KHARIF 2017

ANNUAL PROGRAM OF RESEARCH WORK

AYUB AGRICULTURAL RESEARCH INSTITUTE, FAISALABAD

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INTRODUCTION

Mung (*Vigna radiata* L. Wilczek) and Mash (*Vigna mungo* L. Hepper) are the two most important pulse crops grown in kharif season in Pakistan. Mungbean leads in acreage and production among Kharif pulses. The area under mungbean cultivation is hovering around 130 to 140 thousand hectares over the last five years. During 2011-2016, mungbean production recorded ranged 90 to 98 thousand tons. In national mungbean production, Punjab leads with 87% contribution followed by Balochistan with 6%, KPK with 5% while Sindh with 4% . Similarly In national mashbean production, Punjab leads with 58% contribution followed by Balochistan with 31%, KPK with 10% while Sindh with 1% .

Like other pulse crops, area under mashbean cultivation is also reducing due to competition with cash crops and agro-climatic changes. Historically, mashbean was grown on an area of 71,000 hectares in Pakistan which now has reduced almost three times. Over the last five years, highest mashbean acreage of 24,500 hectares was recorded during 2011-12 which reduced to 19,200 hectares during 2015-16 over the consecutive years. Like acreage, mashbean production is also unstable and reduced to 7,600 tons in 2015-16 from 10,900 recorded during 2011-13. This institute is also working on Cowpeas and trying hard to stream line its breeding programme. Cowpea is being used as salad and very popular among the diet conscious people due to its high protein contents.

Pakistan is deficient in mashbean production to meet the domestic demands. The production and distribution of quality seed of pulses especially of Mung and Mash is another major limiting factor and there is dire need to encourage private seed companies for production and distribution of quality seed to the pulses growers so that pulses production can be increased and import bill of Pulses may be reduced.

Significant Achievements of Last Year`s Research:-

Mungbean

- Twenty eight crosses were attempted and fourteen were successfully harvested.
- In advance yield trial six entries out yield the check. Maximum yield was produced by V-14001 (1099 kg/ha) followed by V-14003(1097 kg/ha)
- In Micro yield trial eight entries yielded higher (914-1146 kg/ha) as compared to check AZRI-2006 (837 kg/ha). Maximum yield was produced by V-13006 (1146 kg/ha) followed by V-12005(1099 kg/ha)
- 150 kg pre basic and 700 kg basic seed was produced by this institute.

Mash bean

- Seven hundred single plants selection were made from farmers field.
- Ten crosses were attempted and six were harvested.
- Two entries out yielded Mash-97 by giving 523 and 517 kg/ha yield in Micro Yield Trial. Maximum yield was given by 14M003.

- Three entries viz: 13M001, 15M004 and 15M005 perform resistant against Mungbean Yellow Mosaic Virus (MYMV)
- 100 kg pre basic and 350 kg basic seed was produced by this institute.

Pulses Research Institute is striving hard to cope with increasing challenges with the following strategies.

- Broadening of genetic base of Mung and Mash crop through strengthening of germplasm.
- Development of high input responsive cultivars possessing high yield potential, wider adaptability, short duration, resistant to insect pests and diseases.
- Seed multiplication of improved varieties and its distribution to farmers.
- Dissemination of improved production technology among the growers.
- Popularization of spring sowing of Mung and Mash.
- Popularization of intercropping of Mung and Mash in spring planted sugarcane.
- Popularization of mung as catch crop in rice wheat system.

A - MUNGBEAN (*Vigna radiata* L. *Wilczek*) 2n = 22

1- Title **Maintenance of Germplasm**

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

Research worker(s) Muhammad Sajjad Saeed, Dr. Aziz-ur-Rehman M. Amin & Ch. Muhammad Rafiq
Project duration 2017 (continuous)
Location Faisalabad

Treatments/ Methodology

No. of Entries	= 170+100 = 270
Blocks	= 5
Entry / block	= 54
Check	= 5
Design	= Augmented
Plot size	= 4m x 0.30m
Plant spacing	= 10 cm
Planting date	= 2nd fortnight of June.
Data to be taken	= Days to 50 % flowering, days to 90% maturity, plant height, number of pods/plant, pod length, number of seeds/pod,1000 grain weight, seed yield and incidence of diseases under natural conditions.

Previous year's Results Data was collected and maintained. The range of various characters recorded is as follows:

Characters	Range
Days to 50% flowering	29-50
Plant height (cm)	38-96
Pod length (cm)	5-14
No. of grains/pod	4-10
No. of pods per plant	16S-74
days to 90% maturity	58-88
1000 grain weight (gm)	35-50

2- Title **Hybridization Programme**

Objectives To develop new recombinants of:
1. High yield potential
2. Wider adaptability
3. Early maturity
4. Resistance/tolerance to diseases
5. Bold seeded.

Research worker(s) Muhammad Sajjad Saeed, Dr. Aziz-ur-Rehman, M. Amin & Ch. Muhammad Rafiq
Project duration 2017 (continuous)

Location Faisalabad

Treatments/ Methodology

Cross Combinations = 32

Mung Bean New Cross Combination Kharif 2017							
Sr.#	**Cross Combination**			**Sr.#**	**Cross Combination**		
1	NM-16	x	LS-442	17	AZRI-M-2006	x	LS-442
2	″	x	014068	18	″	x	014068
3	″	x	016078	19	″	x	016078
4	″	x	016058	20	″	x	016058
5	″	x	M-303	21	″	x	M-303
6	″	x	013006	22	″	x	013006
7	″	x	08009	23	″	x	08009
8	″	x	015002	24	″	x	015002
9	NM-11	x	LS-442	25	013009	x	LS-442
10	″	x	014068	26	″	x	014068
11	″	x	016078	27	″	x	016078
12	″	x	016058	28	″	x	016058
13	″	x	M-303	29	″	x	M-303
14	″	x	013006	30	″	x	013006
15	″	x	08009	31	″	x	08009
16	″	x	015002	32	″	x	015002

Sr. No	Variety/Line	Salient Characters
1	NM-2016	High yielding
2	NM-2011	High yielding
3	AZRI-M-2006	High yielding
4	13009	High yielding
5	LS-442	Extra long pod
6	014068	Bold seeded
7	016078	Crinkle & MYMV resistant
8	016058	Erect type
9	M-303	MYMV resistant
10	013006	Crinkle Virus Resistant
11	08009	Drought tolerant
	015002	Short duration/early maturing

Date of Sowing = 2nd fortnight of June

Planting pattern = Parential 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 cross combinations were attempted and 14 successful crosses were harvested for further studies.

3- Title — Study of Filial Generations

Objectives To select the desirable recombinants from segregating generations

Research worker(s) Muhammad Sajjad Saeed, Dr. Aziz-ur-Rehman, M.Amin & Ch. Muhammad Rafiq

Project duration 2017 (continuous)

Location Faisalabad

Treatments/ Methodology

Filial generations	Crosses/progenies selected/harvested
F_1	14
F_2	06
F_3	12/120
F_4	14/110
F_5	10/96
F_6	8/90

Row length = 4.0 m
Row spacing = 30 cm
Plant spacing = 10 cm
Date of sowing = 2nd fortnight of June.

Previous year's Results

Filial generations	Crosses/progenies studied	Crosses/progenies selected/harvested
F_0	28	14
F_1	7	6
F_2	15	12/120
F_3	26	14/110
F_4	14	10/96
F_5	10	8/120
F_6	8	8/90

4- Title — Preliminary Yield Trial

Objectives To identify the promising genotypes for yield and other desirable characters

Research worker(s) Muhammad Sajjad Saeed, Dr. Aziz-ur-Rehman, M. Amin, Ch. Muhammad Rafiq, Mushtaq Ahmad & Tariq Mehmood.

Project duration 2017 (continuous)
Location Faisalabad & Kallurkot

Treatments/ Methodology

Entries = 7 viz; V-16001, V-16002, V-16003, V-16004, V-16005, V- 16006, V-16007 &V- 6008.
Standards = AZRI M-2006 & NM-2011
Design = RCB
Replications = 3
Plot size = 4m x 1.2m
Row spacing = 30cm
Plant spacing = 10 cm
Planting date = 1st & 2nd fortnight of June.
Data to be recorded = Plant Stand, Days to 50 % flowering, days to 90 % maturity, plant height, number of pods/plant, pod length, number of seeds/pod, 1000 grain weight, seed yield and disease incidence.

Previous year's Results

S. #	Entries	Yield (kg/ha)
1	V-15002	494
2	V-15004	482
3	V-15007	471
4	V-15001	470
5	V-15005	435
6	NM-11	349
7	V-15006	335
8	AZRI-06	329
9	V-15003	317
	L.S.D at 5%	***49.97***
	C.V %	***14.70***

5- Title Advance Yield Trial

Objectives To evaluate the high yielding and disease resistant genotypes.

Research worker(s) Muhammad Sajjad Saeed, Dr. Aziz-ur-Rehman, M. Amin, Ch. Muhammad Rafiq, Mushtaq Ahmad & Tariq Mehmood.

Project duration 2017 (continuous)

Location Faisalabad and Kallurkot.

Treatments/ Methodology

Entries = 7 viz; V-15001, V-15002, V-15003, V-15004, V-15005, V-15006 &V- 15007.
Standards = AZRI M-2006 & NM-2011
Design = RCB
Replications = 3
Plot size = 4m x 1.2m
Row spacing = 30cm
Plant spacing = 10 cm
Planting date = 1st & 2nd fortnight of June.
Data to be recorded = Plant Stand, Days to 50 % flowering, days to 90 % maturity, plant height, number of pods/plant, pod length, number of seeds/pod, 1000 grain weight, seed yield and disease incidence.

Previous year's Results

R.#	Entries	Yield kg/ha		
		Faisalabad	Kallur kot	Average
1.	V-14001	692	1506	1099
2.	V-14003	678	1515	1097
3.	V-14006	507	1426	967
4.	V-14004	446	1447	947
5.	V-14007	460	1431	946
6.	V-14002	491	1366	929
7.	AZRI-06	495	1302	899
8.	V-14005	507	1277	892
	L.S.D at 5%	**74.30**	**39.38**	
	C.V %	**16.93**	**3.43**	

6- Title Micro Yield Trial

Objectives

To evaluate advance lines for high yield potential and wider adaptability under different ecological/agro climatic zones of the Punjab.

Reseaearch worker(s)

Muhammad Sajjad Saeed, Dr. Aziz-ur-Rehman, M.Amin
Ch. Muhammad Rafiq, Mushtaq Ahmad & Tariq Mehmood.

Project duration

2017 (continuous)

Location

Faisalabad, Kallurkot, Bahawalpur, Chakwal and NARC Islamabad.

Treatments/ Methodology

Entries	= 7 viz; V-14001, V-14002, V- 14003, V14004, V-14005, V-14006 &V-14007..
Checks	= AZRI M-2006 & NM-2011
Design	= RCB
Replications	= 3
Plot size	= 4m x 1.2m
Row spacing	= 30cm
Plant spacing	= 10 cm
Planting date	= 1st & 2nd fortnight of June.
Data to be recorded	= Plant Stand, Days to 50 % flowering, days to 90 % maturity, plant height, number of pods/plant, pod length, number of seeds/pod, 1000 grain weight, seed yield and disease incidence.

Previous year's Results

Sr. #	Entries	Yield kg/ha		
		Faisalabad	Kallurkot	Average
1.	V-13006	827	1464	1146
2.	V-12005	448	1749	1099
3.	V-13001	594	1588	1091
4.	V-13011	692	1369	1031
5.	V-13009	839	1155	997
6.	V-13002	575	1408	992
7.	V-13010	632	1346	989
8.	V-13004	551	1276	914
9.	AZRI-06	474	1200	837
10.	NM-11	606	1000	803
	V-13005	328	1217	773
	L.S.D at 5%	***77.90***	***44.19***	
	C.V %	***15.96***	***4.03***	

Previous year's results (Set-II)

Sr. #	Entries	Yield kg/ha		
		Faisalabad	Kallurkot	Average
1.	V-12001	546	861	704
2.	TM-1426	379	993	686
3.	V-12009	569	656	613
4.	AZRI-06	432	780	606
5.	TM-1428	426	753	590
6.	TM-1418	315	684	500
7.	TM-1408	450	500	475
8.	V-12005	388	543	466
	L.S.D at 5%	***59.01***	***83.45***	
	C.V %	***16.03***	***13.76***	

7- Title National Uniform Yield Trial

Objectives

To test the performance of candidate Mungbean cultivars of different institutes.

Research worker(s)

Muhammad Sajjad Saeed, Dr. Aziz-ur-Rehman & Ch. Muhammad Rafiq, Mushtaq Ahmad & Tariq Mehmood

Project duration

2017 (continuous)

Location

Faisalabad

Treatments/ Methodology

This Institute will contribute 2 entries viz; V-12009 & V-14002.

Layout = As per instructions from the National Coordinator, Pulses, NARC, Islamabad.

Sowing date = 2nd fortnight of June

Data to be recorded = Days to 50 % Flowering, days to 90% Maturity, Plant height, Number of pods/plant, Pod length, Number of seeds/pod, 1000 grain weight, seed yield and disease incidence.

Previous year's Results

Advance line V- 07008 is ranked 16th in NUYT -2016. (Annexure –I)

Consolidated Results of
Mungbean National Uniform Yield Trial 2016 across the country

Annexure-1

(Grain Yield Kg/ha)										
Entry No.	Entry Name	Source	Locations*							
			1	2	3	4	5	6	7	8	Mean
1	NIFA Mung-4	NIFA, Peshawar	733	1037	604	691	336	1764	240	1518	865
2	NIFA Mung-4	NIFA, Peshawar	921	963	574	888	316	1967	206	852	836
3	09-TM-11	AZRI, Bhakkar	1174	1082	563	1452	631	1795	182	1222	1013
4	12-TM-03	AZRI, Bhakkar	1711	921	556	1720	650	1768	131	741	1025
5	13-TM-04	AZRI, Bhakkar	1400	1338	541	1136	364	1780	114	1222	987
6	13-TM-14	AZRI, Bhakkar	1429	948	519	763	437	1734	244	1296	921
7	NM-16	NIAB, Faisalabad	1140	1084	511	941	721	1753	181	1481	977
8	NM-19	NIAB, Faisalabad	1476	1055	504	1227	396	1879	196	852	948
9	NM-18	NIAB, Faisalabad	792	898	504	1081	345	1161	147	1111	755
10	07008	AARI, Faislaabad	351	790	500	532	582	951	163	889	595
11	BRM-353	RARI, Bahawalpur	948	976	489	624	447	1050	181	1037	719
12	BRM-357	RARI, Bahawalpur	372	1154	359	769	414	890	194	1407	695
13	NCM-257-10	NARC, Islamabad	541	938	344	688	433	1111	151	963	646
14	NCM-252-10	NARC, Islamabad	790	897	330	656	435	1131	164	1074	685
15	NM-2011	CHECK	986	998	307	1227	385	1417	272	1185	847
16	AZRI Mung-06	CHECK	1808	829	304	1171	589	1337	196	1037	909
Location Means			1036	994	469	973	468	1468	185	1118	

Coefficient of variation=21.43% Location (L) and G x L interactions are highly significant (P<0.01)

***Locations:**

1= NIAB, Faisalabad 2= AZRI, Umer Kot 3= BARS, Fateh Jang
4= AZRI, Bhakkar 5= NARC, Islamabad 6= NIFA, Peshawar
7= AARI, Faisalabad 8= RARI, Bahawalpur

Note: The trial was sent to 16 locations for evaluation but yield data was received from 8 locations

8- Title — Pre-basic and Basic Seed Production

Objectives
To maintain the genetic purity of approved cultivars.

Research worker(s)
Muhammad Sajjad Saeed, Dr. Aziz-ur-Rehman, Ch. Muhammad Rafiq Mushtaq Ahmad & Tariq Mehmood

Project duration
2017 (continuous)

Location
Faisalabad & Kallurkot

Treatments/ Methodology
Variety = AZRI M-2006 and advance line V-8009.

- Selected seed of healthy and true to type single plants will be sown in plant to row progenies.
- Selected plant to row progeny lines will be sown in separate progeny blocks.
- Bulked seed of selected progeny blocks will be sown for the production of pre-basic seed.

Previous year's Results

Entries/varieties	Pre-basic (Kg)	Basic Seed (Kg)	Total (Kg)
AZRI M-2006	**150**	**700**	**850**

9 - Title — Impact of Plant Geometry on Yield and its Development

Objectives
To determine the optimum plant and row spacing of Mungbean.

Research Workers
Muhammad Sajjad Saeed, Dr. Aziz-ur-Rehman, Ch. Muhammad Rafiq, Mushtaq Ahmad & Tariq Mehmood.

Project Duration
2017 (continuous)

Location
Faisalabad and kallurkot.

Treatments / Methodology

Entries	= 2 viz; AZRI-M-2006 & V-08009..
Row spacing	= Viz; 3 (30cm, 45cm, 60cm)
Plant spacing	= Viz; 3 (7.5cm, 10cm, 15cm
Design	= RCB
Replications	= 3
Plot size	= 1.2 m x 4m
Sowing date	= 2nd fortnight of June.
Data to be recorded	= Plant Stand, Days to 50 % flowering, days to 90 % maturity, plant height, number of pods/plant, pod length, number of seeds/pod, 1000 grain weight, seed yield and disease incidence.

Previous year's Results
New experiment.

10 - Title	**Determination of Proper Sowing Dates to Overcome the Climatic Change.**
Objectives	To find out proper sowing time for Mungbean cultivars.
Research Workers	Muhammad Sajjad Saeed, Dr. Aziz-ur-Rehman , Ch. Muhammad Rafiq, Mushtaq Ahmad & Tariq Mehmood.
Project Duration	2017 (continuous)
Location	Faisalabad and kallurkot.

Treatments / Methodology

Entries	= 4 viz; 1 Check (AZRI-M-2006.) V-08009, V-13006, V-12001& V-14001
Design	= Split plot
Replications	= 3
Plot size	= 1.2 m x 4m
Row spacing	= 30cm
Plant spacing	= 10 cm
Sowing date	= 7 viz: Ist May, 16th May, Ist June, 16th June, Ist July, 16th July and Ist August.
Data to be recorded	= Plant Stand, Days to 50 % flowering, days to 90 % maturity, plant height, number of pods/plant, pod length, number of seeds/pod, 1000 grain weight, seed yield and disease incidence.

Previous year's Results New experiment.

B - MASH (*Vigna mungo L. Hepper*) 2n = 22

11- Title: Germplasm Studies

Objectives
Collection, maintenance and evaluation of germplasm accessions for utilization in hybridization programme.

Research worker(s)
Amer Hussain, Irfan Rasool,Afzal Zahid, Muhammad Shafiq, Dr. Aziz ur Rehman and Ch. Muhammad Rafiq

Project duration
2017 (continuous)

Location
Faisalabad

Treatments/ Methodology

No. of entries	= 67
Plot size	= 2.5 m x 0.6 m(paired rows)
Row spacing	= 30cm
Plant spacing	= 10cm
Sowing time	= 2nd fortnight of June to 1st week of July
Data to be taken	= Plant stand, Plant type, Days to 50% flowering, Plant height, Number of pods/plant, Number of seeds/pod, 1000 Grain weight, Days to maturity, Seed yield, incidence of insect pests and Diseases.

Previous year's Results

Trait	Range
Plant height	19- 68 cm
No. of pods /plant	10-100
No. of seeds/ pod	4-6
1000-grain weight	35-58 g
Maturity days	75-115
Biological yield /plant	10.41-40.56 g
Grain yield / plant	2.63 – 14.28 g
Harvest index	6.87-30.32

60 entries were evaluated and maintained.

12- Title: Hybridization Programme

Objectives
To create genetic variability by crossing desirable parents

Research worker(s)
Amer Hussain, Muhammad Amir Amin, Irfan Rasool and Afzal Zahid

Project duration
2017 (continuous)

Location
Faisalabad

Treatments/
Parents: 8 viz. M-97, Arooj-2011, ES-1, 62027, SPN-1,SPN-2,SPN-3 and SPN-4.

Methodology

Cross Combinations=15		
High yield	**x**	**ULCV Tolerant**
Arooj	x	Mash -97
	x	62027
	x	ES-1
SPN-1	x	Mash -97
	x	62027
	x	ES-1
SPN-2	x	Mash -97
	x	62027
	x	ES-1
SPN-3	x	Mash -97
	x	62027
	x	ES-1
SPN-4	x	Mash -97
	x	62027
	x	ES-1

Planting pattern = Paired rows of male and female parents.
Row spacing = 30cm
Plant spacing = 10cm
Sowing time = 15/06, 01/07, 15/07 and 30/07
Parental lines will be sown on different dates to find out best seed setting period

.

Previous year's Results 10 cross combinations were attempted and 6 crosses were successful.

13- Title Study of Filial Generations

Objectives To select desirable genotypes from segregating generations.

Research worker(s) Amer Hussain, Muhammad Amir Amin, Irfan Rasool and Muhammad Shafiq

Project duration 2017 (continuous)

Location Faisalabad.

Treatments/ Methodology

Filial generations	Crosses/progenies selected/harvested
F_1	06
F_2	07
F_3	6/21
F_4	-
F_5	5/18
F_6	2/12

Row Length = 4 m
Row spacing = 45 cm
Plant spacing = 15 cm
Sowing time = 1st fortnight of July.

Previous years Results

Filial generations	Crosses/progenies studied	Crosses/progenies selected/harvested
F_1	7	7
F_2	6/25	6/21
F_3	-	-
F_4	5/24	5/18
F_5	2/18	2/12
F_6	4/12	4/10 10 lines were selected

14- Title Preliminary Yield Trial

Objectives To evaluate promising lines for yield potential.

Research worker(s) Amer Hussain, Muhammad Amir Amin, , Afzal Zahid Muhammad Shafiq and Ch. Muhammad Rafiq

Project duration 2017 (continuous)

Location Faisalabad

Treatments/ Methodology

Entries = 10 viz; 17M001, 17M002, 17M003, 17M004, 17M005, 17M006, 17M007, 17M008, 17M009 & 17M010.

Checks = Mash-97 & Arooj

Design = RCB

Replications = 3

Plot size = 4m x 1.2m

Row spacing = 30 cm

Plant spacing = 10 cm

Planting date = 1st fortnight of July.

Data to be recorded = Plant stand , Growth habit, Days to 50% flowering, Plant height, number of pods/plant, number of seeds/pod, 1000 grain weight, days to maturity, seed yield, Incidence of insect pests and diseases.

Previous year's Results

	Yield Kg/ha	
Rank #	**Entry No.**	**Faisalabad**
1.	16M004	650
2.	MASH-97	627
3.	AROOJ-11	452
4.	16M006	429
5.	16M010	423
6.	16M009	415
7.	16M001	410
8.	16M002	408
9.	16M003	385
10.	16M005	371
11.	16M008	360
12.	16M007	315
	C.V.%	12.45

15- Title — Advanced Yield Trial

Objectives To identify high yielding lines under different agro climatic conditions.

Research worker(s) Amer Hussain, Muhammad Amir Amin, Muhammad Shafiq and Ch. Muhammad Rafiq

Project duration 2017 (continuous)

Location Faisalabad, Kallur Kot and Sahowali

Treatments/ Methodology

Entries	= 10 viz, 16M001, 16M002, 16M003, 65M004, 16M005, 16M006 , 16M007, 16M008, 16M009,16M010.
Checks	= Mash-97 & Arooj
Design	= RCB
Replications	= 3
Plot size	= 4m x 1.2m
Row spacing	= 30 cm
Plant spacing	= 10 cm
Planting date	= 1st fortnight of July.
Data to be recorded	= Plant stand, Growth habit, Days to 50% flowering, Plant height, number of pods/plant, number of seeds/pod, 1000 grain weight, days to maturity, seed yield, Incidence of insect pests and diseases.

Previous year's Results

	Yield Kg/ha	
Rank #	**Entry No.**	**Faisalabad**
1.	M-97(check)	917
2.	15M002	648
3.	15M007	446
4.	15M008	360
5.	15M006	356
6.	15M005	323
7.	15M003	310
8.	15M004	290
9.	AROOJ-11(check)	279
10.	15M001	254
	C.V.%	15.10

Advance Yield Trial was completely damaged due to Floods in Sahowali, Sialkot

16- Title — Micro Yield Trial

Objectives

To select better performing and well adapted lines suitable for different ecological zones of Punjab

Research worker(s)

Muhammad Amir Amin, Amer Hussain, Mushtaq Ahmad, Faryad Ahmad Khan and Muhammad Shafiq.

Project duration

2017 (continuous)

Location

Faisalabad, Kallurkot, Sahowali

Treatments/ Methodology

Entries	= 8 viz; 15M001, 15M002, 15M003, 15M004, 15M005, 15M006, 15M007, 15M008.
Checks	= Mash-97 & Arooj
Design	= RCB
Replications	= 3
Plot size	= 4m x 1.2m
Row spacing	= 30 cm
Plant spacing	= 10 cm
Planting date	= 2nd fortnight of June to 1st week of July
Data to be recorded	= Plant stand, Growth habit, Days to 50% flowering, Plant height, number of pods/plant, number of seeds/pod, 1000 grain weight, days to maturity, seed yield, Incidence of insect pests and diseases.

Previous year's Results

	Yield Kg/ha	
Rank #	**Entry No.**	**Faisalabad**
1.	14M003	523
2.	14M005	517
3.	M-97(check)	433
4.	14M001	421
5.	14M008	415
6.	14M006	365
7.	AROOJ-11(check)	348
8.	14M004	337
9.	14M002	306
10.	14M007	246
	C.V.%	14.08

Micro Yield Trial was completely damaged due to Floods in Sahowali, Sialkot

17- Title — Pre Basic/Basic Seed Production

Objectives To maintain the genetic purity of approved cultivars.

Research worker(s) Amer Hussain, Mushtaq Ahmad, Faryad Ahmad Khan,Muhammad Shafiq
Ch. Muhammad Rafiq

Project duration 2017 (continuous)

Location Faisalabad, Kallurkot & Sahowali

Treatments/ Methodology Approved cultivars = Mash-97 & Arooj

- Selected seed of healthy and true to type single plants will be sown in plant to row progenies.
- Selected plant to row progeny lines will be sown in separate progeny blocks.
- Bulked seed of selected progeny blocks will be raised for the production of pre-basic seed.

Previous year's Results

S #	Entries/Lines	Pre-Basic (Kgs)	Basic Seed (Kgs)
1.	Arooj-2011	120	300
2.	Mash-97	30	50
	Total	**150**	**350**

18- Title — Sowing date effect on yield and yield components

Objectives To ascertain the optimum sowing time for different Mash varieties

Research worker(s) Muhammad Amir Amin, Amer Hussain, Faryad Ahmed Khan and Muhammad Shafiq

Project duration 2017 (continuous)

Location Faisalabad and Sahowali

Treatments/ Methodology Entries = 2 Viz, Mash-97 & Arooj

D1 = 1st May
D2 = 15th May
D3 = 1st June
D4 = 15th June
D5 = 30th June
D6 = 1st July
D7 = 30th July

Design = Factorial
Replications = 3
Plot size = 4m x1.2m
Row spacing = 30cm
Plant spacing = 10cm
Data to be taken = Plant stand, Days to 50% flowering, Plant height, number of pods/plant, number of seeds/pod, 1000 grain weight, days to maturity, seed yield, Incidence of insect pests and diseases.

19 - Title: National Uniform Yield Trial

Objectives To test the performance of candidate Mashbean cultivars of different institutes.

Research worker(s) Muhammad Amir Amin, Amer Hussain and Muhammad Shafiq

Project duration 2017 (continuous)

Location Faisalabad

Treatments/ Entries will be provided by Pulses Coordinator.

Methodology

Layout = As per instructions from the National Coordinator, Pulses, NARC, Islamabad.

Sowing date = 2nd fortnight of June to 1st week of July

Data to be taken = Plant stand, Plant type, Days to 50% flowering, Plant height, Number of pods/plant, Number of seeds/pod, 1000 Grain weight, Days to maturity, Seed yield, Attack of insect pests and Disease reaction

Previous year's Results

Rank	Entry Name	Source	Locations Grain Yield Kg/ha					Mean
			1	2	3	4	5	
1	11CM-707	BARI,Chakwal	696	499	1346	1268	1368	1035
2	Mash-010-2	NARC Islamabad	506	664	860	1753	1271	1011
3	NARC Mash-3	Check	728	754	929	1173	1250	967
4	NARC Mash-14	NARC Islamabad	715	436	826	1453	1389	964
5	10CM-707	BARI Chakwal	742	567	944	903	1278	887
6	10CM-702	BARI Chakwal	567	439	738	1329	1229	860
7	10CM-703	BARI Chakwal	671	425	446	1354	1313	842
8	Arooj Mash	Check	894	494	964	863	931	829
		Location Means	690	535	882	1262	1253	

Locations:

1= AZRI,Umerkot

2=PRI, AARI, Faisalabad

3= BARDC,Quetta

4= NARC,Islamabad

5= BARI,Chakwal

Note: The trial was sent to 12 locations for evaluation but yield data was received from 05 locations.

C - COWPEAS (*Vigna sinensis*) 2n = 22

20- Title — Germplasm Studies

Objectives Collection, maintenance and evaluation of elite lines / genotypes for their utilization in hybridization programme.

Research worker(s) Muhammad Amir Amin, Dr.Anwar-ul-Haq, and Ch. Muhammad Rafiq

Project duration 2017 (Continuous)

Location Faisalabad

Treatments/ Methodology

Entries	= 67
Check	= S.A. Dandy , CP-037 and JK-101
Plot size	= 5 m x 1.5m
Row spacing	= 60 cm
Plant spacing	= 20cm
Planting time	= 2nd fortnight of june
Data to be taken	= Plant stand, Days to 50 % flowering, plant type, days to maturity, disease incidence, number of pods/plant, flower colour, number of seeds/pod, 100 grain weight and seed yield.

Previous year's Results

Trait	Range
Plant type	Erect to Spreading
Flower colour	White and Purple
Leaf colour	Light green to Dark green
No. of pods /plant	35 -102
Days to Flower initiation	50-69
Maturity days	112-126
100-grain weight	12- 23 g

67 entries were evaluated and maintained

21- Title — Hybridization Programme

Objectives To create genetic variability for incorporation of desirable traits.

Research worker(s) Muhammad Amir Amin, Dr. Anwar-ul-Haq and Ch. Muhammad Rafiq

Project duration 2017 (continuous)

Location Faisalabad

Treatments/ Methodology

Parents: = 6 viz. CP-002, CP-017, CP-030, CP-034, CP-037& CP-72

High yield	**x**	**Erect type**
CP-017		CP-002
CP-030		CP-034
CP-072		CP-037

Planting pattern = Paired rows of male and female parents.

Row spacing = 60 cm

	Plant spacing = 20cm Planting time = 1st fortnight of September
Previous year's Results	Harvested 2 successful crosses

22- Title — Study of Filial Generations

Objectives	To evaluate various segregating generations for selecting desirable genotypes.
Research worker(s)	Muhammad Amir Amin, Dr. Anwar-ul-Haq and Muhammad Shafiq
Project duration	2017 (continuous)
Location	Faisalabad.

Treatments/ Methodology

Filial generation	Crosses/ progenies
F1	= 2 crosses
F2	= 6 crosses
Row Length	= 4m
No of rows	= Single and four rows of F_1 and F_2 crosses respectively
Row spacing	= 60 cm
Plant spacing	= 20cm
Planting time	= 2nd fortnight of June.

Previous year's Results: Two F_1 crosses were harvested

23. Title — Preliminary Yield Trial

Objectives	To evaluate promising lines for high yield potential.
Research worker(s)	Muhammad Amir Amin, Dr. Anwar-ul-Haq, , Muhammad Shafiq
Project duration	Ch. Muhammad Rafiq
Location	2017 (Continuous)

Treatments/ Methodology

Entries	= 13 viz; CP-002, CP-004, CP-028, CP-029, CP-031, CP-063, CP-075, CP-076, CP-082, CP-083, CP-085, CP- 089 & CP-090
Check	= S.A. Dandy
Design	= RCB
Replications	= 3
Plot size	= 5 m x 3.0m
Row spacing	= 60 cm
Plant spacing	= 20cm
Planting time	= 2nd fortnight of june
Data to be taken	= Plant stand, Days to 50 % flowering, plant type, to maturity, disease incidence, number of pods/plant, flower colour, number of seeds/pod, 100 grain weight and seed yield.

Previous year's Results

Rank	Entry	Yield kg/ha
1.	CP-058	1147
2.	CP-088	1057
3.	CP-064	1033
4.	CP-086	995
5.	CP-016	937
6.	CP-067	895
7.	CP-094	852
8.	S.A.Dandy (Check)	833
9.	CP-043	756
10.	CP-040	722
	LSD 5%	**66**
	CV %	**7.35**

24- Title Advanced Yield Trial

Objectives To select high yielding, well-adapted and disease resistant lines.

Research worker(s) Muhammad Amir Amin, Dr. Anwar-ul-Haq and Muhammad Shafiq

Project duration 2017 (Continuous)

Location Faisalabad

Treatments/ Methodology

Entries	= 11 viz; CP-016, CP-036, CP-054, CP-052, CP-058, CP-060,CP-064, CP-065, CP-067, CP-086 & CP-088
Check	= S.A. Dandy
Design	= RCB
Replications	= 3
Plot size	= 5 m x 3.0 m
Row spacing	= 60 cm
Plant spacing	= 20cm
Planting time	= 2nd fortnight of june
Data to be taken	= Plant stand, Days to 50 % flowering, plant type, to maturity, disease incidence, number of pods/plant, flower colour, number of seeds/pod, 100 grain weight and seed yield.

Previous year's results

Rank	Entry	Yield kg/ha
1.	CP-030	1067
2.	CP-049	993
3.	CP-025	897
4.	CP-032	833
5.	CP-021	750
6.	CP-091	717
7.	CP-005	660
8.	S.A.Dandy (Check)	643
9.	CP-036	630
10.	CP-009	623
	LSD 5%	**80**
	CV%	**5.67**

25. Title — Micro Yield Trial

Objectives To select high yielding, well-adapted and disease resistant lines.

Research worker(s) Muhammad Amir Amin, Dr. Anwar-ul-Haq and Muhammad Shafiq

Project duration 2017 (Continuous)

Location Faisalabad, Kallurkot, Sahowali and Fatehjang,

Treatments/ Methodology

Entries = 09 viz. CP-021, CP-025, CP-030, CP-032, CP-033, CP-049, CP-056, CP-074 & CP-077

Check = S.A. Dandy

Design = RCB

Replications =3

Plot size = 5 m x 3 m

Row spacing = 60 cm

Plant spacing = 20 cm

Planting time = 2nd fortnight of june

Data to be taken = Plant stand, Days to 50 % flowering, plant type, to maturity, disease incidence, number of pods/plant, flower colour, number of seeds/pod, 100 grain weight and seed yield.

Previous year's Results

Rank	Entry No.	Location		Av. Yield kg/ha
		Faisalabad	Kallurkot	
1.	CP-009	1025	515	770
2.	CP-041	962	450	706
3.	CP-030	912	349	631
4.	CP-037	830	389	609
5.	S.A.Dandy(Check)	802	348	575
6.	CP-072	795	241	518
7.	CP-001	745	296	520
8.	CP-034	732	120	426
	LSD (5%)	**77**	**NS**	
	CV %	**5.89**	**17.29**	

26- Title	Sowing Date Trials
Objectives	To find out the optimum time of sowing of the crop
Research worker(s)	Muhammad Amir Amin, Dr. Anwar-ul-Haq and Muhammad Shafiq
Project duration	2017 (continuous)
Location	Faisalabad
Treatments/ Methodology	Entries = CP-037, CP-065 and JK-101 D1 = 15th May D2 = 1st June D3 = 15th June D4 = 1st July D5 = 15th July D6 = 30th July Design = Split Plot Replications = 3 Plot size = 5 m x 3.0m Row spacing = 60 cm Plant spacing = 20 cm
Previous year's Results	First year of the trial.

D. PLANT PATHOLOGY

27. Title	SCREENING OF MUNGBEAN (*Vigna radiata* (L.) Wilczek) PROMISING LINES/ VARIETIES FOR RESISTANCE/ TOLERANCE TO MUNGBEAN YELLOW MOSAIC VIRUS (MYMV) AND URDBEAN LEAF CRINKLE VIRUS (ULCV)
Objectives	To select mungbean cultivars/lines resistant/tolerant to Mungbean Yellow Mosaic Virus and Urdbean Leaf Crinkle Virus .
Research worker(s)	Javed Anwar Shah and Dr. M. Azhar Iqbal
Project duration	2017
Location	Faisalabad (PRI)
Treatments	Varieties/ lines
Methodology	Each entry will be planted in 3 meter long and 30 cm apart single row during the 1st week of July in three replications. A highly susceptible variety **Mung Kabuli** will be sown as spreader after every two test entries. Observations on the incidence of MYMV and ULCV will be recorded under field conditions at Seedling stage and Maturity according to disease rating scale (Bashir, 2005 and Khalid *et al*., 2011).

Previous Years Results

REACTION	LINES / VARIETIES (MYMV)
Highly Resistant	-
Resistant	-
Moderately Resistant	15001,15002,15003,15005,15007,15024,15025,15029, 15030,15141,,Vc1968 AZRI-06 and NM-11.
Moderately Susceptible	-
Susceptible	15001,15004,15005,15009,15018,15033 15034,15035,15036,15037,15039 ,15041 ,15043,15045 and 15107
Highly Susceptible	-

Note: Urdbean Leaf Crinkle Virus was not observed on the Mung bean lines.

28. Title	SCREENING OF MASH (*Vigna mungo* (L.) Hepper) LINES/ VARIETIES FOR RESISTANCE/ TOLERANCE TO URDBEAN LEAF CRINKLE VIRUS (ULCV) AND MUNGBEAN YELLOW MOSAIC VIRUS (MYMV)
Objectives	To select mash cultivars/lines, resistant/tolerant to Urdbean Leaf Crinkle Virus and Mungbean Yellow Mosaic Virus
Research worker(s)	Dr. M. Azhar Iqbal, Javed Anwar Shah
Project duration	2017
Location	Faisalabad (PRI)
Treatments	Varieties/ lines

Methodology

Each entry will be planted in 3 meter long and 30cm apart single row during the 1st week of July in three replications. A highly susceptible variety **Kandhari Mash** will be sown as spreader after every two test entries. Observations on the incidence of ULCV and MYMV will be recorded under field conditions at Seedling stage and Maturity according to disease rating scale (Bashir, 2005 and Khalid *et al*., 2011).

Previous Years Results

REACTION	LINES/ VARIETIES (MYMV)
Highly Resistant	-
Resistant	13M001,15M004 and 15M005
Moderately Resistant	14M006 and 15M009
Moderately Susceptible	13M001
Susceptible	-
Highly Susceptible	-

Note: Urdbean Leaf Crinkle Virus was not observed on the Mung bean lines.

29. Title — SCREENING OF COWPEAS (*Vigna sinensis*) PROMISING LINES FOR RESISTANCE/ TOLERANCE TO COWPEA YELLOW MOSAIC VIRUS (CYMV)

Objectives To select cultivars/lines, resistant/tolerant to CYMV

Research worker(s) Dr. M. Azhar Iqbal and Javed Anwar Shah

Project duration 2017

Location Faisalabad (PRI)

Treatments Varieties/ lines

Methodology

Each entry will be planted in 3 meter long and 30cm apart single row during the 1st week of July having three replications. A highly susceptible **Desi Arvan** will be sown after every two test entries. Observations on the virus incidence will be recorded under field conditions at seedling and maturity, according to disease rating scale (Bashir, 2005 and Khalid *et al*., 2011).

Previous Years Results

REACTION	LINES/ VARIETIES
Highly Resistant	CP-JK-001,CP-002, CP-005, CP-006, CP-009, CP-017,CP-029,CP-030,CP-034,CP-035,CP-036,CP-037 and CP-039
Resistant	-
Moderately Resistant	-
Moderately Susceptible	-
Susceptible	-
Highly Susceptible	-

30. Title	**Screening of Mungbean (*Vigna radiata* (L.) Wilczek) Lines for Resistance/ Tolerance to *Cercospora* leaf spot**
Objectives	To select Mungbean cultivars/ lines resistant/ tolerant to Cercospora canesens for use in hybridization programme.
Research worker(s)	Dr. M. Azhar Iqbal and Javed Anwar Shah
Project duration	2017
Location	Faisalabad (PRI)
Treatments / Methodology	Each Entry will be planted in 3 meter long and 30 cm apart single row during the first week of July having three replications. A highly susceptible variety C_2-94-4-36 will be sown as spreader after every two test entries. The severity of disease will be recorded by using scale 1-5 (Park 1978) in natural conditions.
Previous Years Results	Out of 66 lines/ varieties, no line was found resistant . Only12 lines were found moderately susceptible and 54 were found susceptible under controlled conditions.

31. TITLE	**MANAGEMENT OF CERCOSPORA LEAF SPOT (*Cercospora canescens*) in MUNG BEAN (*Vigna radiata* (L.) Wilczek) BY USING CURATIVE FUNGICIDES**
Objectives	To see the effect of different spray fungicides for the management of Cercospora leaf spot (*Cercospora canescens*) in Mungbean.
Research worker(s)	Dr. M. Azhar Iqbal and Javed Anwar Shah
Project duration	2017
Location	Faisalabad (PRI)
Treatments	Variety = C_2-94-4-36 T_1 Daconil (Chlorothalonil) (600ml/ Acre) T_2 Ridomil Gold (Mancozeb+Metalaxyl) (250g/ Acre) T_3 Bavistin (Carbendazim) (200ml/ Acre) T_0 Control (H_2O)
Methodology	Cercospora leaf spot (CLS) susceptible variety C_2-94-4-36 will be sown in RCBD having 3 replications with 1x4m subplots. The inoculum will be sprayed after 40-45 days of sowing to create disease epidemic. The test fungicides will be sprayed after the appearance of the disease. The severity of disease will be recorded after 7 days interval by using scale 1-5 (Park 1978)
Previous Years Results	New experiment

E. ENTOMOLOGY STUDIES

32 - TITLE — To Test Different insecticides against white fly on mung crop.

Objectives To find out the most suitable insecticide for the control of white fly.

Research worker(s) Zubair Ahmad, Muhammad Sajjad Saeed and Ch.Muhammad Rafiq

Project duration 2017

Location District Sheikhupura

Treatments

1. Acetamiprid20%SP @ 125 gram/acre
2. Pyriproxifen10.8%EC @ 500 ml/acre
3. Nitenpyram10%SL @ 200 ml/ acre
4. Imidacloprid 200SL @ 250 ml/acre
5. Acetamiprid20%SP @ 125 gram/acre+ Pyriproxifen 10.8EC @ 500 ml/acre
6. Imidacloprid 200SL @ 250 ml/acre+ Pyriproxifen10.8%EC @ 500 ml/acre
7. Nitenpyram10%SL @ 200 ml/ acre+ Pyriproxifen10.8%EC @ 500 ml/acre
8. Water
9. Check

Methodology

Layout = RCBD

Replications = 3

Row spacing = 30 cm

Plant spacing = 10 cm

Plot size = 5.0 m x 6.0m (Line per plot 20)

Data to be taken = The Whitefly population will be recorded per leaf before spray and then after 3 and 7 days of spray from 15randomly selected leaves of 15 plants selected at random from each plot. Finally the data will be analysed statistically.

Previous Years Results

Table-1 Efficacy of some insecticides alone and their combination against white fly on mung crop

SR #	Treatments	Dose / Acre	Pre-treatment White fly population per leaf	Post treatment %age mortality of White fly after	
				3 days	7 days
1.	Acetamiprid 20 SP	125 gm	5.33	76.33 b	76.63 d
2.	Pyriproxifen 10.8 EC	500 ml	4.20	83.88 ab	87.30 ab
3.	Nitenpyram 10% AS	200 ml	5.06	83.30 ab	80.41 cd
4.	Imidacloprid 200 SL	250ml	4.62	79.70 ab	76.76 d
5.	Acetamiprid 20 SP + Pyriproxifen 10.8 EC	125gm+500ml	5.20	85.63 a	87.96 a
6.	Imidacloprid 200 SL + Pyriproxifen 10.8 EC	250ml+500ml	4.53	83.70 ab	79.66 cd
7.	Nitenpyram 10% AS + Pyriproxifen 10.8 EC	200ml+500ml	4.66	85.10 a	83.16 bc
8.	Water	100 lit	4.60	5.00 c	3.00 e
9.	Check	-	0.00	0.00	0.00
	LSD (0.05)			7.61	4.54

33 - TITLE — Management of cowpea pod borer *Helicoverpa armigera*

Objectives
To study the performance of different control measures against the attack of pod borer

Research worker(s)
Zubair Ahmad, Muhammad Ammir Amin and Ch. Muhamamd Rafiq

Project duration
2017

Location
Faisalabad

Treatments
1.Weed control at 3 and 6 weeks after sowing
2.Neem oil @ 500 ml/acre
3.Eucalyptus oil @ 500 ml/acre
4.Intercropping of Sorghum (One line in between plot)
5.Emmamectin benzoate 1.9 EC @ 200 ml/acre
6.T1+T2+T3+T5
7.Check

Methodology

Layout	= RCBD
Replications	= 3
Row spacing	= 75cm
Plant spacing	= 20 cm
Plot size	= 5.0m x 6.0m (line per plot=8)
Data to be taken	= Five plants from each plot will be selected randomly for recording data. Pod borer infestation %age will be recorded after 10 days interval upto maturity. Finally the data will be analysed statistically.

Previous Years Results

Table 2 : Average pod borer infestation %age and grain yield

Sr. No.	Treatments	Av. Infestation %age	Av. Grain Yield (gm)
1.	Weed control at 3 and 6 week after sowing	15.71c	370.67 d
2.	Neem oil @ 500 ml per acre	13.14d	411.32 c
3.	Eucalyptus oil @ of 500 ml per acre	12.81d	415.55 c
4.	Intercropping of sorghum (one line in between plot)	18.24b	351.30 e
5.	Emamectin benzoate 1.9 EC @ 200 ml per acre	5.19e	520.43 b
6.	$T_1 + T_2 + T_3 + T_5$	3.86f	539.53 a
7.	Check	20.35a	287.23 f
	LSD (0.05)	1.09	14.15

34- Title **Screening of Mung bean advance lines against store grain pests *Callosobruchus maculatus* (Fab) in Laboratory.**

Objectives To find out the advanced lines having least damage by *C, maculatus*

Research workers Zubair Ahmad Muhammad Sajjad Saeed and Ch. Muhammad Rafiq

Project duration 2017

Location Faisalabad

Treatments / Methodology Fifty gram grains each of thirty advance lines along with checks of mung will be placed in a chamber covered with muslin cloth. Experiment will be replicated thrice. Five pairs per fifty gram grains of *C.maculatus* adults will be released in the chamber.

After completion of one generation, the weight of damaged grains will be taken after removing all dust and insects. The difference between initial and final weight will be recorded to assess the loss of weight in grains. Percentage of damaged grains will also be recorded by counting damaged and undamaged grains in the whole sample replication wise. Finally the data will be analysed statistically.

Previous Years Results

Table 3: Grain damage and weight loss percentage

Sr. No.	Advanced Lines	Av. grain damage %age	Av. grain weight loss %age
1.	NM-98	88	81
2.	NIFA-2	93	86
3.	L.NO-162	93	79
4.	013982	94	88
5.	NM-11	94	85
6.	**013955**	**79**	**67**
7.	014072	91	81
8.	**013959**	**69**	**68**
9.	L.NO-101	88	79
10.	NM-B-1	81	79
11.	014053	82	76
12.	014002	82	62
13.	014058	90	79
14.	014060	89	87
15.	013006	93	82
16.	014066	87	79
17.	013009	73	82
18.	6144-A	91	92
19.	014067	92	90
20.	013956	93	80
21.	A-8	90	86
22.	L. No-177	90	78
23.	E-39	94	90
24.	**14002**	**71**	**45**
25.	E-112	85	82
26.	98006	88	81
27.	L.N-7	88	77
28.	E-182	85	79
29.	14048	86	69
30.	15029	93	90
	LSD 0.05)	11.05	21.40

35- Title	SCREENING OF MUNGBEAN ADVANCED LINES AGAINST WHITEFLY, JASSID, THRIPS AND SPINOLA BUG.
Objectives	To study the performance of mungbean lines against the attack of different insect pests.
Research workers	Zubair Ahmad, Muhammad Sajjad Saeed and Ch.Muhammad Rafiq
Project duration	2017 (continuous)
Location	Faisalabad
Treatments / Methodology	Entries = 13001,13002,13004,13005,12005,13006,13009, 13010,13011, NM-11 Layout = RCBD Replications = 3 Row spacing = 30cm Plant spacing = 10cm Plot size = 4m x 1.2m Data to be taken = The data on number of whiteflies and jassids per leaf, thrips per flower and spinola bugs per plant will be recorded on 5 randomly selected plants from each plot after 10 days interval up to maturity. Finally the data will be analyzed statistically.
Previous Years Results	First Year

F. BACTERIOLOGY

36. TITLE	RESPONSE OF MUNGBEAN TO RHIZOBIUM AND PGPR COINOCULATION
Objectives	To identify the best suited Rhizobium-PGPR co inoculation for optimum mung bean production
Research workers	Dr. Shakeel Ahmad Anwar and Muhammad Sajjad Saeed in collaboration with Soil Bacteriology Section, AARI, FSD.
Project duration	2017-2019
Location	Faisalabad
Treatments/ Methodology	Variety: = AZRI-2006 Treatments: = 6 T1- Control (25-60-0) T2- Rhizobium sp. Of mung bean T3- Azoto bacter ($PGPR_1$) T4- Bacillus ($PGPR_2$) T5- Rhizobium + $PGPR_1$ T6- Rhizobium + $PGPR_2$ Layout: = RCBD Replication: = 3 Plot size: = 3m x 5m Row spacing: = 30 cm Plant spacing: = 10 cm Sowing date: = 15 June – 15 July Recommended dose 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 NPK, Organic-C and microbial count will be carried out
Previous year's Results	First Year

37. TITLE	NUTRITIONAL QUALITY EVALUATION OF MUNGBEAN 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 mung bean through microbial inoculation.

Research Workers Dr. Shakeel Ahmad Anwar, Dr. Aziz ur Rehman

Duration 2017(Continuous)

Location Faisalabad in collaboration with Biochemistry Section, Post Harvest Research Centre, Faisalabad.

Treatments

Lay out = RCBD
Replication = 3
Plot Size = 4m x1.2 m
Row spacing = 30cm
Plant Spacing = 10cm
Sowing Date =15 June -15 July

Varieties:

1. 16001
2. 16002
3. 16003
4. 16004
5. 15003
6. 15005

Methodology 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

38. TITLE NUTRITIONAL QUALITY EVALUATION OF MASH 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 mash through microbial inoculation.

Research Workers Dr. Shakeel Ahmad Anwar, Amer Hussain and Muhammad Shafiq

Duration 2017(Continuous)

Location Faisalabad in collaboration with Biochemistry Section, Post Harvest Research Centre, Faisalabad.

Treatments

Lay out = RCBD
Replication = 3
Plot Size = 4m x1.2 m
Row spacing = 30cm
Plant Spacing = 10cm
Sowing Date =15 June -15 July

Varieties:

1. 15 M 002
2. 15 M004
3. 15 M 007
4. 15 M008
5. Mash 97
6. Arooj 2011

Methodology

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