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بِسْمِ اللَّهِ

# **ANNUAL WHEAT PLANNING MEETING 2017-18**

**WHEAT RESEARCH INSTITUTE,  
FAISALABAD**



# 1. TITLE MAINTENANCE AND IMPROVEMENT OF WHEAT GERMPLASM

## OBJECTIVES:

- To conserve existing genetic variability and enhancing the diversity of wheat germplasm.
- Addition of new entries to enhance genetic stock

## TREATMENTS & METHODOLOGY:

Total entries: 663

Sowings: 1<sup>st</sup> week of November

Plot size: 1 rows of 2.5 meter



## PREVIOUS YEAR'S RESULTS

Six hundred & twenty (620) entries were tested. One hundred & twenty five (125) entries were discarded due to poor look and duplication. One hundred and sixty eight (168) new entries having desirable and diverse genetic background were added. True to type heads from remaining entries were selected and threshed to maintain the genetic stock.



## 2. TITLE CROSSING BLOCK AND HYBRIDIZATION

### OBJECTIVES

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

### TREATMENTS & METHODOLOGY

Total entries: 574

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 2017-18



# GERMPLASM GROUPS

Sr. #	Germplasm Groups	No. of varieties / lines
1	Current varieties of Pakistan	50
2	Old varieties	56
3	Exotic lines	34
4	Disease resistant	168
5	Drought tolerant	18
6	Salt tolerant	07
7	Heat tolerant	48
8	Grain quality	17
9	High grain weight	14
10	High yielding	120
11	Harvest plus	19
12	<i>Triticum pyrum</i>	05
13	CSISA	18
<b>Total</b>		<b>574</b>



## PREVIOUS YEAR'S RESULTS

Last year crossing block comprised of 658 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. #	Traits	Range
1	Plant height (cm)	75-135
2	Days to heading	90-122
3	Days to maturity	136-158
4	1000 grain weight (g)	18.2-51.4
5	Tiller/plant	6-10
6	Protein content (%)	12.2-17.5
7	Gluten content (%)	34-39
8	Canopy temperature (°c) (booting & anthesis)	11.2-19.2 14.6-21.4
9	NDVI range (booting & anthesis)	0.71-0.89 0.68-0.85
10	Leaf & yellow rust reactions	0- 100 S
11	Leaf color, size & orientation	Wide range
Number of crosses: 857		



# TITLE 3, 4, 6 & 7

# STUDY OF FILIAL GENERATIONS (F<sub>1</sub>-F<sub>7</sub>) OF BREAD WHEAT

## OBJECTIVES

- To evaluate the generations in their respective environment (Heat, drought, rusts etc.).
- Selection of single plants resistant to diseases and having good plant type in F<sub>2</sub>-F<sub>5</sub> generations (selected bulk method).
- Selection of desirable single head progenies ( F<sub>6</sub>).
- F<sub>7</sub> generation (single head row progenies) selection for grain yield testing in preliminary yield trials.

## TREATMENTS & METHODOLOGY

F<sub>1</sub> generation: Under normal environment

F<sub>2</sub> to F<sub>7</sub> :

will be exposed to;

- Artificial epidemic to rust condition
- Heat stress
- Drought stress etc





## Filial Generations for 2017-18

<b>Generations</b>	<b>No. of crosses</b>	<b>Plot size</b>
F <sub>1</sub>	857	1 row x 2.5m
F <sub>2</sub>	802	12 rows×8m
F <sub>3</sub>	511	3 rows ×3m
F <sub>4</sub>	305	3 rows×3m
F <sub>5</sub>	189	3 rows×3m
F <sub>6</sub>	106	1 row, 2.5m
F <sub>7</sub>	95	4 rows ×4m



## PREVIOUS YEAR'S RESULTS

<b>Filial Generations</b>	<b>Entries Selected at WRI, FSD</b>	<b>Entries Selected at Kala Shah Kaku</b>
F <sub>1</sub>	857	-
F <sub>2</sub>	511	114
F <sub>3</sub>	305	102
F <sub>4</sub>	189	66
F <sub>5</sub>	1680	36
F <sub>6</sub>	468	-
F <sub>7</sub>	105	-



## 5. 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 and grain yield



## PREVIOUS YEAR'S RESULTS

Twelve advanced lines of bread wheat along with check varieties viz., V-13005, V-12120, V-12066, V-13371, V- V-13372, V-13338, V-13325, V-13348, V-11098, V-12304, Galaxy-13 and Fsd-08 were sown in triplicate at three levels of irrigations on November 20, 2015, one set with rain fed condition ( $L_0$ ) 2<sup>nd</sup> with one irrigation ( $L_1$ ) and 3<sup>rd</sup> with normal irrigated condition ( $L_2$ ). All the agronomic practices were same except irrigation. The line V-12304 has the highest grain yield 4884 kg/ha against check under one irrigation while V-11098 has performed best under no irrigation by producing highest grain yield (3841kg/ha). Punjab-11 (5220 kg/ha) followed by V-12120 (5177kg/ha) has given highest grain yield under three irrigation treatment.



## 8. TITLE

# EVALUATION OF BREAD WHEAT GERMPLASM FOR POST-ANTHESIS HEAT STRESS

## OBJECTIVES

- Development of heat tolerant varieties to combat the effect of global warming (Projected temp. increase is 2 °C 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	QUAIU#1/2*SUP152	2661	1800	2224	35.3	34.1	34.6
2	V-14170	2149	1939	2042	36.1	34.8	35.5
3	V-14225	2541	1687	1825	36.4	33.9	31.6
4	KA/NAC//TRCH/3/ DANPHE#1	2831	1929	2201	33.7	31.8	32.1
5	PASTOR//MILAN/KAUZ/3/ BAV92	2723	1847	2142	40.1	34.2	32.3
6	Galaxy-13	3270	1922	2444	39.3	37.3	30.1



## 9. 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: 6 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 & 1000 grain weight



## PREVIOUS YEAR'S RESULTS

Eighty three (83) 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

<b>Sr No.</b>	<b>Entry No.</b>	<b>Yield (kg ha<sup>-1</sup>)</b>	<b>% increase over Punjab-11</b>
1	4040	6316	35.97
2	4029	6232	34.16
3	4041	6170	32.83
4	4031	6077	30.83
5	3037	5942	27.92





## 10. 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	Status
1	38 <sup>th</sup> ESWYT	CIMMYT	11	46 <sup>th</sup> IBWSN	CIMMYT	All are expected for rabi, 2017-18
2	25 <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	5 <sup>th</sup> WYCYT	CIMMYT	15	18 <sup>th</sup> CWANA SBWON	ICARDA	
6	WPEPYT	CIMMYT	16	18 <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	18 <sup>th</sup> DSBWYT	ICARDA	
9	35 <sup>th</sup> SAWSN	CIMMYT	19	NARC HPRYT	NARC	
10	6 <sup>th</sup> CSISA	CIMMYT				



## PREVIOUS YEAR'S RESULTS

Out of fourteen international nurseries/ trials sown at WRI Faisalabad, 1306 entries were studied while 150 entries were selected for sowing to next generations.

Three trial/nurseries were planted at Kala Shah Kaku. Out of 110 entries 29 were selected to be used in further breeding programme.



## **11. TITLE    PRELIMINARY WHEAT YIELD TRIALS (A-TRIALS)**

### **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 = 70, Check varieties = 4 (Faisalabad-08, Chakwal-50, Dharabi-13 and Galaxy-13)

Layout = Alpha lattice, Reps = 3

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

55 advanced lines (out of 164) of bread wheat were found higher yielding than two checks varieties in their respective trials under irrigated conditions. 33 advance lines were found higher yielder in rain fed condition 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			
<b>A-I (Rainfed)</b>		<b>FSD-08 3706</b>	<b>CK-50 3688</b>	<b>Galaxy-13 3716</b>	<b>Dharabi-11 3375</b>
V-16233	3808	2.75	3.25	2.48	12.8
V-16221	3773	1.81	2.30	1.5	11.8
V-16234	3725	0.512	1.0	0.242	10.4
V-16222	3723	0.46	0.94	0.188	10.3
V-16227	3721	0.40	0.89	0.13	10.25
V-16230	3712	0.161	0.65	-0.10	9.20
LSD (0.05)	326.04				
CV (%)	4.62				
<b>A-II (Rain fed)</b>		<b>FSD-08 3630</b>	<b>CK-50 3671</b>	<b>Galaxy-13 3724</b>	<b>Dharabi-11 3024</b>
V-16260	4165	14.73	13.45	11.8	37.7
V-16259	3909	7.68	6.48	4.96	29.3
V-16261	3769	3.83	2.67	1.21	24.6
LSD (0.05)	302.69				
CV (%)	4.57				
V-16287	4118	1.0	0.46	4.1	
V-16295	4099	0.5	0	3.6	
LSD (0.05)	319.74				
CV (%)	3.91				



# PREVIOUS YEAR'S RESULTS

A-III Rainfed		FSD-08 3916	CK-50 3707	Galaxy-13 3714	Dharabi-11 3488
V-16266	4397	12.8	18.6	18.4	26.1
V-16278	4026	2.8	8.6	8.4	15.4
V-16264	4028	2.9	8.7	8.4	15.5
V-16277	3994	2.0	7.7	7.5	14.5
V-16274	3988	1.8	7.6	7.4	14.3
V-16280	3986	1.8	7.5	7.3	14.3
V-16276	3954	1.0	6.7	6.4	13.4
V-16281	3872	-1.1	4.5	4.3	11.0
V-16270	3867	-1.2	4.3	4.1	10.9
V-16265	3810	-2.7	2.8	2.6	9.2
V-16282	3815	-2.6	2.9	2.7	9.4
V-16262	3804	-2.9	2.6	2.4	9.1
V-16275	3781	-3.4	2.0	1.8	8.4
V-16269	3686	-5.9	-0.6	-0.8	5.7
LSD (0.05)	325.41				
CV (%)	4.27				



## PREVIOUS YEAR'S RESULTS

AIV (Rainfed)		FSD-08 4078	CK-50 4099	Galaxy-13 3957
V-codes	Yield (kg ha <sup>-1</sup> )			
V-16284	4874	19.5	18.9	23.2
V-16291	4581	12.3	11.75	15.7
V-16289	4493	10.3	9.6	13.5
V-16293	4358	6.9	6.31	10.1
V-16294	4301	5.5	4.9	8.7
V-16290	4295	5.3	4.7	8.54
V-16286	4218	3.4	2.9	6.6
V-16297	4122	1.2	0.56	4.1



## 12. TITLE    **REGULAR WHEAT YIELD TRIALS (B-TRIALS)**

### **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 = 34, Check varieties = 4 (Fsd.-08, Chk-50, Dharabi-13 and Galaxy-13)

Layout = alpha lattice, Reps = 3

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

- Thirty seven advanced lines (out of 135) of bread wheat were found high yielding than the two checks under normal conditions.
- Nine advance lines were found higher yielder in rain fed condition 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	Galaxy-13
<b>B-I (Irrigated)</b>			
V-15055	5575	20.41	13.66
V-15079	5447	17.65	11.05
V-15026	5371	16.00	9.50
V-15051	5167	11.60	5.34
V-15049	5136	10.93	4.71
V-15044	5000	7.99	1.94
V-15070	4979	7.54	1.51
LSD (0.05)	266		
CV (%)	3.34		
<b>B-II</b>			
V-15100	6128	20.77	35.34
V-15082	5803	14.37	28.16
V-15081	5700	12.34	25.88
V-15080	5317	4.79	17.42
LSD (0.05)	271		
CV (%)	3.29		





# PREVIOUS YEAR'S RESULTS

Variety Code	Yield (kg ha <sup>-1</sup> )	Percentage Increase over check varieties	
<b>B-III</b>			
V-15113	6047	11.34	27.98
V-15102	5646	3.96	19.49
LSD (0.05)	241		
CV (%)	2.98		
<b>BIV</b>			
V-15168	6387	34.49	30.27
V-15174	5779	21.69	17.87
V-15166	5559	17.06	13.38
V-15156	5261	10.78	7.30
V-15153	5245	10.44	6.98
V-15147	5035	6.02	2.69
LSD (0.05)	265		
CV (%)	3.23		
<b>B-V</b>			
V-15192	6029	20.51	12.75
V-15203	5806	16.05	8.58
V-16166	5654	13.01	5.74
V-15179	5469	9.31	2.28
LSD (0.05)	286	<b>CV (%)</b>	<b>3.44</b>



# PREVIOUS YEAR'S RESULTS

Variety Code	Yield (kg ha <sup>-1</sup> )	Percentage Increase over check varieties	
<b>B-VI</b>			
V-16180	5761	15.27	19.60
V-16179	5451	9.06	13.16
V-16172	5297	5.98	9.96
V-16169	5277	5.58	9.55
LSD (0.05)	251		
CV (%)	3.07		
<b>B-VIII</b>			
V-16200	5691	5.00	20.55
V-16209	5497	1.42	16.44
LSD (0.05)	225		
CV (%)	2.88		
<b>B-IX</b>			
V-16212	6259	28.26	21.06
V-15212	5859	20.06	13.33
V-16213	5757	17.97	11.35
V-15216	5731	17.44	10.85
V-13190	5670	16.19	9.67
V-16215	5575	14.24	7.83
V-14058	5519	13.09	6.75
V-15251	5384	10.33	4.14
LSD (0.05)	272	<b>CV (%)</b>	<b>3.14</b>



## PREVIOUS YEAR'S RESULTS

Variety Code	Yield (kg ha <sup>-1</sup> )	Percentage Increase over check varieties			
		FSD-08 3799	CK-50 3715	Galaxy-13 3502	Dharabi-11 3070
B-I (Rainfed)					
V-15291	4204	10.66	13.16	20.04	36.9
V-15265	3662	-3.6	-1.4	4.5	19.2
V-15309	3694	-2.7	-0.5	5.5	20.3
V-15327	3688	-2.92	-0.73	5.3	20.1
V-15311	3550	-6.5	-4.4	1.37	15.6
V-15329	3696	-2.7	-0.5	5.5	20.4
V-15331	3649	-3.9	-1.7	4.19	18.8
V-15306	3647	-4	-1.8	4.1	18.8
V-15267	3495	-8	-5.9	-0.1	13.8
LSD (0.05)	777.10				
CV (%)	10.62				



## 13. TITLE PUNJAB UNIFORM WHEAT YIELD TRIAL (PUWYT)

### 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, UAF, NIBGE, NIAB, Private Sector, NARC etc.  
Trials: 20, Sowing time: 2<sup>nd</sup> week of November  
Design: Alpha Lattice, Plot size: 1.2m x 5m,  
Replications: 02, Fertilizer: 120-90-60 kg/ha



## PREVIOUS YEAR'S RESULTS

**Entries:** 60

**Check varieties (02):** Johar-16 and local check

**Locations:** 23

**Sowing time:** 1<sup>st</sup> fortnight of November, 2017.

Ranking	Variety/line	Yield (kg ha <sup>-1</sup> )
1	V-14124	4360
2	TWS1335	4144
3	TWS1351	4129
4	V-15235	4129
5	9515	4111
6	15C042	4106
9	Johar-16	4070



## 14. TITLE NATIONAL UNIFORM WHEAT YIELD TRIALS (NUWYT)

### 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.#	Entry No.	Yield (kg ha <sup>-1</sup> )
1	34	4481
2	49	4464
3	38	4444
4	31	4414
5	48	4365
6	59	4361
7	47	4342
8	15	4320



## 15. TITLE HYBRID SEED PROGRAM

### 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)*



## 16. TITLE

# MAINTENANCE AND UTILIZATION OF DURUM AND TRITICALE GERMPLASM

## OBJECTIVES

Enhancement of genetic variability in durum and triticales germplasm

## TREATMENTS & METHODOLOGY

No. of entries = Durum: 165 and Triticales: 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 one entries of Durum and seventy nine entries of Triticale were maintained.

Sr.#	Traits	Variability range	
		Durum	Triticale
1	Days To Heading	82 - 123	80 - 121
2	Days To Maturity	143 - 155	144 - 157
3	Plant Height (cm)	82 - 128	96 - 176
4	1000-grain weight (gm)	31.34 - 46.94	-
5	Rust Reaction (L.R)	0 - 30 S	0 - 30 S
6	Rust Reaction (Y.R)	0 - 60 S	0 - 10 MS



## **17. 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 seven crosses were attempted out of these 50 crosses were harvested



## 18. 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

Generations	No. of entries	Plot size
DF <sub>1</sub>	50	1 row x 2.5m
DF <sub>2</sub>	30	12 rows x 9.0m
DF <sub>3</sub>	25	3 rows x 3.0m
DF <sub>4</sub>	16	3 rows x 3.0m
DF <sub>5</sub>	12	3 rows x 3.0m
DF <sub>6</sub>	250 S.H (11 Crosses)	1 row x 2.5m
DF <sub>7</sub>	45 SHRP	4 rows x 3.0m



## PREVIOUS YEAR'S RESULTS

Sr. #	Generations	Entries Studied	Entries Selected
1	DF <sub>1</sub>	50	30
2	DF <sub>2</sub>	32	25
3	DF <sub>3</sub>	18	16
4	DF <sub>4</sub>	18	12
5	DF <sub>5</sub>	20	250 S.H (11 Crosses)
6	DF <sub>6</sub>	263 SHR	45 SHRP
7	DF <sub>7</sub>	38	11

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



## 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 = 30

Check varieties =3 (Durum-97, Wadanak-85 and Ujala-16)

Layout = alpha lattice

Reps = 3

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

07 advanced lines (out of 30) 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		
		Ujala-16	Wadana k-85	Durum-97
<b>DA-I</b>		<b>Ujala-16</b>	<b>Wadana k-85</b>	<b>Durum-97</b>
D-16710	5101	4.63	27.82	6.5
D-16705	4886	0.21	22.4	2.03
D-16707	4858	-0.36	21.71	1.45
D-16715	4848	-0.54	21.48	1.26
CV (%)	3.12			
<b>DA-II</b>		<b>Ujala-16</b>	<b>Durum-97</b>	<b>Wadana k-85</b>
D-16721	5054	18.02	53.16	8.24
D-16725	4967	16.00	50.54	6.39
D-16727	4774	11.48	44.66	2.24
CV (%)	3.77			





## 20. TITLE

## REGULAR DURUM WHEAT YIELD TRIALS (DB-TRIALS)

### **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 = 30

Check varieties =3 (Durum-97, Wadanak-85 and Ujala-16)

Layout = alpha lattice

Replications = 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		
		Ujala-16	Wadanak-85	Durum-97
<b>DB-I</b>				
D-15728	5277	4.83	15.12	24.90
D-15730	4897	-2.69	22.22	15.92
D-16729	4795	-4.74	19.65	13.48
D-15739	4747	-5.68	18.47	12.36
D-15722	4613	-8.3	15.12	9.19
D-15717	4605	-8.50	14.93	9.00
D-15741	4448	-11.61	11.01	5.29
D-15735	4449	-11.60	11.02	5.30
D-15708	4283	-14.90	6.8	1.38
CV (%)	3.6			
<b>DB-II</b>				
D-16732	5230	13.50	59.47	12.7
D-16738	4923	6.83	50.10	6.13
D-16742	4907	6.50	49.63	5.81
D-16744	4707	2.14	43.51	1.48
D-16743	4695	1.88	43.14	1.22
C.V (%)	3.45			



## 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

Layout: RCBD, Plot Size: 1.20mx5m, Replication, Fertilizer: 120-90-0 NPK Kg/ha, Locations: 05, Entries: 12, Sowing Time: 2<sup>nd</sup> week of Nov

### PREVIOUS YEAR'S RESULTS

Variety/line	Yield (kg ha <sup>-1</sup> )
D-14717	3384
D-14707	3201
D-14731	3026
D-14705	3015
Durum.97	2943



## **22. TITLE    EVALUATION OF INTERNATIONAL YIELD TRIALS OF (CIMMYT/ICARDA) DURUM WHEAT**

### **OBJECTIVES**

To evaluate the CIMMYT material for incorporation in yield trials

### **TREATMENTS & METHODOLOGY**

International Durum Screening Nursery (IDSN) and International Durum Yield Trials (IDYT) are expected, which will be laid out according to the instructions supplied by the donor agency



# PREVIOUS YEAR'S RESULTS

## 48<sup>th</sup> INTERNATIONAL DURUM YIELD NURSERY

Entries studied:50, Selected=15

Entry No.	Yield (kg ha <sup>-1</sup> )
723	4442
747	4356
733	4323
Durum-97 (Check)	2910

## 40<sup>th</sup> INTERNATIONAL DURUM YIELD TRIAL- MEDITERRANEAN DRYLAND

Entries studied:24, Selected=07

Entry No.	Yield (kg ha <sup>-1</sup> )
23	4054
19	3704
22	3676
Durum-97 (Check)	2731



# PREVIOUS YEAR'S RESULTS

**48<sup>th</sup> INTERNATIONAL DURUM SCREENING NURSERY**  
Entries studied:164, Selected=19

<b>Entry No.</b>	<b>Yield (kg ha<sup>-1</sup>)</b>
E-7008	50.14
E-7025	49.4
E-7060	49.0
Durum-97 (Check)	43.32

**40<sup>th</sup> INTERNATIONAL DURUM OBSERVATION NURSERY**  
**- MEDITERRANEAN DRYLAND**  
Entries studied:96, Selected=10

<b>Entry No.</b>	<b>Yield (kg ha<sup>-1</sup>)</b>
E-54	49.08
E-37	48.62
E-72	48.16
Durum-97 (Check)	42.62



# **BARLEY**

*(Hordeum vulgare)*



## 23. 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 = 80, Plot size = 0.6m x 2.5m, 20 crosses will be attempted

### PREVIOUS YEAR'S RESULTS

Seventy eight genotypes were maintained. One line was rejected on the basis of poor performance and disease susceptibility		
Sr. No.	Character	Range
1	Plant height	53-119 cm
2	Days to heading	88-116 days
3	Spike length	4.1-11.1 cm
4	No. of grains per spike	12-84





## 24. TITLE

## STUDY OF FILIAL GENERATIONS (F<sub>4</sub>-F<sub>7</sub>) OF BARLEY

### OBJECTIVES

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

### TREATMENTS & METHODOLOGY

Generations	Crosses	Entries	Plot size
F <sub>4</sub>	05	05	1row x 2.5 m
F <sub>5</sub>	17	17	1row x 2.5 m
F <sub>6</sub>	09	09	4 row x 2.5 m
F <sub>7</sub>	16	16	4 row x 2.5 m

### PREVIOUS YEAR'S RESULTS

Five entries from F<sub>3</sub> were harvested for planting F<sub>4</sub> in next year. Desirable plants were selected from Seventeen entries of F<sub>4</sub>, 09 F<sub>5</sub> and 16 F<sub>6</sub> entries and single heads from the selected plants were harvested. Heads of each entry were threshed in bulk to advance the generation.



## 25. 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-16012	3963	1	B-16020	3429
2	B-16009	3789	2	B-16021	3204
3	B-16003	3670	3	B-16029	3089
4	B-16011	3646	4	B-16026	3085
5	Haider-93	3551	5	B-16030	3061
	LSD (0.05)	483	6	B-16028	2993
			7	B-16024	2970
			8	B-16025	2942
			9	Haider-93	2823
				LSD (0.05)	268



## 26. 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

BB		
Rank	Line/Var.	Yield (Kg/ha.)
1	B-15035	3905
2	B-16045	3731
3	B-16043	3441
9	Haider-93	2900
LSD (0.05)		295



## 27. 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

On overall mean basis the advanced line B-09006 produced maximum grain yield ( $3364 \text{ kg ha}^{-1}$ ) followed by B-09008 ( $3324 \text{ kg ha}^{-1}$ ) and B-05011( $3308 \text{ kg ha}^{-1}$ ) while check variety Haider-93 could produce the grain yield of  $2695 \text{ kg ha}^{-1}$



## 28. TITLE INTERNATIONAL BARLEY NURSERIES AND 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 (ICARDA) will be planted as per instructions of donor agency

### PREVIOUS YEAR'S RESULTS

S. No.	Trial Name	Entries studied	Entries selected
1	International Barley Observation Nursery 2016-17	112	11
2	Global Spring Barley Screening Nursery 2016-17	150	6
3	International Naked Barley Observation Nursery 2016-17	100	10
4	Global Spring Barley Yield Trial 2016-17	25	2
5	International Barley Yield Trial 2016-17	25	9
6	International Naked Barley Yield Trial 2016-17	25	7
Total		437	45



## 29. TITLE

## SOWING DATE TRIAL OF BARLEY

### 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

Name	SD <sub>1</sub>	SD <sub>2</sub>	SD <sub>3</sub>	Grand Mean
B-05011	3183	3638	2546	3123
B-14035	2773	3194	2899	2955
B-14003	3198	3202	2376	2925
Haider-93	2807	2998	2242	2682



## 30. 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

Twelve advanced lines performed better than check variety Haider-93. Maximum grain yield in rainfed conditions ( $2829 \text{ kg ha}^{-1}$ ) was obtained from advanced line B-15018. On overall mean basis B-09008 produced maximum grain yield of  $3135 \text{ kg ha}^{-1}$  followed by B-15018 ( $3117 \text{ kg ha}^{-1}$ ), B-09006 ( $3081 \text{ kg ha}^{-1}$ ) B-05011 ( $2977 \text{ kg ha}^{-1}$ ) while the check variety Haider-93 could produce grain yield of  $2397 \text{ kg ha}^{-1}$ .



## 31. 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	Varieties/lines	Quantity (kg)	Sr. No.	Varieties/lines	Quantity (kg)
1	B-09006	200	16	B-16033	12
2	B-09008	175	17	B-16034	20
3	B-05011	182	18	B-16035	17
4	Haider-93	610	19	B-16036	12
5	Jau-87	21	20	B-15002	17
6	Jau-83	22	21	B-15003	10
7	B-15009	20	22	B-15005	17
8	B-15010	12	23	B-15006	9
9	B-14002	12	24	B-14003	15
10	B-14035	10	25	B-14007	17
11	B-14038	12	26	B-14011	10
12	B-15012	17	27	B-10007	11
13	B-15013	19	28	B-16031	11
14	B-15015	18	29	B-16032	14
15	B-15016	20	30	B-15018	09





# AGRONOMIC STUDIES



## 32. 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

Date of sowing = 7		
D <sub>1</sub> = 1 <sup>st</sup> November	D <sub>2</sub> = 10 <sup>th</sup> November	D <sub>3</sub> = 20 <sup>th</sup> November
D <sub>4</sub> = 30 <sup>th</sup> November	D <sub>5</sub> = 10 <sup>th</sup> December	D <sub>6</sub> = 20 <sup>th</sup> December
D <sub>7</sub> = 30 <sup>th</sup> December		

Varieties/Advanced lines = 12

Observations	
Plant count per m <sup>2</sup>	Productive tillers/m <sup>2</sup>
Days to heading	Days to Physiological maturity
Plant height (cm)	Lodging % age
No. of grains/spike	1000-grain weight (g)
Grain yield (kg ha <sup>-1</sup> ).	

Layout	RCBD, split plot arrangement
Rep	03
Plot size	1.62m x 6 m
Fertilizer NPK	120-90-60 kg ha <sup>-1</sup>
Seed Rate	100 kg ha <sup>-1</sup>



## 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
Punjab-11	5597	6262	4942	4321	4386	3783	3152	4635cd
Galaxy-13	6132	5682	4599	4462	4270	2894	2596	4376e
Ujala-16	6139	5923	4818	4242	4263	3659	3340	4626cd
V-11098	6286	6091	4835	4691	4424	3611	3498	4777bc
V-12304	6262	6063	4712	4479	4379	3937	3543	4768bc
V-12066	5912	4877	4393	4492	4115	3659	3378	4404e
V-13348	6307	5586	4530	4252	4458	3995	3368	4642cd
V-14154	6910	6166	5357	5086	5147	4043	3635	5192a
V-14225	5953	5974	4825	4763	4739	4016	3786	4865b
V-14227	4931	5785	4750	4681	4414	4084	3361	4572d
V-14168	5737	5895	4890	4657	4654	4122	3810	4824b
V-14170	6375	6519	5528	5134	4873	4297	3879	5229a
Mean	6045a	5902a	4848b	4605c	4510c	3842d	3445e	
Cd <sub>1</sub> for sowing dates 145, for varieties 160 and for interaction 431								



### 33. 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>) = 04</b>
S <sub>1</sub> = 75
S <sub>2</sub> = 100
S <sub>3</sub> = 125
S <sub>4</sub> = 150

<b>Layout</b>	Split plot Design
<b>Rep</b>	03
<b>Plot size</b>	1.62m x 6 m
<b>Fertilizer NPK</b>	120-90-60 (kg ha <sup>-1</sup> )



## 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	5768	6461	6259	6046	6133bc
V-13348	5370	5700	5511	5652	5558e
V-14154	5576	7260	7089	7020	6736a
v-14225	6101	6492	6399	6300	6323b
V-14227	6049	6121	5888	5796	5964cd
V-14168	6039	6530	6128	5799	6124bc
V-14170	6512	7099	6680	6348	6660a
V-12066	5840	6005	5881	5655	5845d
Mean	5907c	6458a	6229b	6077b	
Cd <sub>1</sub> for varieties 220, for Seed rates 165 and for V × S= 462					



## 34. 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>Varieties/advanced lines=08</b>
<b>Fertilizer levels NPK (kg ha<sup>-1</sup>)</b>
Level 1 = 0 – 0 – 0
Level 2 = 90 – 60 – 60
Level 3 = 120-90-60
Level 4 = 150-120-60

Layout	Split plot Design
Rep	03
Plot size	1.62m x 6 m
Fertilizer NPK (Kg/ha.)	According to treatment
Seed Rate	100 (kg ha <sup>-1</sup> )
Sowing time	1 <sup>st</sup> fortnight of Nov



## PREVIOUS YEAR'S RESULTS

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

Advanced lines/ Varieties	Fertilizer levels NPK (kg ha <sup>-1</sup> )				Mean
	L 1 0-0-0	L 2 120-90-60	L 3 120-114-60	L 4 160-171-60	
Fsd-08	3292	5230	5340	5141	4751c
V-13348	3752	5216	5316	5213	4874bc
V-14154	3841	5593	5861	5532	5207 a
V-14225	2977	5511	5703	5408	4900 bc
V-14227	3570	4379	5069	4880	4474d
V-14168	3577	5065	5950	5278	4967b
V-14170	3350	5096	5600	5079	4781bc
V-12066	2860	4520	4955	4825	4290d
Mean	3402 c	5076 b	5474a	5169 b	
Cd <sub>1</sub> for varieties 198, for Fertilizer rates 125.12 and for V × F 391.51					



## 35. TITLE EFFECT OF IRRIGATION SCHEDULING ON DIFFERENT GROWTH STAGES OF WHEAT

### OBJECTIVE

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

### TREATMENTS & METHODOLOGY

Variety: Anaj-17, Plot Size: 1.62x6m, Seed rate=100 kg ha<sup>-1</sup>

Layout = RCBD with 3 replications

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)





## PREVIOUS YEAR'S RESULTS

Treatments	Mean yield (kg ha <sup>-1</sup> )
T <sub>1</sub> = no irrigation	3160 f
T <sub>2</sub> = 1 irrigation (at crown root stage)	3990 e
T <sub>3</sub> = 2 irrigations (1 <sup>st</sup> at crown root and 2 <sup>nd</sup> at booting)	4483 cd
T <sub>4</sub> = 2 irrigations (1 <sup>st</sup> at crown root and 2 <sup>nd</sup> at heading)	4189 de
T <sub>5</sub> = 2 Irrigations (1 <sup>st</sup> at crown root and 2 <sup>nd</sup> at grain filling)	4934 bc
T <sub>6</sub> = 3 irrigations (1 <sup>st</sup> at crown root, 2 <sup>nd</sup> at booting and 3 <sup>rd</sup> at heading)	5240 ab
T <sub>7</sub> = 3 Irrigations (1 <sup>st</sup> crown root, 2 <sup>nd</sup> at booting and 3 <sup>rd</sup> at grain filling)	5442a
T <sub>8</sub> = 3 Irrigations (1 <sup>st</sup> at crown root , 2 <sup>nd</sup> at heading and 3 <sup>rd</sup> grain filling)	5115ab
T <sub>9</sub> = 4 irrigations (1 <sup>st</sup> at crown root , 2 <sup>nd</sup> at booting, 3 <sup>rd</sup> at heading and 4 <sup>th</sup> at grain filling)	5008 ab
T <sub>10</sub> = 5 irrigations (1 <sup>st</sup> at crown root , 2 <sup>nd</sup> at stem elongation, 3 <sup>rd</sup> at booting, 4 <sup>th</sup> at heading and 5 <sup>th</sup> at grain filling)	5048 ab
LSD (0.05) =461	



# PATHOLOGICAL STUDIES



## 36. 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 with major emphasis on wheat blast, in different agro ecological zones of Punjab.

## 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



## PREVIOUS YEAR'S RESULTS



The result indicates that all the surveyed wheat fields were free from visual typical symptoms of blast i.e. brown to whitish discoloration of spikes. However, the symptom of foliar blight was observed at scattered locations and disease suspected samples were collected and analysed in Lab. for pathogen identification. The lab analysis report revealed that none of the samples showed the presence of wheat blast pathogen (*Magnaporthe oryzae* Triticum pathotype (Mot)). While other pathogens like *Alternaria spp.*, and *Drechslera spp.* were isolated from collected disease samples.

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## **37. 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>	<b>LR Differentials = 40, YR Differentials = 28 , SR Differentials = 16 Commercial Varieties/lines = 200</b>
<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 11-12-2016 while yellow rust on 17-02-2017 in 1<sup>st</sup> trap nursery.

The results regarding virulence pattern are given in table below:

<b>The isogenic lines showed resistant response to leaf and stripe rusts.</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 2016-17.



## 38. 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 & Psedu black chaff.
- To strengthen the rust resistant breeding program.

## TREATMENTS & METHODOLOGY

<b>No. of entries</b>	~ 400
<b>Check</b>	Morocco at border and every 10 <sup>th</sup> entry
<b>Sowing Date</b>	Mid of November
<b>Plot Size</b>	2 rows x 2 m
<b>Observations</b>	<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; Psedu black chaff will be used for the identification of resistant genes i.e. LR34, LR46 &amp; SR2 respectively</li></ul> All the entries will be evaluated for important agronomic parameters.



## PREVIOUS YEAR'S RESULTS

Parameters	No of entries
Pseudo black chaff	21
Leaf tip necrosis	36
Low infection type to LR	146

Entries showing presence of slow rusting genes on the basis of morphological markers	
Morphological Markers	Lines/Varieties
Leaf tip necrosis (Ltn)	6137, 6119, 6130, 6142, 6143, 6147, 6162, 6163, 6164, 6208, 6232, HRS-1, HRS -10, HRS -12, HRS -16, HRS -50, HRS -52, HRS -58, HRS -68, HRS -71, HRS -75, HRS -136, HRS -148, HRS -161, HRS -162, HRS -170, HRS -175, HRS -181, HRS -187, HRS -206, HRS -216, HRS -217, HRS -219, HRS & HRS -274
Pseudo black chaff (Pbc)	6067, 6163, 6191, 6208, 6213, 6222, HRS-11, HRS-28, HRS -76, HRS-118, HRS-124, HRS-129, HRS -132, HRS -136, HRS -144, HRS -153, HRS -164, HRS -206, HRS-208, HRS- 221 & HRS -253





**39. 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, Twenty three entries showed susceptible reaction to leaf rust Seven showed susceptibility to yellow rust while, twenty 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.



## 40. 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,

Twenty four entries

i.e. V-12066, V-14168, V-14057, V-14122, V-15235, V-15238, V-15249, V-15250, V-13165, V-13192, NR-448, NR-491, NS-13, WV-1038, 13FJ20, 13FJ29, 15CO42, 15CO44, TWS-1351, TWS-1334, TWS-1335, TWS-1355, 15B1131 and 13B3044 showed low infection type (score 0, ; ,1 & 2) at seedling stage.

While the fifteen entries showed resistant to moderately resistant response in field and 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.



## 41. 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 or Partial Bunt ( <i>Tilletia indica</i> )				
Scale		Reaction	No. of lines/varieties	No. of Entries
0	No Symptoms of bunt on head and grains	HR	V-14154, 14B-1005, V-15238 , 13FJ29, V-14266, TWS1355, V-15207, Uqab-2002, Shafaq-06 & MH-97	10
1	1% or less grains bunted	R	V-14168, HYT-27-21, V-14270, 13FJ29, V-14117, 14B-1572, V-13192, V-15249, HYT-60-7, V- 14215C044, V-14057, WV-1038, Ujalla-16 & Millat-11	15
3	1-2 % of grains bunted	MR	13FJ20, 13-3044, V-12066, NR-499, NS-13,V- 13348, TWS1335,, AARI-11, AaS-11, Inqilab-91 & Lassani-08	11
5	2-5 % of grains bunted	MS	V-14170,HYT-27-11, 15C042, HYT-60-57, TWS1334, 9515, V-15235, TWS1351, V-14225, V-14124, NR-505, Gandum-4, 12FJ-26, Wattan, Pak-81, Blue Silver & Passban-90	17
7	5-10 % of grains bunted	S	V-15211, NR-488, V-14262, V-15210, V-12066, , HYT-60-5, 9496, NR-487, TWS-12-245, Punjab-11, Fsd-08 & Shalimar-88	12
9	More than 10% of grains bunted	HS	V-13165, V-15210, 15B-1116, 13FJ35, V-15250, NS-14, V-14271, V-14122, 14BT022, , NR-448, V-14268, V-14269,V-14057, V-14084 15C042, 9515, V-15235,Lyalpur-73 & AS-02	19
<b>Total</b>				<b>84</b>



## 42. 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 60 samples)				PWYT (out of 60 samples)			
	Karnal Bunt		Black Point		Karnal Bunt		Black Point	
	Infected	Prevalence (%)	Infected	Prevalence (%)	Infected	Prevalence (%)	Infected	Prevalence (%)
Kot Nina	46	76.6	33	55.0	19	31.6	28	46.6
K.S. Kaku	14	23.3	21	35.0	11	18.3	14	23.3
R.Khurd	06	10.0	23	38.3	02	3.3	13	21.6
Gujjarwala	04	6.6	11	18.3	04	6.6	06	10.0
Khannewal	0	0	18	30.0	0	0.0	11	18.3
Sahiwal	0	0	13	21.6	0	0.0	09	15.0
Faisalabad	03	5.0	17	28.3	01	1.6	08	13.3
Sargodha	0	0	29	48.3	0	0.0	13	21.6
Pakpattan	04	6.6	18	30.0	01	1.6	10	16.6
Bahwalnagar	07	11.6	12	55.0	03	5.0	09	15.0
<b>Total</b>	<b>84</b>	<b>14.0</b>	<b>195</b>	<b>32.5</b>	<b>41</b>	<b>6.8</b>	<b>121</b>	<b>20.1</b>

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





# WHEAT ENTOMOLOGY



## 43. 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

Month	Temperature C <sup>o</sup>		Humidity (%)	Rain fall/week (mm)	Av. Aphid population. /Trap/week	Av. Aphid pop./Trap/d ay
	Max C <sup>o</sup>	Min C <sup>o</sup>	(mm)	(mm)		
<b>January,2017</b>						
1 <sup>st</sup> week	18.75	10.17	91.43	0	98.28	14.04
2 <sup>nd</sup> week	18.06	4.16	84.37	4.8	140.0	18.25
3 <sup>rd</sup> week	18.70	4.97	86.87	0	203.96	25.47
4 <sup>th</sup> week	18.76	8.42	88.50	7.1	250.8	31.35
<b>February,2017</b>						
1 <sup>st</sup> week	20.83	6.97	85.43	3.7	314.37	44.91
2 <sup>nd</sup> week	24.28	5.6	76.14	0	333.90	47.7
3 <sup>rd</sup> week	26.95	12.28	76.71	0	361.76	51.68
4 <sup>th</sup> week	27.14	8.78	71.43	0	458.71	65.53
<b>March,2017</b>						
1 <sup>st</sup> week	26.44	11.54	75.29	1.7	1229.9	175.7
2 <sup>nd</sup> week	22.03	10.93	78.12	14.4	1636.32	204.54
3 <sup>rd</sup> week	30.41	14.36	72.75	0	1882.24	235.28
4 <sup>th</sup> week	35.82	19.44	62.25	0	1178.8	147.35
<b>April,2017</b>						
1 <sup>st</sup> week	33.75	19.44	58.57	9	135.94	19.42



## 44. 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

Design: RCBD, Reps:3, 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

Varieties /Lines	Aphid population per tiller
V1-11098	12.610
Punjab	29.410 C
Galaxy-13	15.590 EF
Ujala-16	24.487 D
V-12304	17.087 E
V-12066	13933EF
V-13348	43.320 A
V-14154	33.900B
V-14225	24.023D
V-14227	31.030BC
V-14168,	34.400B
V-14170	17.410E
LSD Value at @ 0.05	3.7457



## 45. 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,2018.

Material	Total Entries	Average Aphid population/ Tiller on each variety/line (Mean values)										
		0-5	6-10	11-15	16-25	26-35	36-45	46-55	56-65	66-75	76-85	>86
Crossing block	658	0	51	180	281	76	36	16	11	4	2	1



## 46. 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, 2018



## PREVIOUS YEAR'S RESULTS

The survey revealed that the aphid population ranged from 4.0-22.0 aphids/tiller on different wheat varieties in the Punjab. While regarding wheat varietal basis aphid population remained in the range 4-12,7-14,10-21,12-22,9-19,11-20 and 9-20 per tiller on Fsd-08, Lasani-08, Galaxy-13,Punjab-11 , Johar-16, Glod-16 and Ujala-16, respectively. So aphid population was recorded more in Narowal on Punjab-08 and low in Gujranwala on Faisalabad- 08. Therefore, the aphid population during the season was not so alarming and the natural enemies (Coccinellids, Chrysoperlla Spp. Syrphid flies and etc) controlled the pest naturally and therefore no pesticides should be recommended for aphid control.





# SEED PRODUCTION



## 47. 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



**48. 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.#	Varieties	kg	Sr.#	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.		



**49. 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

<b>Sr. #</b>	<b>Varieties/lines</b>	<b>Sr. #</b>	<b>Varieties/lines</b>
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.	Ujala-16	12	V-14168
6	V-13348	13	V-14170
7	V-14154		



## PREVIOUS YEAR'S RESULTS

<b>Sr. #</b>	<b>Varieties</b>	<b>kg</b>	<b>Sr. #</b>	<b>Varieties</b>	<b>kg</b>
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





## 50. 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 of Galaxy-13, Ujala-16 and Anaj-17 after harvest will be collected and ground into flour (using Quadrumate 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 in the High Performance Liquid Chromatograph (HPLC) along with the standards of acrylamide. Peaks will be obtained and interpreted.



## PREVIOUS YEAR'S RESULTS

Products	Acryl amide Concentration (ppb)	
	Ujala-16	Galaxy-13
<b>Biscuit</b>	287	275
<b>Bread</b>	249	267
<b>Cake</b>	255	263

Varieties: Ujala-16 and Galaxy-13, Products: Biscuits, cake and bread, Equipment: (HPLC). Acrylamide, Range: 250 to 300 ppb.



## 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

Grains of three promising bread wheat varieties i.e. Galaxy-13, Ujala-16 and Anaaj-17 will be collected from three planting dates i.e. 1<sup>st</sup> November, 30<sup>th</sup> November and 30<sup>th</sup> December. Collected samples will be ground and analyzed through Spectrophotometer to determine their phytic acid and iron contents. Zn contents will be determined using Atomic Absorption Spectro-photo meter.



# PREVIOUS YEAR'S RESULTS

Varieties	Iron Content (ppm)			Zinc Content (ppm)			Phytic Acid Content (%)		
	D1	D2	D3	D1	D2	D3	D1	D2	D3
<b>Millat-11</b>	137	141	144	31.0	31.0	33.2	1.72	1.86	1.96
<b>Punjab-11</b>	135	142	142	32.5	32.2	32.7	1.82	1.90	1.97
<b>Galaxy-13</b>	136	142	143	30.2	33.0	33.0	1.83	1.78	2.05
<b>Ujala-16</b>	137	142	143	31.5	33.7	32.9	1.87	1.88	2.00

**Varieties:** Millat-11, Punjab-11, Galaxy-13 and Ujala-16

**Planting dates :** 1<sup>st</sup> November, 30<sup>th</sup> November and 30<sup>th</sup> December.

There was no significant difference among varieties but sowing date impact on iron was significant



## 52. TITLE | QUALITY EVALUATION OF BREAD WHEAT ADVANCED LINES/VARIETIES

### OBJECTIVE

- To screen advanced lines for different quality traits.

### TREATMENTS & METHODOLOGY

Advanced lines Selected in NUWYT & PUWYT

#### Parameters:

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).



# PREVIOUS YEAR'S RESULTS

<b>Trials</b>	<b>1000 grain wt. (g)</b>	<b>Test Wt. (kg hl<sup>-1</sup>)</b>	<b>Protein (%)</b>	<b>Starch (%)</b>	<b>Gluten (%)</b>
<b>NUWYT (I)</b>	28.35-46.15	64.9-73.6	52.8-56.6	12.9-15.9	22.5-34.0
<b>NUWYT (R.F)</b>	31.85-41.20	69.1-79.4	52.2-55.8	12.9-16.1	23.0-35.5
<b>PUWYT (I)</b>	34.25-41.20	66.4-78.4	52.9-56.8	12.3-16.2	22.5-33.5
<b>PUWYT (R.F)</b>	29.00-41.20	60.5-77.2	50.6-56.3	13.4-15.8	24.0-39.5

## **No. of lines=240 (NUWYT & PUWYT)**

The average values for thousand grain weights and test weight were 37 g and 70 kg/hl respectively. Whereas, average values for protein and gluten contents were 14.5% and 28%, respectively. Chapatti and bread quality scores were also within desirable range.



## 53. TITLE

# EFFECT OF PLANTING TIME ON GRAIN QUALITY TRAITS

## 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)	33.40-44.03	31.67-41.73	27.93-34.03	27.37-32.55	26.70-37.57	23.93-30.67	23.67-29.53
Protein (%)	13.2-14.8	13.0-15.4	14.2-15.8	14.2-15.6	12.2-15.5	13.1-15.3	12.7-15.1
Gluten (%)	24.7-30.3	23.3-30.3	26.3-33.7	26.3-31.7	20.0-30.7	23.7-31.0	22.5-29.7
Starch (%)	50.0-56.5	53.5-56.0	53.2-54.8	53.4-54.9	53.4-56.4	53.1-55.8	53.2-55.5

Advanced lines=12, Dates:7, Samples=252, Reps:3

Ujala-16 was the topper with 44.03 g weight in first sowing date i.e. 1<sup>st</sup> November, which was the most favorable planting date in regards to 1000 grain weight, followed by D2. Whereas, D7 scored the least in this regard. Faisalabad-08 remained ever green regarding chapatti quality scoring highest marks in wet gluten content (33.7 % in D3 i.e. Nov. 20). Protein content was the highest in D3 and D4, but the overall results of the protein percentage were quite acceptable. V-14225 gave the highest protein score on average of all sowing dates and individually at D3, i.e. 15.1% and 15.8%, respectively





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

### **OBJECTIVES**

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

### **TREATMENTS & METHODOLOGY**

Advanced wheat lines incorporated in fertilizer trial for the year 2017-18 will be tested for comprehensive quality parameters especially grain weight (using seed counter & electric balance), test weight (through test weight/bushel weight apparatus), starch, gluten and protein, contents using Kernelyzer).



## PREVIOUS YEARS' RESULTS

- **1000 kernel weight**,  $F_1$  treatment contributed the top most average followed by  $F_3$ . The prominent variety with the highest average scores in 1000 grain weight in all treatments was V-14170, followed by V-14154 which also had the maximum count 42.4 g.
- **Test weight** has mostly excelled in the  $F_2$  treatment. V- 12066 have shown promising results regarding test weight, by having a good average score of 74.8 kg/hL with the fertilizer treatments and varietal comparison. Fsd-08 revealed the highest test weight 76.6 kg/hL with the application of  $F_2$ .
- V-14170 gave prominent **starch** results at individual treatments i.e.  $F_2$ ,  $F_3$  and  $F_4$  and with maximum starch content of 56.7%.
- $F_4$  revealed the highest **protein and gluten** range. V-14225 excelled in all four fertilizer treatments with the highest protein and gluten content on average basis and giving the topmost protein and gluten content, i.e. 15% and 30.3%, respectively.
- Assessing the fertilizer combinations, it has been concluded that maximum quality parameters showed their best potentials and indicated visibly better averages at  $F_3$  treatment.



# PREVIOUS YEARS' RESULTS

Treatments	1000 Grain wt.				Protein %				Gluten %			
	F1	F2	F3	F4	F1	F2	F3	F4	F1	F2	F3	F4
<b>Varieties/ Lines</b>												
<b>Fsd-08</b>	40.2	38.2	35.6	37.4	9.9	12.1	12.9	13.6	16.0	24.0	26.3	28.0
<b>V-14154</b>	42.4	40.2	40.2	39.3	10.0	11.6	12.7	12.3	15.7	22.3	21.0	23.0
<b>V-14225</b>	36.7	35.1	38.0	35.1	10.9	14.2	13.8	15.1	15.7	27.7	27.7	30.3
<b>V-14170</b>	41.5	40.9	43.0	40.2	10.8	10.9	12.1	12.1	17.3	15.3	20.0	18.3
<b>V-14168</b>	41.2	40.1	38.6	39.6	10.6	11.6	12.8	12.7	14.7	17.3	20.7	22.0
<b>Fertilizer levels NPK (kg ha<sup>-1</sup>)</b> F <sub>1</sub> = 0 – 0 – 0, F <sub>2</sub> = 90 – 60 – 60, F <sub>3</sub> = 120 – 90 – 60, F <sub>4</sub> = 150 – 120 – 60												



# 55. 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 YEARS' RESULTS

Parameters	Planting Dates		
	D1	D2	D3
Test wt. (kg/hL)	50.2-59.4	47.3-58.3	45.3-57.7
1000 grain wt. (g)	30.7-41.9	28.5-40.1	30.5-38.7
Protein (%)	11.3-14.3	12.5-14.6	12.3-13.9



## 56. TITLE

# EFFECT OF DIFFERENT TEMPERING CONDITIONS ON MILLING YIELD IN RELATION TO DOUGH EXTENSIBILITY

## OBJECTIVE

To determine the correlation of flour yield and dough extensibility

## TREATMENTS & METHODOLOGY

- **Wheat varieties:** Galaxy-13, Ujala-16 & Anaaj-17
- **Moisture levels:** 14.5%, 15.0%, 15.5%, 16.0%
- **Time intervals:** moisture contents of 14, 15 and 16% for time intervals of 8, 16, & 24 hours
- **Milling equipment:** Buhler mill



## PREVIOUS YEAR'S RESULTS

Four promising varieties i.e., Punjab-11, Millat-11, Galaxy-13 & Ujala-16 were selected for the study at four moisture levels. The most suitable moisture to get maximum flour yield during milling was 15% at 16 hours for Punjab-11 and 15.5% for Ujala-16 soaked for the same time duration i.e. 16 hours.



# SHUTTLE BREEDING



# Wheat Research Sub Station, Murree





## 57. TITLE | SUMMER DISEASE SCREENING NURSERY

### OBJECTIVES

A set of germplasm including advanced lines and existing varieties screened against available races of yellow and stem rust

### TREATMENTS & METHODOLOGY

Germplasm consisting of different wheat lines will be sown in the small pots in green house under controlled conditions.

At seedling stage the lines will be inoculated with rust spores for the development of infection. Reaction type will be then recorded to evaluate the resistant and susceptible material.

### PREVIOUS YEAR'S RESULTS

A set of 192 lines were inoculated with stem rust RRTTF race. Advanced material was found to be resistant against this race.



## 58. TITLE

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

### OBJECTIVES

To produce sufficient quantity of differential seed for their use in the rust 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 2018. Spikes will be harvested at maturity and seed will be saved for use in next analysis. A set of 192 wheat lines were sown in field area. Upon maturity seed of these lines was harvested and send back to main station.

### PREVIOUS YEAR'S RESULTS

17, 12 and Near Isogenic lines differential of stem rust and yellow rust, respectively were planted separately at Wheat Research Sub-Station, Murree. On maturity spikes were collected and seeds were saved for next cycle of race analysis.



## 59. TITLE

## OFF- SEASON TRAILS OF ADVANCED GENERATIONS

### **OBJECTIVES**

Off season trails of wheat advanced generations to speed up the variety development process

### **TREATMENTS & METHODOLOGY**

A Set of germplasm including wheat advance lines will be sown in field area.

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

A set of 192 wheat lines were sown in field area. Upon maturity seed of these lines was harvested and send back to main station.



# **RICE RESEARCH INSTITUTE, Kala Shah Kaku**



**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

Varieties/ lines	Yield	Disease reaction		Varieties/ lines	Yield Kg/ha	Disease reaction	
		Lr	Yr			Lr	Yr
<b>V-13001</b>	2616	0	0	Jauhar-16	2374	TMS	0
<b>Galaxy-13</b>	3146	30M	20M	AB-16	2492	0	0
<b>CK-50</b>	2968	20M	0	CD-16	2255	0	0
<b>Lassani-08</b>	2849	5M	10M	Punjab-11	2255	TMS	20M
<b>Ujala-16</b>	2962	5M	0	V-11160	2255	0	0
<b>AARI-11</b>	2849	TM	0				
<b>FSD-08</b>	2611	10M	0				
<b>Gold-16</b>	2493	TM	0				
<b>V-08086</b>	2314	0	0				



# PREVIOUS YEAR'S RESULTS

## **FILIAL GENERATIONS:**

In segregating generations, 206 entries of  $F_2$ , 167 entries of  $F_3$ , 76 entries of  $F_4$  and 41 entries of  $F_5$  were studied. Out of them 114, 102, 66 and 36 entries were selected respectively on the basis of plant aspects and disease reaction.

## **LOCAL DISEASE SCREENING NURSERY (LDSN).**

Out of 209 tested entries, 28 advanced lines from NUWYT, PUWYT, A, B trials as well as commercial varieties showed susceptible reaction to rusts while the remaining entries showed resistant to moderate resistant disease reactions.



# PREVIOUS YEAR'S RESULTS

## NATIONAL SCIENCE FOUNDATION

### Effect of low, medium and high salinity on yield of tested wheat/barley varieties

On overall mean basis the tested wheat variety AgCS produced maximum yield (2219.9 kg/ha) followed by Uqab.2000 (2157.4 kg ha<sup>-1</sup>) and CSLe (1868 kg ha<sup>-1</sup>) while Yecora Rojo produced minimum yield (951.3 kg ha<sup>-1</sup>) under low, medium and high salinity levels

## ADVANCED LINES EVALUATION TRIAL

The trial consisted of 25 entries including local check variety Ujala-16. Seven lines (V.15101, V.16178, V.15090, V-16169, V-16174, V-16180 and V.15153) gave higher yield 4444 kg ha<sup>-1</sup> 4234 kg ha<sup>-1</sup> 4078 kg ha<sup>-1</sup> 4074 kg ha<sup>-1</sup>, 4074 kg ha<sup>-1</sup>, 3996 kg ha<sup>-1</sup> and 3909 kg ha<sup>-1</sup> than Check variety (3819 kg ha<sup>-1</sup>).





# Kenya Agricultural Research Institute, Kenya



## 61. TITLE

## STEM RUST SCREENING NURSERY IN KENYA

### 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, 2018. 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

Material was rejected due to quarantine measures



**OBJECTIVES**

- To screen the wheat germplasm against rusts and powdery mildew.
- To incorporate effective rust resistant genes in local germplasm.
- To select the resistant material for further studies.
- To advance the generations for speedy variety development.

**TREATMENT AND METHODOLOGY**

About 1000 entries will be planted during last week of May, 2018 in single rows of 2 meters length. Around the planted material susceptible wheat variety (Morocco) will also be planted. Rusts and powdery mildew data will be recorded in August. Hybridization work will be carried out. Harvesting of fresh crosses and selected material will be done during the month of September, 2018 for evaluation at WRI, Faisalabad.

**Previous Years' results**

Not sown due to unavailability of land



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

## PREVIOUS YEAR'S RESULTS

Annual report 2016-17 (Under compilation)



## 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 2016-17



## 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) b-  
b-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 2016-17 (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 2016-17 (Under compilation)



# NEW EXPERIMENTS



## **68. TITLE    Breeding for climate smart wheat varieties (heat/drought tolerant)**

### **OBJECTIVES**

- Screening of advance lines/varieties for water and heat stress environment with reference to climate change scenario.
- Association of grain filling period and grain size with grain yield.
- Screening of advance lines/genotypes under drought and heat stress at seedling stage

### **TREATMENTS & METHODOLOGY**

Entries: Thirty, Checks: Fsd-08, Millet-11, Chakwal-50, Ujala-16

Sown Date: In triplicate under normal, drought (2<sup>nd</sup> week of November) and heat (last week of December), Plot size: 2 rows x 2.5m, Design: RCBD.

### **OBSERVATIONS:**

Days to heading, canopy temperature, NDVI, plant height, days to physiological maturity, 1000- grain weight and grain yield were recorded.



## PREVIOUS YEAR'S RESULTS

- The line SATYT-44, V-14262 and SATYT-34 has the highest grain yield 4294.79kg/ha, 3989.21 kg/ha and 3690.57 kg/ha respectively against check under normal irrigated conditions
- The line V-14154 gave highest yield 3054.41 kg/ha under drought conditions
- While SATYT-27, SATYT-26 and SATYT-13 has given 4218.39 kg/ha, 4137.83 kg/ha and 4117.00 kg/ha under heat stress conditions.



## **69. TITLE    BREEDING FOR DEVELOPING ENRICHED IRON AND ZINC CONTENTS WHEAT LINES/CULTIVARS**

### **OBJECTIVES**

- To develop high yielding, disease resistant, Iron and Zinc enriched lines

### **TREATMENTS & METHODOLOGY**

- About 30 fresh crosses will be attempted to accumulate genes for high concentration of iron, zinc and low concentration of phytic acid.
- F<sub>1</sub> generation for the last year crosses will be studied

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

About 25 crosses were made



## 70. TITLE | EFFECT OF TEMPERATURE, HUMIDITY AND STORAGE PERIOD ON QUALITY AND GERMINATION BEHAVIOR OF CURRENT WHEAT VARIETIES

### OBJECTIVES

To determine the impact of temperature, relative humidity and storage period on quality and germination behavior of current wheat varieties/lines.

### TREATMENTS & METHODOLOGY

Four wheat varieties viz. Punjab-11, Millat-11, galaxy-13 and Ujala-16 along with four advanced wheat lines of the crop year 2015-16 and 2016-17 will be studied. Each variety/ line of the crop year 2015-16 and 2016-17 will be kept at 25°C and 40°C with 45% relative humidity and their quality characteristics and germination behavior will be tested after suitable time interval

### PREVIOUS YEAR'S RESULTS

New experiment



## 71. TITLE

# PREPARATION OF CHAPATTI FROM ALEURON FLOUR

### OBJECTIVES

To have benefits of functional properties of aleuron flour (red dog).

### TREATMENTS & METHODOLOGY

Grains of three promising varieties viz. Galaxy-13, Ujala-16 and Anaaj-17 will be collected and further be proceeded for fractional milling to get aleuron flour (red dog). The aleuron flour along with whole wheat flour of the relevant variety (control) will further be used to bake chapattis.

### PREVIOUS YEAR'S RESULTS

New experiment





## 72. TITLE

## BIOFORTIFICATION OF WHEAT THROUGH APPLICATION OF AND ZINC AND IRON

### OBJECTIVES

To improve the Fe and Zn concentration in wheat grain.

### TREATMENTS & METHODOLOGY

Variety=Aanaj-17

Treatments	
T1	Control (No application of Fe & Zn)
T2	Foliar application of 0.5 % ZnSO <sub>4</sub>
T3	Foliar application of 1.0 % Fe SO <sub>4</sub>
T4	Foliar application combination of ZnSO <sub>4</sub> & Fe SO <sub>4</sub>
T5	Soil application of 10 kg Zn ha <sup>-1</sup>
T6	Soil application of 12 kg Fe ha <sup>-1</sup>
T7	Soil application combination of Zn & Fe

Iron and zinc will be incorporated in the soil at the time of seed bed preparation. Plant height (cm), productive tillers/m<sup>2</sup>, 1000-grain weight (g) and grain yield (kg ha<sup>-1</sup>) will be recorded in the field. Finally grain samples of all treatments will be analyzed for the determination of iron and zinc concentration.

### PREVIOUS YEAR'S RESULTS

New experiment



# Thanks

