

**BREAD WHEAT**  
*(Triticum aestivum L.)*

**WHEAT RESEARCH INSTITUTE**  
**FAISALABAD**

**OBJECTIVES**

- To maintain genotypes/lines with their typical characteristics.
- To combine high yield, adaptability and tolerance to biotic and abiotic stresses, quality and other desirable characteristics.
- To incorporate effective rust resistance genes in local germplasm.

**TREATMENTS & METHODOLOGY**

Total entries: 717

Sowings: 2 (during 1<sup>st</sup> and 3<sup>rd</sup> week of Nov.)

Plot size: 2 rows of 2.5 meter length each

About 850 crosses will be attempted during 2016-17

## GERMPLASM GROUPS

Sr. No.	Germplasm Groups	No. of varieties / lines
1	Current varieties of Pakistan	30
2	Old varieties	79
3	Exotic lines	27
4	Disease resistant	218
5	Drought tolerant	18
6	Salt tolerant	06
7	Heat tolerant	34
8	Grain quality	17
9	High grain weight	14
10	High yielding	229
11	Harvest plus	19
12	<i>Triticum pyrum</i>	05
13	CSISA	15
14	Miscellaneous	06
Total		717

## PREVIOUS YEAR'S RESULTS

Last year crossing block comprised of 530 entries. It has been reconstituted to face the new challenges on the basis of information derived through a series of studies during last few years.

Sr. No.	Character	Range
1	Plant height (cm)	80-140
2	Days to heading	90-118
3	Days to maturity	135-155
4	1000 grain weight (g)	18.7-51.9
5	Tiller/plant	9-21
6	Protein content (%)	12.8-17.9
7	Gluten content (%)	33-39
8	Canopy temperature (°C) (booting & anthesis)	12.1-18.4 14.2-20.5
9	NDVI range (booting & anthesis)	0.68-0.88 0.69-0.87
10	Leaf & yellow rust reactions	0- 100 S
11	Leaf color, size & orientation,	Wide range



## Filial Generations for 2016-17

Generations	No. of crosses	Plot size
F <sub>1</sub>	857	1 row x 2.5m
F <sub>2</sub>	769	12 rows×8m
F <sub>3</sub>	501	3 rows ×3m
F <sub>4</sub>	195	3 rows×3m
F <sub>5</sub>	120	3 rows×3m
F <sub>6</sub>	93	1 row, 2.5m
F <sub>7</sub>	76	4 rows ×4m

## PREVIOUS YEAR'S RESULTS

Filial Generation	Entries Selected at WRI, FSD	Entries Selected at Kala Shah Kaku
F <sub>0</sub>	858	-
F <sub>1</sub>	565	-
F <sub>2</sub>	382	285
F <sub>3</sub>	174	85
F <sub>4</sub>	120	55
F <sub>5</sub>	93	-
F <sub>6</sub>	282	-
F <sub>7</sub>	171	-

#### 4. TITLE

# STUDY OF PROMISING ADVANCED LINES OF BREAD WHEAT UNDER DROUGHT STRESS CONDITIONS

## OBJECTIVES

- To evaluate advanced lines/varieties suitable for rainfed/ water stressed areas.

## TREATMENTS & METHODOLOGY

**Advanced lines** = 12 advance lines from different sources

**Treatments** = 3 sets

One set in rainfed condition, 2<sup>nd</sup> with one irrigation at reproductive stage, 3<sup>rd</sup> in normal irrigated conditions

**Layout** = Split plot Design

**Parameters** = Canopy temperature Depression (CTD),  
days to 50% heading,  
days to 50% maturity,  
plant height,  
chlorophyll contents with NDVI,  
grains per spike,  
1000-grain weight  
grain yield



## **PREVIOUS YEAR'S RESULTS**

On overall mean basis

V-13005 ranked first (4002 kg ha<sup>-1</sup>) with

9.1% and 11% reduction in grain yield in both conditions  
i.e., with one irrigation and with no irrigation (Rainfed)

V-11098 remained at second position (3918 kg ha<sup>-1</sup>)

5.2% and 6% reduction in grain yield in both conditions

Fsd-08 (3813 kg ha<sup>-1</sup>)

11.8% and 17.7% reduction in grain yield in both conditions

## OBJECTIVES

- Development of heat tolerant varieties to combat the effect of global warming  
(Projected temp. increase is 2 to 4 °C by the end of this century.)
- Evaluation of bread wheat germplasm for yield and yield components under post-anthesis heat stress conditions.

## TREATMENTS & METHODOLOGY

- Varieties/lines = 50,
  - Set = 3 (in & out side tunnel (normal planting)
  - late planting
- Layout = Alpha Lattice, Reps = 2
- Post anthesis heat shock will be induced by covering the tunnel with clear poly propylene sheet for about three weeks.
- **Parameters** = days to heading, canopy temperature, chlorophyll content, plant height, days to maturity, rust reactions, Grains/spike, 1000- grain weight and grain yield.

## PREVIOUS YEAR'S RESULTS

Sr.#	Genotype	Yield(kg/ha)			1000 Grain Weight(g)		
		Normal	Tunnel	Late sown	Normal	Tunnel	Late sown
1	BAJ #1*2/HUIRIVIS #1	4804	2098	2046	45.5	40.5	40.6
2	WBLL1*2/KURUKU//HEILO	4686	2488	2164	52	45.9	46
3	F 60314.76/ MRL// CNO 79/3/ LUCO-M/4/HEI/3* CNO 79//2* SERI/5/KAUZ// BOW/NKT	4276	2725	2560	46.7	44.7	42.4
4	SOKOLL//PBW343*2/KUKUNA/3/ATTILA/PASTOR	4125	2164	2283	48.9	42.6	46.6
5	TOBA97/PASTOR*2//AKURI	3834	2270	2310	44.4	37.9	42.6
6	SAUAL/3/MILAN/S87230//BAV92	3768	2204	2296	41.4	39	41.4

## 8. TITLE

# YIELD EVALUATION OF CIMMYT MATERIAL IN NORMAL AND LATE SOWN CONDITIONS

## OBJECTIVES

To evaluate CIMMYT candidate lines under local climatic conditions.

## TREATMENTS & METHODOLOGY

Entries: 650

Source: CIMMYT

Plot size: 5 rows x 5 m

Sowing time: Normal (1<sup>st</sup> week of Nov.)

Late (last week of Dec.)

Parameters: NDVI, Canopy Temperature, Days to heading, Plant Height, Lodging Score, Days to maturity, Yield and 1000 grain weight

## PREVIOUS YEAR'S RESULTS

Fifty two (52) promising lines were selected from candidate lines received from CIMMYT for further study in yield trials. The yield performance of top five high yielding lines compared to check variety is as under

Entry No.	Yield (kg ha <sup>-1</sup> )	% increase over Galaxy - 13
4012	4432	15.78
6040	4302	12.38
2012	4261	11.31
4057	4243	10.84
2010	4212	10.03

# 9. TITLE EVALUATION OF INTERNATIONAL BREAD WHEAT MATERIAL (CIMMYT / ICARDA).

## OBJECTIVES

To evaluate and select promising lines from CIMMYT / ICARDA materials for strengthening bread wheat germplasm and testing in station yield trials

## TREATMENTS & METHODOLOGY

The following yield trials/nurseries are expected from (CIMMYT, ICARDA & NARC)

Sr. No.	Trials/ Nurseries	Source	Sr. No.	Trials/ Nurseries	Source
1	37 <sup>th</sup> ESWYT	CIMMYT	11	46 <sup>th</sup> IBWSN	CIMMYT
2	24 <sup>th</sup> SAWYT	CIMMYT	12	11 <sup>th</sup> Stem RRSN	CIMMYT
3	9 <sup>th</sup> EBWYT	CIMMYT	13	23 <sup>rd</sup> ISPTON	CIMMYT
4	15 <sup>th</sup> HTWYT	CIMMYT	14	17 <sup>th</sup> SSR-FA/IR ISBWYT	ICARDA
5	4 <sup>th</sup> WYCYT	CIMMYT	15	17 <sup>th</sup> CWANA SBWON	ICARDA
6	WPEPYT	CIMMYT	16	17 <sup>th</sup> CWANA ESBWYT	ICARDA
7	7 <sup>th</sup> HPYT	CIMMYT	17	17 <sup>th</sup> CWANA HTSBWON	ICARDA
8	2 <sup>nd</sup> SATYT	CIMMYT	18	17 <sup>th</sup> DSBWYT	ICARDA
9	34 <sup>th</sup> SAWSN	CIMMYT	19	NARC HPRYT	NARC
10	6 <sup>th</sup> CSISA	CIMMYT			

## PREVIOUS YEAR'S RESULTS

Sr. No.	Name of Trial	Entries	
		Studied	Selected
1	36 <sup>th</sup> ESWYT	50	10
2	23 <sup>rd</sup> SAWYT	50	6
3	3 <sup>rd</sup> WYCYT	42	10
4	16 <sup>th</sup> ESBWYT	24	6
5	16 <sup>th</sup> ISBWYT	24	4
6	16 <sup>th</sup> DSBWYT	24	3
7	16 <sup>th</sup> SBW-ON	130	7
8	16 <sup>th</sup> HTSBW-ON	160	15
9	14 <sup>TH</sup> HTWYT	50	13
10	1 <sup>st</sup> SATYT	45	5
11	33 <sup>rd</sup> SAWSN	235	41
12	10 <sup>th</sup> Stem RRSN	208	36
13	23 <sup>rd</sup> ISPTON	52	9
14	48 <sup>th</sup> IBWSN	300	49
<b>Total=14</b>		<b>1394</b>	<b>214</b>

**OBJECTIVES**

To evaluate the newly developed stable lines for yield and other agronomic parameters under irrigated and rainfed conditions.

**TREATMENTS & METHODOLOGY**

Irrigated:

Entries = 150, Check varieties = 3 (Faisalabad-08, Punjab-11 and Galaxy-13)

Rainfed:

Entries = 77, Check varieties = 4 (Faisalabad-08, Chakwal-50, Dharabi-13 and Galaxy-13)

Layout = Alpha lattice, Reps = 3

**PREVIOUS YEAR'S RESULTS**

35 advanced lines (out of 204) of bread wheat were found high yielding than two check varieties in their respective trials.

Thirty five lines were found high yielding than all three check varieties in rain fed trials.



## PREVIOUS YEAR'S RESULTS

Variety Code	Yield (kg ha <sup>-1</sup> )	Percentage Increase over check varieties	
		FSD-08	Punjab-11
<b>A-I</b>			
V-15008	3624	3.0	5.4
V-15006	3540	0.7	3.0
V-15012	3540	0.7	3.0
LSD (0.05)	317		
CV (%)	5.61		
<b>A-II</b>			
V-15030	4278	0.8	7.0
LSD (0.05)	383		
CV (%)	6.22		
<b>A-III</b>			
V-15044	4724	10.5	8.5
V-15045	4401	3.0	1.1
LSD (0.05)	332		
CV (%)	5.10		
<b>A-V</b>			
V-15070	4669	16.3	33.9
V-15065	4514	12.4	29.4
V-15066	4270	6.4	22.4
LSD (0.05)	250		
CV (%)	3.93		

## PREVIOUS YEAR'S RESULTS

Variety Code	Yield (kg ha <sup>-1</sup> )	Percentage Increase over check varieties	
<b>A-VI</b>		<b>FSD-08</b>	<b>Punjab-11</b>
V-15082	4959	8.0	9.4
V-15090	4905	6.9	8.2
LSD (0.05)	253	CV (%)	3.59
<b>A-VII</b>			
V-15101	5411	12.7	13.6
V-15099	5105	6.4	7.2
V-15102	4948	3.1	3.9
LSD (0.05)	273	CV (%)	3.65
<b>A-VIII</b>			
V-15112	5158	12.6	22.3
V-15115	4759	3.9	12.9
LSD (0.05)	230	CV (%)	3.31
<b>A-IX</b>			
V-15123	4730	3.9	15.3
V-15122	4575	0.5	11.6
LSD (0.05)	258		
CV (%)	3.78		
<b>A-X</b>			
V-15150	4714	6.2	4.8
V-15147	4702	5.9	4.6
LSD (0.05)	228	CV (%)	3.27

## PREVIOUS YEAR'S RESULTS

Variety Code	Yield (kg ha <sup>-1</sup> )	Percentage Increase over check varieties	
		FSD-08	Punjab-11
<b>A-XI</b>			
V-15153	4899	16.6	12.6
V-15151	4784	13.9	9.9
V-15156	4521	7.6	3.9
V-15165	4451	6.0	2.3
LSD (0.05)	258		
CV (%)	3.74		
<b>A-XII</b>			
V-15174	4878	4.2	8.6
V-15173	4800	2.5	6.9
LSD (0.05)	226		
CV (%)	3.15		
<b>A-XIII</b>			
V-15181	4537	5.4	5.3
V-15186	4516	5.0	4.9
V-15195	4381	1.8	1.7
V-15182	4352	1.1	1.0
LSD (0.05)	238		
CV (%)	3.50		

## PREVIOUS YEAR'S RESULTS

Variety Code	Yield (kg ha <sup>-1</sup> )	Percentage Increase over check varieties		
<b>A-I (Rainfed)</b>		FSD-08	CK-50	Dhurabi-09
V-15267	5111	30.2	17.2	16.4
V-15264	4654	18.5	6.7	6
V-15269	4790	22	9.9	9.1
V-15265	4894	24.7	12.2	11.5
V-15262	4780	21.8	9.6	8.9
V-15263	4755	21.1	9.1	8.3
V-15268	4479	14.1	2.7	2
<b>LSD (0.05)</b>	272.83	CV (%)	3.94	
<b>A-II (Rainfed)</b>		FSD-08	CK-50	Dharabi-11
V-15302	4893	9	9.5	20.3
V-15289	4815	7.3	7.7	18.4
V-15296	4700	4.7	5.1	15.6
V-15290	4619	2.9	3.3	13.6
V-15291	4531	0.9	1.4	11.4
V-15295	4521	0.7	1.1	11.2
V-15286	4513	0.5	1	11
<b>LSD (0.05)</b>	335.24	CV (%)	4.66	

## PREVIOUS YEAR'S RESULTS

Variety Code	Yield (kg ha <sup>-1</sup> )	Percentage Increase over check varieties		
<b>A-III Rainfed</b>		FSD-08	CK-50	DhArabi-09
<b>V-15311</b>	4843	3.2	5.5	13.5
<b>V-15307</b>	4771	1.6	4	11.8
<b>V-15321</b>	4751	1.2	3.5	11.4
<b>V-15309</b>	4734	0.9	3.2	11
<b>V-15304</b>	4693	0	2.3	10
<b>LSD (0.05)</b>	279.38	CV (%)	3.86	
<b>A-IV Rainfed</b>		Galaxy-2013	CK-50	Dharabi-11
<b>V-15338</b>	5017	21.4	16.9	28.6
<b>V-15343</b>	4646	12.5	8.3	19.1
<b>V-15331</b>	4573	10.7	6.6	17.2
<b>V-15337</b>	4554	10.2	6.2	16.7
<b>V-15332</b>	4494	8.8	4.8	15.2
<b>V-15329</b>	4473	8.3	4.3	14.7
<b>V-15333</b>	4425	7.1	3.1	13.4
<b>V-15327</b>	4301	4.1	0.3	10.3
<b>V-15326</b>	4300	4.1	0.2	10.2
<b>LSD (0.05)</b>	326.63	CV (%)	3	

**OBJECTIVES**

To evaluate the promising lines of bread wheat selected from preliminary yield trials for yield and other agronomic parameters under irrigated and rainfed conditions.

**TREATMENTS & METHODOLOGY**

Irrigated:

Entries =120, Check varieties =3 (Faisalabad-08, Punjab-11 and Galaxy-13)

Rainfed:

Entries = 35, Check varieties = 4 (Fsd.-08, Chk-50, Dharabi-13 and Galaxy-13)

Layout = alpha lattice, Reps = 3

**PREVIOUS YEAR'S RESULTS**

- Twenty one advanced lines of bread wheat were found high yielding than the two checks under normal conditions.
- Six advance lines (rain fed condition) were found higher yielder than three checks (Faisalabad-08, Chakwal-50 and BARS-09).

## PREVIOUS YEAR'S RESULTS

Variety Code	Yield (kg ha <sup>-1</sup> )	Percentage Increase over check varieties	
		FSD-08	Punjab-11
<b>B-I</b>			
V-14031	4535	1.1	5.1
LSD (0.05)	229		
CV (%)	3.24		
<b>B-II</b>			
V-14058	4911	8.6	21.8
V-14059	4858	7.5	20.5
V-14061	4741	4.9	17.6
LSD (0.05)	235		
CV (%)	3.29		
<b>B-III</b>			
V-14078	4465	3.7	6.5
V-14077	4426	2.8	5.6
V-14090	4379	1.7	4.5
V-14099	4372	1.5	4.3
V-14076	4329	0.5	3.3
LSD (0.05)	194		
CV (%)	2.77		
<b>B-IV</b>			
V-14117	4915	2.7	35.2
LSD (0.05)	223		
CV (%)	3.14		

# PREVIOUS YEAR'S RESULTS

Variety Code	Yield (kg ha <sup>-1</sup> )	Percentage Increase over check varieties	
		FSD-08	Punjab-11
<b>B-V</b>			
V-14133	4669	6.8	22.1
V-15208	4656	6.5	21.7
V-15207	4632	6.0	21.1
V-15216	4572	4.6	19.5
V-14134	4467	2.2	16.8
V-15217	4451	1.9	16.4
LSD (0.05)	228		
CV (%)	3.19		
<b>B-VII</b>			
V-15238	4607	4.6	17.4
V-15234	4568	3.7	16.4
V-15235	4349	-1.2	10.8
LSD (0.05)	212		
CV (%)	3.09		
<b>B-VIII</b>			
V-13372	4887	14.1	21.0
V-13340	4868	13.6	20.5
V-13315	4444	3.7	10.0
V-15245	4344	1.4	7.6
LSD (0.05)	343		
CV (%)	4.96		



## PREVIOUS YEAR'S RESULTS

Variety Code	Yield (kg ha <sup>-1</sup> )	Percentage Increase over check varieties		
		FSD-08	Galaxy-13	Dhurabi-09
B-XII (Rainfed)				
V-13325	5016	0.21	0.21	0.12
V-13348	4923	0.19	0.19	0.09
V-13338	4511	0.09	0.09	0.00
V-13340	4328	0.05	0.04	-0.04
V-13311	4232	0.02	0.02	-0.06
V-13315	4192	0.01	0.01	-0.07
LSD (0.05)	282	CV (%)	4.2	

## OBJECTIVES

To assess the yield performance and adaptability of promising lines in different ecological zones of the Punjab.

## TREATMENTS & METHODOLOGY

Locations: Govt. farms in Punjab.

Contributing Institutes: AARI, BARI, AZRI, University of Agriculture; NIBGE, NIAB, Faisalabad, Private Sector, NARC, Islamabad etc.

	Trials	Entries	Sowing time
	20	44	2 <sup>nd</sup> week of Nov.
Planting Layout	Alpha Lattice		
Plot size	1.20 m x 5 m		
Replications	2		
Fertilizer	120-90-60 NPK kg ha <sup>-1</sup>		

## PREVIOUS YEAR'S RESULTS

44 entries

Two check varieties i.e., Faisalabad-08 and local check

Locations 24

Sowing time 1<sup>st</sup> fortnight of November, 2016.

S. No.	Variety/line	Yield (kg ha <sup>-1</sup> )
1	V-13348	4424
2	V-14157	4383
3	HYT-80-44	4244
4	V-14154	4207
5	V-13338	4189
6	V-14153	4180
7	Galaxy-13	4163

**OBJECTIVES**

To confirm the yield and adaptability of elite lines contributed by the wheat breeders of Pakistan.

**TREATMENTS & METHODOLOGY**

- Eight lines (six for irrigated & two for rainfed ) will be provided by WRI, Faisalabad.
- National Wheat Coordinator, PARC, will design the trial.
- Trials with Coded entries will be supplied to Director Wheat for planting and harvesting on the selected sites in the Punjab.

## PREVIOUS YEAR'S RESULTS

Sr. No.	V. Code	Yield (kg/ha)
1	V-11098	4067
2	V-12120	3949
3	V-13372	3849
4	V-13016	3723
5	V-13005	3698
6	V-12066	3692
7	V-12304	3666
8	Fsd.08	3845

## OBJECTIVES

- To maintain CMS (A), maintainer (B) and fertility restorer (R) lines

## TREATMENTS & METHODOLOGY

33 A-lines (CMS lines)

33 B-lines (maintainers) will be planted in the field.

A-lines will be maintained by pollinating with its corresponding maintainer.

Sixteen lines with fertility restorer gene (Rf) will also be maintained.

Seed of  $F_1$  will be planted for back crosses

## PREVIOUS YEAR'S RESULTS

Thirty three CMS lines were maintained by crossing with their respective maintainer (B-lines). Sixteen fertility restorers were also maintained by selfing.

**DURUM WHEAT**  
*(Triticum durum)*

# 15. TITLE MAINTENANCE AND UTILIZATION OF DURUM AND TRITICALE GERMPLASM

## OBJECTIVES

Enhancement of genetic variability in durum and triticale germplasm

## TREATMENTS & METHODOLOGY

No. of entries = Durum: 168 and Triticale: 79, Plot size = 2 rows x 2.5 m

Desirable lines will be utilized in hybridization program.

## PREVIOUS YEAR'S RESULTS

One hundred and sixty four (164) entries of Durum and 79 entries of Triticale were maintained.

Sr.No	Traits	Variability range	
		Durum	Triticale
1	Days To Heading	85 -128	84 – 124
2	Days To Maturity	151 – 158	153 – 160
3	Plant Height (cm)	89 – 133	104 – 172
4	1000-grain weight (gm)	32.60 - 49.78	
5	Rust Reaction (L.R)	0 - 30 S	0 - 20 S
6	Rust Reaction (Y.R)	0 – 20 MSS	0 - 10 MS



## **16. TITLE**

# **CROSSING DURUM WHEAT WITH BREAD WHEAT**

### **OBJECTIVES**

Introgression of genes for biotic and abiotic stresses in bread wheat

### **TREATMENTS & METHODOLOGY**

Durum germplasm will be crossed with stable bread wheat lines/varieties. Fifty crosses/back crosses will be developed.

### **PREVIOUS YEAR'S RESULTS**

Fifty nine crosses were attempted out of these 53 crosses were harvested

**17. TITLE****STUDY OF FILIAL GENERATIONS (F<sub>1</sub>-F<sub>7</sub>).****OBJECTIVES**

- To advance the generations.
- To select the vigorous and disease resistant plants from segregating generations F<sub>2</sub>-F<sub>7</sub>.
- To select the homozygous and uniform lines for yield Testing

**TREATMENTS & METHODOLOGY**

Sr. No.	Generations	No. of entries	Plot size
1	DF <sub>1</sub>	53	1 row x 2.5m
2	DF <sub>2</sub>	30	12 rows x 9.0m
3	DF <sub>3</sub>	16	3 rows x 3.0m
4	DF <sub>4</sub>	39	3 rows x 3.0m
5	DF <sub>5</sub>	15	3 rows x 3.0m
6	DF <sub>6</sub>	240 S.H (12 Crosses)	1 row x 2.5m
7	DF <sub>7</sub>	45 SHRP	4 rows x 3.0m

## PREVIOUS YEAR'S RESULTS

Following entries were selected:

Sr. #	Generations	Entries Studied	Entries Selected
1	DF <sub>1</sub>	48	30
2	DF <sub>2</sub>	28	16
3	DF <sub>3</sub>	76	39
4	DF <sub>4</sub>	19	15
5	DF <sub>5</sub>	15	240 S.H (12 Crosses)
6	DF <sub>6</sub>	273 SHR	45 SHRP
7	DF <sub>7</sub>	44	19

Nineteen lines from DF<sub>7</sub> were promoted to preliminary yield trial.

**18. TITLE****EVALUATION OF INTERNATIONAL YIELD TRIALS OF (CIMMYT/ICARDA) DURUM WHEAT****OBJECTIVES**

To evaluate the CIMMYT material for incorporation in yield trials

**TREATMENTS & METHODOLOGY**

<b>Trial/Nurseries</b>	<b>Source</b>
<b>IDYT &amp; IDON</b>	ICARDA
<b>IDSN &amp; IDYN</b>	CIMMYT

## PREVIOUS YEAR'S RESULTS

Nine out of 54 lines of 47<sup>th</sup> International Durum Yield Nursery were selected on the basis of yield performance and resistance against diseases.

Entry No.	Yield (kg ha <sup>-1</sup> )	% increase over Durum – 97
701	3815	26.96
741	3726	23.99
724	3632	20.87
Durum-97 (Check)	3005	

39<sup>th</sup> International Durum Yield Trial was received from ICARDA. In this trial, 7 out of 24 lines were selected on the basis of yield performance

Entry No.	Yield (kg ha <sup>-1</sup> )	% increase over Durum - 97
17	3202	26.66
12	2942	16.38
3	2849	12.70
Durum-97 (Check)	2528	

## 19. TITLE

## PRELIMINARY DURUM WHEAT YIELD TRIAL (DA-TRIALS)

### **OBJECTIVES**

To evaluate the genotypes for yield and other agronomic parameters under irrigated conditions.

### **TREATMENTS & METHODOLOGY**

Entries = 45

Check varieties =3 (Durum-97, Wadanak-85 and Galaxy-13)

Layout = alpha lattice

Reps = 3

### **PREVIOUS YEAR'S RESULTS**

13 advanced lines (out of 47) of durum wheat were found high yielding than check varieties Wadanak-85 and Durum-97 in their respective trials.

## PREVIOUS YEAR'S RESULTS

Variety Code	Yield (kg ha <sup>-1</sup> )	Percentage Increase over check varieties		
<b>DA-I</b>		<b>Galaxy-13</b>	<b>Wadanak-85</b>	<b>Durum-97</b>
D-15707	3757	-13.0	-9.0	4.6
D-15708	3741	-13.3	-9.4	4.1
LSD (0.05)	210	CV (%)	3.65	
<b>DA-II</b>		<b>Galaxy-13</b>	<b>Durum-97</b>	<b>Wadanak-85</b>
D-15728	4506	10.9	34.8	38.9
D-15729	3937	-3.1	17.8	21.3
D-15730	3909	-3.8	17.0	20.5
D-15718	3733	-8.1	11.7	15.0
D-15722	3630	-10.6	8.6	11.9
D-15717	3597	-11.4	7.6	10.8
D-15716	3506	-13.7	4.9	8.0
LSD (0.05)	228	CV (%)	3.87	
<b>DA-III</b>		<b>Galaxy-13</b>	<b>Wadanak-85</b>	<b>Durum-97</b>
D-15736	4337	-6.0	2.6	22.0
D-15735	4292	-7.0	1.6	20.7
LSD (0.05)	246	CV (%)	4.05	

**OBJECTIVES**

To evaluate the promising lines of durum wheat selected from preliminary yield trials for yield and other agronomic parameters under irrigated conditions.

**TREATMENTS & METHODOLOGY**

Entries = 24

Check varieties =3 (Durum-97, Wadanak-85 and Galaxy-13)

Layout = alpha lattice

Reps = 3



## PREVIOUS YEAR'S RESULTS

One advanced line of durum wheat was found higher yielding than all three check varieties.

Variety Code	Yield (kg ha <sup>-1</sup> )	Percentage Increase over check varieties		
DB-I		Galaxy-13	Wadanak-85	Durum-97
D-14707	4617	3.1	12.3	27.3
D-14723	4246	-5.2	3.3	17.1
D-14717	4235	-5.4	3.0	16.8
D-14705	4185	-6.5	1.8	15.4
LSD (0.05)	216			
CV (%)	3.36			

**21. TITLE****PUNJAB UNIFORM DURUM YIELD TRIALS (PUDYT).****OBJECTIVES**

To assess the yield performance and adaptability of promising durum lines at Govt. farms in different ecological zones of the Punjab.

**TREATMENTS & METHODOLOGY**

<b>Locations</b>	<b>Entries</b>	<b>Sowing time</b>
5	12	2 <sup>nd</sup> week of Nov.
Layout	RCBD	
Plot size	1.20 m x 5 m	
Replication	03	
Fertilizer	120-90-0 NPK kg ha <sup>-1</sup>	

**PREVIOUS YEAR'S RESULTS**

<b>Variety/line</b>	<b>Yield (kg ha<sup>-1</sup>)</b>
D-13208	3860
D-13202	3650
D-13219	3632
Durum.97	3597

**BARLEY**

*(Hordeum vulgare)*

## 22. TITLE

# MAINTENANCE AND IMPROVEMENT OF BARLEY GERMPLASM

## OBJECTIVES

- To conserve existing genetic variability and broaden the base of genetic diversity
- To combine high yield, tolerance to biotic & abiotic stresses, quality and other desirable characteristics.

## TREATMENTS & METHODOLOGY

Entries = 78

Plot size = 0.6m x 2.5m

20 crosses will be attempted

## PREVIOUS YEAR'S RESULTS

During the year, Seventy five genotypes were maintained. Two lines were rejected on the basis of poor performance and disease susceptibility

## 23. TITLE      STUDY OF FILIAL GENERATIONS (F<sub>3</sub>, F<sub>4</sub>, F<sub>5</sub> & F<sub>6</sub>) OF BARLEY

### OBJECTIVES

- To advance generations for developing homozygous lines with desirable traits.

### TREATMENTS & METHODOLOGY

Generations	Crosses	Entries	Plot size
F <sub>3</sub>	05	05	4 row x 2.5 m
F <sub>4</sub>	17	17	4 row x 2.5 m
F <sub>5</sub>	09	09	4 row x 2.5 m
F <sub>6</sub>	16	16	4 row x 2.5 m

### PREVIOUS YEAR'S RESULTS

Generations	Crosses	Entries	Plot size
F <sub>2</sub>	05	05	4 row x 2.5 m
F <sub>3</sub>	17	17	4 row x 2.5 m
F <sub>4</sub>	09	09	4 row x 2.5 m
F <sub>5</sub>	16	16	4 row x 2.5 m

## 24. TITLE PRELIMINARY BARLEY YIELD TRIALS

### OBJECTIVES

To test different lines of barley for yield and other desirable traits.

### TREATMENTS & METHODOLOGY

Entries = 30, Check varieties =1 (Haider-93), No. of Trials = 2

Layout =RCBD, Reps = 3, Plot size = 1.2m x 5m

### PREVIOUS YEAR'S RESULTS

BA1			BA2		
Rank	Line/Var.	Yield (Kg/ha.)	Rank	Line/Var.	Yield (Kg/ha.)
1	B-15029	2781	1	B-15044	2681
2	B-15024	2669	2	B-15035	2572
	Haider-93	2538	3	B-15042	2567
<b>LSD (0.05)</b>		222.40		Haider-93	2562
			<b>LSD (0.05)</b>		212.98

## 25. TITLE

## REGULAR BARLEY YIELD TRIALS

### OBJECTIVES

To test advanced lines of barley for yield and other desirable traits.

### TREATMENTS & METHODOLOGY

Entries = 15, Check varieties =1 (Haider-93)

Layout = RCBD, Reps = 3, Plot size = 1.2m x 5m

### PREVIOUS YEAR'S RESULTS

Out of 15 advanced lines, 8 produced more grain yield than check variety (Haider-93). The better performing lines are as follows

BB		
Rank	Line/Var.	Yield (Kg/ha.)
1	B-15002	2635
2	B-15010	2633
3	B-14035	2616
	Haider-93	2302
LSD (0.05)		315.13

## 26. TITLE

## PUNJAB UNIFORM BARLEY YIELD TRIAL

### OBJECTIVES

To assess yield potential of advanced lines against check variety under different agro-climatic conditions.

### TREATMENTS & METHODOLOGY

Entries = 11, Check varieties =1 (Haider-93), Layout = RCBD

Reps = 3, Plot size = 1.2m x 5m

### PREVIOUS YEAR'S RESULTS

Eleven advanced lines of barley alongwith check variety (Haider-93) were tested at different six locations of punjab and results are as under

PUBYT 2015-16		
Rank	Line/Var.	Yield (Kg/ha.)
1	B-14003	3052
2	B-09006	3014
3	B-14011	2973
	Haider-93	2728



**27. TITLE****INTERNATIONAL NURSERIES/YIELD TRIALS****OBJECTIVES**

To test adaptability of different exotic genotypes of barley for yield and other desirable traits.

**TREATMENTS & METHODOLOGY**

Different international nurseries/yield trials will be planted as per instructions of donor agency

**PREVIOUS YEAR'S RESULTS**

<b>S. No.</b>	<b>Trial Name</b>	<b>Entries studied</b>	<b>Entries selected</b>
<b>1</b>	International Barley Observation Nursery 2015-16	139	13
<b>2</b>	Global Spring Barley Screening Nursery 2015-16	150	10
<b>3</b>	Int. Naked Barley Observation Nursery 2015-16	78	7
<b>4</b>	Global Spring Barley Yield Trial 2015-16	25	7
<b>5</b>	International Barley Yield Trial 2015-16	25	5
<b>6</b>	International Naked Barley Yield Trial 2015-16	25	1
<b>Total</b>		<b>442</b>	<b>43</b>

**OBJECTIVES**

To find out best sowing time of barley advanced lines.

**TREATMENTS & METHODOLOGY**

Entries = 11, Check varieties =1 (Haider-93), Sowing dates = 3

Layout = RCBD, Reps = 3, Plot size = 1.2m x 5m

**PREVIOUS YEAR'S RESULTS**

Eleven advanced lines of barley alongwith check variety (Haider-93) were tested at three sowing dates and results are as under

Entry Name	Yield kg/ha			
	D1	D2	D3	GM
B-14007	2999	2665	2608	2757
B-05011	2733	2716	2748	2732
B-10007	2821	2534	2237	2531
B-09008	2605	2658	2298	2521
Haider-93	2625	2194	2185	2335

**CD1 for sowing dates 98, for varieties 125 and for interaction 227**

## 29. TITLE

## BARLEY RAINFED YIELD TRIAL

### OBJECTIVES

To test different lines/varieties of barley for yield potential and other desirable traits in rainfed conditions

### TREATMENTS & METHODOLOGY

Entries =15, Check varieties =1 (Haider-93), Layout = RCBD, Reps = 3, Plot size = 1.2m x 5m

### PREVIOUS YEAR'S RESULTS

Nine out of fifteen lines produced more grain yield than check variety and better performing lines are as follows

Rank	Line/Var.	Yield Normal (Kg/ha.)	Yield Rainfed (Kg/ha.)	Average Yield
1	B-15018	2981	2604	2793
2	B-05011	2977	2544	2761
3	B-12025	2758	2541	2649
	Haider-93	2696	2226	2461

# 30. TITLE SEED PRODUCTION OF BARLEY VARIETIES AND ADVANCED LINES

## OBJECTIVES

To produce pure seed of barley varieties/lines for experimental use and farmers

## TREATMENTS & METHODOLOGY

Barley varieties and advanced lines will be sown as per needs of next year planting.

## PREVIOUS YEAR'S RESULTS

Sr. No.	Var./lines	Quantity (kg)	Sr. No.	Var./lines	Quantity (kg)
1	B-09006	210	11	Haider-93	20
2	B-05011	124	12	B-15002	11
3	B-09008	122	13	B-14003	12
4	B-10007	10	14	B-14024	11
5	B-10008	12	15	B-15029	10
6	Aus-2	9	16	B-14035	9
7	B-09005	9	17	B-15035	9
8	11001	10	18	B-15042	10
9	Jau-83	12	19	B-15044	9
10	Jau-87	12	20	B-15010	10

# **AGRONOMIC STUDIES**

# 31. TITLE EFFECT OF CLIMATE CHANGE ON SOWING TIME OF WHEAT CROP

## OBJECTIVES

To determine the shift in sowing time of wheat under changing climatic scenario.

To explore optimum sowing time of promising lines of wheat.

## TREATMENTS & METHODOLOGY

<b>Varieties/Advanced lines = 12</b>	<b>Date of sowing = 07</b>
V <sub>1</sub> = Faisalabad- 08	D <sub>1</sub> = 1 <sup>st</sup> November
V <sub>2</sub> = Punjab-11	D <sub>2</sub> = 10 <sup>th</sup> November
V <sub>3</sub> = Millat-11	D <sub>3</sub> = 20 <sup>th</sup> November
V <sub>4</sub> = Galaxy-13	D <sub>4</sub> = 30 <sup>th</sup> November
V <sub>5</sub> = V-12304	D <sub>5</sub> = 10 <sup>th</sup> December
V <sub>6</sub> = V-12066	D <sub>6</sub> = 20 <sup>th</sup> December
V <sub>7</sub> = V-13348	D <sub>7</sub> = 30 <sup>th</sup> December
V <sub>8</sub> = V-14154	
V <sub>9</sub> = V-14225	<b>Fertilizer = 120-90-60 NPK kg ha<sup>-1</sup></b>
V <sub>10</sub> = V-14227	<b>Seed Rate: 100 kg ha<sup>-1</sup></b>
V <sub>11</sub> = V-14168	<b>Layout = RCBD</b>
V <sub>12</sub> = V-14170	<b>Reps = 3</b>

## PREVIOUS YEAR'S RESULTS

Advanced lines/ Varieties	1 <sup>st</sup> Nov.	10 <sup>th</sup> Nov.	20 <sup>th</sup> Nov.	30 <sup>th</sup> Nov.	10 <sup>th</sup> Dec.	20 <sup>th</sup> Dec.	30 <sup>th</sup> Dec.	Mean
<b>Fsd-08</b>	5137	4894	4105	3992	3443	2905	2548	3860 efg
<b>Punjab-11</b>	4911	4654	4499	4150	3728	3275	2905	4017 cde
<b>Galaxy-13</b>	5391	5631	4829	3793	3131	2630	2438	3978 cdef
<b>Ujala-16</b>	4949	4705	3882	3560	3525	3392	2908	3846 fg
<b>V-11098</b>	5230	5151	4681	4177	4078	3704	3045	4295 ab
<b>V-12066</b>	4695	4822	4383	3844	4112	3419	3203	4068 cd
<b>V-12120</b>	5213	4921	3954	3652	3762	3371	2661	3933 defg
<b>V-12304</b>	5278	4935	4835	4136	4143	3577	3179	4297 a
<b>V-13005</b>	5566	4448	4588	4438	4287	3529	3265	4303 a
<b>V-13016</b>	4794	4609	4126	3587	3683	2816	2860	3782 g
<b>V-13372</b>	5151	5295	4612	4174	3491	2939	2257	3988 cdef
<b>NR-456</b>	4853	4352	4276	4215	4012	3985	3210	4129 bc
<b>Mean</b>	5097 a	4868 b	4398 c	3976 d	3783e	3295f	2873g	

**Cd<sub>1</sub> for sowing dates 153.37, for varieties 166.13 and for interaction 439.55**

**32. TITLE****RESPONSE OF SEED RATE ON GRAIN YIELD OF WHEAT ADVANCED LINES****OBJECTIVE**

To determine optimum seed rate of advanced lines of wheat

**TREATMENTS & METHODOLOGY**

<b>A) Varieties/Lines = 08</b>	<b>B) Seed Rate (kg ha<sup>-1</sup>) = 4</b>
V <sub>1</sub> = Fsd-08	S <sub>1</sub> = 75
V <sub>2</sub> = V-13348	S <sub>2</sub> = 100
V <sub>3</sub> =V-14154	S <sub>3</sub> = 125
V <sub>4</sub> = V-14225	S <sub>4</sub> = 150
V <sub>5</sub> = V-14227	
V <sub>6</sub> = V-14168	
V <sub>7</sub> = V-14170	
V <sub>8</sub> = V-12066	
<b>Plot size</b> = 1.62m x 5m	<b>Fertilizer</b> = 120-90-60 NPK (kg ha <sup>-1</sup> )
<b>Layout</b> = Split plot design	
<b>Reps</b> = 3	
<b>Sowing time</b> =1 <sup>st</sup> fortnight of Nov.	



## PREVIOUS YEAR'S RESULTS

### Grain yield (kg ha<sup>-1</sup>)

Advanced lines/ Varieties	Seed rate (kg ha <sup>-1</sup> )				Mean
	75	100	125	150	
Fsd-08	4235	4458	4372	4475	4385ab
Galaxy-13	3937	4630	4194	4023	4196 b
V-11098	4287	4417	4054	4040	4199 b
V-12304	3865	4585	4331	4242	4256 b
V-12066	3992	4465	4420	4119	4249 b
V-12120	3491	3762	3632	3282	3542 c
V-13005	3947	4901	4602	4513	4491 a
V-13372	3981	4599	4376	4270	4306ab
Mean	3967 c	4477 a	4248 b	4120bc	

**Cd<sub>1</sub> for varieties 218.30, for seed rates 198.69 and for V × S 533.25**

**33. TITLE****EFFECT OF DIFFERENT LEVELS OF FERTILIZER  
ON GRAIN YIELD OF WHEAT****OBJECTIVE**

To explore optimum fertilizer requirement of advanced lines of wheat

**TREATMENTS & METHODOLOGY**

<b>A) Varieties/Lines = 08</b>	<b>NPK (kg ha<sup>-1</sup>)</b>
V <sub>1</sub> = Fsd-08	Level 1 = 0 – 0 – 0
V <sub>2</sub> = V-13348	Level 2 = 90 – 60 – 60
V <sub>3</sub> =V-14154	Level 3 = 120-90-60
V <sub>4</sub> = V-14225	Level 4 = 150 – 120 – 60
V <sub>5</sub> = V-14227	
V <sub>6</sub> = V-14168	
V <sub>7</sub> = V-14170	
V <sub>8</sub> = V-12066	
<b>Plot size = 1.62m x 6m</b>	<b>Seed Rate: 100 kg ha<sup>-1</sup></b>
<b>Sowing date = 1<sup>st</sup> fortnight of Nov</b>	
<b>Layout = Split plot design</b>	
<b>Reps = 03</b>	

## PREVIOUS YEAR'S RESULTS

### Grain yield (kg ha<sup>-1</sup>)

Advanced lines/ Varieties	Fertilizer levels NPK (kg ha <sup>-1</sup> )				Mean
	L1 0-0-0	L2 120-90-60	L3 120-114-60	L4 160-171-60	
Fsd-08	3543	3762	4067	3813	3796ab
Galaxy-13	3735	4194	4026	3748	3926 a
V-11098	3827	3903	3707	3601	3759abc
V-12304	3121	4091	4102	3577	3723abc
V-12066	3148	3992	3690	3666	3624bc
V-12120	3083	4153	3525	3244	3501 c
V-13005	2836	4369	4348	4026	3895ab
V-13372	2994	4191	4036	3848	3767abc
Mean	3286 c	4082 a	3938 a	3690 b	

**Cd<sub>1</sub> for varieties 286.10, for Fertilizer rates 169.74 and for V × F 560.73**

## 34. TITLE

# EFFECT OF CLIMATE CHANGE ON IRRIGATION SCHEDULING OF WHEAT

## OBJECTIVE

To determine the proper stage of crop and optimum requirement of water for yield enhancement.

## TREATMENTS & METHODOLOGY

### Treatments

T<sub>1</sub> = no irrigation

T<sub>2</sub> = 1 irrigation (at crown root stage)

T<sub>3</sub> = 2 irrigations (1st at crown root and 2nd at booting)

T<sub>4</sub> = 2 irrigations (1st at crown root and 2nd at heading)

T<sub>5</sub> = 2 Irrigations (1st at crown root and 2nd at grain filling)

T<sub>6</sub> = 3 irrigations (1st at crown root, 2nd at booting and 3rd at heading)

T<sub>7</sub> = 3 Irrigations (1<sup>st</sup> at crown root, 2<sup>nd</sup> at booting and 3rd at grain filling)

T<sub>8</sub> = 3 Irrigations (1st at crown root , 2<sup>nd</sup> at heading and 3rd grain filling)

T<sub>9</sub> = 4 irrigations (1st at crown root , 2nd at booting, 3rd at heading and 4th at grain filling)

T<sub>10</sub> = 5 irrigations (1st at crown root , 2nd at stem elongation, 3rd at booting, 4th at heading and 5th at grain filling)

Variety = Galaxy-13      Plot size=1.62m x 6m, Seed rate = 100 kg ha<sup>-1</sup>

Layout = RCBD with 3 replications

## PREVIOUS YEAR'S RESULTS

Treatments	Mean yield (kg ha <sup>-1</sup> )
T <sub>1</sub> = no irrigation	2863 e
T <sub>2</sub> = 1 irrigation (at crown root stage)	3780 d
T <sub>3</sub> = 2 irrigations (1st at crown root and 2nd at booting)	4100 bcd
T <sub>4</sub> = 2 irrigations (1st at crown root and 2nd at heading)	4053 cd
T <sub>5</sub> = 2 Irrigations (1st at crown root and 2nd at grain filling)	4211 bcd
T <sub>6</sub> = 3 irrigations (1st at crown root, 2nd at booting and 3rd at heading)	4558 ab
T <sub>7</sub> = 3 Irrigations (1st crown root, 2 <sup>nd</sup> at booting and 3rd at grain filling)	4702 a
T <sub>8</sub> = 3 Irrigations (1st at crown root , 2 <sup>nd</sup> at heading and 3rd grain filling)	4448 abc
T <sub>9</sub> = 4 irrigations (1st at crown root , 2nd at booting, 3rd at heading and 4th at grain filling)	4431 abc
T <sub>10</sub> = 5 irrigations (1st at crown root , 2nd at stem elongation, 3rd at booting, 4th at heading and 5th at grain filling)	4369 abc
LSD (0.05) = 464.71	

# **PATHOLOGICAL STUDIES**

## **35. TITLE INVESTIGATION ON NEWLY EMERGING FOLIAR DISEASES OF WHEAT UNDER CHANGING CLIMATIC CONDITIONS**

### **OBJECTIVES**

- To determine the prevalence/status of newly emerging foliar diseases of wheat like blast, foliar blight, fusarium head blight in different agro ecological zones of Punjab & its correlation with environmental factors .

### **TREATMENTS & METHODOLOGY**

- The survey will be conducted in two phase
  - 1<sup>st</sup> Phase pre harvest (Last week of Feb to Last week of March) &
  - 2<sup>nd</sup> Phase after harvest (Mid April to Mid May)
- Infected wheat leaf/spike/seed samples will be collected from lines of PWYT and NUWYT throughout the Punjab.
- These samples would be analyzed in Pathology Lab. to identify the pathogens
- Environmental data will be correlated with identified disease.

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

## 36. TITLE

## DISEASE TRAP NURSERIES.

### OBJECTIVES

- To trap the early landed rust inoculums and its multiplication.
- To monitor the rust virulence pattern at different locations.
- To observe the blast symptoms on foliar part of plant especially head/spike.

### TREATMENTS & METHODOLOGY

<b>No. of entries</b>	LR Differentials = 40 YR Differentials = 28 SR Differentials = 16 Commercial Varieties/lines = 150
<b>Check</b>	Morocco at border and every 10 <sup>th</sup> entry
<b>Sowing Date</b>	Mid November to Mid December
<b>Plot Size</b>	2 rows x 2 m
<b>Assessment Scale</b>	Rust data will be recorded on Modified Cobb's Scale.



## PREVIOUS YEAR'S RESULTS

- Leaf rust was trapped on 28-11-2015 while yellow rust on 21-01-2016 in 1<sup>st</sup> trap nursery.
- The results regarding virulence pattern are given in Table.

<b>The isogenic lines showed resistant response to leaf and stripe.</b>	
Isogenic lines for LR	Lr 19, Lr 25, Lr 27 +31, Lr 28, Lr 29, Lr 35, Lr 36, Lr 37 and Lr 23+Gaza
Isogenic lines for YR	Yr 5, Yr 10, Yr 15, Yr 24, Yr 26, Yr 28 and YrCV
Isogenic lines for SR	none of the tested entries showed the symptoms of stem rust during 2015-16.

## 37. TITLE

# ESTABLISHMENT OF HOST RESISTANCE (RUSTS) PRE-BREEDING NURSERY

## OBJECTIVES

- To identify the designated durable rust resistant genes i.e. LR34/YR18, LR46/YR29 as well as SR2/YR30 on the basis of phenotypic markers i.e. Ltn1, Ltn2 & Pseud black chaff.
- To strengthen the rust resistant breeding program.

## TREATMENTS & METHODOLOGY

No. of entries	<ul style="list-style-type: none"><li>• 9<sup>th</sup> and 10<sup>th</sup> Stem Rust Resistance Nursery = 104</li><li>• 5<sup>th</sup> and 6<sup>th</sup> Baseline resistance study = 359</li></ul>
Check	Morocco at border and every 10 <sup>th</sup> entry
Sowing Date	Mid of November
Plot Size	2 rows x 2 m
Observations	<ul style="list-style-type: none"><li>• Rust data will be recorded on Modified Cobb's Scale.</li><li>• Morphological markers i.e. Ltn1, Ltn2 &amp; Pseud black chaff will be used for the identification of resistant genes i.e. LR34, LR46 &amp; SR2 respectively</li><li>• All the entries will be evaluated for important agronomic parameters.</li></ul>

## PREVIOUS YEAR'S RESULTS

Parameters	No of entries
Pseudo black chaff	14
Leaf tip necrosis	42
Leaf Rust	243
Yellow rust	452
Low infection type	201

### Entries showing presence of slow rusting genes on the basis of morphological markers

Morphological Markers	Lines/Varieties
Leaf tip necrosis (Ltn)	6119, 6130, 6137, 6142, 6143, 6147, 6162, 6163, 6164, 6208, 6232, E-1, E-10, E-12, E-16, E-50, E-52, E-58, E-68, E-71, E-75, E-76, E-95, E-99, E-101, E-116, E-131, E-136, E-148, E-161, E-162, E-170, E-175, E-181, E-187, E-206, E-216, E-217, E-219, E-228, E-261, & E-274
Pseudo black chaff (Pbc)	6067, 6163, 6191, 6208, 6213, 6222, E-76, E-132, E-136, E-144, E-153, E-164, E-206 & E-253

**38. TITLE****SCREENING OF WHEAT AND BARLEY ADVANCED LINES/VARIETIES AGAINST RUSTS AT DIFFERENT LOCATIONS****OBJECTIVES**

To screen advanced lines of wheat and barley against leaf, yellow and stem rusts at adult stage.

**TREATMENTS & METHODOLOGY:**

<b>No. of entries</b>	<b>500</b>
<b>Susceptible Check</b>	Morocco at boarder & at every 10 <sup>th</sup> entry
<b>Sowing Date</b>	2 <sup>nd</sup> and 3 <sup>rd</sup> week of November
<b>Plot Size</b>	1 row x 2 m
<b>Rust</b>	<ul style="list-style-type: none"><li>• At adult plant stage</li></ul>
<b>Assessment date (s)</b>	<ul style="list-style-type: none"><li>• 2<sup>nd</sup> and 4<sup>th</sup> week of March</li></ul>

## PREVIOUS YEAR'S RESULTS

All the test entries were free from stem rust, however,

among tested entries,

- seventy nine entries showed susceptible reaction to leaf rust
- sixty nine showed susceptibility to yellow rust
- while, eighteen entries showed susceptible reaction to both rusts (YR & LR).

Moreover, the entry showing rust rating up to 30 MRMS under stress condition was promoted / selected for further evaluation.

## **39. TITLE**

# **EVALUATION OF ADVANCED LINES/VARIETIES FOR SEEDLING AND ADULT PLANT RESISTANCE TO LEAF RUST**

## **OBJECTIVES**

- To identify rust resistant genes in advanced lines/varieties of wheat.

## **TREATMENTS & METHODOLOGY**

### **For Seedling Study**

- The seed of different lines/varieties will be sown in pots.
- After 7-9 days of germination, the plants will be inoculated with leaf rust.
- The inoculated plants will be kept in dew chamber at 15-20 °C and 100 % relative humidity for 12 hours and then shifted into glass house.
- After 14-16 days of inoculation, scoring will be done for leaf rust.

### **For Adult Plant Study**

- Inoculation of rust to create artificial epidemic conditions will be done in field.
- Rust data will be recorded twice at adult plant stage.

### **For Molecular Study**

- Molecular markers will be applied for gene identification.

## PREVIOUS YEAR'S RESULTS

Among test entries,

- The eighteen entries i.e. V-13016, V-12120, V-14154, V-HYT80-44, V-13348, CDRI-PV-2, 9496, 14CO36, UOS-1, V-14170, 14B1030, V-14225, NR-487, 12FJ-26, V-14168, V-14152, CDRI-SA, and NW-1-9-47 showed low infection type (score 0, ; ,1 & 2) at seedling stage.
- While the fifteen entries i.e. V-11098, V-12304, V-13005, V-13016, V-14154, TWS12155, V-13348, V-14B1028, V-13167, 9496, 14CO36, 12FJ-26, V-14168, TWS112464, and V-14154 showed resistant to moderately resistant response in field.
- The lines, which showed the resistant to moderately resistant response in field and high infection type at seedling stage indicates the presence of APR genes.

## 40. TITLE

# SCREENING OF ADVANCED WHEAT MATERIAL AGAINST KARNAL BUNT (*Tilletia indica*).

## OBJECTIVES

- To identify bunt resistant material for utilization in hybridization program.

## TREATMENTS & METHODOLOGY

- Advanced lines/varieties of wheat will be tested under inoculated condition in the field.
- The trial will be sown in two different sowing dates in order to minimizing the chances of disease escape (1<sup>st</sup> set during 2<sup>nd</sup> week of Nov. & 2<sup>nd</sup> set during 2<sup>nd</sup> week of Dec. )
- Each entry will be sown in single row of 1 m.
- The inoculum will be prepared and spore suspension will be injected by Syringe method to 10 heads of each variety at boot stage.
- Disease incidence and severity of each spike will be recorded according to the scale of Augil *et al.*, (1989).



## PREVIOUS YEAR'S RESULTS

### Reaction of various varieties/lines of wheat against Karnal Bunt

Scale	Reaction	No. of lines/varieties	No. of Entries
0	HR	V-13372, V-12066, V-14227, 12FJ01, CDRI-pv-1, 14B1028, NR453, FSD-08, 14B1030, NR443, 13BT034, CDRI-SA, 12B2511, UJALLA-16, MILLAT-11 & SEHER-06	16
1	R	V-13016, V-12120, CDRI-PV-2, 14CO36, GALAXY-13, NR457, TWS-112464, V-13325, SHAFaq-06 & MH-97	10
3	MR	TWS12155, 11FJS-309, 13BT016, NW-1-9-47, AARI-11, AaS-11, LASSANI-08, UQAB 2000 & INQILAB-91	9
5	MS	V-11098, V-13167, V-13338, V-13348, V-14152, V-14225, UOS-2, HYT-80-44, V-14152, 13BT017, 14CO040, UOS-1, GANDUM-4, 12FJ-26, WATTAN, PASSBAN-90, BLUE SILVER & PAK-81	18
7	S	V-12304, V-14168, V-14170, HYT-08-07, HYT-80-34, 13B3146, 9496, NR-487, TWS-12-245, Punjab-11, Fsd-08 & Lyalpur-73	12
9	HS	V-13005, V-14151, V-14153, V-14154 & AS-02	05
Total			70

## **41. TITLE SURVEY OF KARNAL BUNT AND BLACK POINT OF WHEAT**

### **OBJECTIVES**

- To find out the prevalence of karnal bunt and black point diseases in different agro ecological zones of Punjab.

### **TREATMENTS & METHODOLOGY**

- Grain samples (250 grams each) will be collected from lines of MWYT and NUWYT throughout the Punjab.
- These samples would be analyzed in Wheat Pathology Lab.
- The disease prevalence of karnal bunt and black point diseases will be recorded on the basis of following formula;

**Disease prevalence (%age) = No. of infected samples / total X 100**

## PREVIOUS YEAR'S RESULTS

Locations	Infected Samples							
	NUWYT (out of 50 samples)				PWYT (out of 44 samples)			
	Karnal Bunt		Black Point		Karnal Bunt		Black Point	
	Infected	Prevalence (%)	Infected	Prevalence (%)	Infected	Prevalence (%)	Infected	Prevalence (%)
Kot Nina	08	16	37	74	09	18	28	56
K.S. Kaku	01	2	24	48	08	16	10	20
R.Khurd	01	2	26	52	0	0	16	32
Gujjarwala	0	0	0	0	0	0	0	0
Khannewal	0	0	12	24	0	0	16	32
Karoor	0	0	08	16	05	10	22	44
Kaloor Kot	0	0	09	18	0	0	11	22
Sahiwal	0	0	11	22	0	0	16	32
Faisalabad	0	0	07	14	0	0	06	12
Sargodha	0	0	23	46	0	0	08	16
Pakpattan	02	4	16	32	0	0	13	26
Bahwalnagar	03	6	09	18	03	6	09	18
<b>Total</b>	15	2.5 %	182	30 %	25	4.16 %	155	25.83 %

**Note: Disease prevalence (%age) = No. of infected samples/total X 100**

# **WHEAT ENTOMOLOGY**

## **42. TITLE**

# **EFFECT OF DIFFERENT CLIMATIC FACTORS ON APHID POPULATION IN WHEAT CROP**

## **OBJECTIVES**

To know the population intensities of wheat aphid in relation to climatic factors.

## **TREATMENTS & METHODOLOGY**

Three Moericke Yellow water tray traps will be installed at 200ft distance in three different fields of wheat crop at the height of 75cm from the ground level. Daily alate aphid population will be recorded from three Moericke yellow traps and later on data will be transformed into weekly basis. The weekly counts of trapped alate aphids will be correlated with climatic factors by taking average aphid population throughout the season

## PREVIOUS YEAR'S RESULTS

		January,2016						
<b>1<sup>st</sup> week</b>	22.5	7.4	87.2	50.8	0	0	0	<b>4.52</b>
<b>2<sup>nd</sup> week</b>	19.47	8.07	90.5	65.75	1	6.5	2	<b>5.45</b>
<b>3<sup>rd</sup> week</b>	12.85	6.57	88.5	77.6	0	0	7	<b>6.21</b>
<b>4<sup>th</sup> week</b>	16.9	5.8	93.0	67.1	2	5.7	5	<b>7.37</b>
		February,2016						
<b>1<sup>st</sup> week</b>	23.3	6.0	83.2	39.2	0	0	0	<b>10.90</b>
<b>2<sup>nd</sup> week</b>	21.7	15.6	86.5	46.2	1	0	2	<b>31.38</b>
<b>3<sup>rd</sup> week</b>	24.18	6.7	73.2	46.2	2	5.8	0	<b>55.0</b>
<b>4<sup>th</sup> week</b>	<b>28.6</b>	<b>11.2</b>	<b>81.6</b>	<b>42.6</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>157.1</b>

## PREVIOUS YEAR'S RESULTS

		March, 2016						
<b>1<sup>st</sup> week</b>	19.18	9.7	87.7	69.2	5	30.5	1	<b>1452.76</b>
<b>2<sup>nd</sup> week</b>	23.4	10.5	84.5	56.5	2	27.0	0	<b>395.54</b>
<b>3<sup>rd</sup> week</b>	27.75	13.8	84.1	52.6	1	1.2	0	<b>102.37</b>
<b>4<sup>th</sup> week</b>	30.61	17.0	75.7	51.2	1	0	0	<b>63.71</b>
		April, 2016						
<b>1<sup>st</sup> week</b>	<b>28.36</b>	<b>19.4</b>	<b>57.5</b>	<b>43.2</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>17.0</b>

## **43. TITLE VARIETAL SCREENING OF WHEAT AGAINST APHID IN RELATION TO CLIMATIC AND BIOTIC FACTORS**

### **OBJECTIVES**

- To evaluate the wheat varieties / advance lines against aphids.
- To determine correlation of aphids with predators

### **TREATMENTS & METHODOLOGY**

The trial will be conducted in RCB Design having 3 repeats with plot size 5m x 1.8m.

The data regarding aphids, *Coccinellids*, *chrysoperla* and *syrphid* fly will be recorded during the month of march, 2016 till crop maturity at 10 day interval per tiller and plant basis for aphid and predators, respectively by selecting randomly 10 tiller/ plants per plot.

Varieties/ lines will be screened out by taking average aphid population throughout the season.



## PREVIOUS YEAR'S RESULTS

Average population of aphid per tiller	No of lines	Average population of aphid per tiller	No of lines
0-5	1	36-45	12
6-10	17	46-55	4
11-15	194	56-65	9
16-25	203	66-75	20
26-35	26	76-85	21

## **44. TITLE**

# **MASS SCREENING OF WHEAT GERmplasm AGAINST APHIDS**

## **OBJECTIVES**

To find out resistant/ tolerant varieties/lines against aphid attack.

## **TREATMENTS & METHODOLOGY**

The data will be recorded on 10 days interval from 10 randomly selected tillers on each lines/variety especially during the month of March,2016

## PREVIOUS YEAR'S RESULTS

Sr. No.	Varieties	Aphid population / tiller
1	Faisalabad-08	23.167 E
2	Punjab-11	31.397 D
3	Galaxy-13	30.490 D
4	Ujala -16	33.357 CD
5	V-11098	33.320 CD
6	V-12066	36.043 BCD
7	V-12120	49.143 A
8	V-12304	43.420 AB
9	V-13005	46.023 AB
10	V-13016	37.710 BCD
11	V-13372	42.837 ABC
12	NR-456	44.590 AB
LSD Value		2.074

## **45. TITLE**

# **SURVEY OF APHID POPULATION ON WHEAT CROP IN DIFFERENT CLIMATIC ZONES OF THE PUNJAB DURING FEBURARY TO MARCH**

## **OBJECTIVE**

To find out the occurrence and fluctuation of aphids population on wheat crop in different climatic zones of the Punjab

## **TREATMENTS & METHODOLOGY**

Aphid population and their predators will be recorded from different wheat varieties sown in different ecological zones per tiller / plant basis, respectively.

The data will be recorded during the month of February and March, 2017

## PREVIOUS YEAR'S RESULTS

Sr. No.	Varieties	Aphid population / tiller
1	Fsd.08	14.27
2	Lasani.08	16.73
3	Galaxy.13	15.33
4	Punjab.11	15.73
5	Ujalla.16	14.73
6	Millat.11	14.4
7	Seher.03	14.87

On the whole more aphid population on Lasani-08(16.73) and less on Fsd-08(14.27) per tiller in the Punjab.

# SEED PRODUCTION

## **46. TITLE**

# **PRODUCTION OF BREEDERS NUCLEUS SEED OF WHEAT ADVANCED LINES AND VARIETIES**

## **OBJECTIVES**

- To maintain true to type seed of bread/durum wheat varieties.
- To obtain the phenotypic stability of advanced wheat lines.

## **TREATMENTS & METHODOLOGY**

40-200 single heads of all commercial varieties and elite lines will be planted in 2.5 meters long row.

Head rows of each commercial variety will be observed at different stages of plant development.

Head rows deviating from the original variety will be discarded.

Uniform vigorous head rows will be harvested and threshed separately for further study as head rows progenies

## PREVIOUS YEAR'S RESULTS

Sr. No.	Varieties/ lines	No. of heads	Sr. No.	Varieties/ lines	No. of heads
1.	Punjab-11	160	18.	V-13016	40
2.	Millat-11	160	19.	V-13167	40
3.	AARI-11	40	20.	V-13325	40
4.	Faisalabad-08	80	21.	V-13338	40
5.	Lasani-08	40	22.	V-13348	40
6.	Pasban-90	40	23.	V-13372	40
7.	Uqab-2000	40	24.	V-14151	40
8.	Galaxy-13	160	25.	V-14152	40
9.	Ujalla-16	160	26.	V-14153	40
10.	V-11098	160	27.	V-14154	40
11.	V-11160	160	28.	V-14168	40
12.	V-12001	80	29.	V-14170	40
13.	V-12066	80	30.	V-14225	40
14.	V-12120	80	31.	V-14227	40
15.	V-12304	160	32.	HYT-08-7	40
16.	V-13001	80	33.	HYT-08-34	40
17.	V-13005	80	34.	HYT-08-44	40



**47. TITLE PRE-BASIC SEED PRODUCTION OF BREAD AND DURUM WHEAT CULTIVARS AND ADVANCED LINES.**

**OBJECTIVES**

To produce pure seed of commercial wheat cultivars/ lines for supplying to the Punjab Seed Corporation and Private Seed Companies

**TREATMENTS & METHODOLOGY**

Two to four kanals of 10 cultivars/lines will be sown using seeds of selected head rows for head row progeny. Each single head row progeny will be planted 24m x 1.65m and field will be inspected at different stages of plant growth.

## PREVIOUS YEAR'S RESULTS

Sr. No.	Varieties	kg	Sr. No.	Varieties	kg
1.	Faisalabad-08	500	5.	Punjab-11	500
2.	Lasani-08	200	6.	Galaxy-13	585
3.	AARI-11	100	7.	Ujalla-16	800
4.	Millat-11	280	8.		

## 48. TITLE SEED PRODUCTION OF BREAD AND DURUM WHEAT CULTIVARS AND ADVANCED LINES

### OBJECTIVES

To produce pure seed of commercial wheat cultivars/lines for farmers

### TREATMENTS & METHODOLOGY

One to four acres of the following cultivars will be sown

Sr. No.	Varieties	Sr. No.	Varieties
1.	Punjab-11	8.	V-12304
2.	Faisalabad-08	9.	V-12066
3.	Lasani-08	10.	V-14225
4.	Galaxy-13	11	V-14227
5.	Ujalla-16	12	V-14168
6.	V-13348	13	V-14170
7.	V-14154		

## PREVIOUS YEAR'S RESULTS

Seed of following varieties/lines was produced

Sr. No.	Varieties	kg	Sr. No.	Varieties	kg
1.	Faisalabad-08	5600	6.	V-11098	1500
2.	Lasani-08	2800	7.	V-12304	1400
3.	Punjab-11	2600			
4.	Ujalla-16	5000			
5.	Galaxy-13	8100			

:

# **CEREAL TECHNOLOGY**

## 49. TITLE

# Estimation of acrylamide compound in various baked products of wheat flour

## OBJECTIVE

To determine the amount of acrylamide in various baked products

## TREATMENTS & METHODOLOGY

Wheat grains after harvest will be collected and ground into flour (using Quadramate Senior Mill) and developed into various baked products i.e. biscuits, cake and bread.

Sample preparation of these products will be done according to protocol. These samples will be run on the High Performance Liquid Chromatograph (HPLC) along with the standards of acrylamide.

Peaks of sample will be obtained and interpreted with standard peak.

New experiment

## 50. TITLE

# IMPACT OF PACKAGING MATERIAL ON QUALITY OF STORED WHEAT GRAIN

## OBJECTIVE

To determine the impact of different packaging material on quality of wheat grain during storage

## TREATMENTS & METHODOLOGY

### Selected bread wheat varieties

- Millat-11
- Punjab-11
- Galaxy-13

### Packaging Materials

- Jute bag,
- Polypropylene
- “*Grain Pro*” Super grain bag

### Storage Temperature

Room temperature

## **TREATMENT & METHODOLOGY**

### **Storage Duration**

Three months

### **Parameters to be studied (at fortnight intervals)**

- Moisture
- Protein
- Gluten
- Starch
- Alpha-amylase activity
- Water absorption
- Dough development time
- Dough stability
- Softening of dough



Quality parameter	Packaging material	Storage (days)						
		0	15	30	45	60	75	90
Moisture (%)	Jute bag	10.80	10.84	10.95	11.05	11.21	11.35	11.40
	Polypropylene bag	10.80	10.78	10.85	10.90	10.95	11.10	11.20
	Grain Pro Super grain bag	10.80	10.80	10.82	10.85	10.85	11.90	11.00
Protein (%)	Jute bag	13.90	13.78	13.65	13.51	13.41	13.35	13.21
	Polypropylene bag	13.90	13.80	13.70	13.60	13.48	13.40	13.38
	Grain Pro Super grain bag	13.90	13.90	13.85	13.82	13.79	13.75	13.74
Starch (%)	Jute bag	56.60	56.20	56.00	55.70	55.4	55.00	54.80
	Polypropylene bag	56.60	56.40	56.40	56.20	56.00	55.55	55.40
	Grain Pro Super grain bag	56.60	56.60	56.50	56.34	56.30	56.29	56.25
Gluten (%)	Jute bag	32.00	31.00	31.00	30.60	30.00	29.80	29.10
	Polypropylene bag	32.00	31.80	31.70	31.60	31.40	31.20	31.10
	Grain Pro Super grain bag	32.00	32.00	31.90	31.80	31.80	31.76	31.75

Quality parameter	Packaging material	Storage (days)						
		0	15	30	45	60	75	90
Alpha amylase activity (sec)	Jute bag	625	597	540	498	475	440	430
	Polypropylene bag	625	615	570	520	508	497	470
	Grain Pro Super grain bag	625	618	610	602	590	578	565
Water absorption (%)	Jute bag	60	57	56	54	54	52	51
	Polypropylene bag	60	58	57	56	55	54	54
	Grain Pro Super grain bag	60	60	58	58	56	56	56
Dough development time (min)	Jute bag	6.71	6.90	7.20	7.50	7.80	8.00	8.00
	Polypropylene bag	6.71	6.75	6.90	7.00	7.10	7.30	7.30
	Grain Pro Super grain bag	6.71	6.73	6.75	6.80	6.80	6.90	6.90
Dough stability (min)	Jute bag	7.80	7.68	7.52	7.40	7.22	6.85	6.55
	Polypropylene bag	7.80	7.72	7.66	7.50	7.38	7.02	6.99
	Grain Pro Super grain bag	7.80	7.76	7.65	7.58	7.48	7.40	7.40
Softening of dough (BU)	Jute bag	48	52	56	63	71	77	80
	Polypropylene bag	48	50	52	56	59	62	69
	Grain Pro Super grain bag	48	48	50	51	52	52	54

## 51. TITLE

# IMPACT OF SOWING TIME ON IRON AND ZINC CONTENTS IN WHEAT GRAIN

### OBJECTIVE

To determine the variation in iron and Zinc contents due to different sowing time in wheat varieties.

### TREATMENTS & METHODOLOGY

#### Selected bread wheat varieties

- Millat-11
- Punjab-11
- Galaxy-13
- Ujala-16

#### Planting Dates

- D1 (1<sup>st</sup> November)
- D2 (30<sup>th</sup> November)
- D3 (30<sup>th</sup> December)
- Grinding of samples
- Determination of iron and phytic acid through Spectrophotometer
- Determination of Zinc through Atomic Absorption Spectrophotometer

## PREVIOUS YEAR'S RESULTS

Three leading varieties i.e., Punjab-11, Millat-11 & Galaxy-13 were selected for the above mentioned study and sown at three different sowing dates (with one month interval). There was no significant difference among varieties but sowing date impact on iron was significant.

Zn(ppm)				Fe(ppm)			
Variety	D1	D2	D3	Variety	D1	D2	D3
Punjab-11	18	21	29	Punjab-11	130	139	149
Millat-11	19	23	27	Millat-11	127	138	155
Galaxy-13	22	23	25	Galaxy-13	138	142	145

## 52. TITLE

# COMPARISON OF BREAD AND DURUM WHEAT FOR PREPARATION OF VALUE ADDED PRODUCTS

### OBJECTIVE

To determine the comparative suitability of bread and durum wheat for different value added bakery products

### TREATMENTS & METHODOLOGY

#### Selected Varieties\Advanced lines

- Ujala-16
- Galaxy-13
- Durum-97
- D-12306

Cont . . . . .

# TREATMENT & METHODOLOGY

## Parameters Determined

- Farinograph
- Extensograph
- Protein content
- Gluten content
- Suitability for value added products
  - Chapatti
  - Muffins
  - Biscuits
  - Pizza

Cont . . . . .

## PREVIOUS YEAR'S RESULTS

- Two promising varieties of bread wheat i.e., Lasani-08 & Galaxy-13 and similarly two varieties from Durum Wheat i.e., D-97 & D-12306 were selected to compare their potential for value added products.
- In case of biscuits the difference in textural characteristics was not too significant but in case of volume raising products like muffins etc., the durum wheat proved to be poor.

**53. TITLE**

**QUALITY EVALUATION OF BREAD WHEAT  
ADVANCED LINES/VARIETIES**

**OBJECTIVE**

To screen advanced lines for different quality traits

**TREATMENTS & METHODOLOGY**

Varieties/Advanced lines Selected in

- National Uniform Wheat Yield Trials
- Punjab Uniform Wheat Yield Trials

**Cont . . . . .**



## TREATMENT & METHODOLOGY

### Parameters Determined

Thousand grain weight	(using seed counter & electric balance)
Test weight	(through bushel weight apparatus)
Protein contents	(using Kernelyzer)
Starch contents	(using Kernelyzer)
Gluten contents	(using Kernelyzer)
$\alpha$ amylase activity	(through falling number)
Bread making	(through dough pin mixer, baking oven and fermentation cabinet)
Chapatti quality	(using mixer and hot plate).

Cont . . . . .

## PREVIOUS YEAR'S RESULTS

Four hundred and sixty six wheat samples from NUDYT, NUWYT (N.C, I & R.F) and PUWYT (I & R.F) were analyzed for their physico-chemical and quality traits.

Trial	1000 grain wt. (g)	Test Wt. (kg hl <sup>-1</sup> )	Protein (%)	Starch (%)	Gluten (%)	α-Amylase Activity	Chapatti Quality
NUDYT	30.70-41.80	80.40-89.20	13.80-16.30	50.60-53.60	26.00-36.00	295-385	
NUWYT (N.C)	27.50-39.80	69.80-78.50	14.20-16.40	50.30-55.30	28.00-40.00	333-446	Good
NUWYT (I)	25.10-38.75	68.70-78.55	14.30-16.30	49.70-55.75	29.00-40.00	432-554	Good
NUWYT (R.F)	31.05-45.05	74.40-84.35	13.95-16.15	48.15-56.70	26.00-36.50	405-562	Good
PUWYT (I)	28.60-41.05	70.75-78.15	13.60-16.15	49.30-56.00	27.00-37.50	395-521	Good
PUWYT (R.F)	30.90-44.40	72.05-81.20	13.35-16.05	52.90-55.95	25.50-35.50	407-542	Good

Cont . . . . .

## PREVIOUS YEAR'S RESULTS

Protein and gluten content more than 14 % and 28 % was observed in almost all the genotypes whereas 24 entries out of 50 from NUWYT, 12 entries out of 44 from PUWYT and were screened out best regarding 1000 grain weight exceeding 38 g. Chapatti and bread quality scores were also within desirable range.

**OBJECTIVE**

To study the effect of planting time on grain quality traits

**TREATMENTS & METHODOLOGY**

- **Number of varieties:** Twelve
- **Analyzed parameters:**
  - 1000-grain weight (using seed counter & electric balance)
  - Test weight (using bushel weight apparatus)
  - Protein content (Kernelyzer)
  - Gluten content (Kernelyzer)
  - Starch content (Kernelyzer)
  - Alpha amylase activity and dough rheology will also be determined through falling number apparatus and farinograph

## PREVIOUS YEAR'S RESULTS

Parameters	D1	D2	D3	D4	D5	D6	D7
1000 grain weight (g)	30.20-36.27	30.67-36.95	30.73-38.60	30.07-38-80	32.10-41.37	29.80-39.15	25.70-32.80
Protein (%)	14.40-16.20	14.13-15.90	14.65-15.97	14.10-15.83	13.60-16.13	13.43-15.83	14.13-16.17
Gluten (%)	29.33-34.67	26.50-34.33	29.33-37.50	28.67-35.67	27.67-33.50	26.00-34.50	26.33-36.00
Starch (%)	51.47-54.27	51.67-54.65	51.63-53.90	52.63-54.73	52.20-54.83	51.75-54.53	51.13-54.10

Cont..

## PREVIOUS YEAR'S RESULTS

- Two hundred fifty two samples of twelve promising wheat lines and varieties with three replicates at seven planting dates were selected.
- Ujala-16 gave best values in case of thousand grain weight and Gluten content and Galaxy-13 for test weight whereas as an average of all sowing dates maximum average value was given by Punjab for Test weight and grain weight.
- Yield controlling parameters gave their best values as an average at 4<sup>th</sup> and 5<sup>th</sup> sowing dates i.e., 30<sup>th</sup> November and 10<sup>th</sup> December respectively.

# 55. TITLE EFFECT OF DIFFERENT FERTILIZER TREATMENTS ON WHEAT GRAIN QUALITY

## OBJECTIVE

To study the effect of fertilizer combinations and time of their application on physico-chemical quality parameters in advanced wheat lines/varieties

## TREATMENTS & METHODOLOGY

**Number of varieties:** Eight

**Analyzed parameters:**

-1000-grain weight	(using seed counter)
-Test weight	(using bushel weight apparatus)
-Protein content	(NIR Omeg Analyzer)
-Gluten content	(NIR Omeg Analyzer)
-Starch content	(NIR Omeg Analyzer)
-Chapatti quality	(organoleptic evaluation)

Cont..

## PREVIOUS YEAR'S RESULTS

- The effect of different fertilizer treatments and combinations at a specific planting date were studied on grain quality of eight different varieties/lines, totally consisting of ninety-six (96) grain samples.
- The results revealed that, the highest 1000-grain weight was recorded for V-13372 i.e. 42.6 g, followed by Galaxy-13, having a 1000 grain weight of 40.2 g under the  $F_1$  treatment i.e. zero NPK. V-12066 have shown promising results regarding test weight, by not only having a maximum score of 79.2 kg/hL with the application of  $F_1$ , but also being the runner-up with the rest of the fertilizer treatments, giving maximum test weight overall.
- Fsd-08 has observed the maximum protein (15.9 %), gluten (34.7 %) values with  $F_4$  (160-171-60 NPK kg/ha). Starch content among the varieties and treatments did not have very wide range, and the top starch (56.9%) was found in V-12304. The overall acceptability has been adequate, in almost all varieties, especially Fsd-08 and V-12066, regarding chapatti quality.



## PREVIOUS YEAR'S RESULTS

Treatments	1000 Grain wt.				Protein %				Gluten %			
Varieties/ Lines	F1	F2	F3	F4	F1	F2	F3	F4	F1	F2	F3	F4
<b>Fsd-08</b>	37.6	31.2	32.1	30.0	10.8	15.1	15.0	15.9	21.0	32.3	31.7	34.7
<b>Galaxy-13</b>	40.2	32.8	34.4	32.3	10.6	13.9	14.0	14.2	16.5	28.0	26.7	29.0
<b>V-11098</b>	35.8	30.2	27.9	29.7	10.7	14.7	15.2	15.2	17.7	30.0	31.3	31.0
<b>V-12066</b>	33.6	31.6	30.4	31.6	11.6	14.0	13.7	15.3	26.0	28.0	27.0	32.0
<b>V-13372</b>	42.6	32.8	36.0	34.6	10.2	13.7	13.6	15.6	16.0	26.0	26.3	33.0

Fertilizer Levels NPK (kg/ha)

F1 = 0 - 0 - 0

F2= 120 - 00 - 60

F3= 120 - 114 -60

F4= 160 - 171 - 60

## 56. TITLE DETERMINATION OF QUALITY TRAITS IN PRELIMINARY AND ADVANCED LINES OF BARLEY

### OBJECTIVE

To evaluate high yielding barley lines for different quality parameters

### TREATMENTS & METHODOLOGY

- **Quality parameters to be evaluated :**
  - 1000 kernel weight
  - test weight
  - protein content

### PREVIOUS YEAR'S RESULTS

Trial	1000 grain wt. (g)	Test wt. (kg/hL)	Protein (%)
Advanced Yield	23.3-40.9	50.0-74.2	10.4-14.8
Barani	29.9-41.2	50.7-60.6	10.9-14.9
Micro Yield	45.5-58.0	29.8-36.2	11.9-14.8
Sowing Date	29.1-36.8	51.0-59.0	14.0-14.1

Cont..

## PREVIOUS YEAR'S RESULTS

- Forty-eight (48) various advanced lines and varieties of Barley were analyzed for quality traits, under; the Advanced yield trials, Barani trial, Micro yield trial and the Sowing Date trial.
- Results in the Advanced yield trial of barley have revealed the highest test weight (74.2 kg/hl) and the top most 1000 grain weight (40.9 g) in B-15004, whereas B-15007 from this trial has recorded the highest protein content (14.8%).
- In the Barani trial of barley, B-10007 has shown the maximum 1000 grain weight (41.2 g), the utmost test weight (60.6 kg/hl) and fortunately this variety has given maximum 1000 grain weight in the Micro trial as well. B-15013 of the Barani trial has shown the top most protein content among all the lines from overall trials, i.e. 14.9%.
- B-14007 has revealed maximum test weight (59.0 kg/hl) and has given a top score in 1000 grain weight (36.8 g). Protein content of all the four lines in the Sowing date trial was good ( $\geq 14\%$ ).

**OBJECTIVE**

To determine the suitable amount of moisture and time required for proper tempering of commercial wheat varieties.

**TREATMENTS & METHODOLOGY**

- **Wheat varieties:** Punjab-11  
Millat-11  
Galaxy-13  
Ujala-16
- **Moisture levels:** 14.5%  
15.0%  
15.5%  
16.0%
- **Time intervals:** 16, 24, 32 and 48 hours.
- **Milling equipment:** Buhler mill

## PREVIOUS YEAR'S RESULTS

- Varieties studied: **Punjab-11, Millat-11 & Galaxy-13**
- Variety with maximum flour yield: Galaxy-13
- Flour yield: 70 %
- At moisture level: 15%
- Tempered for: 16 hours

:

# **SHUTTLE BREEDING**

# **Wheat Research Sub Station, Murree**

**OBJECTIVES**

To produce sufficient quantity of differential seed for their use in rust race analysis

**TREATMENTS & METHODOLOGY**

Near isogenic lines representing the differential sets for each type of rust disease will be sown in field plots during March-April 2016. Spikes will be harvested at maturity and seed will be saved for use in next analysis

**PREVIOUS YEAR'S RESULTS**

Seventeen, twelve and eighteen isogenic lines differential of stem, leaf and yellow rusts, respectively were planted separately at Wheat Research Sub Station, Murree. On maturity spikes were collected and seed were saved for next cycle of race analysis. Spike size was observed to be small and seed set was very poor because of harsh weather conditions during the season



## 59. TITLE

# SEED INCREASE OF RUST DIFFERENTIAL SETS (NEAR ISOGENIC LINES)

### **OBJECTIVES**

To produce sufficient quantity of differentials seed for their use in rust race analysis

### **TREATMENTS & METHODOLOGY**

Near isogenic lines representing the differential sets for each type of rust disease will be sown in field plots during March-April 2016. Spikes will be harvested at maturity and seed will be saved for use in next analysis

### **PREVIOUS YEAR'S RESULTS**

Seventeen, twelve and eighteen isogenic lines differential of stem, leaf and yellow rusts, respectively were planted separately at Wheat Research Sub Station, Murree. On maturity spikes were collected and seed were saved for next cycle of race analysis. Spike size was observed to be small and seed set was very poor because of harsh weather conditions during the season

**OBJECTIVES**

To find out rust resistant varieties from the available germplasm for their use in breeding program and to gather information about rust inoculum present in environment.

**TREATMENTS & METHODOLOGY**

A set of germplasm including existing varieties and differentials for different set.wheat advanced lines will be sown in field area. Screening of these advanced lines will be carried out against rust diseases.

**PREVIOUS YEAR'S RESULTS**

Out of 186 lines most of the lines shown resistance, 28 were moderately resistant and 10 were susceptible. The inoculum causing this reaction could not be identified because weather conditions were not suitable. Most of the lines were lodged due to heavy rain and storm.

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**RICE RESEARCH  
INSTITUTE, KSK**

**OBJECTIVES**

- To develop high yielding, disease resistant and well adapted wheat varieties for rice zone.
- To screen wheat germplasm against rusts.

**TREATMENT AND METHODOLOGY**

Following material will be planted:

- Track record of wheat varieties
- Segregating generations
- Local Disease screening nursery (LDSN).
- Advanced lines evaluation trial.
- PUWYT and NUWYT

## PREVIOUS YEAR'S RESULTS

### SELECTED VARIETIES/LINES IN TRACK RECORD OF WHEAT VARIETIES

- The demonstration consisted of 17 lines/genotypes (V.13001, V-11160, V-12066, V-12120, V-08203, V-13305, V-13016, V-13372, Khanpur, , Galaxy-13, Aas-11, Fsd-08, AARI-11, Millat-11 MSW-14, Punjab-11, Lasani-11, ). Four lines (V.13001, V-12066, Khanpur, V-11160 gave maximum yield (3567, 3402, 3341 and 3118 kg ha<sup>-1</sup>) than Galaxy-13 (3117 kg ha<sup>-1</sup> ).

### FILIAL GENERATIONS:

- Under artificial rusts epidemic condition, 367 entries of F<sub>2</sub>, 105 entries of F<sub>3</sub> and 100 entries of F<sub>4</sub> generations were studied. Out of them, 285,85 and 55 entries were selected, respectively.

### LOCAL DISEASE SCREENING NURSERY (LDSN).

- Out of 340 tested entries from NUWYT, PUWYT, A, B trials as well as commercial varieties, 49 entries showed susceptible reaction to rusts while the remaining entries showed resistant to moderate resistant disease reactions.

# PREVIOUS YEAR'S RESULTS

- ADVANCED LINES EVALUATION TRIAL

Varieties/ lines	Yield	Disease reaction		Varieties/ Lines	Yield	Disease reaction	
		LR	YR			LR	YR
V-15234	3150	0	0	V-15206	2294	0	0
V-15211	2889	TMS	0	V-15229	2172	0	0
V-15250	2867	0	0	V-15239	2156	0	0
V-15213	2767	0	0	V-15245	2100	0	0
Galaxy-13	2700	0	0	V-15214	1994	TMR	0
V-15217	2683	0	0	V-15221	1983	10MR	0
V-15215	2672	0	0	V-15225	1983	0	0
V-15208	2556	0	0	V-15216	1972	0	0
V-15249	2467	0	0	V-15219	1972	0	0
V-15207	2406	0	0	V-15233	1961	0	0
V-15247	2406	0	0	V-15244	1956	0	0
V-15251	2372	0	0	V-15230	1944	0	0
V-15243	2350	0	0	V-15220	1933	0	0
V-15238	2339	0	TMS	V-15231	1822	0	0
V-15209	2328	0	0	V-15222	1811	0	0
V-15212	2317	0	0	V-15218	1550	0	TMS
V-15205	2317	0	0	V-15226	1550	10MR	0
V-15240	2311	0	0	V-15228	994	0	0
V-15232	2306	0	0	V-15227	733	0	0
V-15241	2300	0	0	LSD=383.6			

**OBJECTIVES**

To screen the promising wheat genotypes against stem rust especially Ug-99 race

**TREATMENTS & METHODOLOGY**

Sixty five promising genotypes will be sent to KARI, Kenya with the coordination of National Wheat Coordinator, NARC., Islamabad and CIMMYT Pakistan for screening against stem rust especially Ug-99 race during 1<sup>st</sup> week of May, 2016. Stem rust data will be recorded in collaboration with the international breeders and pathologists. Recorded data will be provided by the organizers to collaborators.

**PREVIOUS YEAR'S RESULTS**

Out of sixty tested entries, twelve entries including V-13053, V-13060, V-13068, V-13072, V-13088, V-13089, V-13099, V-13112, V-13311, V-13315, V-13116 & V-13340, showed susceptible reaction and two advance lines (V-13178 & V-13193) showed moderate resistant to moderate susceptible reaction, While the remaining tested entries showed moderately susceptible to susceptible reaction.

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# PROJECTS



## 63. TITLE

# DEVELOPMENT OF NOVEL SALT TOLERANT FORAGE AND CEREAL CROPS

## OBJECTIVES

To change the physiology of the wheat plant making it halophytic.

## Treatment and Methodology

Wheat x *Lophopyrum elongatum* amphiploids has high levels of salt and water logging tolerance. A *ph1c* amphiploid (genomes AABBEE) will be crossed with the *ph1b* mutants of *T. aestivum* (genomes AABBDD). The homozygosity for the *ph1* state will allow homologous recombination between the E and D chromosomes.

Recombinant inbreds and backcross recombinant inbred lines will be tested both for agronomic evaluation in field trials in Pakistan, and by simultaneous genotyping at North Dakota State University, USA.

# Treatment and Methodology

Current year work plan

- Salinity trials under Wheat Research Institute, Faisalabad.  
Wheat Research Institute, Faisalabad.  
Pacca Anna, Faisalabad.  
Tandojam, Sindh.
- Salinity trials under Soil salinity Research Institute, Pindi Bhattian.  
SSRI, Pindi Bhattian
- Amphiploid Yield Trial consists of following entries/varieties  
AgCS, BeCS, CSLe, Yecora Rojo, Chinese spring, Ishi, Auqab-2000,  
Pasban-90 and Haider-93  
Salinity levels (Low, Medium and High salinity)
- Soil analysis of amphiploid trials and minerals analysis of wheatgrass will be conducted.
- Data of biomass and grain yield of amphiploid trials will be recorded and analyzed.

Training of one Pakistani scientist at UC, Davis.

## **PREVIOUS YEAR'S RESULTS**

Two amphiploid viz AgCs and BeCs performed better than the checks under medium and high salinity levels

## 64. TITLE

# WHEAT PRODUCTIVITY ENHANCEMENT PROGRAMME (W-PEP)

### OBJECTIVES

To enhance wheat productivity by provision of high yielding varieties with rust resistance especially Ug99.

### TREATMENTS & METHODOLOGY

This project has four objectives i.e.

- i) Objective-1 (Surveillance), ii) Objective-2 (Host resistance), iii) Objective-3 (Breeding) and iv) Objective-4 (Seed). Work will be carried out according to specified plan of the project.

## PREVIOUS YEAR'S RESULTS

Annual report W-PEP 2015-16

## 65. TITLE

# AGRICULTURAL INNOVATION PROGRAM (AIP)

## A- Yield loss assessment of wheat due to leaf rust using fungicides

### OBJECTIVES

- Rust control in high yielding wheat cultivars by the application of fungicides
- To ascertain losses caused by rusts in wheat crop.

### Treatment and Methodology

Will be mutually finalized by WRI and AIP scientists

### PREVIOUS YEAR'S RESULTS

- Three sprays of Folicur 430SC, Tilt and Nativo gave best results in controlling leaf rust as compared to the remaining treatments on Seher -06 and Morocco while on resistant variety Ass-11, there is no edge of fungicides application.
- More than 90% plots under treatments lodged badly due to heavy rainfall and hailstorms during cropping season, therefore estimation of yield losses due to single factor i.e. leaf rust is very difficult and experiment need conformation of results.

## 66. TITLE

**AGRICULTURAL INNOVATION PROGRAM (AIP)**  
**Diamond trial to ascertain the effect of using certified seed of new varieties**

### **OBJECTIVES**

To enhance wheat productivity by provision of high yielding varieties with rust resistance especially Ug99.

#### **Treatment and Methodology**

Varieties: 2 (One new and one old variety)

Treatments: 2 (Certified seed and farmer's own seed)

Plot size: 250 m<sup>2</sup>

### **PREVIOUS YEAR'S RESULTS**

Annual report AIP 2015-16 (Under compilation)

## 67. TITLE

# AGRICULTURAL INNOVATION PROGRAM (AIP) Conservation trials (Agronomy)

## OBJECTIVES

- Wheat planting in standing cotton
- Wheat-Rice-Wheat rotation
- Zero tillage in rice
- Direct seeded rice
- Bed planting of wheat

## Treatment and Methodology

Will be mutually finalized by WRI and AIP scientists

## PREVIOUS YEAR'S RESULTS

Annual report AIP 2015-16 (Under compilation)

# **NEW EXPERIMENTS**

<b>68. TITLE</b>	<b>BREEDING FOR CLIMATE SMART WHEAT VARIETIES (HEAT/DROUGHT TOLERANT)</b>
<b>OBJECTIVES</b>	<p>Screening of advance lines/varieties for water and heat stress environment with reference to climate change scenario.</p> <p>Association of grain filling period and grain size with grain yield.</p> <p>Screening of advance lines/genotypes under drought and heat stress at seedling stage.</p>
<b>TREATMENTS &amp; METHODOLOGY</b>	<p>Entries: 30</p> <p>Expt.1: Under wire house Control, Drought, Heat</p> <p>Expt.2: Under field conditions Normal irrigated Normal rainfed Late sown (Last week of December)</p>
<b>PREVIOUS YEAR'S RESULTS</b>	New Experiment



<b>69. TITLE</b>	<b>EVALUATION OF WHEAT GERMPLASM TO DEVELOP HEAT TOLERANT VARIETY FOR ADOPTATION TO THE PRESENT CLIMATIC CHANGE SCENARIO</b>
<b>OBJECTIVES</b>	To evaluate and select material having terminal heat tolerance ability.
<b>TREATMENTS &amp; METHODOLOGY</b>	<p>Entries: 100 will be sown in RCB with two reps</p> <p>Source: National and International material</p>
<b>Plot size</b>	6 rows x 5m
<b>Sowing time</b>	Normal (last week of Nov.) & Late (last week of Dec.)
<b>Checks and Parameters</b>	<p>Fsd-08, Millat-11, Galaxy-13</p> <p>NDVI, Canopy Temperature, Days to heading, Plant Height, Lodging Score, Days to maturity, Yield and 1000 grain weight will be recorded.</p>
<b>PREVIOUS YEAR'S RESULTS</b>	New experiment

<b>70. TITLE</b>	<b>Breeding For Developing Enriched Iron and Zinc contents Wheat Lines/cultivars.</b>
<b>OBJECTIVES</b>	To develop high yielding, disease resistant, Iron and Zinc enriched lines
<b>TREATMENTS &amp; METHODOLOGY</b>	Ten Iron and Zinc enriched lines will be hybridized with two high locally adapted male parent in Line X tester mating system. Next year F1 along with their parents will be studied for Fertile tillers per plot 1000 grain weight, plant height and grain yield per plot, Iron and Zinc in grains. The recombinant of desired objective will be selected in subsequent generation for the development of lines
<b>PREVIOUS YEAR'S RESULTS</b>	New Experiment

<b>71. TITLE</b>	<b>Effect Of Drought On Canopy Cover and Chlorophyll Contents</b>
<b>OBJECTIVES</b>	To evaluate the promising lines of bread wheat for chlorophyll content, canopy cover and yield parameters by comparing in irrigated and drought condition.
<b>TREATMENTS &amp; METHODOLOGY</b>	Eighteen wheat lines with three replication will be tested under irrigated and drought conditions including two check varieties (Faisalabad-08, Ck-50).
<b>PREVIOUS YEAR'S RESULTS</b>	New Experiment

72. TITLE	<b>RESPONSE OF SEED RATE ON GRAIN YIELD OF BARLEY</b>		
OBJECTIVES	To determine optimum seed rate of advanced lines and varieties		
TREATMENTS & METHODOLOGY	<b>Layout</b>	<b>Split plot Design</b>	
	Reps	03	
	Plot size	5m x 1.2m	
	Fertilizer NPK (Kg/ha.)	50-50-0	
	<b>A) Varieties/Lines = 5</b>	<b>B) Seed Rate (kg ha<sup>-1</sup>) = 3</b>	
	V <sub>1</sub> = B-14003	S <sub>1</sub> = 50	
	V <sub>2</sub> = B-09006	S <sub>2</sub> = 62.5	
V <sub>3</sub> = B-09008	S <sub>3</sub> = 75		
V <sub>4</sub> = B-05011			
V <sub>5</sub> = Haider-93			
PREVIOUS YEAR'S RESULTS	New Experiment		

Thanks