Annual Program of Research Work

RABI 2017 – 18

PULSES RESEARCH INSTITUTE, FAISA-LABAD

CONTENTS

INTRODUCTION

Pulses are an important source of proteins and sustain soil fertility through biological nitrogen fixation. Pulses were grown in Pakistan on an average area of 1227 thousand hector with average production of 614 thousand tones during 2011-2015. Punjab contributes more than 85% of the total pulses production. Gram is the largest pulse crop, accounting for 76 percent of total production of pulses mainly grown in rainfed areas of Thall. It is being grown on (945 thousand ha) during 2015-16. Lentil is another important crop among Rabi pulses, being grown on about 17.9 thousands hector with 7.8 thousand tons production in Pakistan. Most of the lentil requirements are being fetched through import with ever increasing import bill. Pulses production has been declining for the last few years resulting in huge export of these commodities worth billions rupees. 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 weather conditions.

Area, production and yield of Gram and Lentil during 2015-16 are as under:

Year	Punjab			Pakistan		
	Area 000 ha	Production 000 tons	Yield Kg / ha	Area 000 ha	Production 000 tons	Yield Kg / ha
Gram						
2015-16	860	246	286	945	312	330.16
Lentil						
2015-16	11.2	4.0	357	17.9	7.8	435.7

Salient Achievements of Pulses Research Institute during 2016-17 is as under:

CHICKPEA KABULI *(Cicer arietinum L.)*

- Advance line viz. K-01216 of this institute occupied top position In NUYT 2016-17 while line K002-10 contributed by this institute under PARB Project No. 120 occupied 2nd position.
- Advance lines K-01241 (1660 kg/ha) and K-01308 (1636 kg/ha) out-yielded all other genotypes contributed by sister organizations in Cooperative yield trial conducted at ten locations.
- Advance lines K-01401 (1336 kg/ha) and K-01406 (1307 kg/ha) out-yielded other genotypes including both the checks Noor-2013 and Noor-2009 in Micro Yield Trials.
- Advance line K-01519 (1854 kg/ha) produced more grain yield than the checks in Advance yield trials while genotypes K-01610 (2589 kg/ha) in PYT Set-I and K-01626 (2500 kg/ha) In PYT Set-II occupied top positions in respective trials.
- Twenty-three (23) 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.

CHICKPEA DESI (*Cicer arietinum* L.)

- Advance lines D-13036 (2248 kg/ha) and D-13012 (2241 kg/ha) out-yielded all other genotypes contributed by sister organizations in Cooperative yield trial conducted at nine locations.
- Advance line D-15036 (2858 kg/ha) produced more grain yield than the checks in Advance yield trials while genotypes D-16001 (3170 kg/ha) in PYT Set-I and D-16033 (2866 kg/ha) In PYT Set-II occupied top positions in respective trials.
- Twenty-three (27) successful F_0 crosses were developed.
- Four hundred and ninty (490) single plant progenies from F_2 to F_5 generations were selected for generation enhancement. In F_2, twenty two (21) crosses were bulked separately.
- More than 100 desirable single plants were harvested from farmer's field of Thall area.

LENTIL (*Lens culinaris* Medik)

- Advance line V- 11501 and V- 13502 produced higher yield 1047 and 1040 kg/ha as compared to Pb- Masoor 2009 (1013 kg/ha) in National Uniform Yield Trial 2016-17
- Advance lines V-15502 (1233 kg/ha) and V-15501 (1167 kg/ha) gave higher yield in contrast with other genotypes in Advance Yield Trial. Entries V-16508 (2165 kg/ha) and V-16502 (1861 kg/ha) gave significantly higher yield than checks in Preliminary Yield Trials.
- Twenty (20) successful new cross combinations were harvested.
- Three hundred and Seventy one (371) progenies were selected for further studies from F_2- F_6 generations.
- Twenty six (26) uniform desirable lines were selected for preliminary yield testing.

CHICKPEA (DESI)

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

1.	GERMPLASM STUDIES
OBJECTIVES	To collect, maintain, characterize and evaluate gene pool entries
RESEARCH WORKERS	Irfan Rasool, Dr. Anwar-ul-Haq, Muhammad Shafiq, Mushtaq Ahmad & Ch. Muhammad Rafiq
PROJECT DURATION	2017-18
LOCATION	PRI, Faisalabad
TREATMENTS/ METHODLOGY	**Total Entries** = 297 + 350 = 647 PRI, Faisalabad = 297 (Pr. 280 + New 17) GBRSS, Kallurkot = 350 (Received from PGRI, Islamabad) Checks = Bittal-2016, Bhakkar-2011, Punjab-2008 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	Faisalabad: Entries studied & maintained = 280 Kallurkot: Entries studied & maintained = 375

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

TRAIT	RANGE	
	Minimum	Maximum
Plant height (cm)	27	67
Leaflets/ leaf (No.)	12	20
Primary branches/ Plant	2	8
Secondary branches/ Plant	6	20
Pods/ plant	6	107
Seeds/ pod	1-2	2-3
100- grain weight (g)	16	34

2.	**HYBRIDIZATION PROGRAMME**

OBJECTIVES To create variability for the selection of desirable recombinants

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

PROJECT DURATION 2017-18

LOCATION PRI, Faisalabad

TREATMENTS/ METHODOLOGY

CHICKPEA (Desi) NEW CROSS COMBINATIONS							
Sr.#	**Female Parent**		**Male Parent**	**Sr.#**	**Female Parent**		**Male Parent**
1.	Bittal-2016	X	97086	16.	D-10008	X	"
2.	Punjab-2008	X	"	17.	D-13036	X	"
3.	Bhakkar2011	X	"	18.	D-15036	X	"
4.	D-10008	X	"	19.	Bittal-2016	X	CH39 /08
5.	D-13036	X	"	20.	Punjab-2008	X	"
6.	D-15036	X	"	21.	Bhakkar2011	X	"
7.	Bittal-2016	X	93127	22.	D-10008	X	Neelam
8.	Punjab-2008	X	"	23.	D-13036	X	"
9.	Bhakkar2011	X	"	24.	D-15036	X	"
10.	D10008	X	"	25.	Bittal-2016	X	SB - 17
11.	D-13036	X	"	26.	Punjab-2008	X	"
12.	D-15036	X	"	27.	Bhakkar2011	X	"
13.	Bittal-2016	X	CH 40/09	28.	Bittal-2016	X	Almaz
14.	Punjab-2008	X	"	29.	Punjab-2008	X	"
15.	Bhakkar2011	X	"	30.	Bhakkar2011	X	"

Sr	Variety	Salient Character
1.	D-97086	Advance line with high yield potential and moderately resistant to Blight and wilt
2.	D-93127	Advance line with high yield potential and moderately resistant to Blight and wilt
3.	Almaz	Bold Seeded and high Yielding Australian Kabuli variety
4.	SB - 17	Bold seeded kabuli Imported seeds from Market (100 grain wt =55 g)
5.	CH 40/09	Stood first in NUYT 2016-17 with Ave. Yield 2817 kg/ha in 9 locations
6.	CH 39/08	Stood 2nd in NUYT 2016-17 with Ave. Yield 2752 kg/ha in 9 locations
7.	Bittal-2016	High Yielding bold seeded
8.	Punjab-08	High Yielding
9.	Bhakar2011	High Yielding bold seeded
10.	D-10008	Stood first in NUYT 2015-16 with Ave. Yield 1954 kg/ha in 11 locations
11.	D-13036	Stood first in CYT with Ave. Yield 2248 kg/ha in 9 locations
12.	D-15036	Stood first in AYT with Ave. Yield 2858 kg/ha

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 27 successful crosses were harvested.

3. 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
2017-18

LOCATIONS
PRI, Faisalabad

TREATMENTS/ METHODLOGY

Crosses / plant progenies to be studied:

Filial generation	Crosses	progenies
F_1	27	-
F_2	21	-
F_3	10	120
F_4	20	140
F_5	15	140
F_6	17	90

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	30	27	
F_1	23	21	
F_2	16	10/120	
F_3	23/63	20/140	
F_4	17/120	15/140	
F_5	18/150	17/90	8
F_6	13/80		28

4. 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
2017-18

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.	**D-16001**	2882	3458	**3170**
2.	**D-16004**	3208	2764	**2986**
3.	**D-16012**	2733	3111	**2922**
4.	**D-16011**	2688	3014	**2851**
5.	**D-16015**	2632	3049	**2840**
6.	**D-16003**	2764	2708	**2736**
7.	**D-16017**	2597	2833	**2715**
8.	**D-16007**	2677	2750	**2714**
9.	**Pb.2008**	2840	2569	**2705**
10.	**D-16018**	2535	2796	**2665**
11.	**D-16016**	2486	2813	**2649**
12.	**D-16002**	2951	2344	**2648**
13.	**D-16013**	2576	2708	**2642**
14.	**Bittal -2016**	2858	2173	**2515**
15.	**D-16009**	2528	2500	**2514**
16.	**D-16014**	2333	2646	**2490**
17.	**D-16010**	2396	2465	**2431**
18.	**D-16005**	2639	2132	**2385**
19.	**D-16008**	2292	2361	**2326**
20.	**D-16006**	2587	2000	**2293**
CV %		11.40	3.76	
LSD (0.05)		247.67	81.68	

Set – II

Rank	Entries	PRI, Fsd	GBRSS, K.Kot	Ave. Yield Kg/ha
1.	**D-16033**	3019	2713	**2866**
2.	**D-16019**	2712	2938	**2825**
3.	**D-16029**	2665	2813	**2739**
4.	**D-16032**	2762	2674	**2718**
5.	**D-16020**	2872	2508	**2690**
6.	**D-16030**	2840	2396	**2618**
7.	**Pb.2008**	2517	2712	**2615**
8.	**D-16035**	2715	2500	**2608**
9.	**D-16031**	2536	2569	**2553**
10.	**D-16034**	2735	2340	**2538**
11.	**D-16036**	2688	2354	**2521**
12.	**Bittal 2016**	2594	2361	**2477**
13.	**D-16027**	2819	2073	**2446**
14.	**D-16026**	2910	1944	**2427**
15.	**D-16024**	2122	2722	**2422**
16.	**D-16028**	2483	2340	**2411**
17.	**D-16025**	2832	1979	**2406**
18.	**D-16023**	2222	1938	**2080**
19.	**D-16021**	1965	2152	**2059**
20.	**D-16022**	1576	1736	**1656**
CV %		8.59	6.10	
LSD (0.05)		181.01	118.90	

5.	**ADVANCE YIELD TRIAL**

OBJECTIVES To evaluate promising lines for yield potential and disease tolerance

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

PROJECT DURATION 2017-18

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-15036**	3295	2420	2858
2.	**D-15015**	2889	2465	2677
3.	**D-15033**	2708	2646	2677
4.	**D-15019**	2889	2417	2653
5.	**D-15030**	3020	2257	2639
6.	**D-15020**	2549	2694	2622
7.	**D-15024**	2765	2458	2612
8.	**D-15012**	3115	2049	2582
9.	**Pb.2008**	2903	2257	2580
10.	**D-15026**	2436	2622	2529
11.	**D-15021**	2653	2243	2448
12.	**D-15005**	2969	1875	2422
13.	**D-15016**	2565	2215	2390
14.	**D-15014**	3035	1736	2385
15.	**Bittal2016**	2795	1931	2363
16.	**D-15008**	2875	1424	2149
17.	CV %	5.48	12.27	
18.	LSD (0.05)	99.84	284.7	

6.	**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	2017-18
LOCATION	13 (Faisalabad, NIAB, Kallurkot, Bhakkar, Bahawalpur, Karor, Rakhuttra, Karak & farmer fields.)
TREATMENTS/ METHODLOGY	Entries = 22 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

Sr	Entry	PRI, Fsd	NIAB	K.Kot	K.Kot Barani	K.Kot F.Field	Karor	R/uttra (Barani)	AZRI. Bkr	B.Pur	Ave. (Kg/h)
		1	2	3	4	5	6	7	8	9	
1.	**D-13036**	**3438**	**2236**	**2986**	**2604**	**910**	**1826**	**1458**	**2033**	**2743**	**2248**
2.	D-13012	3299	2194	3146	2556	806	2363	972	1880	2951	2241
3.	D-14005	3729	2308	2056	2229	563	2321	1389	1704	3333	2181
4.	BRC-457	2719	2508	2674	2542	677	2695	1493	1983	2236	2170
5.	D-13011	3181	2361	2882	2188	486	2542	764	1994	2778	2131
6.	**Bittal 2016**	**2854**	**2437**	**3000**	**1826**	**868**	**2672**	**903**	**2157**	**2292**	**2112**
7.	CH 32/10	3028	2293	2653	2431	566	2782	1042	1522	2361	2075
8.	D-13029	3160	2309	2778	1781	747	2430	1458	1667	2326	2073
9.	Pb.2008	3167	2294	2417	2507	861	1826	625	2111	2847	2073
10.	TG-1306	3260	2475	2535	1955	642	2754	1042	1893	2049	2067
11.	D-14008	3042	2274	2785	2083	747	2590	1042	1614	2257	2048
12.	CH 35/10	2882	2288	2069	2618	917	2377	1250	1517	2014	1992
13.	BRC-424	2972	2386	2535	2118	597	1534	903	1996	2708	1972
14.	D-14013	3063	2165	2465	1965	660	1785	694	1992	2778	1952
15.	D-14014	2847	2067	2743	2188	566	1931	1181	1815	2014	1928
16.	CH 19/10	2750	2426	2688	868	660	2450	1181	1858	2431	1923
17.	CM1036/09	2651	2205	2028	1493	639	2380	1111	1586	2986	1898
18.	D-13031	3049	2226	2931	1701	594	1262	1319	1808	2153	1894
19.	CM584/09	2660	2260	2514	1792	389	1986	1111	1476	2743	1881
20.	D-13030	2896	2163	2632	1875	299	1469	1042	1626	1875	1764
	CV	8.78	8.95	4.86	12.27	14.41	5.48	16.34	7.48	12.73	
	LSD 5%	217.41	167.59	104.26	206.91	77.59	98.37	146.58	110.69	259.24	

7.	**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**	2514	1198	**1856**	2118	1097	**1608**	1885	972	**1429**
2	**D-12026**	2632	1424	**2028**	1872	917	**1394**	1944	715	**1330**
3	**D-12034**	2604	764	**1684**	2319	628	**1474**	2194	590	**1392**
4	**D-13022**	2868	1354	**2111**	2368	1111	**1740**	1875	854	**1365**
5	**D-13023**	2264	986	**1625**	2201	1014	**1608**	1896	701	**1299**
6	**D-10039**	2160	1565	**1863**	1556	955	**1255**	1625	1351	**1488**
7	**D-03009**	2302	1090	**1696**	1934	1049	**1491**	2021	542	**1281**
8	**D-075-09**	2438	1003	**1720**	2406	1319	**1863**	2222	931	**1576**
9	**Noor-2009**	2368	1028	**1698**	1965	813	**1389**	1917	660	**1288**
10	**K-01014**	1924	1087	**1505**	1854	861	**1358**	1851	458	**1155**
11	**K-70005**	2257	1354	**1806**	2292	764	**1528**	1771	479	**1125**
12	**K-70008**	2302	1181	**1741**	1854	701	**1278**	1503	729	**1116**
13	**K-01020**	1795	1767	**1781**	1611	1076	**1344**	1406	917	**1161**
14	**K-01019**	2229	1424	**1826**	1913	646	**1280**	1823	701	**1262**
15	**Pb-2008**	2094	1674	**1884**	2007	938	**1472**	1351	847	**1099**
16	**Noor-2013**	2215	1250	**1733**	2500	799	**1649**	1382	517	**950**
	CV	**10.11**	**10.59**		**12.91**	**15.23**		**6.63**	**15.96**	
	LSD	**190.6**	**108.9**		**215.9**	**114.1**		**96.9**	**97.44**	

8.	**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	2017-18
LOCATIONS	2 (Faisalabad & KallurKot)
TREATMENTS/ METHODLOGY	This institute will contribute 09 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 = 26 Pulses Res. Institute contributed 5 entries

Grain Yield (kg/ha)

Rank	Entry name	Locations*									MEAN
		AARI	ARS	AZRI	AZRI	GBRSS	NARC	NIAB	NIFA	QAARI	
1.	**CH 40/09**	**3215**	**2032**	**3056**	**3327**	**3389**	**2891**	**2065**	**2999**	**2382**	**2817**
2.	CH 39/08	2972	2615	2992	3209	2847	2766	1981	2868	2521	2752
3.	DCD	3444	1750	1392	4326	3334	2740	2052	2957	2559	2728
4.	Punjab-2008	3236	1879	2324	3550	3473	2994	1967	2833	2194	2717
5.	CH 49/09	3403	1545	2243	4066	2938	2924	1826	3271	2236	2717
6.	**Bittle-2016**	**3667**	**1970**	**2458**	**3260**	**2851**	**3035**	**2074**	**3032**	**2043**	**2710**
7.	CH 28/07	3514	1415	2701	3032	3160	2651	2200	2896	2514	2676
8.	09AG006	3458	1823	1708	4003	2778	2584	2315	2740	2319	2636
9.	D-10008	3181	1518	2174	3266	3264	2868	2025	3164	2097	2617
10.	CH 17/08	3028	1901	1993	3355	3299	2329	2210	3112	2319	2616
11.	CM 1026/09	2778	1647	1972	4634	2709	2053	1924	3335	2458	2612
12.	CH 19/07	2597	2344	2398	2869	3618	2280	1690	2971	2514	2587
13.	D-11030	3819	1434	2360	2675	3056	2263	2098	3015	2555	2586
14.	TG-1221	3028	1765	2544	3147	2896	2258	2046	2916	2291	2543
15.	TG-1218	3028	1967	2403	3619	2743	2341	1892	2640	2229	2540
16.	CH 10/08	3181	1944	2688	2605	2986	2235	1842	2985	2146	2512
17.	D-09027	3361	1701	1699	3805	2889	1970	1794	3042	2173	2493
18.	D-10039	3083	1659	1201	3397	2917	2818	2054	2918	2270	2480
19.	D-12011	3403	1589	2521	2527	3195	1594	1862	3298	2284	2475
20.	TG×228	2403	1862	2903	2784	2473	2715	1963	2882	1930	2435
21.	TG×220	2625	1975	2184	3156	2743	1463	1842	2950	2319	2362
22.	SL-05-64	2715	2457	875	2822	2695	2351	1812	2162	2236	2236
23.	NIFA-3	2319	1486	1250	3091	2465	2383	1429	2891	2368	2187
24.	NIFA-2	2014	1537	1097	3315	2167	2156	1303	2838	2166	2066
25.	AZC	2583	1653	1521	2001	2764	2208	1769	1460	2472	2048
26.	NIFA-1	1500	1108	979	2312	1389	821	1269	2869	1979	1581
Location Means		2983	1791	2063	3237	2886	2373	1896	2886	2291	

Coefficient of variation= 16.03% Genotypes (G), Location (L) and G x L interactions are highly significant (P<0.01)

*Locations			
1= AARI, Faisalabad	2= ARS, Ahmadwala Karak	3= AZRI, Bhakkar	4=AZRI, D.I.Khan
5= GRS, Kalur Kot	6= NARC, Islamabad	7= NIAB, Faislabad	8= NIFA, Peshawar
9= QAARI, Larkana			

9.	**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 2017-18

LOCATION Faisalabad

TREATMENTS/ MATHOD-LOGY

Variety = 1 (Bittal- 2016)

Treatments = 9

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		Plant Spacing		
		10 cm	**15 cm**	**20 cm**
Row Spacing	**23 cm**	1137	922	884
	30 cm	1086	1061	983
	45 cm	1125	916	789
CV = 16 % ,			LSD (0.05%) = 165.89	

10.	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

2017-18

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	Pre-Basic	Basic	Total (Kg)
Punjab-2008	1250	4350	5600
Bittal - 2016	3045	-	3045
Total	**4295**	**4350**	**8645**

CHICKPEA (KABULI)

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

11.	**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	2017-18
LOCATION	Faisalabad
TREATMENTS/ METHODLOGY	Entries = 310 (Pr. 300 + New 10) 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 = 2nd fortnight of October
PREVIOUS YEAR'S RESULTS	Entries studied & maintained = 300 Range of variation for some quantitative traits in the chickpea (kabuli) Germplasm

TRAIT	**RANGE** (Average of five plants)	
	Minimum	**Maximum**
Plant height (cm)	30	110
Primary branches per plant	3	11
Secondary branches per plant	5	25
Days to flowering (50%)	88	115
Pods per plant	22	120
Days to maturity	145	165
100- grain weight (g)	18	36
Grain yield per plant (g)	20	164
Harvest index (%)	14	54

12.	**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 2017-18

LOCATION Faisalabad

TREATMENTS/ METHODLOGY Cross combinations= 30

Sr	High Yielding		Blight Toler-ant	Sr	High Yield-ing		Wilt Tolerant
1	K-01241	×	CDC Leader	16	K-01211	×	K-01020
2	K-01308	×	CDC Cabri	17	K-01216	×	K-01241
3	K-01242	×	CDC Marengo	18	K-01209	×	K-08003
4	K-01248	×	K-01514	19	CH55/09	×	K-01305
5	K-01221	×	K-01515	20	CH77/08	×	K-01241
6	K-01302	×	CDC Cabri	21	CH74/08	×	K-08003
7	CH56/09	×	CDC Marengo	22	BKK2174	×	K-01305
8	K-01250	×	K-01516	23	CH72/08	×	K-01241
9	CM877/10	×	K-01518		Bold Seeded		High Yielding
10	CM616/10	×	K-01519	24	SB-17	×	Almaz
11	K002-10	×	FLIP08/37C	25	UC-27	×	Almaz
12	K-01216	×	FLIP82/150C	26	K-60042	×	K-01338
	High Yielding		Heat Tolerant	27	K-01524	×	K-01242
13	K002-10		K-01020	28	K-01508	×	K-01302
14	K-01216		K-01110	29	K-096019	×	K-90315
15	CH56/09	×	K-08003	30	K-01610	×	K-01242

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 25 crosses were attempted and seed of 23 successful crosses were harvested

13.	**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 2017-18

LOCATION Faisalabad

TREATMENTS/ METHODLOGY Crosses / plant progenies to be studied;

Filial generation	Crosses/progenies
F_1	23
F_2	16
F_3	8/34
F_4	17/110
F_5	10/120
F_6	9/72

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	25	23	
F_1	19	16	
F_2	9	8/34	
F_3	22	17/110	
F_4	10/130	10/120	
F_5	10/140	9/72	
F_6	7/70	-	32

14. 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

2017-18

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

Set-I

R	Entries	PRI, Fsd	GBRSS, K.Kot	Av. Yield Kg/ha
1	K-01610	2170	3007	**2589**
2	K-01605	1631	2959	**2295**
3	K-01611	2022	2556	**2289**
4	**Noor-2009**	**2031**	**2431**	**2231**
5	K-01613	1722	2604	**2163**
6	K-01609	1691	2361	**2026**
7	K-01607	1611	2382	**1997**
8	K-01604	1819	2028	**1924**
9	K-01612	1608	2160	**1884**
10	K-01606	1809	1944	**1877**
11	K-01608	1538	2167	**1853**
12	**Noor-2013**	**1620**	**1722**	**1671**
13	K-01615	1580	1444	**1512**
14	K-01603	1139	1021	**1080**
15	K-01616	936	1041	**989**
16	K-01601	861	1076	**969**
17	K-01614	851	972	**912**
18	K-01602	765	1028	**897**
	LSD (0.05)	**92.89**	**76.63**	**85.35**
	CV%	**3.68**	**2.38**	**3.03**

PREVIOUS YEAR'S RESULTS

Set-II

R	Entries	PRI, Fsd	GBRSS, K.Kot	Av. Yield Kg/ha
1	K-01626	1993	3007	**2500**
2	K-01621	1982	2959	**2471**
3	K-01629	2314	2604	**2459**
4	K-01623	2181	2382	**2282**
5	K-01627	1982	2556	**2269**
6	K-01625	2174	2361	**2268**
7	**Noor-2009**	**2042**	**2431**	**2237**
8	K-01628	2209	2160	**2185**
9	K-01624	1938	2167	**2053**
10	K-01631	2603	1444	**2024**
11	K-01620	1853	2028	**1941**
12	K-01622	1878	1944	**1911**
13	**Noor-2013**	**1901**	**1722**	**1812**
14	K-01632	2198	1041	**1620**
15	K-01630	1935	972	**1454**
16	K-01619	1467	1021	**1244**
17	K-01618	1216	1028	**1122**
18	K-01617	1038	1076	**1057**
	LSD (0.05)	**81.75**	**76.76**	**83.55**
	CV%	**2.54**	**2.39**	**2.65**

15.	**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	2017-18
LOCATIONS	Faisalabad, Kallurkot and Rakhuttra

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	PRSS, Rakhutra	Av. Yield Kg/ha
1	K-01519	2173	2660	729	**1854**
2	**Noor-2009**	**2507**	**2479**	**417**	**1801**
3	K-01518	2431	2497	208	**1712**
4	K-01517	2242	2632	208	**1694**
5	K-01509	2081	2465	313	**1620**
6	K-01512	1370	2806	625	**1600**
7	**Noor-2013**	**1764**	**2188**	**729**	**1560**
8	K-01530	1713	2514	417	**1548**
9	K-01501	2135	2070	417	**1541**
10	K-01525	1797	2472	208	**1492**
11	K-01510	1635	2319	521	**1492**
12	K-01514	1603	2611	208	**1474**
13	K-01513	1814	2083	521	**1473**
14	K-01511	1745	2333	313	**1464**
15	K-01528	1757	2250	208	**1405**
16	K-01504	1579	2125	313	**1339**
	LSD (0.05)	**69.06**	**96.49**	**12.74**	**67.66**
	CV%	**2.18**	**2.40**	**1.92**	**2.66**

16.	**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 2017-18

LOCATIONS Faisalabad, Kallurkot, Rakhuttra, Karor 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

Rank	Entry	PRI, Fsd	GBRSS, K.Kot	PRSS, R.Uttra	AZRI, Bhakkar	BARS, F.Jang	Av. Yield Kg/ha
1	K-01401	1368	2292	208	2013	799	**1336**
2	K-01406	1361	2556	208	1743	669	**1307**
3	K-01407	1132	2570	208	1770	793	**1295**
4	K-01405	1265	1916	277	1910	992	**1272**
5	K-01404	1118	2604	208	1735	686	**1270**
6	**Noor-2009**	**1424**	**2201**	**313**	**1664**	**691**	**1259**
7	K-01424	1601	2375	208	996	861	**1208**
8	K-01403	1083	2285	278	1518	699	**1173**
9	K-01402	1031	2125	208	1860	603	**1165**
10	**Noor-2013**	**1080**	**2327**	**313**	**1338**	**713**	**1154**
11	K-01426	1264	1792	313	1604	737	**1142**
12	K-01411	979	2264	313	1379	641	**1115**
13	K-01417	1253	2056	313	944	835	**1080**
14	K-01422	930	2097	208	964	969	**1034**
	LSD (0.05)	**69.11**	**100.10**	**29.40**	**61.81**	**86.25**	**70.96**
	CV%	**3.41**	**2.65**	**6.86**	**2.41**	**6.73**	**3.66**

17.	**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 2017-18

LOCATIONS Faisalabad (PRI, NIAB), Kallurkot (Irri., barani), Rakhuttra, Bhakkar, Karor, Bahawal-pur, Chakwal and Fatehjang

TREATMENTS/ METHODOLOGY

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	Entries	PRI, Fsd (R.fed)	PRI, Fsd (Irri)	NIAB, Fsd	K.Kot (R.fed)	K.Kot (Irri)	R.uttra (R.fed)	AZRI, Bhakr	ARS, Karor	RARI, Bwp	BARI, Chkwal	BARS, F.Jang	Mean Kg/ha
1	K-01241	886	2590	2221	2167	2465	1042	792	2128	2083	875	1008	**1660**
2	K-01308	1161	2361	1956	2257	2243	764	913	2439	2166	903	838	**1636**
3	K-01242	1134	2667	2229	2674	2451	625	1170	1363	1042	931	953	**1567**
4	K-01248	1251	2517	2365	2278	2378	903	803	1757	1333	722	924	**1566**
5	K-01221	920	2045	2006	2465	2333	347	1499	2156	1541	833	921	**1551**
6	K-01302	1092	2406	2087	1667	2448	764	803	2572	1562	743	787	**1539**
7	K-01250	797	2445	2117	2139	2625	764	693	2038	1500	882	873	**1534**
8	CM877/10	663	2201	1808	2313	2278	625	936	2840	1250	736	983	**1512**
9	CM616/10	1093	1966	2076	2035	2288	903	700	2865	1125	618	728	**1491**
10	K-01219	1149	2090	1817	2073	2347	625	676	1944	1854	778	1022	**1489**
11	K-01240	1042	2065	1867	2139	2500	903	785	1708	1291	882	886	**1461**
12	K-01338	1266	2573	1939	1597	2226	556	472	2078	1458	861	794	**1438**
13	**Noor-2013**	**997**	**1886**	**1815**	**2118**	**2292**	**625**	**515**	**2264**	**1125**	**833**	**818**	**1390**
14	TG12K05	937	1598	1740	1806	2455	556	692	1844	1500	778	960	**1351**
15	TG12K01	729	1462	1448	1653	2115	694	925	2722	937	910	925	**1320**
16	CM545/10	907	2158	1836	2104	2222	347	1126	1742	396	778	855	**1316**
17	TG12K10	584	1538	1478	1528	1927	556	726	1920	1291	889	865	**1209**
18	TG12K02	605	1372	1196	1444	1726	486	465	2012	562	743	915	**1048**
LSD (0.05)		**72.49**	**76.67**	**84.49**	**100.0**	**87.73**	**87.34**	**96.80**	**47.17**	**146.57**	**98.81**	**96.27**	**90.02**
CV%		**4.57**	**2.19**	**2.70**	**2.95**	**2.30**	**7.84**	**7.15**	**1.33**	**6.66**	**7.29**	**6.50**	**3.87**

18. 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 2017-18

LOCATIONS Faisalabad & Kallurkot

TREATMENTS/ METHODOLOGY

Entries = 18
No. of sets = 2
Moisture levels = Zero Irrigation & two Irrigations

Checks = Noor-2009 & Noor-2013
Design = R.C.B.
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

R	Entries	Zero Irrigation	Two Irrigations	Av. Yield Kg/ha
1	K-01242	2063	2267	**2165**
2	K-01020	2153	2174	**2163**
3	K-01221	1832	2206	**2019**
4	K-01248	1686	2263	**1975**
5	K-01302	1549	2371	**1960**
6	K-01338	1585	2318	**1951**
7	K-01212	1644	2226	**1935**
8	K-70005	1818	1979	**1899**
9	K-09015	1788	2003	**1895**
10	K-01250	1599	2188	**1893**
11	**Noor-2013**	**1588**	**2140**	**1864**
12	K-09012	1582	2108	**1845**
13	K-01241	1274	2414	**1844**
14	K-01308	1463	2199	**1831**
15	K-01213	1647	1999	**1823**
16	K-70008	1301	2027	**1664**
17	K-01240	1425	1893	**1659**
18	K-01219	1125	2006	**1565**
	LSD	**165.71**	**151.12**	**154.07**
	CV%	**6.17**	**4.23**	**5.02**

19. 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 2017-18

LOCATIONS Faisalabad and Kallurkot

TREATMENTS/ METHODLOGY NUYT-2017-18
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= 19

R	Entries	AARI, Fsd	ARS, Karak	AZRI, Bhakar	AZRC, DIKhan	BARI, Chakwal	GBRSS K.Kot	NARC, Islmabad	NIAB Fsd	PRS, T.Jam	QAARI Larkana	Mean Kg/ha
1	K-01216	2028	1763	2531	3413	1472	3076	1404	2022	2516	2521	**2275**
2	K002-10	1257	1244	2736	4126	1778	2222	2037	1899	2722	2569	**2259**
3	CH 55/09	1177	813	2340	3973	1861	2521	2730	2003	2646	2437	**2250**
4	K-01211	2201	1025	1743	3558	1722	2917	2029	2267	2472	2308	**2224**
5	CH 56/09	1312	1658	2190	3900	1667	2521	1552	2078	2632	2583	**2209**
6	CH 61/09	1264	1681	2514	3876	1750	2153	1928	2076	2513	2319	**2207**
7	CH 74/08	1427	1956	2524	3304	1764	2535	1413	1966	2555	2444	**2189**
8	TG12K-07	1214	1247	3132	3728	1556	2000	2367	1500	2590	2395	**2173**
9	CH 72/08	1188	1592	2451	3840	1764	2556	1300	2037	2500	2417	**2165**
10	BKK2174	1396	1944	2378	3453	1806	2451	1154	1924	2645	2458	**2161**
11	CH76/08	1098	1290	2028	3798	1819	2292	2035	1858	2680	2565	**2146**
12	CH 77/08	1212	1271	2813	3472	1444	2139	1945	2104	2590	2381	**2137**
13	K-01209	1903	1571	2361	3426	1236	2604	1317	1954	2583	2305	**2126**
14	**Noor-13**	**1795**	**1408**	**2667**	**3118**	**16671**	**2201**	**703**	**1805**	**2569**	**2450**	**2038**
15	TG12K-01	1049	1119	2889	3304	1486	1819	1160	1457	2594	2243	**1912**
16	QG-3	587	1090	1224	3312	1486	917	1947	842	2548	2680	**1663**
17	QG-4	597	1178	1640	2982	1819	917	971	815	2631	2583	**1613**
18	DG-2017	490	1147	1993	3380	1556	1389	**0	931	2354	2375	**1562**
19	QG-1	497	1180	1894	3219	1556	1194	468	787	2402	2292	**1549**

Coefficient of variation=11.1%

20. Identification of climate resilient chickpea genotypes for mitigating climatic impacts on yield potential (AIP Project)

OBJECTIVES To identify climate resilient genotypes by conducting different sowing date trials

RESEARCH WORKERS Dr. M. Naveed, M. Shafiq, Irfan Rasool, M. Afzal Zahid and C.M. Rafiq

PROJECT DURATION 2017-18

LOCATIONS Kallurkot

TREATMENTS/ METHODLOGY

Entries = 300 (150 desi & 150 kabuli)
Sowing date = 3
Design = Alpha lattice
Plot size = 2 × 0.3 m
Replications = 2
Inter/intra row spacing = 30/15 cm
Sowing time = 14 October, 24 October & 3rd November
Data to be taken = Germination %age, days to 50% flowering, days to 90% maturity, Pods per plant and grain yield

PREVIOUS YEAR'S RESULTS 1st year

21. Identification of post-emergent herbicide tolerant chickpea genotypes (PARB Project No. 909)

OBJECTIVES To access response / genetic variability of chickpea genotypes to different post-emergent herbicides

RESEARCH WORKERS Dr. M. Naveed, M. Shafiq, Irfan Rasool, M. Afzal Zahid and C.M. Rafiq

PROJECT DURATION 2017-18

LOCATIONS Faisalabad

TREATMENTS/ METHODLOGY

Entries = 150 (75 desi & 75 kabuli)
Design = Alpha lattice
Plot size = 1 × 0.3 m
Inter/intra row spacing = 30/15 cm
Sowing time = Last week of October / 1st week of November
Data to be taken = Germination %age, scoring for herbicide tolerance 2-weeks after spray on a 1–5 scale (Gaur et al., 2013)

1 = highly tolerant (excellent plant appearance, no burning/chlorosis of leaves),
2 = tolerant (good plant appearance with minor burning/chlorosis of leaves),
3 = moderately tolerant (fair plant appearance with moderate burning/chlorosis of leaves),
4 = sensitive (poor plant appearance with severe burning/chlorosis of leaves), and
5 = highly sensitive (complete burning of leaves leading to plant mortality).

PREVIOUS YEAR'S RESULTS 1st year

22. 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 2017-18

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-2009	10	315	-	325
Noor-2013	26	300	530	856
Total	**36**	**615**	**530**	**1181**

LENTIL

(*Lens culinaris* Medik) 2n = 14

23.	**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	2017-18
LOCATION	Pulses Research Institute, Faisalabad
TREATMENTS/ METHODOLOGY	Local Entries = 220 Exotic = 8 Total = 228 Design = Augmented Checks = 7 Entries per block = 33 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
REVIOUS YEAR'S RESULTS	217 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	81	91-100	106	101-108	30
Days to 90% Maturity	135-142	90	143-150	76	151-160	51
Plant Height (cm)	20-25	25	26-31	157	32 -40	35
1st Pod Height (cm)	10-14	118	15-20	79	21 -23	20
No of Primary Branches / Plant	6-10	103	11-14	91	15 -18	23
No. of Secondary Branches/Plant	10-15	73	16-20	118	21-26	26
No. of Pods / Plant	50-150	58	151-250	91	250 -280	68
No. of Seeds / Pod	1	21	2	196	Above 2	0
Seed Yield/Plant (g)	2.5-3.5	87	3.6-4.5	109	4.6 -5.0	21
1000 grain wt. (g)	15-20	35	21-25	102	26 -29	80

24.	**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

2017-18

LOCATION

Pulses Research Institute, Faisalabad

TREATMENTS/ METHODLOGY

A. Cross combinations proposed= 20

Sources of high yield = 5 Viz. Pb. Masoor 2009, LPP-12137, LPP-12161, V-14512 and V-14513

Resistant to rust = 6

Local = 4 Viz. M-2009, V-16507, V-16508 & V-16509

Exotic = 4 Viz. V- 13502, V-13514, V- 13516 & V-15512.

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	20	Single row of 4 m length
F_2	20	6 rows of 4m length
F_3	14	3 rows of 4m length
F_4	27	3 rows of 4m length
F_5	13/188	188 single plant progenies each in a 4 m row
F_6	9/70	70 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	20
F_1	20	20
F_2	15	14
F_3	31	27
F_4	13	13/188
F_5	10/175	9/70
F_6	6/79	26 uniform desirable lines were selected for PYT set-I & PYT set-II

25.	**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	2017-18
LOCATION	Faisalabad
TREATMENTS/ METHODLOGY	Entries = **Set 1 (13 viz, 2 Checks)** V-17501, V-17502, V-17503, V-17504, V-17505, V-17506, V- 17507, V-17508, V-17509, V-17510, V-17511, V-17512 & V-17513. =**Set 11 (13 viz, 2 Checks)** V-17514, V-17515, V-17516, V-17517, V-17518, V-17519, V- 17520, V-17521, V-17522, V-17523, V-17524, V-17525 & V-17526 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-16508	2169
2	V-16506	1861
3	V-16507	1747
4	V-16509	1744
5	V-16505	1708
6	V-16504	1464
7	**Pb. M-09**	**1458**
8	V-16510	1392
9	V-16502	1333
10	**M-2009**	**986**
11	V-16501	903
12	V-16503	881
	CV%	12.43
	LSD(0.05)	25.34

26.	**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 2017-18

LOCATION Faisalabad ,Sahowali (Sialkot) & kullorkot

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		
		Faisalabad	K.KOT	mean
1	V-15501	1569	764	1167
2	V-15502	1757	708	1233
3	V-15503	1319	708	1014
4	V-15504	1563	833	1198
5	V-15505	1333	625	979
6	V-15506	1146	868	1007
7	V-15507	1076	885	981
8	V-15508	1257	903	1080
9	V-15509	1276	625	951
10	V-15510	1278	625	951
11	V-11511	1021	694	858
12	V-11512	1035	694	865
13	Pb.M-09	1076	625	851
14	M-09	938	451	694
	CV%	6.67	16.50	
	LSD(0.05)	23.29	32.69	

27.	**MICRO YIELD TRIAL**
OBJECTIVES	To evaluate advance lines under different agro-climatic conditions
RESEARCH WORKERS	Dr. Aziz-Ur-Rehman, Sadia Kaukab, Muhammad Sajjad Saeed, Faryad Ahmad Khan and Ch. Muhammad Rafiq
PROJECT DURATION	2017-18
LOCATION	Faisalabad, Sahowali (Sialkot), Kallurkot, Fatehjang, Kot Naina, Bahawalpur and Chakwal
TREATMENTS/ METHODLOGY	Entries = 10 viz, 2 Checks V-15501, V-15502,V-15503, V-15504, V-15505, V-15507,V-15508, V-15509, V-10502, V-14513 and V-14515. Design = . Checks = R.C.B. Plot size = Markez-2009 & Pb. Masoor-2009 Replications = 4 x 1.2m Row spacing = 3 Plant spacing = 30 cm Sowing date = 7.5 cm Data to be taken = Ist fortnight of November = 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)					
		FSD	K.KOT	Sahowali	Fatehjung	K.naina	Mean
1	M-09	1178	524	1361	1615	396	1015
2	V-14512	1494	344	1424	1292	316	974
3	V-14513	1150	434	1479	1385	392	968
4	V-14509	931	663	1125	1435	569	945
5	V-14503	860	826	896	1634	424	928
6	V-14515	993	382	1007	1716	510	922
7	P.M-09	1114	392	854	1533	510	881
8	V-14501	1203	844	951	986	406	878
9	V-14506	1093	688	1090	1197	319	877
10	V-14504	981	673	979	1213	340	837
11	V-14502	1236	660	660	1233	250	808
12	V-14511	831	465	1014	1172	413	779
	CV%	8.45	24.14	13.12	2.32	43.48	
	LSD(0.05)	25.48	38.45	38.92	8.78	51.64	

28.	**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	2017-18
LOCATION	Faisalabad
TREATMENTS/ METHODLOGY	Entries = 14 viz, 2 Checks V-15501, V-15502, V- 15503, V-15504, V- 15505, V-15506, V-15507, V-15508, V-15509, V-14515, V-13502, V-14512, V-13514 & V-13516.. 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= Ist fortnight of November Sowing date = 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. Data to be taken

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-12512	1347
2	V-10502	1194
3	V-11514	1153
4	V-13502	1128
5	V-13512	1107
6	V-13514	1083
7	Pb.M-09	1042
8	V-11501	1028
9	M-93	1014
10	V-12505	865
11	V-12503	799
12	V-12514	792
13	V-11513	774

14	V-11510	771
15	V-13516	688
16	V-11508	631
	CV%	13.81
	LSD(0.05)	36.86

29. 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 and Ch. Muhammad Rafiq

PROJECT DURATION 2017-18

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 3 advance lines (V-13502, V-14512 & V-13516) in the Lentil National Uniform Yield Trial..

PREVIOUS YEAR'S RESULTS **The line M-2009 got 1ST & LPP-12161 got 2nd position in NUYT**

Entry No.	Entry name	Source	LOCATIONS									Mean
			1	2	3	4	5	6	7	8	9	
1	**Markaz-09**	**Check**	**712**	**1403**	**711**	**1946**	**836**	**2160**	**907**	**472**	**1292**	**1160**
2	**LPP-12161**	**NIAB, FSD**	**712**	**1549**	**392**	**2150**	**1021**	**1501**	**1419**	**536**	**1132**	**1157**
3	**LPP-12103**	**NIAB, FSD**	**608**	**1403**	**556**	**2261**	**736**	**1365**	**1432**	**333**	**872**	**1063**
4	**LPP-12137**	**NIAB, FSD**	**417**	**1486**	**607**	**1746**	**1021**	**1289**	**1533**	**486**	**875**	**1051**
5	V-11501	AARI, FSD	476	1417	772	1926	1007	1599	860	590	774	1047
6	V-13502	AARI, FSD	538	1125	721	1986	1240	1265	1299	510	677	1040
7	LPP-12030	NIAB, FSD	493	1306	693	2416	788	1046	1232	448	698	1013
8	**Pb.M-09**	**Check**	**833**	**1431**	**603**	**1582**	**931**	**1594**	**751**	**433**	**955**	**1013**
9	LPP-11025	NIAB,FSD	446	1132	618	1770	869	1381	1476	333	833	984
10	V-13516	AARI,FSD	729	1368	574	608	1063	1819	1174	422	976	970
11	V-13514	AARI,FSD	625	1107	697	1701	785	1526	647	417	990	944
12	NARC-11-1	NARC,	764	1264	824	1408	888	1840	687	350	354	931
13	10CL-304	BARI, Chakwal	410	1493	575	1829	963	1116	649	304	434	864
14	10CL-303	BARI, Chakwal	313	1250	504	1835	868	1327	637	500	465	855
15	LD-3	AZRI, D.I Khan	656	1132	436	1188	997	1125	754	268	760	813
Mean Locations			965	171	1592	1171	1433	593	527	1787		

Coefficient of variation=19.8% Genotypes (G), Location (L) and G x L interactions are highly significant (P<0.01)

Locations	1-NIA Tandojam	2= QAARI, Larkana	3=BARS, Kohat
4-AZRC, D.I Khan	5= AARI, Faisalabad	6= NARC, Islamabad	7= NIAB,Faisalabad
8= BARDC, Quetta	9-AZRI, Bhakkar		

30.	**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, Dr. Shakeel Anwer, Ch. Muhammad Rafiq
PROJECT DURATION	2017-18
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 = Split plot 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	750
T1(25-60-0)	942
T2(50-120-0)	962
T3(50-120-30)	1052
T4(50-120-60)	1141
T5(50-120-120)	1248
CV%	16.51
LSD(0.05)	65.815

31.	**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 ,Dr.Shakeel Anwer & Ch. Muhammad Rafiq
PROJECT DURATION	2017-18
LOCATION	Faisalabad
TREATMENTS/ METHODLOGY	Entries = 2 viz; Pb. Masoor 2009**, V-**10502 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)	621	607	614
S2(10cm)	640	679	660
S3(15cm)	442	377	410
S4(20cm)	344	365	355
CV%	4.67 (Main plot)	8.44 (Sub plot)	
LSD(0.05)	Main plot N.S	25.11 Sub plot	Interaction N.S

32. 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 2017-18

LOCATION Faisalabad

TREATMENTS/ METHODLOGY

Entries = 6 viz; 2 checks

Checks **V-**10502, **V-**11508, **V-**11513, LPP-12103, LPP-12137, LPP-12161

Design = Masoor-93 & Pb. Masoor-2009

Replications = Split plot

Plot size = 3

Row spacing = 4 x 1.2m

Plant spacing = 30 cm

Sowing date = 7.5 cm

Data to be taken = 4 viz, 15 Oct, 1 Nov., 15 Nov and 30th Nov

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

PREVIOUS YEAR'S RESULTS

Rank	Geno-type	SD1 (30 Oct)	SD 2 (15 Nov)	SD 3 (30 Nov)	Average (kg/ha)
1	V-09503	805	743	318	622
2	V-10502	693	682	291	555
3	V-11508	722	587	291	532
4	V-11513	693	734	264	564
5	**M-2009**	**666**	**510**	**166**	**447**
6	**Pb M-09**	**651**	**666**	**193**	**503**
		705	653	254	

CV for reps x sowing =10.67

CV for reps x sowing x entries =13.55

LSD (0.05) varieties = 67 kg/ha

LSD (0.05) Sowing dates = 51 kg/ha

33.	**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, Faryad Ahmad Khan and Ch. Muhammad Rafiq
PROJECT DURATION	2017-18
LOCATION	Faisalabad and Sahowali
TREATMENTS/ METHODLOGY	**S. No. Variety** Pb.Masoor-2009
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	10	500	1300

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

34.	**MAINTENANCE AND EVALUATION OF GERMPLASM**
OBJECTIVES	To collect, maintain, evaluate and characterize the gene pool entries
RESEARCH WORKERS	Muhammad Amin, Muhammad Shafiq and Ch.Muhammad Rafiq
PROJECT DURATION	2017-18
LOCATION	Faisalabad
TREATMENTS/ MEHODLOGY	Previous Varieties/lines = 93+10 New entries, Total=103 Sowing time =Last week of Oct/1st week of Nov, 2017 Inter/Intra row spacing = 30cm/15cm Plot size = 4m x 0.5m Checks = No.267 and PF-400 Design = Augmented
PREVIOUS YEAR'S RESULTS	Range of variation for some morphological traits in Dry peas germplasm

Trait	**Range**	
	Minimum	**Maximum**
Plant height (cm)	27	97
Number of primary branches/ plant	1	4
Number of pods/plant	12	41
Pod length (cm)	5	8
Number of clusters/plant	6	21
Number of seeds/pod	3	7

35.	**HYBRIDIZATION**
OBJECTIVES	To create genetic variability for the selection of desirable recombinants pos-sessing. 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	2017-18
LOCATION	Faisalabad
TREATMENTS/ METHODLOGY	New Cross combinations = 30 Following parents are selected for crossing

HIGH YIELDING	×	POWDERY MILDEW RESISTANT
No.267	×	PF-400
T-11	×	T-27
T-40	×	T-28
T-3	×	Meteor
T-15	×	Climax
DP-01-18		

Sowing time = Last week of October, 2017/1st week of Nov.

Parental lines will be planted in paired (female and male) 4 meter long and 30 cm apart rows to facilitate crossing.

Previous year's results

Twenty five (25) crosses were attempted and seed of 25 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	25
F_2	16
F_3	06/56
F_4	21/210
F_5	12/120
F_6	11/110

Breeding method = Bulk/Pedigree
Sowing time = Last week of October/1st week of November, 2017
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.

Sr. No.	Generation	Crosses/Progenies Studied	Crosses/Progenies selected	Advanced lines selected
1	F_0	25	25	
2	F_1	16	16	-
3	F_2	9	6	-
4	F_3	21/210	21/210	-
5	F_4	12/120	12/120	-
6	F_5	11/101	11/101	-
7	F_6	31/300	-	28

Twenty eight (28) Uniform lines were selected from F_6 to make a preliminary yield trial set I and preliminary yield trail set II.

36. PRELIMINARY YIELD TRIAL

OBJECTIVES

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

RESEARCH WORKERS

Muhammad Amin, Faryad Ahmad Khan, Muhammad Shafiq and Ch.Muhammad Rafiq

PROJECT DURATION

2017-18

LOCATION

Faisalabad and Sialkot

TREATMENTS/ METHODLOGY

Entries = 14+14 (PYT Set I and Set II
Checks = No.267and 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, 2017
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)
	DP-03-13	2639
	DP-12-14	2535
	DP-09-15	2526
	DP-02-13	2500
	DP-04-14	2413
	DP-07-13	2162
	DP-10-14	2161
	DP-09-07	2093
	DP-05-12	2093

	DP-03-14	2007
	NO.267	1844
	Climax (C)	1513
	DP-02-14	1445
	PF-400 (C)	1396
	DP-05-14	1261
	DP-07-14	1184
LSD (0.05)		136
C.V %		4

37.	**ADVANCE YIELD TRIAL**
OBJECTIVES	To evaluate/select high yielding and disease resistant lines for micro yield trial
RESEARCH WORKERS	Muhammad Amin, Faryad Ahmad Khan and Ch.Muhammad Rafiq
PROJECT DURATION	2017-18
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, 2017
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-13-15	2978
2.	DP-02-15	2924
3.	DP-04-15	2876
4.	DP-12-15	2522
5.	DP-03-15	2389
6.	DP-01-15	2350
7.	DP-10-15	2254
8.	DP-11-15	2189
9.	DP-14-15	2069
10.	DP-05-15	2019
11.	*NO. 267 (C)*	1998
12.	DP-07-15	1880
13.	DP-06-15	1837
14.	*Climax (C)*	1731
LSD (0.05)		220
C.V %		6

38.	**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	2017-18
LOCATIONS (8)	Locations-09 (PRI-Fsd, Karor, Sahowali, VRI-Sahiwal, Agronomic, AARI-Fsd, Pathological RI-Fsd, ERI-Fsd, RARI-Bahawalpur 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, 2017 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	Micro yield trial was conducted at Eight (8) locations in Punjab.

Rank	**Entries**	**Locations**							**Av. Yield (Kg/ha)**
		FSD	**K. KOT**	**Agr**	**SWL**	**Sialkot**	**SKPR**	**KAROR**	
1	DP-01-14	1776	556	715	7431	1243	868	312	2283
2	DP-06-14	1778	313	980	7778	1243	882	330	2258
3	DP-08-14	1915	521	908	7292	1854	993	212	2177
4	DP-01-13	2161	243	980	8194	1701	743	334	2051
5	DP-12-14	2807	361	734	9931	1049	826	274	2041
6	DP-11-14	3119	431	680	9306	1076	837	361	2013
7	DP-01-12	2363	417	956	8333	2007	892	267	1956
8	DP-09-22	2752	243	694	7083	1021	823	340	1900
9	*NO.267 (C)*	2117	417	1132	7847	1382	858	337	**1879**
10	DP-09-14	2365	681	996	7847	1368	743	288	1851
11	DP-09-08	1913	243	457	8889	583	896	174	1843
12	*PF-400 (C)*	1530	153	108	8264	989	781	160	**1712**
LSD (0.05)		225	114	21	824	120	91	142	127
C.V %		6	17	2	6	6	6	29	10

New advanced line **DP-09-08** completed two years of Distinguishing uniform Stability studies. During 2017-18, this institute will present it for spot examination to experts sub committee. This institute contributed five entries including one check to FSC&RD for further DUS studies.

39. IMPACT OF HIGH FERTILIZER DOSES ON BIOMASS AND YIELD OF DRY PEAS

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

RESEAEARCH WORKERS Muhammad Amin, Dr. Shakeel Ahmad Anwar and Ch.Muhammad Rafiq

PROJECT DURATION 2017- 18

LOCATION Pulses Research Institute, Faisalabad

TREATMENTS/ METHODLOGY

No. of Entries(1)	= DP-09-08
Plot size	= 4m x 1.2m
Replications	= 3
Inter/intra row spacing	= 30cm/ 15cm
Design	= RCB
Sowing time	=Last week of October / 1st week of November, 2017
(N-P-K) Kg/acre	
T1	00-00-00
T2	25-23-25
T3	25-35-25 (Recommended fertilizer dose)
T4	25-47-25
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 1st Year

40. IMPACT OF PLANT GEOMETRY ON BIOMASS AND YIELD OF DRY PEAS

OBJECTIVES To determine the optimum plant spacing of dry peas.

RESEAEARCH WORKERS Muhammad Amin, Dr. Shakeel Ahmad Anwar and Ch. Muhammad Rafiq

PROJECT DURATION 2017- 18

LOCATION Pulses Research Institute, Faisalabad

TREATMENTS/ METHODLOGY

No. of Entries(2)	= DP-09-08 and No.267
Plot size	= 4m x 1.2m
Replications	= 3
Row spacing	= 9" (24cm), 12" (30 cm), and 15" (38 cm)
Plant spacing	= 3" (7 cm), 6" (15 cm), and 9" (24 cm)
Design	=RCB
Sowing time	=Last week of October / 1st week of November, 2017
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 1st Year

PLANT PATHOLOGY

41.	**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 , Javed Ihsan and Javed Anwar Shah
PROJECT DURATION	2017- 18 (Continuous)
LOCATION	Pulses Research Institute, Faisalabad
TREATMENTS/ METHODLOGY	No of line = 203 Plot size = 3m x 0.30m Check line = K-850 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	Due to un-avoidable circumstances, the disease could not appear, therefore, the lines have been included this year.

42.	**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	Javed Ihsan ,Dr. M. Azhar Iqbal and Javed Anwar Shah
PROJECT DURATION	2017- 18 (Continuous)
LOCATION	Pulses Research Institute, Faisalabad
TREATMENTS/ METHODLOGY	No of lines = 203 Plot size = 3m x 0.30m Check line = AUG-424 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 226 lines/ varieties, Eight varieties/ lines were found resistant (Noor-13, K-01501, K-01504, K-01509, BRC-457, K-01406, K-01417, K-01424, Five lines were found moderately resistant (K-01605, K-01606, K-01609, K-01610, K-01618). 37 lines were found moderately susceptible, 75 lines were susceptible and 101 found highly susceptible.

43.	**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	Javed Anwar Shah Javed Ihsan and Dr. Muhammad Azhar Iqbal
PROJECT DURATION	2017-18 (Continuous)
LOCATION	Pulses Research Institute, Faisalabad
TREATMENTS/ METHODLOGY	No of lines = 60 Plot size = 3m x 0.30m Check line = M-85 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	The 51 lines were evaluated against wilt/ root rot diseases. 12 lines were highly susceptible, 18 susceptible, 2 moderately resistant, 9 resistant (V-11501,V-12505,V-13502,V-13514,V13516,V-14502,V-14513,V-14515 andV-15512

44.	**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 , Javed Anwar Shah and Javed Ihsan
PROJECT DURATION	2017-18 (Continuous)
LOCATION	Adoptive Research Station, Kot Naina (Teh. Shakargarh)
TREATMENTS/ METHODLOGY	No of lines = 60 Plot size = 3m x 0.30m Check line = M-85 Replications = 1 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 of 51 lines, 6 lines (V-16507, V-16508, V-16509, V-16510, V-15504, M-93) were found highly resistant 13 lines (V-16502, V-16505, V-16506, V-15501, V-15502, V-15503, V-15505, V-15506, V-15507, V-15511, V-15512, V14513, V-12512, V-13502) were resistant, 12 moderately resistant, 19 susceptible and 1 highly susceptible.

45.	**SCREENING OF DRY PEAS GERMPLASM AGAINST POWDERY MILDEW**
OBJECTIVES	To identify varieties/ lines resistant/ tolerant to powdery mildew caused by ***Erysiphe pisi*** [syn. ***E. polygoni*****]** and ***E. trifolii***.
RESEARCH WORKERS	Javed Ihsan, Dr. M. Azhar Iqbal, Javed Anwar Shah
PROJECT DURATION	2017-18 (1st Year)
LOCATION	Pulses Research Institute, Faisalabad
TREATMENTS/ METHODLOGY	No of lines = Advanced breeding material Plot size = 3m x 0.30m Check line = Meteor and Climax Replications = 3 The experiment will be conducted in natural condition. Disease severity in different lines will be quantified by using the disease severity scale described by Jan, 1999 and Ghufran ul haq, *et al.* 2000.
REVIOUS YEAR'S RESULTS	New Experiment

ENTOMOLOGICAL STUDIES

46.	**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 2017-18 (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 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	13030	5.65	Moderately Resistant
2	Bittal2016	4.10	
3	14014	7.33	Moderately Susceptible
4	14008	8.00	Susceptible
5	13012	9.85	
6	13031	9.60	
7	13011	10.00	
8	13036	9.56	
9	14013	9.77	
10	13029	10.10	
11	14005	9.88	

The line 13030 showed moderately resistance against pod infestation followed by Bittal 2016. The remaining lines were found with higher pod infestation than the moderately resistance lines and check.

47.	**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 2017-18 (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	01417	5.10	Moderately Resistant
2	01422	6.40	
3	Noor.2013	6.00	
4	01406	7.35	Moderately susceptible
5	01407	7.86	
6	01411	8.20	
7	01404	9.66	Susceptible
8.	01424	9.40	
9.	01426	9.22	
10.	01405	10.50	
11.	01402	11.00	
12	01401	10.45	
13	01403	12.33	

The line 014017 and 01422 showed moderately resistance against pod infestation .

48.	**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 2017-18 (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.	14506	0.50	Resistance
2.	14509	0.70	
3.	14513	0.60	
4.	14515	1.45	Susceptible
5.	Pb-M-2009	1.00	
6.	14503	1.33	
7.	14511	1.50	
8.	14502	1.00	
9.	14501	2.00	
10.	14504	2.33	
11.	14512	2.75	

The minimum aphids population 0.50 and 0.60 aphids per branch were recorded in Lentil line 14506,14509 and 14513 respectively.

49. 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 2017-18

LOCATION Faisalabad

TREATMENTS/ METHODLOGY

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

`

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

Treatments	Synthetic and Bio Pesticides	Dose/lit water	AV.G.P.B Infestation %age
1	Neem oil	2ml	6.66
2	Eucalyptus oil	2ml	8.10
3	E mamectin benzoate	2ml	5.25
4	Cypermethrin	1ml	6.00
5	Check	-	10.80

Minimum gram pod borer infestation %age 5.25was recorded where

Emamectin benzoate was applied.

BACTERIOLOGICAL STUDIES

50.	**USE OF RHIZOBIUM AND PGPR CO-INOCULATION FOR CHICKPEAPRODUC-TION**

OBJECTIVES To identify the best suited Rhizobium-PGPR Co-inoculation for optimum chickpea production

RESEARCH WORKERS Dr. Shakeel Ahmad Anwar, Dr. Azhar Iqbal in collaboration with Soil Bacteriology Section, AARI, FSD.

PROJECT DURATION 2016-18

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: = 4m×1.2 m
Row spacing: = 30cm
Plant spacing: = 10 cm
Variety: = Bittal 2016
Sowing date: = First fortnight of November

Recommended dose (25-60 N, P kg/ha) of fertilizers 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 and grain yield will be recorded. Pre sowing and post-harvest soil analysis for P,K and Organic matter will be carried out

PREVIOUS YEAR'S RESULTS

Treatments	**Plant Height (cm)**	**Primary branches plant^{-1}**	**Second-ary branches plant^{-1}**	**Pods Plant^{-1}**	**1000 grain weight (g)**	**Grain yield (kg ha^{-1}**
T1	48.2	8.4	13.4c	55.2 b	175.7 c	1239 c
T2	51.2	8.6	14.1 bc	74.3 a	194.8 a	1761 a
T3	53.2	9.1	15.1 abc	76.4 a	187.1ab	1628 ab
T4	49.8	9.1	17.2 ab	73.2 a	179.3 bc	1453 bc
T5	48.4	9.1	16.0 abc	66.0 a	183.0 bc	1383 bc
T6	51.4	9.4	18.3 a	68.4 a	185.2abc	1411 bc
	NS	NS				

Treatments	Dry matter	Ash	Crude protein	Crude fat	Phosphorus	Potassium
	%age					
T1.	91.6	2.73	20.3	3.86	0.35	0.44
T2.	91.2	2.93	20.1	3.47	0.35	0.42
T3.	90.9	2.88	20.5	3.78	0.35	0.48
T4.	90.3	2.69	20.1	3.90	0.35	0.46
T5.	92.2	2.49	22.7	3.37	0.36	0.45
T6.	91.3	2.91	20.5	3.09	0.34	0.46

51. BIOFORTIFICATION OF RABI PULSES BY ZINC APPLICATION

OBJECTIVES

Zinc (Zn) deficiency has been reported in our soils which lead to malnutrition. Therefore, this study is planned to increase the Zn concentration in pulse crops.

RESEARCH WORKERS

Dr. Shakeel Ahmad Anwar, Dr. Aziz U Rehman and Muhammad Shafique

PROJECT DURATION

2017-19

LOCATION

Faisalabad

TREATMENTS/ METHODLOGY

T1	Control (25-60-0)
T2	2.5 kg ZnSO4 / ha
T3	5.0 kg ZnSO4 / ha
T4	0.1 % ZnSO4 (Two sprays: one at flowering and one 15 days after first spray

Variety: = Approved variety of chickpea (Desi and Kabuli) and lentil
Layout: = RCBD
Treatments: = 4
Replication: = 3
Plot size: = 4m x 1.2 m
Row spacing: = 30cm
Plant spacing: = 10 cm
Sowing date: = First fortnight of November

Recommended dose (25-60 N, P kg/ha) of fertilizers will be added to the soil prior to sowing. Data for Plant height, No. of branches and No. of pods per plant, 1000 grain weight and grain yield will be recorded. Pre sowing and post-harvest soil analysis for Zn, P,K and Organic matter will be carried out

PREVIOUS YEAR'S RESULTS

First Year

52.	**NUTRITIONAL QUALITY OF CHICKPEA GENOTYPES DUE TO MICROBIAL INOCULATION**
Objectives	Pulses have a special role in food security on account of their ability to reduce protein malnutrition. It contains about twice as much protein as cereals. Keeping in view, the present study is designed to improve the nutritional value of chickpea through microbial inoculation.
Research Workers	Dr. Shakeel Ahmad Anwar and Mr. Muhammad Shafique
Duration	2017(Continuous)
Location	Faisalabad in collaboration with Biochemistry section, Post Harvest Research Centre, Faisalabad.
TREATMENTS/ METHODLOGY	Varieties: =K-70005 , Noor-2009, Noor-2013, D-10008, Punjab-2008 & Bittal2016 Layout: =RCBD Replication: = 3 Plot size: =4m x1.2 m Row spacing = 30cm Plant Spacing = 10cm Sowing Date =First fortnight of November Recommended doses (25-60 N, P kg/ha) of fertilizer will be applied at sowing. Following RCBD with three replications. One set of treatment will be inoculated with microbial strains while the other remains un-inoculated and treated as control. Data regarding yield and nodulation will be recorded. Samples will be dried, ground and analyzed for dry matter, crude protein, crude fiber, crude fat, ash, hard grain and phosphorus etc.
PREVIOUS YEAR'S RESULTS	New Experiment

Endorsement by the Members of Research & Development Board, Pulses Research Institute, Faisalabad			
S.#	**Name / Representative**	**Designation**	**Signature**
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