabad & Kallurkot)

TREATMENTS/ METHODLOGY
Entries = 36
Sets = 2 (18 entries +2 checks in each set)
Checks = 2 (Bittal-2016 & Pb-2008)
Design = R.C.B
Plot size = 4 × 1.2 m
Replications = 3
Inter/intra row spacing = 30/15 cm
Sowing time = 2nd fortnight of October
Data to be taken = Plant Stand, Days to 50 % Flowering, Days to 90% Maturity, Plant height, Number of pods/plant, Number of seeds/pod, seed yield and reaction to disease under natural conditions.

PREVIOUS YEAR'S RESULTS

Set – I

Rank	Entries	PRI, Fsd	GBRSS K.Kot	Ave. Yield Kg/ha
1	Bhakkar-11	1958	1806	**1882**
2	15008	1722	1951	**1837**
3	15015	1667	1844	**1755**
4	15014	1736	1563	**1649**
5	15016	1785	1514	**1649**
6	15013	1722	1524	**1623**
7	15005	1778	1406	**1592**
8	Pb.2008	1764	1372	**1568**
9	15002	1674	1441	**1557**
10	15012	1806	1233	**1519**
11	15001	1569	1444	**1507**
12	15009	1736	1271	**1503**
13	15011	1444	1531	**1488**
14	15006	1465	1507	**1486**
15	15017	1569	1389	**1479**
16	15010	1472	1403	**1438**
17	15018	1590	1285	**1438**
18	15003	1569	1198	**1384**
19	15007	1465	1285	**1375**
20	15004	1611	1128	**1370**
CV %		**3.84**	**9.06**	**6.61**
LSD (0.05)		**51.96**	**107.63**	**167.03**

Set – II

Rank	Entries	PRI, Fsd	GBRSS, K.Kot	Ave. Yield Kg/ha
1	15020	1882	1809	**1845**
2	15036	1938	1556	**1747**
3	15026	1708	1608	**1658**
4	15024	1694	1580	**1637**
5	15033	1611	1597	**1604**
6	Bhakkar-11	1486	1545	**1516**
7	15035	1542	1469	**1505**
9	15021	1674	1330	**1502**
8	Pb.2008	1563	1413	**1488**
10	15019	1764	1111	**1438**
11	15028	1521	1319	**1420**
12	15031	1368	1441	**1405**
13	15034	1403	1302	**1352**
14	15032	1563	1076	**1319**
15	15025	1222	1389	**1306**
16	15030	1563	1024	**1293**
17	15029	1083	1458	**1271**
18	15022	1035	1285	**1160**
19	15027	688	920	**804**
20	15023	306	1146	**726**
CV %		**3.67**	**7.67**	**5.72**
LSD (0.05)		**42.90**	**85.69**	**130.82**

5. TITLE — ADVANCE YIELD TRIAL

OBJECTIVES

To evaluate promising lines for yield potential and disease tolerance

RESEARCH WORKERS

Irfan Rasool, Dr. Anwar-ul-Haq, Muhammad Saleem & Muhammad Shafiq

PROJECT DURATION

2016-17

LOCATIONS

Faisalabad & Kallurkot

TREATMENTS/ METHODLOGY

Entries	= 14
Checks	= 2 (Bittal-2016 & Bhakkar-2011)
Design.	= R.C.B.
Plot size	= 4 × 1.2 m
Replications	= 3
Inter/intra row spacing	= 30/15 cm
Sowing time	= 2nd fortnight of October
Data to be taken	= Plant Stand, Days to 50 % Flowering, Days to 90% Maturity, Plant height, Number of pods/plant, Number of seeds/pod, seed yield and reaction to disease under natural conditions.

PREVIOUS YEAR'S RESULTS

Rank	Entries	PRI, Fsd	GBRSS, K.Kot	Av. Yield Kg/ha
1.	D-13030	3014	2139	**2576**
2.	D-13031	2868	2018	**2443**
3.	D-14008	2736	2146	**2441**
4.	D-14005	3132	1701	**2417**
5.	D-13012	3000	1799	**2399**
6.	D-13036	2833	1951	**2392**
7.	D-13011	3000	1597	**2299**
8.	D-14014	2424	2153	**2288**
9.	D-13029	3021	1500	**2260**
10.	D-14013	2278	2160	**2219**
11.	D-13007	2917	1478	**2198**
12.	**Pb.2008**	**2486**	**1813**	**2149**
13.	D-13035	2333	1943	**2138**
14.	D-13006	2896	1375	**2135**
15.	D-14015	2139	2111	**2125**
16.	D-14010	2271	1958	**2115**
17.	D-14011	2410	1792	**2101**
18.	D-13004	2743	1444	**2094**
19.	D-13034	2743	1354	**2049**
20.	**Bhakkar-11**	**2007**	**1833**	**1920**
CV %		**2.93**	**8.41**	**5.87**
LSD (0.05)		**63.63**	**124.57**	**213.53**

6. TITLE — COOPERATIVE YIELD TRIAL

OBJECTIVES
To evaluate Advance lines of PRI and sister organizations of Punjab in different agro-ecological zones

RESEARCH WORKERS
Irfan Rasool, Dr. Anwar-ul-Haq, Muhammad Shafiq and M. Mushtaq Ahmad

PROJECT DURATION
2016-17

LOCATION
13 (Faisalabad, NIAB, Kallurkot, Bhakkar, Bahawalpur, Karor, Rakhuttra, Karak & farmer fields.)

TREATMENTS/ METHODLOGY

Entries	= 18 Pulses Res. Institute will contribute (10) advance lines
Checks	= 2 (Bittal-2016 & Punjab-2008)
Design.	= R.C.B.
Plot size	= 4 × 1.2 m
Replications	= 3
Inter/intra row spacing	= 30/15 cm
Sowing time	= 2nd fortnight of October
Data to be taken	= Plant Stand, Days to 50 % Flowering, Days to 90% Maturity, Plant height, Number of pods/plant, Number of seeds/pod, seed yield and reaction to disease under natural conditions.

PREVIOUS YEAR'S RESULTS

ENTRIES	PRI Fsd	NIAB Fsd	GBRSS K.Kot	AZRI Bkr	RARI B.Pur	ARS Karor	Rakh-utra	GBRSS K.Kot	AZRI Bkr	Mankira F.Field	K.Kot F.Field	K.Kot F.Field	*Kg/ha*
CH49/09	2611	487	1667	2778	2229	764	1042	503	527	861	111	83	**1139**
D-12011	**2396**	**486**	**1823**	**1872**	**1875**	**903**	**833**	**694**	**654**	**1597**	**54**	**115**	**1108**
CH17/09	2750	665	1059	2269	1604	946	764	417	360	1424	118	115	**1041**
CM1026/09	2778	491	1163	1970	1541	856	625	486	636	1663	111	111	**1036**
BRC-403	2438	345	1875	1861	1958	991	556	677	515	836	125	118	**1025**
CH40/09	2472	490	1587	2208	1500	835	694	764	372	1175	101	73	**1023**
D-11030	2333	380	1406	2094	1701	1095	278	688	368	1469	96	219	**1011**
CH28/07	2833	628	1344	1771	2166	805	694	670	289	688	146	101	**1011**
Pb.2008	**2590**	**490**	**1323**	**1638**	**1958**	**822**	**417**	**590**	**453**	**1469**	**104**	**177**	**1003**
D-11035	2479	415	1250	2212	1812	780	833	399	542	933	90	205	**996**
CM584/09	2576	567	1111	2042	1750	912	625	368	578	885	115	184	**976**
D-12005	2139	381	1535	1726	2083	778	278	292	469	1617	160	208	**972**
Bhakkar-11	2181	515	1233	1374	2083	820	833	625	534	881	132	106	**943**
D-12025	1840	360	1125	1681	2270	1010	694	486	519	1035	122	139	**940**
D-11033	2361	427	1163	1882	1750	942	556	469	660	729	60	222	**935**
D-12036	2125	283	1240	1722	1708	816	625	531	541	1333	97	97	**927**
BRC-390	1979	306	1090	1996	1875	1171	486	556	588	792	60	111	**917**
CM1036	2972	399	1198	1566	833	1058	903	347	632	698	124	115	**904**
D-12046	1993	290	1229	1860	1875	739	486	660	521	713	156	69	**883**
TG-1209	2750	322	1045	1674	708	1156	556	382	638	639	125	104	**842**
TG-1210	2688	503	660	1042	771	899	764	278	294	1544	139	73	**805**
TG-1205	2396	510	434	1889	521	968	417	434	348	1137	101	122	**773**
CV %	**2.93**	**26.9**	**11.90**	**3.14**	**12.00**	**1.41**	**65.08**	**20.48**	**9.66**	**9.67**	**25.36**	**27.06**	
LSD (0.05)	**58.39**	**95.84**	**121.68**	**47.94**	**162.7**	**10.48**	**337.1**	**86.00**	**39.5**	**86.57**	**23.01**	**28.79**	

7. TITLE	**IDENTIFICATION OF CHICKPEA GENOTYPES RESPONSIVE TO HIGH INPUTS**
OBJECTIVES	To indentify chickpea genotypes with high harvest index
RESEARCH WORKER	M. Shafiq, Dr. Anwar-ul-Haq, Irfan Rasool & Dr. Muhammad Naveed
PROJECT DURATION	2016 (Continuous)
LOCATIONS	2 (Faisalabad & Kallur Kot)
TREATMENTS/ METHODLOGY	Varieties = 16 Fertilizer Doses Kg/Acre = 3 N - P - K 9 - 23 - 0 18 - 46 - 12 27 - 69 - 25 Design = Split plot Plot size (genotypes) = 4 × 1.2 m Plot size (fertilizer) = 30 × 20 m Replications = 3 Inter/intra row spacing = 30/15 cm Sowing time = 2nd fortnight of October Data to be taken = Days to 50 % Flowering & 90% Maturity, Plant height, Number of pods/plant, Pod length, Number of seeds/pod, seed yield and reaction to disease under natural conditions.

		Dose 1			Dose 2			Dose 3		
Sr.#	**Entry**	**PRI**	**GBRSS**	**Ave.**	**PRI**	**GBRSS**	**Ave.**	**PRI**	**GBRSS**	**Ave.**
1	D-11017	3021	2003	**2512**	2847	1500	**2174**	2507	1163	**1835**
2	D-12026	2986	1372	**2179**	2972	1247	**2109**	2694	1424	**2059**
3	D-12034	2597	1247	**1922**	3014	1326	**2170**	2479	1583	**2031**
4	D-13022	2201	1566	**1884**	2410	1628	**2019**	2479	1059	**1769**
5	D-13023	2688	1514	**2101**	2799	1340	**2069**	2090	1191	**1641**
6	D-10039	3090	1997	**2543**	2743	1785	**2264**	2618	903	**1760**
7	D-03009	2458	1410	**1934**	2382	1920	**2151**	2139	1722	**1931**
8	D-075-09	2819	1406	**2113**	2882	2139	**2510**	2861	1389	**2125**
9	Noor-2009	2403	1833	**2118**	2889	1972	**2431**	2424	1250	**1837**
10	K-01014	1979	1458	**1719**	1979	1549	**1764**	2056	1382	**1719**
11	K-70005	2354	1615	**1984**	2813	1576	**2194**	2396	990	**1693**
12	K-70008	2014	1563	**1788**	2597	1854	**2226**	2146	1740	**1943**
13	K-01020	1778	1528	**1653**	2361	1646	**2003**	1986	1313	**1649**
14	K-01019	2014	1736	**1875**	2403	1910	**2156**	2028	1441	**1734**
15	Pb-2008	2646	1667	**2156**	2806	1424	**2115**	3049	1181	**2115**
16	Noor-2013	1938	1181	**1559**	2389	1354	**1872**	1868	1101	**1484**

8. TITLE — NATIONAL UNIFORM YIELD TRIAL

OBJECTIVES To test the performance of candidate lines in different ecological zones of the country

RESEARCH WORKERS Irfan Rasool, Dr. Anwar-ul-Haq, Muhammad Shafiq, Mushtaq Ahmad & Ch. Muhammad Rafiq

PROJECT DURATION 2016-17

LOCATIONS 2 (Faisalabad & Kallurkot)

TREATMENTS/ METHODLOGY This institute will contribute 05 entries in NUYT.

Layout = As per instructions received along with seed
Sowing time Data = 2nd fortnight of October
to be taken = Days to 50% flowering, days to 90% maturity, incidence of insect pests & diseases and grain yield

PREVIOUS YEAR'S RESULTS Entries tested = 16
Pulses Res. Institute contributed 4 entries directly and one entry through PARB project No.120.

Grain Yield (kg/ha)

Rank	Entry name	Locations*											MEAN
		BARS	2	3	4	5	6	7	8	9	10	11	
1.	**D-10008**	**2000**	**2264**	**2137**	**931**	**1694**	**2412**	**1993**	**979**	**2506**	**1926**	**2759**	**1964**
2.	**D-09027**	**1462**	**1954**	**2300**	**563**	**2153**	**2584**	**3139**	**1021**	**1007**	**1977**	**2681**	**1895**
3.	CH 39/08	1531	2125	2628	1219	1736	2334	2354	896	1415	1515	1602	1760
4.	CH 104/06	1413	2708	2187	809	1500	2781	2167	1063	1404	1083	2229	1759
5.	CH 19/07	1687	1680	2168	827	1543	2311	2458	993	1967	799	2347	1707
6.	DCD-1	1331	2134	2236	816	1681	2326	2653	903	2065	788	1699	1694
7.	D-10039	1573	1745	2496	910	1592	2094	2764	903	823	1432	2238	1688
8.	09AG006	1726	1639	1896	727	1639	2233	2146	840	2680	938	1977	1676
9.	D 097-10	1535	1893	2360	742	1508	2575	2746	875	1162	604	2431	1676
10.	CH 10/08	1510	1782	2136	558	1459	2084	2257	826	2113	1138	2255	1647
11.	CH 24/07	1601	1935	2220	717	1491	2545	2557	833	1321	650	2213	1644
12.	TG1205	1465	1500	2164	919	1625	2258	3283	1118	1253	502	1840	1630
13.	D-09013	1583	1937	1975	783	1477	2300	2160	986	1661	1213	1780	1623
14.	Punjab-2008	1524	1746	2054	650	1583	1993	2908	944	1499	527	2331	1614
15.	BRC-390	1611	1889	2145	633	1667	2203	1826	1063	810	795	1708	1486
16.	AZRC-06A	1490	1629	2167	610	1560	1858	1370	1063	1227	780	1697	1405
Location Means		1565	1910	2204	776	1619	2306	2424	957	1557	1042	2112	

Coefficient of variation= 18.08% Genotypes (G), Location (L) and G x L interactions are highly significant P<0.01)

*Locations			
1= BARS, Fatehjung	2= GBRS, Kalurkot	3= PRI, AARI, Faisalabad	4=NIAB, Faisalabad
5= QAARI, Larkana	6= ARS, AhmadwalaKarak	7= AZRI, Bhakhar	8= BARI, Chakwal
9= NARC, Islamabad	10= AZRC, DI Khan	11= NIFA= Peshawar	

9. TITLE — IMPACT OF PLANT SPACING ON PHYSIO-MORPHOLOGICAL CHARACTERS OF CHICKPEA PLANT AND SEED YIELD

OBJECTIVES
To determine the optimum plant spacing

RESEARCH WORKERS
Muhammad Aqeel, Muhammad Shafiq and Ch. Muhammad Rafiq

PROJECT DURATION
2016-17

LOCATION
Faisalabad

TREATMENTS/ MTHODLOGY

Variety = 1
Treatments = 6

Treatments	P-P Distance	R-R Distance
T1	10 cm	23 cm
T2	10 cm	30 cm
T3	10 cm	45 cm
T4	15 cm	23 cm
T5	15 cm	30 cm
T6	15 cm	45 cm
T7	20 cm	23 cm
T8	20 cm	30 cm
T9	20 cm	45 cm

Design = Split plot
Plot size = 4 × 1.8 m
Replications = 3
Sowing time = 2nd fortnight of October
Data to be taken = Days to 50 % Flowering, days to Maturity, Plant height, Number of pods/plant, Pod length, Number of seeds/pod, 100 seed weight and grain yield.

PREVIOUS YEAR'S RESULTS

Treatments	10 cm	15 cm	20 cm	Mean
23 cm	821.33	807.33	666.33	765.00
30 cm	914.33	879.33	849.00	880.89
45 cm	555.00	423.33	439.67	472.67
Mean	763.56	703.33	651.67	706.19

10. TITLE — PRE-BASIC / BASIC SEED PRODUCTION

OBJECTIVES
i. To maintain the genetic purity of approved / commercial varieties
ii. To supply seed to different seed producing organizations

RESEARCH WORKERS
Dr. Anwar-ul-Haq, Muhammad Shafiq, Irfan Rasool and M. Mushtaq Ahmad

PROJECT DURATION
2016-17

LOCATION
Faisalabad and Kallurkot

TREATMENTS/ METHODLOGY

Single plants will be selected and single plant progeny rows will be sown in 4 meter long and 30 cm apart rows. True to type progeny rows will be harvested separately. Seed of selected progeny rows will be sown in blocks. Genetically true to type, disease free and healthy progeny blocks will be selected, harvested and bulked as BNS which will be used for pre-basic seed production.

PREVIOUS YEAR'S RESULTS

Seed of following genotypes was produced

Variety	**Seed Produced (Kg)**
Punjab-2008	3650
Bittal - 98	900
Bittal - 2016	1500

CHICKPEA (KABULI) (*Cicer arietinum* L.) 2n = 16

1. TITLE	**GERMPLASM STUDIES**
OBJECTIVES	To collect, maintain and characterize genepool entries
RESEARCH WORKERS	Dr. Muhammad Naveed, Muhammad Afzal Zahid, Muhammad Saleem and Muhammad Shafiq
PROJECT DURATION	2016-17
LOCATION	Faisalabad
TREATMENTS/ METHODLOGY	Entries = 300 (Pr. 292 + New 8) Checks = Noor-91, CM-2008, Noor-2009 & Noor-2013 Design = Augmented Plot size = 1.8 × 0.6 m Inter/intra row spacing = 30/15 cm Planting time = Last week of October/1st week of November
PREVIOUS YEAR'S RESULTS	Entries studied & maintained = 292 Range of variation for some quantitative traits in the chickpea (kabuli) Germplasm

TRAIT	**RANGE** (Average of five plants)	
	Minimum	**Maximum**
Plant height (cm)	29	96
Primary branches per plant	3	9
Secondary branches per plant	6	24
Days to flowering (50%)	85	115
Pods per plant	20	110
Days to maturity	150	170
100- grain weight (g)	18	30
Grain yield per plant (g)	20	160
Harvest index (%)	15	55

2. TITLE — HYBRIDIZATION PROGRAMME

OBJECTIVES

To create variability for the selection of desirable recombinants

RESEARCH WORKERS

Dr. Muhammad Naveed, M. Afzal Zahid, Irfan Rasool and Muhammad Shafiq

PROJECT DURATION

2016-17

LOCATION

Faisalabad

TREATMENTS/ METHODLOGY

Cross combinations= 25

Sr	High Yielding		Blight Tolerant	Sr	High Yielding		Wilt Tolerant
1	K-01211	×	CDC Leader	15	K-01241	×	K-08003
2	K-01209	×	CDC Cabri	16	K-01338	×	K-01020
3	CH55/09	×	CDC Marengo	17	K-01219	×	K-01241
4	CH74/08	×	K-01514	18	K-01250	×	K-08003
5	CH72/08	×	K-01515	19	K-01302	×	K-01305
6	CH77/08	×	CDC Cabri	20	K-01308	×	K-01241
7	CH56/09	×	CDC Marengo	21	K-01221	×	K-08003
8	CH 76/08	×	K-01516	22	K-01240	×	K-01305
9	CH 54/07	×	K-01518	23	K-01309	×	K-01241
10	TG12K07	×	K-01519		**Bold Seeded**		**High Yielding**
11	CH61/09	×	FLIP08/37C	24	K-06006	×	Almaz
12	K-01212	×	FLIP82/150C	25	UC-27	×	Noor-2013
	High Yielding		**Heat Tolerant**				
13	K-01242		K-01020				
14	K-01248		K-01110				

Sowing time = Last week of October / 1st week of November

Parental lines will be planted in paired (male and female) 4 meter long and 60 cm apart rows to facilitate crossing

PREVIOUS YEAR'S RESULTS

28 crosses were attempted and seed of 19 successful crosses was harvested

3. TITLE — STUDY OF FILIAL GENERATIONS

OBJECTIVES

To select recombinants with desirable traits from segregating populations

RESEARCH WORKERS

Dr. Muhammad Naveed, M. Afzal Zahid, Irfan Rasool and Muhammad Shafiq

PROJECT DURATION

2016-17

LOCATION

Faisalabad

TREATMENTS/ METHODLOGY

Crosses / plant progenies to be studied;

Filial generation	Crosses/progenies
F_1	19
F_2	14
F_3	22
F_4	11/130
F_5	10/140
F_6	7/70

Breeding method = Pedigree
Checks = Noor-91, CM-2008, Noor-2009 & Noor-2013
Plot size = 4 × 0.30 m
Inter/intra row spacing = 30/15 cm
Sowing time = Last week of October / 1st week of November

PREVIOUS YEAR'S RESULTS

Filial generations studied and selected:

Filial generation	Crosses/ progenies studied	Crosses/progenies selected/harvested	Uniform lines selected
F_0	28	19	
F_1	14	14	
F_2	22	22	
F_3	13/115	11/130	
F_4	13/130	10/140	
F_5	8/106	7/70	
F_6	9/66	-	32

4. TITLE — PRELIMINARY YIELD TRIAL

OBJECTIVES

To evaluate promising lines for yield potential and disease tolerance

RESEARCH WORKERS

Dr. Muhammad Naveed, Muhammad Afzal Zahid, Muhammad Saleem and Muhammad Shafiq

PROJECT DURATION

2016-17

LOCATIONS

Faisalabad and Kallurkot

TREATMENTS/ METHODLOGY

Entries = 32
Sets = 2
Checks = Noor-2009 & Noor-2013
Design = R.C.B.
Plot size = 4 × 1.2 m
Replications = 3
Inter/intra row spacing = 30/15 cm
Sowing time = Last week of October / 1st week of November
Data to be taken = Days to 50% flowering, days to 90% maturity, incidence of insect pests & diseases, and grain yield

PREVIOUS YEAR'S RESULTS

R	Set-I, PRI, Fsd Entries	Av. Yield Kg/ha	R	Set-II, PRI, Fsd Entries	Av. Yield Kg/ha
1	K-01510	1857	**1**	K-01530	1790
2	Noor-2009	1836	**2**	K-01519	1646
3	K-01509	1786	**3**	K-01518	1635
4	K-01511	1740	**4**	FLIP82-150c	1610
5	K-01513	1629	**5**	K-01528	1561
6	K-01504	1506	**6**	Noor-2009	1368
7	K-01501	1411	**7**	K-01517	1315
8	K-01512	1350	**8**	K-01525	1301
9	K-01514	1321	**9**	FLIP08-37c	1235
10	Noor-2013	1289	**10**	K-01527	1083
11	K-01507	1256	**11**	K-01522	1061
12	K-01515	1194	**12**	K-01524	1050
13	K-01506	1178	**13**	Noor-2013	1006
14	K-01502	1158	**14**	K-01523	981
15	K-01508	1149	**15**	K-01520	903
16	K-01516	1083	**16**	K-01521	857
17	K-01505	997	**17**	K-01529	783
18	K-01503	190	**18**	K-01526	751
	LSD (0.05)	**143**		**LSD (0.05)**	**153**
	CV%	**6.5**		**CV%**	**7.6**

5. TITLE — ADVANCE YIELD TRIAL

OBJECTIVES

To evaluate promising lines for yield potential and disease tolerance

RESEARCH WORKERS

Dr. Muhammad Naveed, Muhammad Afzal Zahid and Muhammad Shafiq

PROJECT DURATION

2016-17

LOCATIONS

Faisalabad, Rakhuttra and Kallurkot

TREATMENTS/ METHODLOGY

Entries	= 14 + 2
Checks	= Noor-2009 & Noor-2013
Design	= R.C.B.
Plot size	= 4 × 1.2 m
Replications	= 3
Inter/intra row spacing	= 30/15 cm
Sowing time	= Last week of October / 1st week of November
Data to be taken	= Days to 50% flowering, days to 90% maturity, incidence of insect pests & diseases, and grain yield

PREVIOUS YEAR'S RESULTS

R	Entry	PRI, Fsd	GBRSS, K.Kot	BARI, Chakwal	Av. Yield Kg/ha
1	K-01402	2838	1931	1194	1988
2	K-01403	2285	1806	1361	1817
3	K-01406	2603	1569	1186	1786
4	Noor-2009	2146	1642	1250	1679
5	K-01405	1988	1681	1319	1663
6	K-01401	2363	1313	1269	1648
7	Noor-2013	1953	1681	1139	1591
8	K-01424	2026	1139	1389	1518
9	K-01411	1576	1694	1278	1516
10	K-01426	1719	1451	1315	1495
11	K-01422	2235	924	1315	1491
12	K-01407	2131	1014	1296	1480
13	K-01417	1543	1389	1241	1391
14	K-01404	2043	917	1139	1366
15	K-01419	1508	1090	1324	1307
16	K-01412	1350	1278	1278	1302
	LSD (0.05)	**190**	**174**	**165**	**101**
	CV%	**5.6**	**7.4**	**7.8**	**6.9**

6. TITLE — MICRO YIELD TRIAL

OBJECTIVES

To evaluate promising lines under different agro-climatic zones of Punjab

RESEARCH WORKERS

Dr. Muhammad Naveed, M. Afzal Zahid, Mushtaq Ahmad and M. Shafiq

PROJECT DURATION

2016-17

LOCATIONS

Faisalabad, Kallurkot, Bhakkar, Rakhuttra and Fatehjang

TREATMENTS/ METHODLOGY

Entries = 12 + 2

Checks = Noor-2009 & Noor-2013

Design = R.C.B.

Plot size = 4 × 1.2 m

Replications = 3

Inter/intra row spacing = 30/15 cm

Sowing time = Last week of October / 1st week of November

Data to be taken = Days to 50% flowering, days to 90% maturity, incidence of insect pests & diseases, and grain yield

PREVIOUS YEAR'S RESULTS

R	Entry	PRI, Fsd	GBRSS, K.Kot	AZRI, Bhakkar	BARS, Fatehjang	Av. Yield Kg/ha
1	K-01242	2389	2361	1410	1188	1837
2	K-01248	2314	2215	1674	1080	1821
3	K-01241	2258	2424	1365	1053	1775
4	K-01338	2401	2049	1476	1012	1735
5	K-01219	1790	2160	1354	1210	1629
6	K-01250	2365	2007	1142	957	1618
7	Noor-2013	1801	2229	1278	973	1570
8	K-01302	2197	1979	1076	1019	1568
9	K-01308	1914	2111	1278	918	1555
10	K-01221	1994	2014	1292	888	1547
11	K-01240	2008	2035	1203	860	1527
12	Noor-2009	2163	1510	1323	910	1477
13	K-01309	1735	1799	1115	905	1389
14	K-01306	1108	854	847	822	908
	LSD (0.05)	**225**	**235**	**125**	**98**	**90**
	CV%	**6.6**	**7.1**	**5.9**	**5.9**	**7.1**

7. TITLE — COOPERATIVE YIELD TRIAL

OBJECTIVES

To evaluate Advance lines of PRI and sister organizations of Punjab in different agro-ecological zones

RESEARCH WORKERS

Dr. Muhammad Naveed, M. Afzal Zahid, Mushtaq Ahmad and M. Shafiq

PROJECT DURATION

2016-17

LOCATIONS

Faisalabad (PRI, NIAB), Kallurkot (Irri., barani, FF), Rakhuttra, Bhakkar, Karor, Bahawalpur, Chakwal and Fatehjang

TREATMENTS/ METHODLOGY

Entries	= 17 + 1
Checks	= Noor-2013
Design	= R.C.B.
Plot size	= 4 × 1.2 m
Replications	= 3
Inter/intra row spacing	= 30/15 cm
Sowing time	= Last week of October / 1st week of November
Data to be taken	= Days to 50% flowering, days to 90% maturity, incidence of insect pests & diseases, and grain yield

PREVIOUS YEAR'S RESULTS

R	Entry	PRI, Fsd	NIAB, Fsd	GBRSS, K.Kot Irri.	GBRSS K.Kot Barani	PRSS, Rakh-uttra	AZRI, Bhak-kar	ARS, Karor	RARI, Bwp	BARI, Chak-wal	BARS, Fateh-jang	Av. Yield Kg/ha
1	K-01211	2025	792	1632	868	556	1337	1069	1666	1204	903	1205
2	K-01209	1840	572	1753	556	625	1119	875	1958	1454	1090	1184
3	CH55/09	1882	827	1337	642	903	1274	979	1854	1213	910	1182
4	CH74/08	1924	544	1354	910	556	1385	729	2021	1343	1000	1177
5	CH72/08	2086	527	1490	833	486	1297	847	1854	1343	1007	1177
6	CH77/08	1649	635	1545	885	486	1188	766	1562	1435	1076	1123
7	CH56/09	1863	675	1059	851	556	1541	868	1437	1343	1007	1120
8	CH61/09	2224	794	1198	799	417	1070	681	1666	1250	938	1104
9	K-01212	1578	467	1250	694	556	1666	826	1812	1231	924	1100
10	CH64/09	2079	808	694	1021	556	1338	750	1250	1407	1056	1096
11	K-01216	1504	419	1771	1014	347	1233	667	1771	1250	938	1091
12	K-01213	1676	540	1458	833	208	1253	757	1875	1315	986	1090
13	K-01210	1538	547	1517	646	694	1074	958	1541	1236	927	1068
14	K-01207	1538	375	1233	885	417	1260	750	1771	1287	965	1048
15	K-01215	1515	592	1590	747	208	1271	743	1604	1250	938	1046
16	TG12K07	1817	719	920	764	486	986	1086	708	1111	833	943
17	Noor-13	1613	424	1021	833	347	1417	722	708	1176	882	914
18	TG12K05	1236	503	1094	816	625	986	743	812	1259	944	902
	LSD (0.05)	**200**	**108**	**165**	**158**	**61**	**110**	**71**	**276**	**208**	**113**	**50**
	CV%	**6.9**	**10.9**	**7.5**	**11.8**	**7.3**	**5.3**	**5.2**	**10.8**	**9.8**	**7.1**	**9.1**

8. TITLE — RESPONSE OF ADVANCE LINES UNDER DIFFERENT MOISTURE LEVELS

OBJECTIVES To find out suitable lines for irrigated areas

RESEARCH WORKERS Dr. Muhammad Naveed, M. Afzal Zahid, Mushtaq Ahmad and M. Shafiq

PROJECT DURATION 2016-17

LOCATIONS Faisalabad and Kallurkot

TREATMENTS/ METHODLOGY

Entries	= 150
No. of sets	= 2
Moisture levels	= Zero irrigation & two irrigations
Checks	= Noor-91, CM-2008, Noor-2009 & Noor-2013
Design	= Alpha lattice
Plot size	= 4 × 0.6 m
Replications	= 2
Inter/intra row spacing	= 30/15 cm
Sowing time	= Last week of October / 1st week of November
Data to be taken	= Days to 50% flowering, days to 90% maturity, incidence of insect pests & diseases, and grain yield

PREVIOUS YEAR'S RESULTS

Rank	Drought trial	Yield Kg/ha	Moisture trial	Yield Kg/ha
1	K-01306	1990	K-01306	3067
2	K-01406	1969	CH 74/08	3056
3	K 01525	1938	K-01405	2956
4	K-01212	1938	K-01247	2889
5	FLIP 82-150 C	1927	K-01215	2833
6	K 01529	1896	K-01238	2811
7	CH 72/08	1854	K-01216	2778
8	K-01211	1833	K-01240	2744
9	FLIP 08-37 C	1823	K-01309	2656
10	CH 77/08	1792	K-01426	2644
	LSD	**137**	**LSD**	**220**
	CV%	**7.6**	**CV%**	**12.2**

9. TITLE — NATIONAL UNIFORM YIELD TRIAL

OBJECTIVES To test the performance of candidate lines in different ecological zones of the country

RESEARCH WORKERS Dr. Muhammad Naveed, Muhammad Afzal Zahid and Muhammad Shafiq

PROJECT DURATION 2016-17

LOCATIONS Faisalabad and Kallurkot

TREATMENTS/ METHODLOGY NUYT-2016-17

Layout = As per instructions received alongwith seed
Sowing time = Last week of October / 1st week of November
Data to be taken = Days to 50% flowering, days to 90% maturity, incidence of insect pests &diseases & grain yield

PREVIOUS YEAR'S RESULTS Entries tested= 12

R	Entry	BARS, F-jang	GBRSS, KKot	PRI, Fsd	NIAB, Fsd	QAARI, Larkana	ARS, Karak	AZRI, Bhakkar	BARI Chakwal	NARC, I.Abad	AZRC, DIKhan	Av. Yield Kg/ha
1	K-09012	1379	1963	1814	507	930	1897	1824	951	401	1900	1357
2	K-09015	1287	2236	1904	424	963	1662	1653	1063	117	2253	1356
3	K002-10	1200	1933	1705	451	898	1465	2034	979	1011	1875	1355
4	CH 54/07	1632	1907	1548	454	662	1641	2424	986	395	1866	1352
5	TG12K07	1360	1751	1488	408	1023	1607	1722	875	1170	1789	1319
6	CH 76/08	1228	1633	1773	551	819	1572	2224	993	242	2148	1318
7	Noor-2013	1508	1824	1627	397	1051	1799	1760	1028	179	1895	1307
8	CM 1235/08	1671	1526	1538	529	884	1341	2121	1007	151	2284	1305
9	K-01020	1539	1917	1912	497	630	1568	2094	889	322	1652	1302
10	CH 68/08	1229	1836	1442	504	454	1519	2233	889	450	1397	1195
11	TG12K05	1250	1764	1153	432	860	1804	1570	1021	367	1615	1184
12	BKK 02174	1525	1592	1340	413	930	1855	1195	923	317	1601	1169

Coefficient of variation=10.5%

10. TITLE	**PRE-BASIC / BASIC SEED PRODUCTION**
OBJECTIVES	i. To maintain the genetic purity of approved / commercial varieties ii. To supply seed to different seed producing organizations
RESEARCH WORKERS	Dr. Muhammad Naveed, M. Afzal Zahid, Mushtaq Ahmad and M. Shafiq
PROJECT DURATION	2016-17
LOCATION	Kallurkot
TREATMENTS/ METHODLOGY	Single plants will be selected. Single plant progeny rows will be sown in 2 meter long and 30 cm apart rows, true to type progeny rows will be harvested separately. Seed of selected progeny rows will be sown in 4 rows of 4 meter length with 30cm row to row spacing. Genetically true to type, disease free and healthy progeny blocks will be selected, harvested and bulked as BNS which will be used for pre-basic seed production.
PREVIOUS YEAR'S RESULTS	Seed of following genotypes was produced

Variety	**Seed Produced (Kgs)**			**Total (Kgs)**
	BNS	**Pre-basic**	**Basic**	
Noor-2013	10	40	1350	1400
Total	**10**	**40**	**1350**	**1400**

LENTIL (*Lens culinaris* Medik) 2n = 14

1. TITLE — **MAINTENANCE AND EVALUATION OF GERMPLASM**

OBJECTIVES

1. To maintain the genetic purity
2. To enrich the germplasm
3. To identify the sources for different economic characters.

RESEARCH WORKERS Sadia Kaukab, Muhammad Sajjad Saeed, Ch. Muhammad Rafiq and Dr. Aziz-Ur-Rehman

PROJECT DURATION 2016-17

LOCATION Pulses Research Institute, Faisalabad

TREATMENTS/ METHODOLOGY

Local Entries	= 210
Exotic	= 7
Total	= 217
Design	= Augmented
Checks	= 7
Entries per block	= 31
Plot size	= 2 × 0.6 m
Replications	= 2
Row spacing	= 30 cm
Plant spacing	= 7.5 cm
Fertilizer	= 9.23 NP kg/acre
Sowing date	= 1st fortnight of November

PREVIOUS YEAR'S RESULTS 215 entries were planted and characterized. The details are given below

Traits	Group 1		Group 2		Group 3	
	Range	No. of Entries	Range	No. of Entries	Range	No. of Entries
Days to 50 % Flowering	72-90	80	91-100	105	101 - 108	30
Days to 90% Maturity	135-142	90	143-150	75	151 - 160	50
Plant Height (cm)	20-25	25	26-31	155	32 – 40	35
1st Pod Height (cm)	10-14	118	15-20	77	21 – 23	20
No of Primary Branches / Plant	6-10	101	11-14	91	15 – 18	23
No. of Secondary Branches/Plant	10-15	73	16-20	116	21 – 26	26
No. of Pods / Plant	50-150	58	151-250	89	250 – 280	68
No. of Seeds / Pod	1	21	2	194	Above 2	0
Seed Yield/Plant (g)	2.5-3.5	87	3.6-4.5	107	4.6 – 5	21
1000 grain wt. (g)	15-20	33	21-25	102	26 - 29	80

2. TITLE **HYBRIDIZATION AND STUDY OF FILIAL GENERATIONS**

OBJECTIVES

To develop new recombinants of

1. High yield potential
2. Wider adaptability
3. Early maturity
4. Resistance/tolerance to diseases
5. Bold seeds with spotted seed coat

RESEARCH WORKERS Sadia Kaukab, Muhammad Sajjad Saeed, Ch. Muhammad Rafiq and Dr. Aziz-Ur-Rehman

PROJECT DURATION 2016-17

LOCATION Pulses Research Institute, Faisalabad

TREATMENTS/ METHODLOGY

A. Cross combinations proposed= 20

Sources of high yield = 5 Viz. Pb. Masoor 2009, V-11501, V-11508 , V-11513 and V-12514

Resistant to rust = 6

Local = 3 Viz. V-15508, V-15507 & V-15505

Exotic = 3 Viz. 51208, 51236 & 54112

Resistant to wilt = 4

=Viz. V- 14501, V-14515, V- 15504 & V-15507.

Bold seed size = 4 Viz. V- 08511, V-09502, V- 09503 & V-10502.

Entries will be sown in paired rows by keeping plant to plant distance 6cm and row to row 30cm. At flowering crosses will be attempted to pyramid genes for desirable traits.

B. Filial Generations

Breeding Methods = Modified Bulk method

Generations	**Crosses**	**Plot size**
F_1	15	Single row of 4 m length
F_2	15	6 rows of 4m length
F_3	27	3 rows of 4m length
F_4	13	3 rows of 4m length
F_5	10/110	110 single plant progenies each in a 4 m row
F_6	8/79	79 single plant progenies each in a 4 m row

PREVIOUS YEAR'S RESULTS

Following Generations were studied and desirable recombinants/lines were selected

Generations	**No. of crosses/progenies**	
	Crosses Studied	Selected/harvested
F_o(Fresh crosses)	20	15
F_1	15	15
F_2	31	27
F_3	13	13
F_4	10	10/110
F_5	10/175	8/79
F_6	3/28	10 uniform desirable lines were selected for PYT

3. TITLE	**PRELIMINARY YIELD TRIAL**
OBJECTIVES	To evaluate advance lines for high yield and disease resistance.
RESEARCH WORKERS	Dr. Aziz-Ur-Rehman, Sadia Kaukab and Ch. Muhammad Rafiq
PROJECT DURATION	2016-17
LOCATION	Faisalabad
TREATMENTS/ METHODLOGY	Entries = 10 viz, 2 Checks V-16501, V-16502, V-16503, V-16504, V-16505, V-16506, V- 16507, V-16508, V-16509 & V-16510. Design = R.C.B. Checks = Markez-2009 & Pb. Masoor-2009 Plot size =4 x 1.2m Replications = 3 Row spacing = 30 cm Plant spacing = 7.5 cm Sowing date = Ist fortnight of November Data to be taken = Days to 50% flowering, days to 90% maturity, grain yield, incidence of insect pest and diseases.

PREVIOUS YEAR'S RESULTS

Rank	Entries	Yield (kg/ha)
1	V-15510	568
2	V-15502	508
3	V-15507	497
4	V-15505	492
5	V-15512	478
6	V-15509	469
7	V-15508	390
8	V-15504	386
9	V-15506	367
10	**Pb. M-09**	**354**
11	V-15503	329
12	V-15511	276
13	**NL-2006**	**271**
14	V-15501	239
15	V-15513	192
	CV%	5.24
	LSD(0.05)	46.30

4. TITLE	**ADVANCE YIELD TRIAL**
OBJECTIVES	To evaluate promising lines for yield potential and disease tolerance
RESEARCH WORKERS	Dr. Aziz-Ur-Rehman, Sadia Kaukab and Ch. Muhammad Rafiq
PROJECT DURATION	2016-17
LOCATION	Faisalabad ,Sahowali (Sialkot) & kullorkot
TREATMENTS/ METHODLOGY	Entries = 12 viz, 2 Checks V-15501, V-15502, V-15503, V-15504, V-15505, V-15506, V-15507, V-15508, V-15509, V-15510, V-15511 and V-15512. Design = R.C.B. Checks = Markez-2009 & Pb. Masoor-2009 Plot size = 4 x 1.2m Replications = 3 Row spacing = 30 cm Plant spacing = 7.5 cm Sowing date = Ist fortnight of November Data to be taken = Days to 50% flowering, days to 90% maturity, Grain yield, incidence of insect pest and diseases.

PREVIOUS YEAR'S RESULTS

Rank	Entries	Yield kg/ha	
		Faisalabad	Sahowali
1	V-14501	443	Crop damaged due to heavy rain
2	V-14503	360	
3	V-14502	350	
4	V-14506	350	
5	V-14513	350	
6	V-14509	347	
7	V-14515	307	
8	V-14512	306	
9	V-14511	284	
10	V-14504	279	
11	V-14507	182	
12	V-14508	179	
13	**Pb.M-09**	179	
14	**NL-06**	147	
	CV%	6.69	
	LSD(0.05)	50.64	

5. TITLE — MICRO YIELD TRIAL

OBJECTIVES To evaluate advance lines under different agro-climatic conditions

RESEARCH WORKERS Dr. Aziz-Ur-Rehman, Sadia Kaukab, Muhammad Sajjad Saeed, Aamir Hussain, Faryad Ahmad Khan and Ch. Muhammad Rafiq

PROJECT DURATION 2016-17

LOCATION Faisalabad, Sahowali (Sialkot), Kallurkot, Fatehjang, Kot Naina, Bahawalpur and Chakwal

TREATMENTS/ METHODLOGY

Entries	= 10 viz, 2 Checks V-14501, V-14502, V-14503, V-14504, V-14506, V-14509, V-14511, V-14512, V-14513 and V-14515.
Design	= R.C.B.
Checks	= Markez-2009 & Pb. Masoor-2009
Plot size	= 4 x 1.2m
Replications	= 3
Row spacing	= 30 cm
Plant spacing	= 7.5 cm
Sowing date	= Ist fortnight of November
Data to be taken	= Days to 50% flowering, days to 90% maturity, Grain yield, incidence of insect pest and diseases.

PREVIOUS YEAR'S RESULTS

Rank	Entries	Yield(kg/ha)							Sahowali
		Fsd	K.Kot (irrig)	Semi barani	Chakwal	K.Naina	Y.Wala	Mean	
1	V-13514	329	573	913	2347	297	208	778	CROP DAMAGED DUE TO HEAVY RAIN
2	V-13516	342	722	771	2090	386	344	776	
3	**Pb.M-09**	**276**	**705**	**694**	**2035**	**488**	**455**	**775**	
4	V-13512	129	817	820	2243	126	431	761	
5	V-13502	289	788	669	2361	224	212	757	
6	V-13515	90	917	771	2069	278	299	737	
7	V-13501	344	604	438	2035	293	382	683	
8	**Markaz-09**	**206**	**597**	**666**	**1972**	**258**	**340**	**673**	
9	V-13513	81	688	751	1979	172	306	663	
10	V-13509	169	632	557	2000	253	194	634	
11	V-13505	115	628	637	1861	156	316	619	
12	V-13506	243	663	483	1910	165	226	615	
	CV%	8.38	12.20	9.32	5.00	8.73	7.90		
	LSD(0.05)	14.8	68.90	51.58	84.28	18.35	19.87		

6. TITLE — SCREENING OF ADVANCE LINES AGAINST DROUGHT STRESS

OBJECTIVES To select drought tolerant genotypes

RESEARCH WORKER Dr. Aziz-Ur-Rehman, Muhammad Sajjad Saeed, M. Aqeel ,Sadia Kaukab and Ch. Muhammad Rafiq

PROJECT DURATION 2016-17

LOCATION Faisalabad

TREATMENTS/ METHODLOGY

Entries = 14 viz, 2 Checks
V-11501, V-11508, V- 11510, V-11513, V- 11514, V-12503, V-12505, V-12512, V-12514, V-13502, V-13512, V-113514, V-13516 & V-14515.

Design = R.C.B.

Checks = Masoor-93 & Pb. Masoor-2009

Plot size = 4 x 1.2m

Replications = 3

Row spacing = 30 cm

Plant spacing = 7.5 cm

Sowing date = Ist fortnight of November

Data to be taken = Data to be taken = Days to 50% flowering, days to 90% maturity, grain yield and yield components, canopy temperature, root length , root weight and root/shoot weight ratio.

The experiment will be planted under two conditions (Irrigated and Un-irrigated). The material will be sown in well prepared soaked soil. Normal irrigation will be applied to one set and other set will be kept un-irrigated. Soil moisture condition will be checked in regular intervals. The rainfall data during the crop season will be recorded.

For root length studies, five plants of each line will be planted in plastic pipes of 4 inch diameter of 1.2m length. The pipes will be filled with sand and irrigation will be applied according to plant requirement.

PREVIOUS YEAR'S RESULTS

Rank	Entries	Yield(kg/ha)
1	V-12514	1161
2	V-12505	993
3	V-11510	949
4	V-12512	917
5	V-11514	914
6	V-12503	901
7	**Pb.M-09**	**863**
8	V-11507	835
9	V-10503	832
10	V-11509	796

11	V-11501	783
12	V-10514	760
13	**M-93**	**746**
14	V-09501	735
15	V-11504	726
16	V-08504	519
	CV%	4.75
	LSD(0.05)	31.89

7. TITLE — NATIONAL UNIFORM YIELD TRIAL

OBJECTIVES To evaluate varieties with wider adaptability along with higher yield potential and other desirable characters.

RESEARCH WORKERS Dr. Aziz-Ur-Rehman, Sadia Kaukab, Muhammad Sajjad Saeed, Aamir Hussain and Ch. Muhammad Rafiq

PROJECT DURATION 2016-17

LOCATION Faisalabad

TREATMENTS/ METHODLOGY The trial will be received from Coordinator (Pulses) NARC, Islamabad. The experiments will be planted and data will be recorded according to the instructions received with the seed. This Institute will contribute 4 advance lines (V-11501, V-13502, V-13514 & V-13516) in the Lentil National Uniform Yield Trial.

PREVIOUS YEAR'S RESULTS **The line V-11508 got 1ST & V-11513 got 2nd position in NUYT**

Entry No.	Entry name	Source	LOCATIONS								Mean
			1	2	3	4	5	6	7	8	
1	V-11508	AARI, Faisalabad	1166	167	1972	1653	1276	684	932	1924	1222
2	V-11513	AARI, Faisalabad	1069	117	1431	1708	1738	865	929	1639	1187
3	NARC-11-1	NARC, Islamabad	857	135	1597	1208	1820	673	974	1722	1123
4	P.M-09	Check	1069	81	2103	889	1490	679	838	1771	1115
5	V-10502	AARI, Faisalabad	701	213	1467	1917	1338	746	671	1813	1108
6	NLH-061673	NIAB, Faisalabad	611	153	2597	917	1396	560	248	1715	1025
7	10CL-303	BARI, Chakwal	923	207	1747	1139	1301	498	330	1972	1015
8	NLH-062721	NIAB, Faisalabad	1058	213	1728	931	1638	569	216	1708	1007
9	10CL-304	BARI, Chakwal	1127	311	1775	722	1539	310	406	1813	1000
10	LD-3	AZRC-D. I Khan	1083	126	1231	1486	1290	521	235	1972	993
11	Markaz-09	Check	1090	133	928	1153	1694	209	931	1799	992
12	V-11501	AARI, Faisalabad	1104	113	1731	1000	906	732	605	1694	986
13	NLH-061863	NIAB, Faisalabad	930	186	1431	1222	1425	706	290	1618	976
14	NLH-062821	NIAB, Faisalabad	729	299	1433	694	1719	585	226	1993	960
15	NARC-11-4	NARC, Islamabad	937	158	1131	1306	1049	583	464	1653	910
16	NLH-063011	NIAB, Faisalabad	979	128	1175	792	1317	563	140	1792	861
Mean Locations			965	171	1592	1171	1433	593	527	1787	

Coefficient of variation=27.71% Genotypes (G), Location (L) and G x L interactions are highly significant (P<0.01)

Locations			
1= QAARI, Larkana	**2= AARI, Faisalabad**	**3= ARI, Swat**	**4=BARS, Kohat**
5= BARS, Fatehjung	**6= NIAB, Faisalabad**	**7= NARC, Islamabad**	**8= BARI, Chakwal**

8. TITLE — IMPACT OF HIGH FERTILIZER DOSES ON YIELD AND BIOMASS OF LENTIL

OBJECTIVES
To determine the optimum dose of fertilizer to obtain maximum grain yield and biomass

RESEARCH WORKERS
Muhammad Aqeel, Dr. Aziz-Ur-Rehman, M. Aslam Awais, Ch. Muhammad Rafiq

PROJECT DURATION
2016-17

LOCATION
Faisalabad

TREATMENTS/ METHODLOGY

Entries = Pb. Masoor 2009
Fertilizer Combinations + Rhizobial Inoculation
T1 = 25-60-0 kg/ha NPK
T2 =50-120-0
T3 =50-120-30
T4 =50-120-60
T5 =50-120-120

Design = R.C.B.
Plot size = 4 x 1.2m
Replications = 3
Row spacing = 30 cm
Plant spacing = 7.5 cm
Sowing date = Ist fortnight of November
Data to be taken = Days to 50% flowering, days to 90% maturity, grain yield & yield components, canopy temperature and Plant biomass

PREVIOUS YEAR'S RESULTS

Treatments	**Yield (kg/ha)**
T0	240
T1(25-60-0)	325
T2(50-120-0)	345
T3(50-120-30)	355
T4(50-120-60)	375
T5(50-120-120)	380
CV%	12.56
LSD(0.05)	56.01

9. TITLE — IMPACT OF PLANT GEOMETRY ON PLANT DEVELOPMENT AND YIELD

OBJECTIVES
To determine the optimum plant spacing of lentil

RESEARCH WORKERS
Muhammad Aqeel, Dr. Aziz-Ur-Rehman, M. Aslam Awais, Ch. Muhammad Rafiq

PROJECT DURATION
2016-17

LOCATION
Faisalabad

TREATMENTS/ METHODLOGY

Entries = 2 viz; Pb. Masoor 2009**, V-**09506
Fertilizer Combinations + Rhizobial Inoculation

Design = Split plot
Replications = 3
Plot size = 4 x 1.2m
Row spacing = 30 cm
Plant to plant spacing = 7.5 cm, 10 cm, 15 cm, 20 cm
Sowing date = Ist fortnight of November
Data to be taken = Days to 50% flowering, days to 90% maturity, grain yield and yield components, canopy temperature

PREVIOUS YEAR'S RESULTS

Plant spacing	Pb.M-09 yield(kg/ha)	V-09506 yield (kg/ha)	Averages
S1(7.5cm)	245	305	275
S2(10cm)	235	305	270
S3(15cm)	215	265	240
S4(20cm)	130	345	225
CV%			10.47
LSD(0.05)			30

10. TITLE — DETERMINATION OF PROPER SOWING DATE TO OVERCOME THE CLIMATIC CHANGE

OBJECTIVES To find out proper sowing time for new lines

RESEARCH WORKERS Dr. Aziz-Ur-Rehman, Muhammad Sajjad Saeed, M. Aqeel and Sadia Kaukab

PROJECT DURATION 2016-17

LOCATION Faisalabad

TREATMENTS/ METHODLOGY

Entries = 4 viz; 2 checks
V-09503, **V-**10502, **V-**11508, **V-**11513

Checks = Masoor-93 & Pb. Masoor-2009

Design = Split plot

Replications = 3

Plot size = 4 x 1.2m

Row spacing = 30 cm

Plant spacing = 7.5 cm

Sowing date = 4 viz, 15 Oct, 1 Nov., 15 Nov and 30th Nov

Data to be taken = Days to 50% flowering, days to 90% maturity, grain yield and yield components, canopy temperature

PREVIOUS YEAR'S RESULTS

Rank	Genotype	SD1 (30 Oct)	SD 2 (15 Nov)	SD 3 (30 Nov)	Average (kg/ha)
1	V-09503	279	565	647	497
2	V-09505	151	543	513	402
3	V-09506	136	651	488	425
4	V-10502	149	660	610	473
5	**M-93**	**167**	**482**	**382**	**344**
6	**Pb M-09**	**265**	**668**	**654**	**529**
		191	**595**	**549**	

CV for sowing date =10.7
CV for varieties =23.69
CV for interaction =41.02
LSD (0.05) varieties = 10.70 kg/ha
LSD (0.05) Sowing dates = 23.69 kg/ha
LSD (0.05) for interaction =41kg/ha

11. TITLE	**INTERNATIONAL YIELD NURSERIES**
OBJECTIVES	1. To select most adaptable lines under local conditions. 2. Enhancement of genetic diversity of germplasm
RESEARCH WORKERS	Dr. Aziz-Ur-Rehman, Muhammad Sajjad Saeed ,Sadia Kaukab and Ch. Muhammad Rafiq
PROJECT DURATION	2016-17
LOCATION	Faisalabad
TREATMENTS/ METHODLOGY	As per direction of donor agency

PREVIOUS YEAR'S RESULTS

Name of nursery	Lines studied	Lines selected
LIEN-BIGM-CT-16	36	-
BIGM-LIPB-WN-16	8	-
LITT-LIFWN-15	43	-

12. TITLE	**PRE-BASIC / BASIC SEED PRODUCTION**
OBJECTIVES	To maintain genetic purity of approved and promising varieties and to produce the pre-basic and basic seed
RESEARCH WORKERS	Dr. Aziz-Ur-Rehman, Muhammad Sajjad Saeed, Sadia Kaukab, Aamir Hussain, Faryad Ahmad Khan and Ch. Muhammad Rafiq
PROJECT DURATION	2016-17
LOCATION	Faisalabad and Sahowali

TREATMENTS/ METHODLOGY

S. No.	Varieties
1.	V-11508
2.	Pb.Masoor-2009
3.	V-11513

PREVIOUS YEAR'S RESULTS

The following quantities of seed were produced at Faisalabad

Sr.#	Varieties	Quantity of seed produced kg		
		BNS	Pre-basic	Basic
1	Pb. Masoor-2009	30	50	825

DRYPEAS (*Pisum sativum* L.) 2n = 14

1. TITLE — MAINTENANCE AND EVALUATION OF GERMPLASM

OBJECTIVES

To collect, maintain, evaluate and characterize the gene pool entries

RESEARCH WORKERS

Muhammad Ami
n, Muhammad Shafiq and Ch.Muhammad Rafiq

PROJECT DURATION

2016-17

LOCATION

Faisalabad

TREATMENTS/ METHODLOGY

Varieties/lines	= 55
New lines of Dry pea	= 50 (PGRI, NARC, Islamabad)
Sowing time	= Last week of October/1st week of November, 2016
Inter/Intra row spacing	= 30/15cm
Plot size	= 4m x 0.5m
Checks	= No.267 and PF-400
Design	= Augmented
Entries studied and maintained	=55

PREVIOUS YEAR'S RESULTS

Range of variation for some morphological traits in Dry peas Germplasm

Trait	Range	
	Minimum	Maximum
Plant height (cm)	28	95
Number of primary branches/ plant	1	4
Number of pods/plant	12	39
Pod length (cm)	5.2	8.2
Number of clusters/plant	6	20
Number of seeds/pod	4	7

2. TITLE — HYBRIDIZATION

OBJECTIVES

To create genetic variability for the selection of desirable recombinants possessing.

i) High yield potential and wide adaptability
ii) Resistance to powdery mildew
iii) Early maturity

RESEARCH WORKERS

Muhammad Amin, Muhammad Shafiq and Ch.Muhammad Rafiq

PROJECT DURATION

2016-17

LOCATION

Faisalabad

TREATMENTS/ METHODLOGY

New Cross combinations = 25
Following parents are selected for crossing

High yielding	x	Powdery mildew resistant
DP-01-12		PF-400
DP-01-13		Pea-09
DP-03-13		T-07
DP-09-08		T-24
No. 267		DP-04-08

Sowing time = Last week of October, 2016
Parental lines will be planted in paired (femal and male) 4 meter long and 30 cm apart rows to facilitate crossing.

Previous year's results

16 crosses were attempted and seed of 16 crosses was harvested successfully.

STUDY OF FILIALGENERATIONS

To select recombinants with desirable traits from segregating populations
F_1-F_6
Filial generations to be studied:

Filial generation	Crosses/progenies studied
F_1	16
F_2	6
F_3	21/210
F_4	12/120
F_5	11/110
F_6	31/300

Breeding method = Bulk/Pedigree
Sowing time = Last week of October/1st week of November, 2016
Plot size =4m×1.2m
F_1 = Flanked with one row of parents.
F_2 = Bulk - Single Plant
F_3 = Plant to progeny row
F_4- F_6 = One to four rows of each single plant progeny
Checks = Climax and No.267
Selection to be made = Desirable recombinants

PREVIOUS YEAR'S RESULTS

Following segregating populations and progeny rows were studied.

No. of crosses/progenies studied;

Sr. No.	Generation	Crosses/Progenies Studied	Crosses/Progenies selected	Advanced lines selected
1	F_0	16	16	-
2	F_1	6	6	-
3	F_2	21/210	21/210	-
4	F_3	12/120	12/120	-
5	F_4	11/110	11/110	-
6	F_5	31/300	31/300	-
7	F_6	12/70	-	13

13 Uniform lines were selected from F6 to make a preliminary yield trial.

3. TITLE — PRELIMINARY YIELD TRIAL

OBJECTIVES To evaluate/select high yielding and disease resistant lines for advanced yield trial

RESEARCH WORKERS Muhammad Amin, Muhammad Shafiq and Ch.Muhammad Rafiq

PROJECT DURATION 2016-17

LOCATION Faisalabad

TREATMENTS/ METHODLOGY

Entries	= 16
Checks	= No.267, Pea-09 and PF-400
Design	= RCB
Replications	= 3
Plot size	= 4m x 1.2m
Inter/intra row spacing	= 30/ 15cm
Sowing time	= Last week of October / 1st week of November, 2016
Data to be taken .	= Plant stand, Days taken to 50% flowering, Days taken to maturity, Plant height, Pod color, Pod shape, Number of pods per plant, Number of seeds per pod, Seed color, Seed shape, 100 seed weight and Seed surface etc.

PREVIOUS YEAR'S RESULTS

Ranking	Entries	Av. Yield (Kg/ha)
1.	**DP-2-15**	746
2.	**DP-13-15**	664
3.	**DP-6-15**	645
4.	**DP-3-15**	616
5.	**DP-4-15**	578
6.	**DP-7-15**	567
7.	**DP-12-15**	563
8.	**Climax (C)**	551
9.	**DP-01-15**	546
10.	**DP-14-15**	541
11.	**DP-5-15**	502
12.	**DP-11-15**	485
13.	**DP-10-15**	378
14.	**DP-9-15**	369
15.	**DP-8-15**	356
16.	**NO.267(C)**	273
LSD (0.05)		85
C.V %		10

4. TITLE — ADVANCE YIELD TRIAL

OBJECTIVES To evaluate/select high yielding and disease resistant lines for micro yield trial

RESEARCH WORKERS Muhammad Amin, Muhammad Shafiq and Ch.Muhammad Rafiq

PROJECT DURATION 2016-17

LOCATION Faisalabad

TREATMENTS/ METHODLOGY

Entries = 14
Checks = No.267 and Meteor
Design = RCB
Replications = 3
Plot size = 4m x 1.2m
Inter/intra row spacing = 30/ 15cm
Sowing time = Last week of October / 1st week of November, 2016
Data to be taken = Plant stand, Days taken to 50% flowering, Days taken to maturity, Plant height, Pod color, Pod shape, Number of pods per plant, Number of seeds per pod, Seed color, Seed shape, 100 seed weight and Seed surface etc.

REVIOUS YEAR'S RESULTS

Ranking	Entries	Av. Yield (Kg/ha)
1.	**DP-8-14**	753
2.	**DP-01-14**	612
3.	**DP-6-14**	597
4.	**DP-9-14**	540
5.	**DP-11-14**	457
6.	**DP-12-14**	443
7.	**DP-4-14**	397
8.	**DP-10-14**	354
9.	**DP-2-14**	288
10.	**DP-3-14**	246
11.	**PF-400 (C)**	244
12.	**DP-5-14**	225
13.	**DP-7-14**	126
14.	**NO.267 (C)**	125
LSD (0.05)		38
C.V %		6

5. TITLE — MICRO YIELD TRIAL

OBJECTIVES

To select high yielding, well adapted and disease resistant advanced lines suitable for different agro-climatic zones of the Punjab Province.

RESEARCH WORKERS

Muhammad Amin, Muhammad Shafiq and Ch.Muhammad Rafiq

PROJECT DURATION

2016-17

LOCATIONS (8)

Locations-10 (PRI, Kalurkot, Karor, Sahowali, VRI-Sahiwal,VRI-AARI, Agronomic Res. Institute-Fsd, Plant Pathology Res. Institute-Fsd, Entomological Res. Institute-Fsd and BARI-Chakwal)

TREATMENTS/ METHODLOGY

Entries = 10+2
Checks = Climax and NO.267
Design = RCB
Replications = 3
Inter/intra row spacing = 30/ 15cm
Plot size = 4m x 1.2m
Sowing time = Last week of October / 1st week of November, 2016
Data to be taken = Plant stand, Days taken to 50% flowering, Days taken to maturity, Plant height, Pod color, Pod shape, Number of pods per plant, Number of seeds per pod, Seed color, Seed shape, 100 seed weight and Seed surface etc.

REVIOUS YEAR'S RESULTS

This trial was conducted on Seven Locations in Punjab but we received the yield data from Five locations only. The trial was damaged at 2 locations due to severe rains.

Ranking	Entries	Locations					Av. Yield (Kg/ha)
		FSD	K. KOT	BWP	SWL	CKWL	
1	**DP-1-13**	618	217	370	3472	722	1080
2	**DP-01-12**	730	188	440	3125	769	1050
3	**DP-9-33**	415	217	220	3472	750	1015
4	**NO.267 (C)**	296	127	335	2083	741	716
5	**DP-2-13**	358	201	393	2778	741	894
6	**DP-3-13**	628	375	243	2083	833	833
7	**DP-5-12**	499	119	289	2153	741	760
8	**DP-7-13**	299	119	347	2083	759	722
9	**Pea-09 (C)**	296	127	335	2083	741	716
10	**DP-9-22**	321	150	370	2083	657	716
11	**DP-9-7**	336	135	301	2083	685	708
12	**PF-400**	180	160	220	2083	602	649
LSD (0.05)							255
C.V %							17

PLANT PATHOLOGY

1. TITLE	**SCREENING OF CHICKPEA (DESI AND KABULI) ADVANCE LINES AGAINST ASCOCHYTA BLIGHT**
OBJECTIVES	To identify lines of chickpea resistant/ tolerant to blight (*Ascochyta rabiei* (Pass.) Lab.)
RESEARCH WORKERS	Dr. M. Azhar Iqbal and Javed Anwar Shah
PROJECT DURATION	2016- 17 (Continuous)
LOCATION	Pulses Research Institute, Faisalabad
TREATMENTS/ METHODLOGY	No of line = Breeding material from various institutes Plot size = 3m x 0.30m Check line = K-850 Replications = 3 The experiment will be conducted under tunnel conditions. The disease will be produced artificially in the tunnel. Spore suspension will be sprayed on the test lines at 3 days interval till the initiation of disease. Fresh tap water will also be sprayed daily to provide required humidity. The incidence of the disease will be recorded using international standard scale 1-9 (ICARDA).
PREVIOUS YEAR'S RESULTS	Among 172 lines/ varieties, no line was highly resistant, 7 found resistant (13036, 14008, 14011, 14013, 1404, 14015 and Pb.2008), 66 moderately resistant, 93 susceptible and 6 were highly susceptible.

2. TITLE	**SCREENING OF CHICKPEA LINES AGAINST WILT AND ROOT ROT DISEASES**
OBJECTIVES	To identify chickpea varieties/ lines resistant/ tolerant to wilt and root rot diseases caused by *Fusarium oxysporum* f. sp. *ciceri, Rhizoctonia solani* and *R. bataticola*.
RESEARCH WORKERS	Dr. M. Azhar Iqbal, Javed Anwar Shah
PROJECT DURATION	2016- 17 (Continuous)
LOCATION	Pulses Research Institute, Faisalabad
TREATMENTS/ METHODLOGY	No of lines = Breeding material from various institutes Plot size = 3m x 0.30m Check line = AUG-424 Replications = 3 The data will be recorded at early and late infection stages (on plant basis) from seedling to maturity using international 1-9 scale (ICARDA).
PREVIOUS YEAR'S RESULTS	Out of 172 lines/ varieties, no line was highly resistant, resistant or moderately resistant. 9 lines were susceptible and 163 found highly susceptible.

3. TITLE	**SCREENING OF LENTIL GERMPLASM AGAINST WILT AND ROOT ROT DISEASES**
OBJECTIVES	To identify the resistant/ tolerant genotypes of lentil against wilt and root rot diseases caused by *Fusarium oxysporum* f. sp. *lentis* W. L. Gorden.
RESEARCH WORKERS	Dr. M. Azhar Iqbal and Javed Anwar Shah
PROJECT DURATION	2016-17 (Continuous)
LOCATION	Pulses Research Institute, Faisalabad
TREATMENTS/ METHODLOGY	No of lines = Advance breeding material Plot size = 3m x 0.30m Check line = M-85 Replications = 3 Observations on the incidence of wilt/ root rot diseases will be recorded under field conditions by following international 1-9 scale (ICARDA) at both seedling and adult stages.
PREVIOUS YEAR'S RESULTS	There were 45 lines subject to evaluate against wilt/ root rot diseases. Fourteen lines were highly susceptible, 12 susceptible, 8 moderately resistant, 11 resistant (15503, 15504, 15507, 15511, 13515, 14508, 14512, 13514, 13513, 13501, 13509 and NL-2006) and no line showed highly resistant behavior.

4. TITLE	**SCREENING OF LENTIL GERMPLASM AGAINST LENTIL RUST**
OBJECTIVES	To identify varieties/ lines resistant/ tolerant to lentil rust disease caused by ***Uromyces viciae-fabae*** Pers.
RESEARCH WORKERS	Dr. M. Azhar Iqbal and Javed Anwar Shah
PROJECT DURATION	2016-17 (Continuous)
LOCATION	Adoptive Research Station, Kot Naina (Teh. Shakargarh)
TREATMENTS/ METHODLOGY	No of lines = Breeding material from various institutes Plot size = 3m x 0.30m Check line = M-85 Replications = 3 Observations on the incidence of rust will be recorded under field conditions following international 1-9 scale (ICARDA).
REVIOUS YEAR'S RESULTS	This trial was conducted at Adaptive Research Farm, Kot Naina, Teh. Shakar Garh. Out of45 lines, 8 lines were found moderately resistant, 25 susceptible and 12 highly susceptible.

ENTOMOLOGICAL STUDIES

1. TITLE	**IDENTIFICATION OF CHICKPEA DESI ADVANCE LINES FOR TOLERANCE AGAINST POD BORER**
OBJECTIVES	To find out pod borer tolerant chickpea lines
RESEARCH WORKERS	Zubair Ahmad, Irfan Rasool and Muhammad Shafiq
PROJECT DURATION	2016-17 (continuous)
LOCATION	Faisalabad

TREATMENTS/ METHODLOGY

Entries	= 17
Design	= RCB
Replications	= 3
Plot size	= 4 x 1.2m
Inter/intra rows spacing	= 30 cm /15 cm
Sowing time	=15th October – 15th November
Data recording	= with ten days interval.
Data to be recorded	= The data on Gram pod damage will be recorded from 5 randomly selected plants per plot. The data will be analyzed statistically.

PREVIOUS YEAR'S RESULTS

Rank	Line / Variety	Damaged Pod %age	Remarks
1	13034	5.70e	Moderately Resistant
2	13035	6.10de	
3	13007	8.33cde	Moderately Susceptible
4	13004	9.50bcd	Susceptible
5	13006	9.60bcd	
6	13029	9.70bc	
7	13011	10.20bc	
8	13012	10.30bc	
9	13029	13.10ab	
10	13031	15.60a	
11	Pb.2008	15.45a	
LSD (0.05)		**3.57**	

The line 13034 showed moderately resistance against pod infestation followed by 13035. The remaining lines were found with higher pod infestation than the moderately resistance lines and check.

2. TITLE	**IDENTIFICATION OF CHICKPEA KABULIADVANCE LINES FOR TOLERANCE AGAINST POD BORER**
OBJECTIVES	To find out pod borer tolerant chickpea lines.
RESEARCH WORKERS	Zubair Ahmad, M. Afzal Zahid and Muhammad Shafiq
PROJECT DURATION	2016-17 (continuous)
LOCATION	Faisalabad

TREATMENTS/ METHODLOGY

Entries	= 14
Design	= RCB
Replications	= 3
Plot size	= 4 x 1.2m
Inter/intra rows spacing	= 30 cm /15 cm
Sowing time	=15th October – 15th November
Data recording	= with ten days interval.
Data to be recorded	= The data on Gram pods damage will be recorded from 5 randomly selected plants per plot. The data will be analyzed statistically.

PREVIOUS YEAR'S RESULTS

Sr. No	**Line / Variety**	**Damaged Pod %age**	**Remarks**
1	01302	6.00cd	Moderately Resistant
2	01206	6.35cd	
3	01219	6.66cd	Moderately susceptible
4	01308	7.50cd	
5	Noor.2009	7.24cd	
6	01221	8.90c	
7	01241	9.19c	Susceptible
8.	01309	9.30c	
9.	01242	13.05b	
10.	01240	14.66ab	
11.	01219	16.41a	
LSD (0.05)		3.35	

The line 01302 and 01206 showed moderately resistance against pod infestation .

3. TITLE	**IDENTIFICATION OF LENTIL ADVANCE LINES FOR TOLERANCE AGAINST APHIDS**
OBJECTIVES	To identify aphid tolerant lentil lines.
RESEARCH WORKERS	Zubair Ahmad, Dr. Aziz-ur-Rehman and Ch. Muhammad Rafiq
PROJECT DURATION	2016-17 (continuous)
LOCATION	Faisalabad

TREATMENTS/ METHODLOGY

Entries	= 11
Design	= RCB
Replications	= 3
Plot size	= 4 x 1.2m
Inter/intra rows spacing	= 30 cm /7.5 cm
Sowing time	=15th October – 15th November
Data recording	= with ten days interval.
Data to be recorded	= The data of aphids population will be recorded from 20 randomly selected branches per plot (1oCM). The data will be analyzed statistically.

PREVIOUS YEAR'S RESULTS

Sr. No.	Line / Variety	Average Aphid/branch	Remarks
1.	13501	0.50de	Resistance
2.	13517	0.60cde	
3.	13515	1.00cd	Susceptible
4.	13502	1.00cd	
5.	Pb. Masoor 2009	1.00cd	
6.	13506	1.00bcd	
7.	13509	1.45bcd	
8.	13512	1.50bc	
9.	13505	2.00ab	
10.	13515	2.75a	
11.	13513	2.80a	
	LSD(0.05)	0.80	

The minimum aphids infestation 0.50 and 0.60 aphids per branch were recorded in Lentil line 13501 and 13517 respectively.

4. TITLE	**MANAGEMENT OF GRAM POD BORER BY THE APPLICATION OF SYNTHETIC AND BIO PESTICIDES**
OBJECTIVES	To find out an effective, economical and environmental friendly control of gram pod borer in chickpea
RESEARCH WORKERS	Zubair Ahmad, Irfan Rasool and Muhammad Shafiq
PROJECT DURATION	2016-17
LOCATION	Faisalabad

TREATMENTS/ METHODLOGY

Treatments	Synthetic and Bio Pesticides	Dose/lit water
1	Neem oil	2ml
2	Eucalyptus oil	2ml
3	E mamectin benzoate	3ml
4	Cypermethrin	1ml
5	Check	-

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Design = RCB
Replications = 3
Plot size = 8 x 1.2m
Inter/intra rows spacing = 30 cm /15 cm
Sowing time =15th October – 15th November
Data recording = with ten days interval.
Data to be recorded = The data on Gram pods damage will be recorded from 5 randomly selected plants per plot. The data will be analyzed statistically.

PREVIOUS YEAR'S RESULTS

First Year

BACTERIOLOGICAL STUDIES

1. TITLE — USE OF RHIZOBIUM AND PGPR COINOCULATION FOR CHICKPEA PRODUCTION.

OBJECTIVES

To identify the best suited Rhizobium-PGPR coinoculation for optimum chickpea production.

RESEARCH WORKERS

Muhammad Aslam Avais, Dr. Azhar Iqbal, and Ch. Muhammad Rafiq

PROJECT DURATION

2016-17

LOCATION

Faisalabad

TREATMENTS/ METHODLOGY

T1-	Control (25-60-0)
T2-	Rhizobium sp. of chickpea
T3-	Azotobacter ($PGPR_1$)
T4-	Bacillus ($PGPR_2$)
T5-	Rhizobium + $PGPR_1$
T6-	Rhizobium + $PGPR_2$

Layout: = RCBD
Treatments: = 6
Replication: = 3
Plot size: = 3m×5m
Row spacing: = 30cm
Plant spacing: = 10-15 cm
Variety: = D-09029
Sowing date: = First fortnight of November

Fertilizer will be added to the soil prior to sowing. Rhizobium as well as PGPR culture as per treatment will be applied to seed before sowing. Data for Plant height, No. of branches and No. of pods per plant, 1000 grain weight grain yield and quality will be recorded. Pre sowing and post-harvest soil analysis for NPK will be carried out.

PREVIOUS YEAR'S RESULTS

Treatments	Plant height (cm)	Branch plant^{-1}	Pods plant^{-1}	Grain pod^{-1}	100 grain weight (g)	Grain yield (kg ha^{-1})
T1	38.00	4.97	20.00 c	1.41 b	19.99	1069 d
T2	41.00	5.43	26.47 abc	1.52 ab	20.06	1162 cd
T3	42.67	6.07	27.13 abc	1.43 b	20.50	1209 bc
T4	38.67	5.53	30.73 ab	1.57 a	20.77	1227 bc
T5	42.00	5.07	30.80 ab	1.64 a	20.24	1334 b
T6	44.00	6.27	32.80 a	1.57 a	20.69	1404 a
	NS	**NS**			**NS**	

2. TITLE	**EVALUATION OF CHICKPEA SEED INOCULATION METHODS/ TECHNIQUES FOR IMPROVING ITS YIELD AND QUALITY.**

OBJECTIVES

To sort out inoculants application method more suitable for getting higher grain yields with better quality.

RESEARCH WORKERS

Muhammad Aslam Avais, Dr. Azhar Iqbal, and Ch. Muhammad Rafiq

PROJECT DURATION

2016-17

LOCATION

Faisalabad in collaboration with Biochemistry section AARI, Faisalabad

TREATMENTS/ METHODLOGY

T1-	Control (No inoculation)
T2-	Direct seed inoculation
T3-	Inoculants granules placement in seed rows
T4-	Inoculants liquid culture / slurry

Layout: = RCBD
Treatments: = 4
Replication: = 5
Plot size: = 1.2m×4m
Row spacing: = 30cm
Plant spacing: = 10-15 cm
Variety: = Bittal -2016
Sowing date: = First fortnight of November

Fertilizer (25-60-0 kg ha^{-1}) will be added to the soil prior to sowing. Inoculants cultures as per treatment will be applied before sowing. Data for Plant height, No. of branches and No. of pods per plant, 1000 grain weight, grain yield and quality will be recorded. Pre sowing and post-harvest soil analysis for NPK will be carried out.

PREVIOUS YEAR'S RESULTS

New experiment

3. TITLE	**IMPACT OF WHEAT CHICKPEA INTERCROPPING ON GRAIN YIELD, QUALITY AND SOIL HEALTH.**

OBJECTIVES

To investigate the feasibility and advantages of wheat chickpea intercropping in terms of grain yield, quality, benefit cost ratio and soil health.

RESEARCH WORKERS

Muhammad Aslam Avais, Malik Mushtaq Ahmad, Dr. Azhar Iqbal and Ch. Muhammad Rafiq.

PROJECT DURATION

2016-17

LOCATION

Kallur kot

TREATMENTS/ METHODLOGY

T1-	Wheat alone
T2-	Chickpea alone
T3-	Wheat chickpea in alternate rows(4:4)
T4-	Wheat chickpea 8:4 rows respectively
T5-	Wheat chickpea 4:8 rows respectively

Layout: =RCBD
Treatments: =5
Replication: =4
Plot size: =2.4m x 4m
Row spacing: =Wheat (22.5cm), Chickpea (30cm)
Variety: = Wheat (galaxy-2013), Chickpea (Bittal-2016)
Sowing date: = First fortnight of November

Recommended dose of fertilizers (Wheat 120-90-60 and Chickpea 25-60-0 Kg ha^{-1}) will be applied in chickpea whole fertilizer dose will be applied at sowing while in case of 1/2 N and whole quantity of PK will be applied at sowing and remaining of 1/2 N will be applied at booting stage. Data for Plant height, No. of branches and No. of pods per plant, 1000 grain weight, grain yield and quality will be recorded. Pre sowing and post-harvest soil analysis for NPK will be carried out.

PREVIOUS YEAR'S RESULTS First Year

4. TITLE **IMPACT OF WHEAT LENTIL INTERCROPPING ON GRAIN YIELD, QUALITY AND SOIL HEALTH.**

OBJECTIVES To investigate the feasibility and advantages of wheat Lentil intercropping in terms of grain yield, quality, benefit cost ratio and soil health.

RESEARCH WORKERS Muhammad Aslam Avais, Amir Hussain, Faryad Ahmad Khan, Dr. Aziz-ur-Rehman, Dr. Azhar Iqbal and Ch. Muhammad Rafiq.

PROJECT DURATION 2016-17

LOCATION Sahowali

TREATMENTS/ METHODLOGY

T1-	Wheat alone
T2-	Lentil alone
T3-	Wheat lentil in alternate rows(4:4)
T4-	Wheat lentil 8:4 rows respectively
T5-	Wheat lentil 4:8 rows respectively

Layout: =RCBD
Treatments: =5
Replication: =4
Plot size: =2.4m x 4m
Row spacing: =Wheat (22.5cm), Lentil (30cm)
Variety: = Wheat (galaxy-2013), Lentil (Pb MAsoor-2009)
Sowing date: = First fort night of November

Recommended dose of fertilizers (Wheat 120-90-60 and Chickpea 25-60-0 Kg ha^{-1}) will be applied in chickpea whole fertilizer dose will be applied at sowing while in case of wheat 1/2 N and whole quantity of PK will be applied at sowing and remaining 1/2 N will be applied at booting stage. Data for Plant height, No. of branches / tillers, No. of pods / spikes per plant, No. of grains per pod or spike, 1000 grain weight, grain yield and quality will be recorded. Pre sowing and post-harvest soil analysis for NPK will be carried out.

PREVIOUS YEAR'S RESULTS First Year