

**ANNUAL PROGRAM  
OF RESEARCH WORK  
RABI 2015-16**



**WHEAT RESEARCH INSTITUTE,  
FAISALABAD**

## INTRODUCTION

Wheat is the leading food grain of Pakistan occupying the largest area under single crop. Wheat contributes 10.0 percent to the value added in agriculture and 2.1 percent to GDP. Area under wheat has decreased to 9180 thousand hectares in 2014-15 from last year's area of 9199 thousand hectares which shows a decrease of 0.2 percent. The production of wheat stood at 25.478 million tonnes during 2014-15, showing a decrease of 1.9 percent over the last year's production of 25.979 million tonnes. The production decreased due to prolonged winter season and unprecedented rains during April & May and caused damages to grain at harvesting time. Wheat crop has to face yield limiting factors like terminal or post-anthesis heat, drought, salinity, frost, aphids and changing virulence pattern of diseases. Increased agricultural production and high crops yield is essential for food security which make the farming systems less vulnerable to climate change. To make agriculture more effective in supporting sustainable higher economic growth trajectory and reducing poverty in Pakistan, a policy framework needs to be anchored coupled with favourable socio political climate, adequate governance, and sound macroeconomic fundamentals. Scientists of this institute have made tangible efforts to address the challenges faced by wheat crop due to global warming in the country in interaction with International organizations like CIMMYT Mexico, ICARDA Syria and USDA. Likewise, to earn the foreign exchange through the competition in the international market, wheat quality has pivotal importance now a days. In the scenario of nutritional deficiencies, biofortified wheat has also gained the attention of the scientists. The researchers' team of Wheat Research Institute is well aware of the facts that by 2050, the 334.68 million population will need about 37.14 million tons of wheat grain and the country must meet these requirements for its integrity

About 74 experiments were conducted in the research area of this institute beside NUWYT and MTWV under normal and late sown conditions in different agro-ecological zones of the Punjab province. Different projects like conservation agriculture, harvest plus, global warming, limiting water, salt, aphid tolerance and durable rust resistance are also being implemented by this institute. The scientists of the institute are in continuous struggle to break the yield barriers. Their efforts are to move from green revolution to the gene revolution..

The Experts Sub Committee conducted the spot examination of V-08203 at PSC Farm, Khanewal and WRI, Faisalabad, and recommended its case submission before the Punjab Seed Council for approval.

**(Dr. MAKHDOOM HUSSAIN)**

Director  
Wheat Research Institute,  
Faisalabad

# CONTENTS

Sr. No.	TITLE	Page
	<b>BREAD WHEAT (<i>Triticumaestivum</i> L.)</b>	1
1	Maintenance and improvement of wheat germplasm	1
2	Crossing block and hybridization	2
3	Study of filial generations (f <sub>1</sub> - f <sub>7</sub> ) of bread wheat	3
4	Study of drought filial generations (f <sub>1</sub> - f <sub>7</sub> ) of bread wheat	4
5	Study of promising advanced lines of bread wheat under drought stress conditions	5
6	Wheat breeding for durable rust resistance	6
7	Breeding for heat tolerance	7
8	Evaluation of bread wheat germplasm for post-anthesis heat stress	8
9	Improvement of iron and zinc concentration in wheat grain through breeding	9
10	Development of climate resilient wheat varieties	9
11	Yield evaluation of CIMMYT material in normal and late sown conditions	10
12	Evaluation of international bread wheat material (CIMMYT / ICARDA).	11
13	Preliminary wheat yield trials (A-trials)	12
14	Regular wheat yield trials (B-trials)	15
15	Micro wheat yield trial (MWYT)	18
16	National uniform wheat yield trial (NWYT)	19
17	Hybrid seed program	20
18	Screening of wheat advanced lines for lodging tolerance	20
	<b>DURUM WHEAT (<i>Triticum durum</i>) AND TRITICALE (<i>Triticosecale</i>)</b>	22
19	Maintenance of durum triticale germplasm	22
20	Crossing durum wheat with bread wheat	22
21	Study of durum breeding material (F <sub>1</sub> -F <sub>7</sub> )	23
22	Evaluation of international yield trials (CIMMYT) of durum wheat	23
23	Preliminary durum wheat yield trial (DA-trial)	24
24	Regular durum wheat yield trials (DB-trials)	25
25	Micro durum yield trials (MDYT).	26
	<b>BARLEY (<i>Hordeumvulgare</i>)</b>	28
26	Maintenance of barley germplasm and hybridization	28
27	Study of filialgenerations (F <sub>2</sub> , F <sub>3</sub> , F <sub>4</sub> and F <sub>5</sub> ) of barley	28
28	Preliminary barley yield trial	29
29	Regular barley yield trial	30
30	Micro yield trial of barley	31
31	International nursery/ yield trials	31
32	Sowing date trial of barley	32
33	Barley barani field trials	33
34	seed production of barley varieties and advanced lines.	34
	<b>AGRONOMY</b>	35
35	Effect of climate change on sowing time of wheat crop	35
36	Response of seed rate on grain yield of wheat advanced lines	36
37	Effect of different levels of fertilizer on grain yield of wheat	37

38	Effect of climate change on irrigation scheduling of wheat	38
39	Biofortification of wheat through application of iron and zinc	40
	<b>WHEAT PATHOLOGY</b>	41
40	Rust trap nurseries (monitoring of virulence pattern under different climatic conditions)	41
41	Establishment of host resistance (rusts) pre-breeding nursery	42
42.	Screening of wheat and barley advanced lines/varieties against rusts at different locations	42
43	Evaluation of advanced lines/varieties for seedling and adult plant resistance to leaf rust	43
44	Estimation of yield losses due to leaf rust	44
45	Screening of advanced wheat material against karnal bunt ( <i>Tilletia indica</i> ) under normal and late sowing conditions.	46
46	Survey of karnal bunt and black point of wheat	48
	<b>WHEAT ENTOMOLOGY</b>	49
47	Effect of different climatic factors on aphid population in wheat crop	49
48	Varietal screening of wheat against aphid in relation to climatic and biotic factors	50
49	Mass screening of wheat germplasm against aphids	51
50	Survey of aphid population on wheat crop in different climatic zones of the punjab during february to march	52
	<b>SEED PRODUCTION</b>	53
51	Production of breeders nucleus seed of wheat advanced lines and varieties	53
52	Pre-basic seed production of bread and durum wheat cultivars and advanced lines.	54
53	Seed production of bread and durum wheat cultivars and advanced lines	55
	<b>CEREAL TECHNOLOGY</b>	56
54	Impact of packaging material on quality of stored wheat grain	56
55	Impact of sowing time on iron and zinc contents in wheat grain	56
56	Effect of storage length on vitamin e concentration in wheat grain and flour	57
57	Comparison of bread and durum wheat for preparation of value added products	57
58	Quality evaluation of bread wheat advanced lines/varieties	58
59	Effect of planting time on grain quality traits	59
60	Effect of different fertilizer treatments on wheat grain quality	60
61	Effect of split application of nitrogen on grain quality of wheat	61
62	Determination of quality traits in advanced lines of barley	62
63	Effect of different tempering conditions on milling yield of current wheat varieties	63
	<b>SHUTTLE BREEDING PROGRAMME</b>	64
64	Summer wheat screening nursery, kaghan	64
65	Race analysis of yellow, leaf and stem rusts	64
66	Seed increase of rust differential sets (near isogenic lines)	65
67	Sowing of rust trap nursery	65
68	Development of high yielding and disease resistant wheat variety for	66

	rice zone	
69	Stem rust screening nursery kenya	67
	<b>PROJECTS</b>	69
70	Development of novel salt tolerant forage and cereal crops	69
71	Wheat productivity enhancement programme (W-PEP)	69
72	Agricultural innovation programme (AIP)-Yield loss assessment of wheat due to leaf rust using fungicides	70
73	Agricultural innovation programme (AIP)-Diamond trial to ascertain the affect of using certified seed of new varieties	70
74	Agricultural innovation programme (AIP)-Conservation trials (Agronomy)	71

# BREAD WHEAT (*Triticumaestivum* L.)

<b>1. TITLE</b>	<b>MAINTENANCE AND IMPROVEMENT OF WHEAT GERMPLASM</b>																																																
<b>OBJECTIVES</b>	<p>) To conserve existing genetic variability and enhancing the diversity of wheat germplasm.</p> <p>) Addition of new entries to enhance genetic stock</p>																																																
<b>RESEARCH WORKER (S)</b>	Muhammad Zulkiffal, Saima Gulnaz, Dr. Javed Ahmad and Dr. Makhdoom Hussain																																																
<b>PROJECT DURATION</b>	2015-16 (continuous nature)																																																
<b>LOCATION</b>	Wheat Research Institute, Faisalabad.																																																
<b>TREATMENTS &amp; METHODOLOGY</b>	<p>About 688 entries of germplasm will be maintained. Each entry will be sown in two rows of 2.5m length. Susceptible cultivar (morocco) will be planted as border rows to spread the rust inoculum. Selected entries from the local material and international trials/nurseries will be included on the basis of superiority for agronomic characters and resistance to biotic and abiotic stresses.</p> <table border="1" data-bbox="609 1115 1348 1765"> <thead> <tr> <th>Sr. No.</th> <th>Germplasm Groups</th> <th>No. of varieties / lines</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Current varieties of Pakistan</td> <td>40</td> </tr> <tr> <td>2</td> <td>Old varieties</td> <td>30</td> </tr> <tr> <td>3</td> <td>Exotic lines</td> <td>27</td> </tr> <tr> <td>4</td> <td>Disease resistant</td> <td>129</td> </tr> <tr> <td>5</td> <td>Drought tolerant</td> <td>15</td> </tr> <tr> <td>6</td> <td>Salt tolerant</td> <td>06</td> </tr> <tr> <td>7</td> <td>Heat tolerant</td> <td>25</td> </tr> <tr> <td>8</td> <td>Grain quality</td> <td>17</td> </tr> <tr> <td>9</td> <td>High grain weight</td> <td>14</td> </tr> <tr> <td>10</td> <td>High yielding</td> <td>209</td> </tr> <tr> <td>11</td> <td>Harvest plus</td> <td>14</td> </tr> <tr> <td>12</td> <td><i>Triticum pyrum</i></td> <td>05</td> </tr> <tr> <td>13</td> <td>CSISA</td> <td>18</td> </tr> <tr> <td>13</td> <td>Miscellaneous</td> <td>30</td> </tr> <tr> <td colspan="2">Total</td> <td>688</td> </tr> </tbody> </table>	Sr. No.	Germplasm Groups	No. of varieties / lines	1	Current varieties of Pakistan	40	2	Old varieties	30	3	Exotic lines	27	4	Disease resistant	129	5	Drought tolerant	15	6	Salt tolerant	06	7	Heat tolerant	25	8	Grain quality	17	9	High grain weight	14	10	High yielding	209	11	Harvest plus	14	12	<i>Triticum pyrum</i>	05	13	CSISA	18	13	Miscellaneous	30	Total		688
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<b>PREVIOUS YEAR'S RESULTS</b>	Last year 554 entries were tested 14 entries were discarded due disease and duplication. One hundred and three (103) 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 A wide range range of traits were recorded as under,																																																

Sr. No.	Character	Range
1	Plant height	80-140
2	Days to heading	95-120
3	Days to maturity	139-156
4	1000 grain weight (g)	18.2-52.12
5	Protein content (%)	11.2-16.3
6	Wet gluten content (%)	20-39
7	Conopy temperature ( <sup>0</sup> c) (booting & anthesis)	12.1-18.4 13.1-21.7
8	NDVI range (booting & anthesis)	0.62-0.86 0.63-0.87
9	Leaf & yellow rust reactions	0- 100 S
10	Laf color, size & orientation,	Wide range

<b>2. TITLE</b>	<b>CROSSING BLOCK AND HYBRIDIZATION</b>
<b>OBJECTIVES</b>	<ul style="list-style-type: none"> <li>) To maintain genotypes/lines with their typical characteristics.</li> <li>) To combine high yield, adaptability and tolerance to biotic and abiotic stresses, quality and other desirable characteristics.</li> <li>) To incorporate effective rust resistant genes in local germplasm.</li> </ul>
<b>RESEARCH WORKER (S)</b>	Dr. Javed Ahmad, Muhammad Zulkiffal, Saima Gulnaz and Dr. Makhdoom Hussain
<b>PROJECT DURATION</b>	2015-16 (continuous nature)
<b>LOCATION</b>	Wheat Research Institute, Faisalabad.
<b>TREATMENTS &amp; METHODOLOGY</b>	Crossing block comprising 549 entries will be planted twice (during 1 <sup>st</sup> and 3 <sup>rd</sup> week of Nov.). Each entry will be sown in a paired row plot of 2.5 meter length. All the entries will be evaluated for important agronomic, physiological and pathological parameters. Desirable crosses will be attempted to accumulate genes for higher yield, disease resistance and other desirable attributes. About 1000 crosses will be attempted during the coming rabi season.
<b>PREVIOUS YEAR'S RESULTS</b>	Last year crossing block comprised of 520 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. 975 single crosses were harvested

<b>3. TITLE</b>	<b>STUDY OF FILIAL GENERATIONS (F<sub>1</sub>-F<sub>7</sub>) OF BREAD WHEAT</b>																																		
<b>OBJECTIVES</b>	<ul style="list-style-type: none"> <li>i. To evaluate the filial generations under irrigated and stress (heat, drought &amp; rusts) conditions.</li> <li>ii. Selection of single plants resistant to diseases and having good plant type in F<sub>2</sub>-F<sub>4</sub> generations using selected bulk method.</li> <li>iii. Selection of desirable single head progenies in successive generations (F<sub>5</sub>&amp; F<sub>6</sub>).</li> <li>iv. Selection of uniform, vigorous advanced lines (single head row progenies) resistant to diseases from F<sub>7</sub> generation for grain yield testing in preliminary yield trials.</li> </ul>																																		
<b>RESEARCH WORKER (S)</b>	Dr. Javed Ahmed, Muhammad Muzaffar Iqbal , Waseem Sabir, Simab Nasir, Javed Anwar and Dr. Makhdoom Hussain																																		
<b>PROJECT DURATION</b>	2015-16 (continuous nature)																																		
<b>LOCATION</b>	Wheat Research Institute, Faisalabad.																																		
<b>TREATMENTS &amp; METHODOLOGY</b>	<p>F<sub>1</sub> generation will be planted in irrigated conditions. F<sub>2</sub> to F<sub>7</sub> will be exposed to artificial rusts condition. Epidemic rusts conditions will be created by spreading dust of rusts spores. Plants infected with rusts (in pots) will be kept in spreader rows around the field. On spread of rusts, good and resistant plants will be selected and selected bulk method will be used for generation advancement. Uniform maturity of tillers, plant height, lodging resistance and grain diseases will also be considered during selection. Generations of specific crosses i.e., drought and heat will be sown in their respective environmental conditions. All agronomic practices will be kept uniform. The material will be planted with the following specifications during first fortnight of November, 2015.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Generations</th> <th style="text-align: center;">No. of crosses</th> <th style="text-align: center;">Entries</th> <th style="text-align: center;">Plot size</th> </tr> </thead> <tbody> <tr> <td>F<sub>1</sub> single crosses</td> <td style="text-align: center;">878</td> <td style="text-align: center;">1100</td> <td style="text-align: center;">1 row x 2.5m</td> </tr> <tr> <td style="text-align: center;">F<sub>2</sub></td> <td style="text-align: center;">385</td> <td style="text-align: center;">385</td> <td style="text-align: center;">12 rows x 8m</td> </tr> <tr> <td style="text-align: center;">F<sub>3</sub></td> <td style="text-align: center;">138</td> <td style="text-align: center;">1555 SPS</td> <td style="text-align: center;">3 rows x 3m</td> </tr> <tr> <td style="text-align: center;">F<sub>4</sub></td> <td style="text-align: center;">266</td> <td style="text-align: center;">266 SHB</td> <td style="text-align: center;">3 rows x 3m</td> </tr> <tr> <td style="text-align: center;">F<sub>5</sub></td> <td style="text-align: center;">207</td> <td style="text-align: center;">207 SHB</td> <td style="text-align: center;">3 rows x 3m</td> </tr> <tr> <td style="text-align: center;">F<sub>6</sub></td> <td style="text-align: center;">51</td> <td style="text-align: center;">1020 SHR</td> <td style="text-align: center;">1 row, 2.5m</td> </tr> <tr> <td style="text-align: center;">F<sub>7</sub></td> <td style="text-align: center;">52</td> <td style="text-align: center;">224 SHRP</td> <td style="text-align: center;">4 rows x 4m</td> </tr> </tbody> </table> <p>SHB= Single head bulk, and SHRP=Single head row progeny, SHR=Single head rows</p>			Generations	No. of crosses	Entries	Plot size	F <sub>1</sub> single crosses	878	1100	1 row x 2.5m	F <sub>2</sub>	385	385	12 rows x 8m	F <sub>3</sub>	138	1555 SPS	3 rows x 3m	F <sub>4</sub>	266	266 SHB	3 rows x 3m	F <sub>5</sub>	207	207 SHB	3 rows x 3m	F <sub>6</sub>	51	1020 SHR	1 row, 2.5m	F <sub>7</sub>	52	224 SHRP	4 rows x 4m
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<b>PREVIOUS YEAR'S RESULTS</b>	<b>Generations</b>	<b>Crosses Studied /SHB</b>	<b>Selected</b>	
			<b>Crosses</b>	<b>Entries</b>
	F <sub>1</sub> single crosses	1070	965	965
	F <sub>2</sub>	225	138	138 SHB
	F <sub>3</sub>	413	266	266 SHB
	F <sub>4</sub>	410	207	207 SHB
	F <sub>5</sub>	143	51	51 SHB
F <sub>6</sub>	77 (1540) SHR	52	244 S R	
In F <sub>7</sub> generation, 211 lines were studied and 70 lines were selected for testing their yield performance in preliminary yield trials				

<b>4. TITLE</b>	<b>STUDY OF DROUGHT FILIAL GENERATIONS (F<sub>1</sub>-F<sub>7</sub>) OF BREAD WHEAT</b>																																
<b>OBJECTIVES</b>	To make the crosses and evaluate filial generations in drought stress condition for the development of wheat varieties.																																
<b>RESEARCH WORKER (S)</b>	Dr. Muhammad Akbar, Dr. Javed Ahmad, Dr. Makhdoom Hussain and Saleemur Rahman																																
<b>PROJECT DURATION</b>	2015-16 (Continuous nature)																																
<b>LOCATION</b>	Wheat Research Institute, Faisalabad.																																
<b>TREATMENTS &amp; METHODOLOGY</b>	<p>F<sub>1</sub> generation will be planted in irrigated condition so that sufficient seed may be produced from F<sub>1</sub> generation and resistance of each entry against diseases may be precisely observed. F<sub>2</sub> to F<sub>7</sub> will be planted in rainfed condition and these generations will be exposed to artificial rusts inoculated condition. Entries/lines with drought tolerance, uniform maturity, desirable plant height, lodging and disease resistance will be selected. All agronomic practices will be kept uniform. The breeding material will be planted with the following specifications during first fortnight of November, 2015.</p> <table border="1"> <thead> <tr> <th>Generations</th> <th>No. of crosses</th> <th>Entries</th> <th>Plot size</th> </tr> </thead> <tbody> <tr> <td>F<sub>1</sub> single crosses</td> <td>252</td> <td>252</td> <td>1 row x 2.5m</td> </tr> <tr> <td>F<sub>2</sub></td> <td>153</td> <td>153 SHB</td> <td>6 rows x 6m</td> </tr> <tr> <td>F<sub>3</sub></td> <td>127</td> <td>127 SHB</td> <td>6 rows x 6m</td> </tr> <tr> <td>F<sub>4</sub></td> <td>50</td> <td>50 SHB</td> <td>6 rows x 6m</td> </tr> <tr> <td>F<sub>5</sub></td> <td>35</td> <td>35 SH</td> <td>6 rows x 6m</td> </tr> <tr> <td>F<sub>6</sub></td> <td>53</td> <td>457 SHR</td> <td>1 row x 2.5m</td> </tr> <tr> <td>F<sub>7</sub></td> <td>128 SHRP</td> <td>128 lines</td> <td>4 rows x 4m</td> </tr> </tbody> </table> <p>SHB= Single head bulk, SHR=Single head rows and SHRP=Single head row progeny/line</p>	Generations	No. of crosses	Entries	Plot size	F <sub>1</sub> single crosses	252	252	1 row x 2.5m	F <sub>2</sub>	153	153 SHB	6 rows x 6m	F <sub>3</sub>	127	127 SHB	6 rows x 6m	F <sub>4</sub>	50	50 SHB	6 rows x 6m	F <sub>5</sub>	35	35 SH	6 rows x 6m	F <sub>6</sub>	53	457 SHR	1 row x 2.5m	F <sub>7</sub>	128 SHRP	128 lines	4 rows x 4m
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<b>5. TITLE</b>	<b>STUDY OF PROMISING ADVANCED LINES OF BREAD WHEAT UNDER DROUGHT STRESS CONDITIONS</b>
<b>OBJECTIVES</b>	To evaluate advanced lines/varieties suitable for rainfed/water stressed areas with reference to climatic change scenario.
<b>RESEARCH WORKER (S)</b>	Dr. Muhammad Akbar, Dr. Javed Ahmad, Dr. Makhdoom Hussain and Saleemur Rahman
<b>PROJECT DURATION</b>	2015-16 (Continuous nature)
<b>LOCATION</b>	Wheat Research Institute, Faisalabad.
<b>TREATMENTS &amp; METHODOLOGY</b>	Ten advanced Micro/Nuwytlines/varieties of bread wheat viz; V-11183, V-08173, V-09082, V-09087, V-08203, Galaxy-13, Chakwal-50, Faisalabad-08, Punjab-11 and Millat-11 will be sown in triplicate in three sets during 2 <sup>nd</sup> week of November, 2015 keeping plot size of (5×1.68) m <sup>2</sup> for each entry according to split plot design. One set in rainfed, 2 <sup>nd</sup> in normal irrigated conditions and 3 <sup>rd</sup> with one irrigation at reproductive stage on the same date with same agronomic practices except irrigation. Canopy temperature (CT), days to 50% heading, days to 50% maturity, plant height, and chlorophyll content with NDVI, grains per spike, 1000-grain weight and grain yield will be recorded. Finally, lines will be evaluated considering traits recorded.
<b>PREVIOUS YEAR'S RESULTS</b>	Ten advanced lines/varieties of bread wheat viz. V-11183, V-08173, V-09082, V-09087, V-08203, Galaxy-13, CK-50, Faisalabad-08, Punjab-11 and Millat-11 were sown in triplicate at three levels of irrigation on November 21, 2014 with one set in one irrigation (L <sub>1</sub> ), 2 <sup>nd</sup> with rainfed conditions (L <sub>2</sub> ) and 3 <sup>rd</sup> with normal irrigated condition (L <sub>0</sub> ). All the agronomic practices were same except irrigation. The advanced line V-11183 ranked first (4254 kg ha <sup>-1</sup> ) in grain yield with 7% and 9%

	reduction in yield in both conditions i.e., L <sub>1</sub> and L <sub>2</sub> while V-08203 remained at second position (4174 kg ha <sup>-1</sup> ) with 9% and 13% reduction in grain yield in both conditions and Galaxy-13 . (4162 kg ha <sup>-1</sup> ) showed 8% and 13% reduction in grain yield in both of the conditions.
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<b>6. TITLE</b>	Wheat breeding for durable rust resistance															
<b>OBJECTIVES</b>	To develop wheat breeding material having minor genes based adult plant resistance (Sr 2, Lr 34 and Lr 46).															
<b>RESEARCH WORKER (S)</b>	Sadia Ajmal, Sabina Asghar, Dr. Javed Ahmad, Dr. Makhdoom Hussain and Sajidur Rehman															
<b>PROJECT DURATION</b>	2015-16 (continuous nature)															
<b>LOCATION</b>	Wheat Research Institute, Faisalabad.															
<b>TREATMENTS &amp; METHODOLOGY</b>	<p>The lines having desirable combination of rust resistant genes will be crossed with high yielding genotypes for APR gene pyramiding. About 150 fresh crosses of durable rust resistance will be attempted. F<sub>1</sub> crosses will be sown in 2.5 meter row. F<sub>2</sub> will be sown in 3.6 x 6m<sup>2</sup>. At maturity single heads from desirable plants of F<sub>2</sub> will be bulked to raise next generation. The F<sub>7</sub> material will be evaluated for yield in plot size of 4 x 4m.</p> <table border="1" data-bbox="689 1182 1278 1444"> <thead> <tr> <th>Sr. No.</th> <th>Generations/ Crosses</th> <th>Crosses/plants</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Fresh crosses</td> <td>150</td> </tr> <tr> <td>2</td> <td>F<sub>1</sub></td> <td>171</td> </tr> <tr> <td>3</td> <td>F<sub>2</sub></td> <td>85</td> </tr> <tr> <td>4</td> <td>F<sub>7</sub></td> <td>52/315</td> </tr> </tbody> </table> <p>Selection will be done on the basis of plant type visual observation and rusts resistance. Molecular level studies will also be carried out by ABRI, Faisalabad for confirmation of said genes</p>	Sr. No.	Generations/ Crosses	Crosses/plants	1	Fresh crosses	150	2	F <sub>1</sub>	171	3	F <sub>2</sub>	85	4	F <sub>7</sub>	52/315
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<b>PREVIOUS YEAR'S RESULTS</b>	<table border="1" data-bbox="628 1664 1339 1881"> <thead> <tr> <th>Generations</th> <th>Entries tested</th> <th>Entries selected</th> </tr> </thead> <tbody> <tr> <td>Fresh crosses</td> <td>-</td> <td>171</td> </tr> <tr> <td>F<sub>1</sub></td> <td>130</td> <td>85</td> </tr> <tr> <td>F<sub>6</sub></td> <td>54/667</td> <td>52/315</td> </tr> <tr> <td>F<sub>7</sub></td> <td>27/77</td> <td>25/58</td> </tr> </tbody> </table>	Generations	Entries tested	Entries selected	Fresh crosses	-	171	F <sub>1</sub>	130	85	F <sub>6</sub>	54/667	52/315	F <sub>7</sub>	27/77	25/58
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<b>7. TITLE</b>	<b>BREEDING FOR HEAT TOLERANCE</b>																																		
<b>OBJECTIVES</b>	To develop crosses and evaluate the generations in heat stress condition.																																		
<b>RESEARCH WORKER (S)</b>	AneelaAhsan, Dr. Javed Ahmad and Dr. MakhdoomHussain.																																		
<b>PROJECT DURATION</b>	2015-16																																		
<b>LOCATION</b>	Wheat Research Institute, Faisalabad.																																		
<b>TREATMENTS &amp;METHODOLOGY</b>	<p>About 200 fresh crosses will be attempted to accumulate genes for high yield and heat tolerance. F<sub>1</sub> crosses will be sown in 2.5 meter row. F<sub>2</sub>, F<sub>3</sub>, F<sub>4</sub> &amp; F<sub>5</sub> will be sown as 1.8 x 6m<sup>2</sup> in the last week of December. Observations regarding disease incidence and plant type will be recorded. At maturity, single heads from desirable plants of F<sub>2</sub>, F<sub>3</sub> &amp; F<sub>4</sub> will be bulked to raise next generation. While the desirable heads from F<sub>5</sub> will be selected for head to rows in F<sub>6</sub> generation. Plot size of F<sub>6</sub> will be 1 x 2.5m. Selected lines from F<sub>6</sub> will be promoted to F<sub>7</sub> generation. F<sub>7</sub> will be sown in a plot size of 4 x 4m. The following treatment and methology will be followed,</p> <table border="1" data-bbox="630 1077 1334 1458"> <thead> <tr> <th>Sr. No</th> <th>Generations/Crosses</th> <th>Entries</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>F<sub>0</sub> (Fresh Crosses)</td> <td>200</td> </tr> <tr> <td>2</td> <td>F<sub>1</sub></td> <td>43</td> </tr> <tr> <td>3</td> <td>F<sub>2</sub></td> <td>209</td> </tr> <tr> <td>4</td> <td>F<sub>3</sub></td> <td>74</td> </tr> <tr> <td>5</td> <td>F<sub>4</sub></td> <td>57</td> </tr> <tr> <td>6</td> <td>F<sub>5</sub></td> <td>21</td> </tr> <tr> <td>7</td> <td>F<sub>6</sub></td> <td>15 crosses, 382 S.H.R</td> </tr> <tr> <td>8</td> <td>F<sub>7</sub></td> <td>201 S.H.R.P</td> </tr> </tbody> </table>			Sr. No	Generations/Crosses	Entries	1	F <sub>0</sub> (Fresh Crosses)	200	2	F <sub>1</sub>	43	3	F <sub>2</sub>	209	4	F <sub>3</sub>	74	5	F <sub>4</sub>	57	6	F <sub>5</sub>	21	7	F <sub>6</sub>	15 crosses, 382 S.H.R	8	F <sub>7</sub>	201 S.H.R.P					
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<b>8. TITLE</b>	<b>EVALUATION OF BREAD WHEAT GERMPLASM FOR POST-ANTHESIS HEAT STRESS</b>
<b>OBJECTIVES</b>	<p>i- Development of heat tolerant varieties to combat the effect of global warming.</p> <p>ii- To evaluate the bread wheat germplasm for yield and yield components under post-anthesis heat stress conditions.</p>
<b>RESEARCH WORKER (S)</b>	AneelaAhsan, Dr. Javed Ahmad and Dr. MakhdoomHussain
<b>PROJECT DURATION</b>	2015-16 (Continous nature)
<b>LOCATION</b>	Wheat Research Institute, Faisalabad.
<b>TREATMENTS &amp; METHODOLOGY</b>	Fifty bread wheat germplasm entries having similar time of anthesis will be sown as two rows of three meter length following RCB design. The material will be sown in and outside and inside the tunnel during 1st fortnight of November. The same material will be sown late outside the tunnel by providing artificial heat (gas heater)in the 1st week of December.Post anthesis heat shock will be induced by covering the tunnel with clear poly propylene sheet for about three weeks. Data regarding days to heading, canopy temperature, chlorophyll content, plant height, days to maturity, rust reactions, No. of grains/spike, 1000- grain weight and grain yield/meter row will be recorded.

#### PREVIOUS YEAR'S RESULTS

Sr. #	Genotype	Yield(kg/ha)			1000 Grain Weight(g)		
		Normal	Tunnel	Late sown	Normal	Tunnel	Late sown
1	TOBA97/PASTOR*2//AKURI	3555	2287	2621	35.3	34.1	34.6
2	BAJ #1*2/HUIRIVIS #1	2861	1967	2027	36.1	34.8	35.5
3	TRCH/5/REH/HARE//2*BCN/3/CROC_1/AE.SQUARROSA (213)//PGO/4/HUITES	2281	1940	1960	36.4	33.9	31.6
4	TACUPETO F2001*2/KIRITATI//BLOUK #1	2561	1927	2034	33.7	31.8	32.1
5	SUP152/CHYAK1	2594	1860	1720	40.1	34.2	32.3
6	V-08203	2321	1907	2074	39.3	37.3	32.0
7	FRNCLN/3/GUAM92//PSN/BOW/4/PAURAQ	2154	1767	1674	35.4	33.1	31.3
8	Fsd-08	2487	1467	1820	34.7	30.2	30.8

<b>9. TITLE</b>	<b>IMPROVEMENT OF IRON AND ZINC CONCENTRATION IN WHEAT GRAIN THROUGH BREEDING</b>
<b>OBJECTIVES</b>	To develop wheat varieties possessing high concentration of iron and zinc as well as low concentration of phytic acid
<b>RESEARCH WORKER (S)</b>	DrJavedAhmed, Dr. GhulamMahboobSubhani and Dr. MakhdoomHussain
<b>PROJECT DURATION</b>	2015-16
<b>LOCATION</b>	Wheat Research Institute, Faisalabad.
<b>TREATMENTS &amp; METHODOLOGY</b>	About 30 fresh crosses will be attempted to accumulate genes for high concentration of iron, zinc and low concentration of phytic acid. The F <sub>1</sub> generation for the last year crosses will be studied. Trials will be laid out according to randomized complete block design with three replications. and general agronomic practices will be carried out
<b>PREVIOUS YEAR'S RESULTS</b>	About 25 crosses was made.

<b>10. TITLE</b>	<b>DEVELOPMENT OF CLIMATE RESILIENT WHEAT VARIETIES</b>								
<b>OBJECTIVES</b>	To evaluate CIMMYT candidate lines under local climatic conditions.								
<b>RESEARCH WORKER (S)</b>	MajidNadeem, Dr. Javed Ahmad, Dr. MakhdoomHussain, Dr. Muhammad Imtiaz, Muhammad Noor and MuhammdZulkiffal,								
<b>PROJECT DURATION</b>	2015-16								
<b>LOCATION</b>	Wheat Research Institute, Faisalabad.								
<b>TREATMENTS &amp; METHODOLOGY</b>	<p>Entries: 650  Source: CIMMYT (heat project)  Sowing will be done as under,</p> <table border="1" data-bbox="655 1599 1307 1751"> <tr> <td>Plot zise</td> <td>6 rows x 5m</td> </tr> <tr> <td>Sowing time</td> <td>Late (last week of Dec.)</td> </tr> <tr> <td>Design</td> <td>RCB with two reps</td> </tr> <tr> <td>Checks:</td> <td>Fsd-08, Millat-11, Galaxy-13</td> </tr> </table> <p><b>Parameters:</b>NDVI, Canopy Temperature, Days to heading, Plant Height, Lodging Score, Days to maturity, Yield and 1000 grain weight will be recorded.</p>	Plot zise	6 rows x 5m	Sowing time	Late (last week of Dec.)	Design	RCB with two reps	Checks:	Fsd-08, Millat-11, Galaxy-13
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<b>PREVIOUS YEAR'S RESULTS</b>	<p>Eighty seven (87) promising lines were selected from CIMMYT material for further study in yield trials. The yield performance of top five high yielding lines compared to check variety is as under</p> <table border="1"> <thead> <tr> <th>Entry No.</th> <th>Yield (kg ha<sup>-1</sup>)</th> <th>% increase over Galaxy - 13</th> </tr> </thead> <tbody> <tr> <td>3043</td> <td>4990</td> <td>26.13</td> </tr> <tr> <td>2035</td> <td>4947</td> <td>25.04</td> </tr> <tr> <td>2034</td> <td>4694</td> <td>18.64</td> </tr> <tr> <td>2043</td> <td>4342</td> <td>9.75</td> </tr> <tr> <td>2039</td> <td>4271</td> <td>7.96</td> </tr> </tbody> </table>	Entry No.	Yield (kg ha <sup>-1</sup> )	% increase over Galaxy - 13	3043	4990	26.13	2035	4947	25.04	2034	4694	18.64	2043	4342	9.75	2039	4271	7.96
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<b>11. TITLE</b>	<b>YIELD EVALUATION OF CIMMYT MATERIAL IN NORMAL AND LATE SOWN CONDITIONS</b>																												
<b>OBJECTIVES</b>	To find out material having terminal heat tolerance ability																												
<b>RESEARCH WORKER (S)</b>	MajidNadeem, Dr. Javed Ahmad, Dr. MakhdoomHussain, Dr. Muhammad Imtiaz, Muhammad Noor and Muhammad Zulkiffal																												
<b>PROJECT DURATION</b>	2015-16																												
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<b>PREVIOUS YEAR'S RESULTS</b>	<p>Six hundred and fifty (650) promising lines were selected for further study in yield trials.</p> <p>Range for characters (in normal &amp; late trials) is given below:</p> <table border="1"> <thead> <tr> <th>Sr. No.</th> <th>Character</th> <th>Normal</th> <th>Late</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Days to heading</td> <td>91-105</td> <td>70-87</td> </tr> <tr> <td>2</td> <td>Plant height (cm)</td> <td>83-119</td> <td>72-107</td> </tr> <tr> <td>3</td> <td>Leaf rust reaction</td> <td>0- 100 S</td> <td>0- 80 S</td> </tr> <tr> <td>4</td> <td>Yellow rust reaction</td> <td>0-50 S</td> <td>0-40 MRMS</td> </tr> <tr> <td>5</td> <td>1000 grain weight (g)</td> <td>26.1-48.5</td> <td>24.2-46.6</td> </tr> <tr> <td>6</td> <td>Grain yield (kg ha<sup>-1</sup>)</td> <td>2735-5438</td> <td>2143-4864</td> </tr> </tbody> </table>	Sr. No.	Character	Normal	Late	1	Days to heading	91-105	70-87	2	Plant height (cm)	83-119	72-107	3	Leaf rust reaction	0- 100 S	0- 80 S	4	Yellow rust reaction	0-50 S	0-40 MRMS	5	1000 grain weight (g)	26.1-48.5	24.2-46.6	6	Grain yield (kg ha <sup>-1</sup> )	2735-5438	2143-4864
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<b>12.TITLE</b>	<b>EVALUATION OF INTERNATIONAL BREAD WHEAT MATERIAL (CIMMYT / ICARDA).</b>																																							
<b>OBJECTIVES</b>	To evaluate and select promising lines from CIMMYT / ICARDA materials for combating changing climate and strengthening bread wheat germplasm.																																							
<b>RESEARCH WORKER (S)</b>	Muhammad Ijaz, Dr. Javed Ahmad, AneelaAhsan, Dr Muhammad Akbar, Sabina Asghar, Faqir Muhammad, Dr. MakhdoomHussain, SherBaz Khan, Javed Anwar and Muhammad HammadTanveer																																							
<b>PROJECT DURATION</b>	2014-15 (Continuous)																																							
<b>LOCATION</b>	Wheat Research Institute, Faisalabad.																																							
<b>TREATMENTS &amp; METHODOLOGY</b>	<p>The following yield trials/nurseries are expected, which will be laid out according to the instructions supplied by the donor agencies (CIMMYT, ICARDA &amp; NARC):</p> <table border="1"> <thead> <tr> <th><b>Sr. No.</b></th> <th><b>Trials/ Nurseries</b></th> <th><b>Source</b></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>36<sup>th</sup> ESWYT</td> <td>CIMMYT</td> </tr> <tr> <td>2</td> <td>23<sup>rd</sup> SAWYT</td> <td>CIMMYT</td> </tr> <tr> <td>3</td> <td>10<sup>th</sup> EBWYT</td> <td>CIMMYT</td> </tr> <tr> <td>4</td> <td>4<sup>th</sup> WYCYT</td> <td>CIMMYT</td> </tr> <tr> <td>5</td> <td>16<sup>th</sup> CWANA SBWON</td> <td>ICARDA</td> </tr> <tr> <td>6</td> <td>16<sup>th</sup> CWANA ESBWYT</td> <td>ICARDA</td> </tr> <tr> <td>7</td> <td>16<sup>th</sup> CWANA DSBWYT</td> <td>ICARDA</td> </tr> <tr> <td>8</td> <td>16<sup>th</sup> CWANA ISBWYT</td> <td>ICARDA</td> </tr> <tr> <td>9</td> <td>13<sup>th</sup> HTWYT</td> <td>CIMMYT</td> </tr> <tr> <td>10</td> <td>4<sup>th</sup> SATYN</td> <td>CIMMYT</td> </tr> <tr> <td>11</td> <td>15<sup>th</sup> HT-SBWON</td> <td>CIMMYT</td> </tr> <tr> <td>12</td> <td>CSISA-SB</td> <td>CIMMYT</td> </tr> </tbody> </table>	<b>Sr. No.</b>	<b>Trials/ Nurseries</b>	<b>Source</b>	1	36 <sup>th</sup> ESWYT	CIMMYT	2	23 <sup>rd</sup> SAWYT	CIMMYT	3	10 <sup>th</sup> EBWYT	CIMMYT	4	4 <sup>th</sup> WYCYT	CIMMYT	5	16 <sup>th</sup> CWANA SBWON	ICARDA	6	16 <sup>th</sup> CWANA ESBWYT	ICARDA	7	16 <sup>th</sup> CWANA DSBWYT	ICARDA	8	16 <sup>th</sup> CWANA ISBWYT	ICARDA	9	13 <sup>th</sup> HTWYT	CIMMYT	10	4 <sup>th</sup> SATYN	CIMMYT	11	15 <sup>th</sup> HT-SBWON	CIMMYT	12	CSISA-SB	CIMMYT
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10	4 <sup>th</sup> SATYN	CIMMYT																																						
11	15 <sup>th</sup> HT-SBWON	CIMMYT																																						
12	CSISA-SB	CIMMYT																																						



**PREVIOUS YEAR'S RESULTS**

Out of 582 promising lines, 105 were selected from International yield trials and nurseries for testing in station yield trials and inclusion in pre-breeding nursery. The detail is given below:

Sr. No.	Name of Trial	Entries	
		Studied	Selected
1	34 <sup>th</sup> ESWYT	50	18
2	21 <sup>nd</sup> SAWYT	50	21
3	15 <sup>th</sup> CWANA SBWON	120	7
4	15 <sup>th</sup> CWANA ESBWYT	24	4
5	15 <sup>th</sup> CWANA DSBWYT	24	4
6	15 <sup>th</sup> CWANA ISBWYT	24	4
7	13 <sup>th</sup> HTWYT	50	4
8	4 <sup>th</sup> SATYN	28	4
9	15 <sup>th</sup> HT-SBWON	160	22
10	CSISA-SB	52	17
Total=10		582	105

<b>13. TITLE</b>	<b>PRELIMINARY WHEAT YIELD TRIALS (A-TRIALS)</b>
<b>OBJECTIVES</b>	To evaluate the newly developed stable lines for yield and other agronomic parameters under irrigated and rainfed conditions.
<b>RESEARCH WORKER (S)</b>	Muhammad Owais, Muhammad Ijaz, Dr. Javed Ahmad and Dr. Makhdoom Hussain
<b>PROJECT DURATION</b>	2015-16 (Continuous)
<b>LOCATION</b>	Wheat Research Institute, Faisalabad.
<b>TREATMENTS &amp; METHODOLOGY</b>	190 bread wheat lines will be tested in preliminary yield trials under irrigated conditions including three check varieties (Faisalabad-08, Punjab-11 and Galaxy-13), while eighty five bread wheat lines will be tested in preliminary yield trials under rainfed conditions including four check varieties (Faisalabad-08, Chakwal-50, Dhurabi-13 and Galaxy-13). Trials will be laid out according to randomized complete block design with three replications. The most promising lines will be selected on the basis of desirable economic traits to strengthen the regular yield trials (B-Trials).

**PREVIOUS YEAR'S RESULTS**

Thirteen advanced lines (out of 135) of bread wheat were found high yielding than two check varieties in their respective trials. Twenty four advanced lines were found high yielding than two check varieties in rainfed trials. The results are enlisted below.

<b>Variety Code</b>	<b>Yield (kg ha<sup>-1</sup>)</b>	<b>Percentage Increase over check varieties</b>		
<b>A-I</b>		<b>Galaxy-13</b>	<b>FSD-08</b>	<b>Punjab-11</b>
V-14011	4786	- 0.15	0.44	7.19
LSD (0.05)	205			
CV (%)	2.87			
<b>A-III</b>		<b>Galaxy-13</b>	<b>FSD-08</b>	<b>Punjab-11</b>
V-14039	5215	0.04	0.38	1.11
LSD (0.05)	178			
CV (%)	2.27			
<b>A-IV</b>		<b>Punjab-11</b>	<b>Galaxy-13</b>	<b>FSD-08</b>
V-14056	5506	1.72	5.46	14.66
V-14060	5458	0.83	5.54	13.66
V-14058	5437	0.44	4.14	13.22
LSD (0.05)	200			
CV (%)	2.46			
<b>A-V</b>		<b>FSD-08</b>	<b>Punjab-11</b>	<b>Galaxy-13</b>
V-14065	5658	7.92	15.26	17.48
V-14061	5397	2.94	9.94	12.06
V-14064	5275	0.61	7.46	9.53
LSD (0.05)	176			
CV (%)	2.36			
<b>A-VI</b>		<b>FSD-08</b>	<b>Punjab-11</b>	<b>Galaxy-13</b>
V-14084	5513	5.84	6.28	16.97
V-14076	5393	3.53	3.97	14.43
v-14086	5349	2.69	3.12	13.49
LSD (0.05)	180			
CV (%)	2.26			
<b>A-VIII</b>		<b>Galaxy-13</b>	<b>Punjab-11</b>	<b>FSD-08</b>
V-14112	5879	6.93	13.25	15.55
V-14117	5349	-2.71	3.04	5.13
LSD (0.05)	234			
CV (%)	2.82			

Variety Code	Yield (kg ha <sup>-1</sup> )	Percentage Increase over check varieties		
		FSD-08	Galaxy -13	Dhurabi-09
<b>A-X (Rainfed)</b>				
V-14248	5048	0.16	0.12	0.09
V-14243	4866	0.12	0.08	0.05
V-14258	4816	0.10	0.07	0.04
V-14257	4697	0.08	0.04	0.02
V-14246	4665	0.07	0.04	0.01
V-14252	4662	0.07	0.04	0.01
V-14256	4655	0.07	0.03	0.01
V-14244	4624	0.06	0.03	0.00
V-14255	4616	0.06	0.03	0.00
V-14241	4559	0.05	0.01	-0.02
V-14254	4547	0.04	0.01	-0.02
V-14253	4503	0.03	0.00	-0.03
V-14249	4495	0.03	0.00	-0.03
V-14250	4420	0.01	-0.02	-0.05
LSD (0.05)	256			
CV (%)	3.4			

	Variety Code	Yield (kg ha <sup>-1</sup> )	Percentage Increase over check varieties		
	A-XI (Rainfed)		FSD-08	Galaxy-13	Dhurabi-09
	V-14266	4922	0.12	0.00	0.06
	V-14272	4855	0.11	-0.02	0.05
	V-14270	4820	0.10	-0.02	0.04
	V-14273	4810	0.10	-0.02	0.04
	V-14276	4741	0.08	-0.04	0.02
	V-14269	4689	0.07	-0.05	0.01
	V-14268	4566	0.04	-0.07	-0.02
	V-14274	4518	0.03	-0.08	-0.03
	V-14271	4490	0.02	-0.09	-0.03
	V-14262	4392	0.00	-0.11	-0.05
	LSD (0.05)	261			
	CV (%)	3.5			

<b>14. TITLE</b>	<b>REGULAR WHEAT YIELD TRIALS (B-TRIALS)</b>
<b>OBJECTIVES</b>	To evaluate the promising lines of bread wheat selected from preliminary yield trials for yield and other agronomic parameters under irrigated and rainfed conditions.
<b>RESEARCH WORKER (S)</b>	Dr. Javed Ahmad, Muhammad Owais, Muhammad Ijaz and Dr. Makhdoom Hussain
<b>PROJECT DURATION</b>	2015-16 (Continuous)
<b>LOCATION</b>	Wheat Research Institute, Faisalabad.
<b>TREATMENTS &amp; METHODOLOGY</b>	120 bread wheat lines will be tested in regular yield trials under irrigated conditions including three check varieties (Faisalabad-08, Punjab-11 and Galaxy-13). Forty nine advance lines (under rainfed condition) will be tested against check varieties (Faisalabad-08, Chakwal-50, Galaxy-13 and Dhurabi-11). Trials will be laid out according to randomized complete block design with three replications. The most promising lines will be promoted in MWYT on the basis of desirable economic traits.

**PREVIOUS YEARS' RESULTS**

Fifty two advanced lines (out of 165) of bread wheat were found high yielding than two checks. Six advanced lines (rainfed condition) were found higher yielder than two checks . The results are given below.

Variety Code	Yield (kg ha <sup>-1</sup> )	Percentage Increase over check varieties		
		FSD-08	Galaxy-13	Millat-11
<b>B-I</b>		<b>FSD-08</b>	<b>Galaxy-13</b>	<b>Millat-11</b>
V-13192	5300	2.87	7.77	24.74
V-13105	5189	0.72	5.51	22.12
V-13190	5060	-1.79	2.89	19.09
V-13165	4952	-3.88	0.69	16.55
LSD (0.05)	184			
CV (%)	2.30			
<b>B-II</b>		<b>Galaxy-13</b>	<b>FSD-08</b>	<b>Millat-11</b>
V-13101	5567	7.31	19.80	21.66
V-13117	5358	3.28	15.30	17.09
V-13122	5323	2.60	14.55	16.32
V-13136	5219	0.60	12.31	14.05
V-13074	5193	0.10	11.75	13.48
V-13163	5114	-1.43	10.05	11.76
V-13149	4931	-4.95	6.11	7.76
V-13119	4793	-7.61	3.14	4.74
V-13148	4788	-7.71	3.03	4.63
V-13099	4723	-8.96	1.64	3.21
V-13116	4715	-9.12	1.46	3.04
LSD (0.05)	220			
CV (%)	2.70			
<b>B-III</b>		<b>FSD-08</b>	<b>Galaxy-13</b>	<b>Millat-11</b>
V-13155	5260	4.39	9.08	22.27
V-13186	5216	3.51	8.17	21.25
V-13150	5147	2.14	6.74	19.64
V-13193	5057	0.36	4.87	17.55
LSD (0.05)	185			
CV (%)	2.40			

Variety Code	Yield (kg ha <sup>-1</sup> )	Percentage Increase over check varieties		
		Galaxy-13	FSD-08	Millat-11
<b>B-IV</b>		<b>Galaxy-13</b>	<b>FSD-08</b>	<b>Millat-11</b>
V-13075	5017	-1.10	2.05	3.34
LSD (0.05)	180			
CV (%)	2.34			
<b>B-V</b>		<b>FSD-08</b>	<b>Galaxy-13</b>	<b>Millat-11</b>
V-13178	5110	-3.55	1.75	17.77
LSD (0.05)	163			
CV (%)	2.12			
<b>B-VI</b>		<b>FSD-08</b>	<b>Galaxy-13</b>	<b>Millat-11</b>
V-14158	5642	11.46	12.95	26.13
V-14154	5620	11.02	12.51	25.64
V-14152	5598	10.59	12.07	25.15
V-14160	5513	8.91	10.37	23.25
V-14157	5459	7.84	9.29	22.04
V-14155	5453	7.72	9.17	21.91
V-14151	5444	7.55	8.99	21.71
V-14153	5421	7.09	8.53	21.19
V-14156	5255	3.81	5.21	17.48
V-13110	5201	2.75	4.12	16.28
LSD (0.05)	343			
CV (%)	4.04			
<b>B-VII</b>		<b>Galaxy-13</b>	<b>FSD-08</b>	<b>Millat-11</b>
V-14165	5324	-3.62	11.13	12.92
V-14176	5285	-4.33	10.31	12.09
V-14169	5268	-4.63	9.96	11.73
V-14174	5057	-8.45	5.55	7.25
V-14162	4977	-9.90	3.88	5.56
V-14170	4904	-11.22	2.36	4.01
V-14168	4892	-11.44	2.11	3.75
V-14173	4808	-12.96	0.35	1.97
LSD (0.05)	187			
CV (%)	2.31			
<b>B-VIII</b>		<b>Galaxy-13</b>	<b>FSD-08</b>	<b>Millat-11</b>
V-14177	5402	-5.19	3.65	17.92
V-14185	5379	-5.60	3.20	17.42
V-14186	5362	-5.90	2.88	17.05
V-14179	5315	-6.72	1.98	16.02
V-14187	5213	-8.51	0.02	13.80
LSD (0.05)	209			
CV (%)	2.55			
<b>B-IX</b>		<b>Galaxy-13</b>	<b>FSD-08</b>	<b>Millat-11</b>
V-14194	5497	1.36	4.11	23.56
LSD (0.05)	338			
CV (%)	4.17			

	Variety Code	Yield (kg ha <sup>-1</sup> )	Percentage Increase over check varieties																																																													
	<b>B-X</b>			<b>Galaxy-13</b>	<b>FSD-08</b>	<b>Millat-11</b>																																																										
	V-14214	5298	-2.34	4.62	12.27																																																											
	V-14209	5229	-3.61	3.26	10.81																																																											
	V-14215	5086	-6.25	0.43	7.78																																																											
	LSD (0.05)	176																																																														
	CV (%)	2.19																																																														
<b>B-XI</b>			<b>Millat-11</b>	<b>FSD-08</b>	<b>Galaxy-13</b>																																																											
	V-13036	5281	-0.34	4.39	24.43																																																											
	V-13032	5257	-0.79	3.91	23.87																																																											
	V-14222	5242	-1.08	3.62	23.52																																																											
	V-13031	5170	-2.43	2.19	21.82																																																											
	V-14225	5081	-4.11	0.43	19.72																																																											
	LSD (0.05)	161																																																														
	CV (%)	2.03																																																														
<table border="1"> <thead> <tr> <th>Variety Code</th> <th>Yield (kg ha<sup>-1</sup>)</th> <th colspan="3">Percentage Increase over check varieties</th> </tr> </thead> <tbody> <tr> <td colspan="2"><b>B-XII (Rainfed)</b></td> <td></td> <td><b>FSD-08</b></td> <td><b>Galaxy-13</b></td> <td><b>Dhurabi-09</b></td> </tr> <tr> <td></td> <td>V-13325</td> <td>5016</td> <td>0.21</td> <td>0.21</td> <td>0.12</td> </tr> <tr> <td></td> <td>V-13348</td> <td>4923</td> <td>0.19</td> <td>0.19</td> <td>0.09</td> </tr> <tr> <td></td> <td>V-13338</td> <td>4511</td> <td>0.09</td> <td>0.09</td> <td>0.00</td> </tr> <tr> <td></td> <td>V-13340</td> <td>4328</td> <td>0.05</td> <td>0.04</td> <td>-0.04</td> </tr> <tr> <td></td> <td>V-13311</td> <td>4232</td> <td>0.02</td> <td>0.02</td> <td>-0.06</td> </tr> <tr> <td></td> <td>V-13315</td> <td>4192</td> <td>0.01</td> <td>0.01</td> <td>-0.07</td> </tr> <tr> <td></td> <td>LSD (0.05)</td> <td>282</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>CV (%)</td> <td>4.2</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>						Variety Code	Yield (kg ha <sup>-1</sup> )	Percentage Increase over check varieties			<b>B-XII (Rainfed)</b>			<b>FSD-08</b>	<b>Galaxy-13</b>	<b>Dhurabi-09</b>		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			
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<b>15. TITLE</b>	<b>MICRO WHEAT YIELD TRIALS (MWYT).</b>
<b>OBJECTIVES</b>	To assess the yield performance and adaptability of promising lines in different ecological zones of the Punjab.
<b>RESEARCH WORKER (S)</b>	Dr. Makhdoom Hussain, Dr. Muhammad Munir, Abdullah, Muhammad Ijaz, Sher Baz Khan and Muhammad Tariq
<b>PROJECT DURATION</b>	2015-16 (Continuous)
<b>LOCATIONS</b>	Wheat Research Institute, Faisalabad and different districts of the Punjab.
<b>TREATMENTS &amp; METHODOLOGY</b>	Micro wheat yield trials will be conducted at Govt. farms. All the wheat breeders of the Punjab including, University of Agriculture; NIBGE, NIAB, Faisalabad, NARC, Islamabad etc. will contribute the promising lines. The trials will be conducted as per details given below:

	<table border="1"> <tr> <td><b>Set of trial</b></td> <td><b>Trials</b></td> <td><b>Entries</b></td> <td><b>Sowing time</b></td> </tr> <tr> <td>Normal duration</td> <td>20</td> <td>24</td> <td>2<sup>nd</sup> week of Nov.</td> </tr> <tr> <td>Layout</td> <td colspan="3">RCBD</td> </tr> <tr> <td>Plot size</td> <td colspan="3">1.20 m x 5 m</td> </tr> <tr> <td>Replication</td> <td colspan="3">3</td> </tr> <tr> <td>Fertilizer</td> <td colspan="3">120-90-60 NPK kg ha<sup>-1</sup></td> </tr> </table>	<b>Set of trial</b>	<b>Trials</b>	<b>Entries</b>	<b>Sowing time</b>	Normal duration	20	24	2 <sup>nd</sup> week of Nov.	Layout	RCBD			Plot size	1.20 m x 5 m			Replication	3			Fertilizer	120-90-60 NPK kg ha <sup>-1</sup>		
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<b>PREVIOUS YEAR'S RESULTS</b>	<p>44 entries including two check varieties i.e Faisalabad-08 and local check were planted at 23 locations during first fortnight of November, 2014. The best performing varieties/lines with their yields are as under</p> <table border="1"> <thead> <tr> <th colspan="2">Normal duration</th> </tr> <tr> <th>Variety/line</th> <th>Yield (kg ha<sup>-1</sup>)</th> </tr> </thead> <tbody> <tr> <td>V-13371</td> <td>4198</td> </tr> <tr> <td>BWP122559</td> <td>4198</td> </tr> <tr> <td>NR-459</td> <td>4089</td> </tr> <tr> <td>TWS-12268</td> <td>4058</td> </tr> <tr> <td>MSW-14</td> <td>4029</td> </tr> <tr> <td>V-13372</td> <td>4028</td> </tr> <tr> <td>TWX-424</td> <td>4028</td> </tr> <tr> <td>FSD-08</td> <td>4018</td> </tr> </tbody> </table>	Normal duration		Variety/line	Yield (kg ha <sup>-1</sup> )	V-13371	4198	BWP122559	4198	NR-459	4089	TWS-12268	4058	MSW-14	4029	V-13372	4028	TWX-424	4028	FSD-08	4018				
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<b>16. TITLE</b>	<b>NATIONAL UNIFORM WHEAT YIELD TRIALS (NUWYT)</b>
<b>OBJECTIVES</b>	To confirm the yield and adaptability of elite lines contributed by the wheat breeders of Pakistan.
<b>RESEARCH WORKER (S)</b>	Dr. Makhdoom Hussain, Dr. Muhammad Munir, Abdullah, Muhammad Saleem, Muhammad Ijaz, Sher Baz Khan and Muhammad Tariq
<b>PROJECT DURATION</b>	2015-16 (Continuous)
<b>LOCATION</b>	Wheat Research Institute, Faisalabad and Govt. Farms in different districts of the Punjab.
<b>TREATMENTS &amp; METHODOLOGY</b>	Eight lines (six for irrigated & two for rainfed) will be provided by WRI, Faisalabad. National Wheat Coordinator, NARC, Islamabad will design the trial. Coded entries will be supplied to Director Wheat for planting and harvesting on the selected sites in the Punjab. The trials will be conducted under normal, and rainfed conditions to evaluate the yield performance on the availability of different advanced lines.



<b>PREVIOUS YEAR'S RESULTS</b>	The results are as under,		
	Sr No	V.Code	Yield (kg/ha)
	1	PR-112	4074
	2	SRN-09111	4047
	3	NIA-CIM-04-10	4015
	4	AUR-08010	3977
	5	Local Check	3973
	6	V-11138	3967

<b>17.TITLE</b>	<b>HYBRID SEED PROGRAM</b>
<b>OBJECTIVES</b>	<ul style="list-style-type: none"> <li>) To maintain CMS (A), maintainer (B) and fertility restorer (R) lines.</li> <li>) Incorporation of cytoplasmic male sterility in local adapted varieties.</li> </ul>
<b>RESEARCH WORKER (S)</b>	SaimaGulnaz, Muhammad Zulkiffal, Dr. Javed Ahmad and MakhdoomHussain
<b>PROJECT DURATION</b>	2014-15 (continuous nature)
<b>LOCATION</b>	Wheat Research Institute, Faisalabad.
<b>TREATMENTS &amp; METHODOLOGY</b>	<p><b>CMS lines (A-lines):</b> Thirty three A-lines (CMS lines) along with the same number of B-lines (maintainers) will be planted in the field. A-lines will be maintained by pollinating with its corresponding maintainer.</p> <p><b>Fertility restorer Lines (R-lines):</b> Sixteen lines with fertility restorer gene (Rf) will also be maintained.Seed of F<sub>1</sub> will be planted for back crosses</p>
<b>PREVIOUS YEAR'S RESULTS</b>	Thirty three CMS lines were maintained by crossing with their respective maintainer (B-lines). Sixteen fertility restorers were also maintained by selfing. Three male restorer lines were crossed with ten CMS lines developed in local germplasm.

<b>18. TITLE</b>	<b>SCREENING OF WHEAT ADVANCED LINES FOR LODGING TOLERANCE</b>
<b>OBJECTIVES</b>	To evaluate advanced lines/ varieties for lodging tolerance
<b>RESEARCH WORKER (S)</b>	Dr. Muhammad Akbar, Abdullah, Dr. Javed Ahmad, Dr. MakhdoomHussain, Muhammad Tariq and SaleemurRahman
<b>PROJECT DURATION</b>	2015-16 (Continuous)
<b>LOCATION</b>	Wheat Research Institute, Faisalabad

**TREATMENTS & METHODOLOGY**

Ten advanced Micro/Nuwytlines/varieties of bread along with the check (Galaxy-13) will be sown under three treatments ( $L_1$ = Lodged at booting stage,  $L_2$  = lodged at grain filling stage and  $L_0$  = un-lodged or normal condition) in triplicate on first fortnight of November, 2015 keeping plot size ( $5 \times 1.62$ )  $m^2$  for each entry following split plot design. Entries of treatment-1 and 2 will be lodged manually at booting and grain filling stages next day of irrigation. Grain yield and 1000- grain weight will be recorded and their reduction % will be calculated to access lodging tolerance.

**PREVIOUS YEAR'S RESULTS**

Ten advanced lines/varieties of bread wheat viz; V-11183, V-08173, V-09082, V-09087, V-08203, Galaxy-13, Chakwal-50, Faisalabad-08, Punjab-11 and Millat-11 were accessed in ( $L_1$ = Lodged at booting stage,  $L_2$  = lodged at grain filling stage and  $L_0$  = un-lodged or normal condition). The results are as under,

Variety /line	Grain Yield (kg ha <sup>-1</sup> )				Compared (%)	
	( $L_1$ )	( $L_2$ )	( $L_0$ )	Mean	GYR <sub>1</sub> ( $L_1$ )	GYR <sub>2</sub> ( $L_2$ )
V-11183	3858	3337	4421	3872	13	25
V-09087	2970	3042	3523	3179	16	14
V-08173	3489	3231	3816	3512	9	15
Galaxy-13	3853	3306	4233	3797	9	22
Ck-50	3824	3399	3939	3720	3	14
V-09082	3426	3136	3766	3443	9	17
V-08203	3345	3737	3937	3673	15	5
Fsd-08	3711	3205	3867	3595	4	17
Millat-11	3441	3158	3736	3445	8	15
Punjab-11	3605	3600	3821	3675	6	6
Cd <sub>1</sub>				318.92	-	-

## **DURUM WHEAT (*Triticum durum*) AND TRITICALE (*Triticosecale*)**

<b>19. TITLE</b>	<b>MAINTENANCE AND UTILIZATION OF DURUM AND TRITICALEGERMPLASM.</b>		
<b>OBJECTIVES</b>	Enhancement of genetic variability in Durum wheat and Triticale germplasm		
<b>RESEARCH WORKER(S)</b>	Dr. Muhammad Munir, MajidNadeem and Dr.MakhdoomHussain		
<b>PROJECT DURATION</b>	2015-16 (continuous nature)		
<b>LOCATION</b>	Wheat Research Institute, Faisalabad.		
<b>TREATMENTS &amp; METHODOLOGY</b>	No. of entries	Durum (164) & Triticale (79)	
	Plot size	2 rows x 2.5 m.	
	Sowing time	2 <sup>nd</sup> week of November	
	Desirable lines will be utilized in hybridization program.		
<b>PREVIOUS YEAR'S RESULT</b>	One hundred and sixty one (161) entries of Durum and 79 entries of Triticale were maintained.		
	<b>Sr.No.</b>	<b>Traits</b>	<b>Variability range</b>
			<b>Durum</b> <b>Triticale</b>
	1	Days To Heading	89 -131      88 - 113
	2	Days To Maturity	153 - 162      158 - 163
	3	Plant Height (cm)	93 - 139      109 - 174
	4	1000-grain weight (gm)	31.34 - 51.44
	5	Rust Reaction (L.R)	0 - 40 S      0 - 20 MSS
	6	Rust Reaction (Y.R)	0 – 40 MSS      0 - 10 MS

<b>20. TITLE</b>	<b>CROSSING DURUM WHEAT WITH BREAD WHEAT</b>
<b>OBJECTIVES</b>	Introgression of genes for biotic (rusts) and abiotic stresses (drought & heat) in wheat
<b>RESEARCH WORKER(S)</b>	Dr. Muhammad Munir, MajidNadeem and Dr.MakhdoomHussain
<b>PROJECT DURATION</b>	2015-16 (continuous nature)
<b>LOCATION</b>	Wheat Research Institute, Faisalabad.
<b>TREATMENTS &amp; METHODOLOGY</b>	Durum germplasm will be crossed with stable bread wheat and durum lines/varieties .Seventy crosses/back crosses will be developed.

<b>PREVIOUS YEAR'S RESULT</b>	Sixty nine crosses were attempted out of these 60 crosses were harvested.
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<b>21. TITLE</b>	<b>STUDY OF BREEDING MATERIAL (F<sub>1</sub>-F<sub>7</sub>).</b>																																
<b>OBJECTIVES</b>	i) To advance the generations. ii) To select the vigorous and disease resistant plants from segregating generations F <sub>2</sub> -F <sub>7</sub> . iii) To select the homozygous and uniform lines for yield testing.																																
<b>RESEARCH WORKER(S)</b>	Dr.MakhdoomHussain, Dr. Muhammad Munir and MajidNadeem																																
<b>PROJECT DURATION</b>	2015-16 (Continuous nature)																																
<b>LOCATION</b>	Wheat Research Institute, Faisalabad.																																
<b>TREATMENTS &amp; METHODOLOGY</b>	The following treatment and methodology will be followed <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Generations</th> <th>No. of entries</th> <th>Plot size</th> </tr> </thead> <tbody> <tr> <td>DF<sub>1</sub></td> <td>60</td> <td>1 row x 2.5m</td> </tr> <tr> <td>DF<sub>2</sub></td> <td>32</td> <td>12 rows x 9.0m</td> </tr> <tr> <td>DF<sub>3</sub></td> <td>16</td> <td>3 rows x 3.0m</td> </tr> <tr> <td>DF<sub>4</sub></td> <td>17</td> <td>3 rows x 3.0m</td> </tr> <tr> <td>DF<sub>5</sub></td> <td>14</td> <td>3 rows x 3.0m</td> </tr> <tr> <td>DF<sub>6</sub></td> <td>260 S.H (13 Crosses)</td> <td>1 row x 2.5m</td> </tr> <tr> <td>DF<sub>7</sub></td> <td>88 SHRP</td> <td>4 rows x 3.0m</td> </tr> </tbody> </table>	Generations	No. of entries	Plot size	DF <sub>1</sub>	60	1 row x 2.5m	DF <sub>2</sub>	32	12 rows x 9.0m	DF <sub>3</sub>	16	3 rows x 3.0m	DF <sub>4</sub>	17	3 rows x 3.0m	DF <sub>5</sub>	14	3 rows x 3.0m	DF <sub>6</sub>	260 S.H (13 Crosses)	1 row x 2.5m	DF <sub>7</sub>	88 SHRP	4 rows x 3.0m								
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<b>PREVIOUS YEAR'S RESULT</b>	<b>Selection in filial generations:</b> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Sr. #</th> <th>Generations</th> <th>Entries Studied</th> <th>Entries Selected</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>DF<sub>1</sub></td> <td>48</td> <td>32</td> </tr> <tr> <td>2</td> <td>DF<sub>2</sub></td> <td>26</td> <td>16</td> </tr> <tr> <td>3</td> <td>DF<sub>3</sub></td> <td>25</td> <td>17</td> </tr> <tr> <td>4</td> <td>DF<sub>4</sub></td> <td>21</td> <td>14</td> </tr> <tr> <td>5</td> <td>DF<sub>5</sub></td> <td>21</td> <td>260 S.H (13 Crosses)</td> </tr> <tr> <td>6</td> <td>DF<sub>6</sub></td> <td>260 SHR</td> <td>88 SHRP</td> </tr> <tr> <td>7</td> <td>DF<sub>7</sub></td> <td>65</td> <td>28</td> </tr> </tbody> </table> <p>Twenty eight lines from DF<sub>7</sub> were promoted to preliminary yield trial</p>	Sr. #	Generations	Entries Studied	Entries Selected	1	DF <sub>1</sub>	48	32	2	DF <sub>2</sub>	26	16	3	DF <sub>3</sub>	25	17	4	DF <sub>4</sub>	21	14	5	DF <sub>5</sub>	21	260 S.H (13 Crosses)	6	DF <sub>6</sub>	260 SHR	88 SHRP	7	DF <sub>7</sub>	65	28
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<b>22. TITLE</b>	<b>EVALUATION OF INTERNATIONAL YIELD TRIALS (CIMMYT) OF DURUM WHEAT</b>
<b>OBJECTIVES</b>	To evaluate the CIMMYT material for incorporation in yield trials.

<b>RESEARCH WORKER (S)</b>	Dr. Muhammad Munir, MajidNadeem and Dr.MakhdoomHussain,																														
<b>PROJECT DURATION</b>	2015-16																														
<b>LOCATION</b>	Wheat Research Institute, Faisalabad.																														
<b>TREATMENTS &amp; METHODOLOGY</b>	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.																														
<b>PREVIOUS YEAR'S RESULTS</b>	<p>Eighteen lines out of 50 lines of 46<sup>th</sup>International Durum Yield Nursery were selected on the basis of their yield performance and resistance against diseases. The yield performance of top three high yielding lines compared to check variety is as under</p> <table border="1"> <thead> <tr> <th>Entry No.</th> <th>Yield (kg ha<sup>-1</sup>)</th> <th>% increase over Durum - 97</th> </tr> </thead> <tbody> <tr> <td>722</td> <td>4227</td> <td>19.51</td> </tr> <tr> <td>713</td> <td>4153</td> <td>17.42</td> </tr> <tr> <td>732</td> <td>4074</td> <td>15.18</td> </tr> <tr> <td>Durum-97 (Check)</td> <td>3537</td> <td></td> </tr> </tbody> </table> <p>During 2014-15, 38<sup>th</sup> International Durum Yield Trial was received from ICARDA. In this trial, 8 lines out of 24 lines were selected on the basis of yield performance. The yield performance of top three high yielding lines compared to check variety is as under</p> <table border="1"> <thead> <tr> <th>Entry No.</th> <th>Yield (kg ha<sup>-1</sup>)</th> <th>% increase over Durum - 97</th> </tr> </thead> <tbody> <tr> <td>12</td> <td>3723</td> <td>27.63</td> </tr> <tr> <td>20</td> <td>3695</td> <td>26.67</td> </tr> <tr> <td>14</td> <td>3607</td> <td>23.65</td> </tr> <tr> <td>Durum-97 (Check)</td> <td>2917</td> <td></td> </tr> </tbody> </table>	Entry No.	Yield (kg ha <sup>-1</sup> )	% increase over Durum - 97	722	4227	19.51	713	4153	17.42	732	4074	15.18	Durum-97 (Check)	3537		Entry No.	Yield (kg ha <sup>-1</sup> )	% increase over Durum - 97	12	3723	27.63	20	3695	26.67	14	3607	23.65	Durum-97 (Check)	2917	
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<b>23. TITLE</b>	<b>PRELIMINARY DURUM WHEAT YIELD TRIAL (DA-TRIAL)</b>
<b>OBJECTIVES</b>	To evaluate the genotypes for yield and other agronomic parameters under irrigated conditions.
<b>RESEARCH WORKER (S)</b>	Dr. Muhammad Munir, MajidNadeem, Muhammad Owais and Dr. MakhdoomHussain
<b>PROJECT DURATION</b>	2015-16 (Continuous)
<b>LOCATION</b>	Wheat Research Institute, Faisalabad.

<b>TREATMENTS &amp; METHODOLOGY</b>	50 durum wheat lines will be tested in preliminary yield trials under irrigated conditions including three check varieties (Durum-97, Wadanak-85 and Galaxy-13). Trials will be laid out according to randomized complete block design with three replications. The most promising lines will be selected on the basis of desirable economic traits to strengthen the regular yield trials (DB-Trials).																																																																																																								
<b>PREVIOUS YEAR'S RESULTS</b>	<p>19 advanced lines (out of 34) of durum wheat were found high yielding than check varieties Wadanak-85 and Durum-97 in their respective trials. The results are as under:</p> <table border="1" data-bbox="612 600 1350 1697"> <thead> <tr> <th data-bbox="612 600 794 674">Variety Code</th> <th data-bbox="794 600 979 674">Yield (kg ha<sup>-1</sup>)</th> <th colspan="2" data-bbox="979 600 1350 674">Percentage Increase over check varieties</th> </tr> </thead> <tbody> <tr> <td colspan="2" data-bbox="612 674 979 748"><b>DA-I</b></td> <td data-bbox="979 674 1161 748"><b>Wadanak-85</b></td> <td data-bbox="1161 674 1350 748"><b>Durum-97</b></td> </tr> <tr> <td data-bbox="612 748 794 786">D-14710</td> <td data-bbox="794 748 979 786">4868</td> <td data-bbox="979 748 1161 786">25.11</td> <td data-bbox="1161 748 1350 786">26.70</td> </tr> <tr> <td data-bbox="612 786 794 824">D-14707</td> <td data-bbox="794 786 979 824">4850</td> <td data-bbox="979 786 1161 824">24.65</td> <td data-bbox="1161 786 1350 824">26.24</td> </tr> <tr> <td data-bbox="612 824 794 862">D-14706</td> <td data-bbox="794 824 979 862">4547</td> <td data-bbox="979 824 1161 862">16.86</td> <td data-bbox="1161 824 1350 862">18.35</td> </tr> <tr> <td data-bbox="612 862 794 900">D-14705</td> <td data-bbox="794 862 979 900">4504</td> <td data-bbox="979 862 1161 900">15.75</td> <td data-bbox="1161 862 1350 900">17.23</td> </tr> <tr> <td data-bbox="612 900 794 938">D-14703</td> <td data-bbox="794 900 979 938">4461</td> <td data-bbox="979 900 1161 938">14.65</td> <td data-bbox="1161 900 1350 938">16.11</td> </tr> <tr> <td data-bbox="612 938 794 976">D-14704</td> <td data-bbox="794 938 979 976">4284</td> <td data-bbox="979 938 1161 976">10.10</td> <td data-bbox="1161 938 1350 976">11.50</td> </tr> <tr> <td data-bbox="612 976 794 1014">D-14709</td> <td data-bbox="794 976 979 1014">4272</td> <td data-bbox="979 976 1161 1014">9.79</td> <td data-bbox="1161 976 1350 1014">11.19</td> </tr> <tr> <td data-bbox="612 1014 794 1052">D-14708</td> <td data-bbox="794 1014 979 1052">4053</td> <td data-bbox="979 1014 1161 1052">4.16</td> <td data-bbox="1161 1014 1350 1052">5.49</td> </tr> <tr> <td data-bbox="612 1052 794 1090">D-14701</td> <td data-bbox="794 1052 979 1090">3957</td> <td data-bbox="979 1052 1161 1090">1.70</td> <td data-bbox="1161 1052 1350 1090">2.99</td> </tr> <tr> <td data-bbox="612 1090 794 1128">D-14702</td> <td data-bbox="794 1090 979 1128">3920</td> <td data-bbox="979 1090 1161 1128">0.75</td> <td data-bbox="1161 1090 1350 1128">2.03</td> </tr> <tr> <td data-bbox="612 1128 794 1167">LSD (0.05)</td> <td data-bbox="794 1128 979 1167">165</td> <td data-bbox="979 1128 1161 1167"></td> <td data-bbox="1161 1128 1350 1167"></td> </tr> <tr> <td data-bbox="612 1167 794 1205">CV (%)</td> <td data-bbox="794 1167 979 1205">2.54</td> <td data-bbox="979 1167 1161 1205"></td> <td data-bbox="1161 1167 1350 1205"></td> </tr> <tr> <td colspan="2" data-bbox="612 1205 979 1279"><b>DA-II</b></td> <td data-bbox="979 1205 1161 1279"><b>Durum-97</b></td> <td data-bbox="1161 1205 1350 1279"><b>Wadanak-85</b></td> </tr> <tr> <td data-bbox="612 1279 794 1317">D-14734</td> <td data-bbox="794 1279 979 1317">5023</td> <td data-bbox="979 1279 1161 1317">11.92</td> <td data-bbox="1161 1279 1350 1317">32.32</td> </tr> <tr> <td data-bbox="612 1317 794 1355">D-14731</td> <td data-bbox="794 1317 979 1355">4854</td> <td data-bbox="979 1317 1161 1355">8.16</td> <td data-bbox="1161 1317 1350 1355">27.87</td> </tr> <tr> <td data-bbox="612 1355 794 1393">D-14730</td> <td data-bbox="794 1355 979 1393">4698</td> <td data-bbox="979 1355 1161 1393">4.68</td> <td data-bbox="1161 1355 1350 1393">23.76</td> </tr> <tr> <td data-bbox="612 1393 794 1431">D-14721</td> <td data-bbox="794 1393 979 1431">4640</td> <td data-bbox="979 1393 1161 1431">3.39</td> <td data-bbox="1161 1393 1350 1431">22.23</td> </tr> <tr> <td data-bbox="612 1431 794 1469">D-14723</td> <td data-bbox="794 1431 979 1469">4611</td> <td data-bbox="979 1431 1161 1469">2.74</td> <td data-bbox="1161 1431 1350 1469">21.47</td> </tr> <tr> <td data-bbox="612 1469 794 1507">D-14717</td> <td 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<b>24. TITLE</b>	<b>REGULAR DURUM WHEAT YIELD TRIALS (DB-TRIALS)</b>
<b>OBJECTIVES</b>	To evaluate the promising lines of durum wheat selected from preliminary yield trials for yield and other agronomic parameters under irrigated conditions.

<b>RESEARCH WORKER (S)</b>	Dr. Muhammad Munir, MajidNadeem, Muhammad Owais and Dr. MakhdoomHussain																																																																																						
<b>PROJECT DURATION</b>	2015-16 (Continuous)																																																																																						
<b>LOCATION</b>	Wheat Research Institute, Faisalabad.																																																																																						
<b>TREATMENTS &amp; METHODOLOGY</b>	15 durum wheat lines will be tested in regular yield trials in irrigated condition including three check varieties (Durum-97, Wadanak-85 and Galaxy-13). Trials will be laid out according to randomized complete block design with three replications. The most promising lines will be promoted in MDYT on the basis of desirable economic traits.																																																																																						
<b>PREVIOUS YEAR'S RESULTS</b>	<p>14 advanced lines (out of 26) of durum wheat were found higher yielding than check varieties Wadanak-85 and Durum-97. The results are as under:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th rowspan="2">Variety Code</th> <th rowspan="2">Yield (kg ha<sup>-1</sup>)</th> <th colspan="2">Percentage Increase over check varieties</th> </tr> <tr> <th>Durum-97</th> <th>Wadanak-85</th> </tr> </thead> <tbody> <tr> <td colspan="2"><b>DB-I</b></td> <td></td> <td></td> </tr> <tr> <td>D-13195</td> <td>5298</td> <td>16.13</td> <td>25.72</td> </tr> <tr> <td>D-13206</td> <td>5072</td> <td>11.18</td> <td>20.36</td> </tr> <tr> <td>D-13205</td> <td>4817</td> <td>5.59</td> <td>14.31</td> </tr> <tr> <td>D-13208</td> <td>4809</td> <td>5.41</td> <td>14.12</td> </tr> <tr> <td>D-13207</td> <td>4733</td> <td>3.75</td> <td>12.32</td> </tr> <tr> <td>D-13202</td> <td>4730</td> <td>3.68</td> <td>12.24</td> </tr> <tr> <td>LSD (0.05)</td> <td>227</td> <td></td> <td></td> </tr> <tr> <td>CV (%)</td> <td>3.01</td> <td></td> <td></td> </tr> <tr> <td colspan="2"><b>DB-II</b></td> <td></td> <td></td> </tr> <tr> <td>D-13232</td> <td>5313</td> <td>19.77</td> <td>29.62</td> </tr> <tr> <td>D-13219</td> <td>5118</td> <td>15.37</td> <td>24.86</td> </tr> <tr> <td>D-13238</td> <td>4870</td> <td>9.78</td> <td>18.81</td> </tr> <tr> <td>D-13239</td> <td>4726</td> <td>6.54</td> <td>15.30</td> </tr> <tr> <td>D-13234</td> <td>4663</td> <td>5.12</td> <td>13.76</td> </tr> <tr> <td>D-13224</td> <td>4576</td> <td>3.16</td> <td>11.64</td> </tr> <tr> <td>D-13237</td> <td>4504</td> <td>1.53</td> <td>9.88</td> </tr> <tr> <td>D-13240</td> <td>4488</td> <td>1.17</td> <td>9.49</td> </tr> <tr> <td>LSD (0.05)</td> <td>221</td> <td></td> <td></td> </tr> <tr> <td>CV (%)</td> <td>2.92</td> <td></td> <td></td> </tr> </tbody> </table>	Variety Code	Yield (kg ha <sup>-1</sup> )	Percentage Increase over check varieties		Durum-97	Wadanak-85	<b>DB-I</b>				D-13195	5298	16.13	25.72	D-13206	5072	11.18	20.36	D-13205	4817	5.59	14.31	D-13208	4809	5.41	14.12	D-13207	4733	3.75	12.32	D-13202	4730	3.68	12.24	LSD (0.05)	227			CV (%)	3.01			<b>DB-II</b>				D-13232	5313	19.77	29.62	D-13219	5118	15.37	24.86	D-13238	4870	9.78	18.81	D-13239	4726	6.54	15.30	D-13234	4663	5.12	13.76	D-13224	4576	3.16	11.64	D-13237	4504	1.53	9.88	D-13240	4488	1.17	9.49	LSD (0.05)	221			CV (%)	2.92		
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<b>25. TITLE</b>	<b>MICRO DURUM YIELD TRIALS (MDYT).</b>
<b>OBJECTIVES</b>	To assess the yield performance and adaptability of promising durum lines at Govt. farms in different ecological zones of the Punjab.

<b>RESEARCH WORKER (S)</b>	Dr. Muhammad Munir, MajidNadeem, Muhammad Owais and Dr. MakhdoomHussain																				
<b>PROJECT DURATION</b>	2014-15 (Continuous)																				
<b>LOCATIONS</b>	Wheat Research Institute, Faisalabad and selected districts of the Punjab.																				
<b>TREATMENTS &amp; METHODOLOGY</b>	<p>Two sets of trial i.e. normal and short duration will be conducted at Govt. farms. Promising lines contributed by different institutes will be included in MDYT trials. The trials will be conducted as per details given below.</p> <table border="1"> <thead> <tr> <th>Set of trial</th> <th>Trials</th> <th>Entries</th> <th>Sowing time</th> </tr> </thead> <tbody> <tr> <td>Normal duration</td> <td>10</td> <td>10</td> <td>2<sup>nd</sup> week of Nov.</td> </tr> <tr> <td>Short duration</td> <td>10</td> <td>10</td> <td>2<sup>nd</sup> &amp; 3<sup>rd</sup> week of Dec.</td> </tr> </tbody> </table> <table border="1"> <tbody> <tr> <td>Layout</td> <td>RCBD</td> </tr> <tr> <td>Plot size</td> <td>1.20 m x 5 m</td> </tr> <tr> <td>Replication</td> <td>3</td> </tr> <tr> <td>Fertilizer</td> <td>120-90-0 NPK kg ha<sup>-1</sup></td> </tr> </tbody> </table>	Set of trial	Trials	Entries	Sowing time	Normal duration	10	10	2 <sup>nd</sup> week of Nov.	Short duration	10	10	2 <sup>nd</sup> & 3 <sup>rd</sup> week of Dec.	Layout	RCBD	Plot size	1.20 m x 5 m	Replication	3	Fertilizer	120-90-0 NPK kg ha <sup>-1</sup>
Set of trial	Trials	Entries	Sowing time																		
Normal duration	10	10	2 <sup>nd</sup> week of Nov.																		
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Replication	3																				
Fertilizer	120-90-0 NPK kg ha <sup>-1</sup>																				
<b>PREVIOUS YEAR'S RESULTS</b>	1 <sup>st</sup> year																				



## BARLEY (*Hordeumvulgare*)

<b>26. TITLE</b>	<b>MAINTENANCE OF BARLEY GERMPLASM AND HYBRIDIZATION</b>
<b>OBJECTIVES</b>	<p>i. To combine high yield, tolerance to biotic &amp; abiotic stresses, quality and other desirable characteristics.</p> <p>ii. To conserve existing genetic variability and broaden the base of genetic diversity</p>
<b>RESEARCH WORKER (S)</b>	Dr. GhulamMahboobSubhani, Mr. Abdullah and Dr. MakhdoomHussain.
<b>PROJECT DURATION</b>	2015-16
<b>LOCATION</b>	Wheat Research Institute, Faisalabad.
<b>TREATMENTS &amp; METHODOLOGY</b>	Seventy five entries of germplasm will be planted. Each entry will be sown in two rows of 2.5 meters length during 1 <sup>st</sup> fortnight of November. New entries selected from the local material and international trials/ nurseries on the basis of superiority for agronomic characters and resistance to biotic and abiotic stresses will be added. Thirty crosses will be attempted.
<b>PREVIOUS YEAR'S RESULTS</b>	During the year, Seventy two genotypes were maintained. Three lines were rejected on the basis of disease susceptibility.

<b>27. TITLE</b>	<b>STUDY OF FILIALGENERATIONS (F<sub>2</sub>, F<sub>3</sub>, F<sub>4</sub> andF<sub>5</sub>) OF BARLEY</b>
<b>OBJECTIVES</b>	To advance the generation for developing homozygous line with desirable traits.
<b>LOCATION</b>	Wheat Research Institute, Faisalabad.
<b>RESEARCH WORKER(S)</b>	Dr. GhulamMahboobSubhani and Mr. Abdullah
<b>PROJECT DURATION</b>	2015-16

<b>TREATMENTS &amp; METHODOLOGY</b>	<p>Disease resistant and better performing plants will be selected and advanced through selected bulk method. Lodging resistance, plant height and grain quality will also be considered during the selection. The material will be planted with the following specifications:</p> <table border="1" data-bbox="587 338 1374 528"> <thead> <tr> <th>Generations</th> <th>Crosses</th> <th>Entries</th> <th>Plot size</th> </tr> </thead> <tbody> <tr> <td>F<sub>2</sub></td> <td>05</td> <td>05</td> <td>1 row x 2.5 m</td> </tr> <tr> <td>F<sub>3</sub></td> <td>17</td> <td>17</td> <td>1 row x 2.5 m</td> </tr> <tr> <td>F<sub>4</sub></td> <td>09</td> <td>09</td> <td>4 row x 2.5 m</td> </tr> <tr> <td>F<sub>5</sub></td> <td>16</td> <td>16</td> <td>4 row x 2.5 m</td> </tr> </tbody> </table>	Generations	Crosses	Entries	Plot size	F <sub>2</sub>	05	05	1 row x 2.5 m	F <sub>3</sub>	17	17	1 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
Generations	Crosses	Entries	Plot size																		
F <sub>2</sub>	05	05	1 row x 2.5 m																		
F <sub>3</sub>	17	17	1 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																		
<b>PREVIOUS YEAR'S RESULTS</b>	<p>Five entries from F<sub>1</sub> were harvested for planting F<sub>2</sub> in next year. Desirable plants were selected from Seventeen entries of F<sub>2</sub>, 09 F<sub>3</sub>, 16 F<sub>4</sub> and 16 F<sub>7</sub> entries and single heads from the selected plants were harvested. Heads of each entry were threshed in bulk to advance the generation.</p>																				

<b>28. TITLE</b>	<b>PRELIMINARY BARLEY YIELD TRIAL</b>														
<b>OBJECTIVES</b>	To test different lines/varieties of barley for yield and other desirable traits.														
<b>RESEARCH WORKER (S)</b>	Dr. GhulamMahboobSubhani and Mr. Abdullah														
<b>PROJECT DURATION</b>	2015-16														
<b>LOCATION</b>	Wheat Research Institute, Faisalabad.														
<b>TREATMENTS &amp; METHODOLOGY</b>	<table border="1" data-bbox="593 1317 1366 1563"> <tbody> <tr> <td>Varieties/lines</td> <td>30</td> </tr> <tr> <td>No. of trials</td> <td>2 (A1 &amp; A2) 15 lines + 1 check variety</td> </tr> <tr> <td>Layout</td> <td>RCBD</td> </tr> <tr> <td>Reps</td> <td>3</td> </tr> <tr> <td>Plot size</td> <td>1.2 m x 5.0 m</td> </tr> <tr> <td>Fertilizer</td> <td>50 – 50 – 0</td> </tr> <tr> <td>Sowing date</td> <td>1st. fortnight of November</td> </tr> </tbody> </table>	Varieties/lines	30	No. of trials	2 (A1 & A2) 15 lines + 1 check variety	Layout	RCBD	Reps	3	Plot size	1.2 m x 5.0 m	Fertilizer	50 – 50 – 0	Sowing date	1st. fortnight of November
Varieties/lines	30														
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Plot size	1.2 m x 5.0 m														
Fertilizer	50 – 50 – 0														
Sowing date	1st. fortnight of November														

<b>PREVIOUS YEAR'S RESULTS</b>	<p>Seven advanced lines of barley were sown in this experiment with check variety Jau-83 out of which two lines produced more grain yield than check variety. The advanced line B-14038 produced maximum grain yield of 4139 kg ha<sup>-1</sup> followed by B-14039 producing grain yield of 3950 kg ha<sup>-1</sup> while the check variety Jau-83 produced grain yield of 3728 kg ha<sup>-1</sup>.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="3" style="text-align: center;"><b>BA</b></th> </tr> <tr> <th style="text-align: center;"><b>Rank</b></th> <th style="text-align: center;"><b>Line/Var.</b></th> <th style="text-align: center;"><b>Yield (Kg/ha.)</b></th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">B-14038</td> <td style="text-align: center;">4139</td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">B-14039</td> <td style="text-align: center;">3950</td> </tr> <tr> <td></td> <td style="text-align: center;">Jau-83</td> <td style="text-align: center;">3728</td> </tr> <tr> <td></td> <td style="text-align: center;">LSD (0.05)</td> <td style="text-align: center;">390.55</td> </tr> </tbody> </table>	<b>BA</b>			<b>Rank</b>	<b>Line/Var.</b>	<b>Yield (Kg/ha.)</b>	1	B-14038	4139	2	B-14039	3950		Jau-83	3728		LSD (0.05)	390.55
<b>BA</b>																			
<b>Rank</b>	<b>Line/Var.</b>	<b>Yield (Kg/ha.)</b>																	
1	B-14038	4139																	
2	B-14039	3950																	
	Jau-83	3728																	
	LSD (0.05)	390.55																	

<b>29. TITLE</b>	<b>REGULAR BARLEY YIELD TRIAL</b>																					
<b>OBJECTIVES</b>	To test different lines/varieties of barley for yield potential and other desirable traits.																					
<b>RESEARCH WORKER (S)</b>	Dr. GhulamMahboobSubhani and Mr. Abdullah																					
<b>PROJECT DURATION</b>	2015-16																					
<b>LOCATION</b>	Wheat Research Institute, Faisalabad.																					
<b>TREATMENTS &amp; METHODOLOGY</b>	<table border="1" style="margin-left: auto; margin-right: auto;"> <tbody> <tr> <td>Varieties/lines</td> <td>15 + 1 check Variety</td> </tr> <tr> <td>Layout</td> <td>RCBD</td> </tr> <tr> <td>Rep</td> <td>3</td> </tr> <tr> <td>Plot size</td> <td>1.2 m x 5.0 m</td> </tr> <tr> <td>Fertilizer NPK (Kg/ha.)</td> <td>50 – 50 – 0</td> </tr> <tr> <td>Sowing date</td> <td>1<sup>st</sup> fortnight of November</td> </tr> </tbody> </table>	Varieties/lines	15 + 1 check Variety	Layout	RCBD	Rep	3	Plot size	1.2 m x 5.0 m	Fertilizer NPK (Kg/ha.)	50 – 50 – 0	Sowing date	1 <sup>st</sup> fortnight of November									
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Fertilizer NPK (Kg/ha.)	50 – 50 – 0																					
Sowing date	1 <sup>st</sup> fortnight of November																					
<b>PREVIOUS YEAR'S RESULTS</b>	<p>Out of 9 advanced lines, 8 gave best grain yield against check variety (Jau-83)</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="3" style="text-align: center;"><b>BB</b></th> </tr> <tr> <th style="text-align: center;"><b>Rank</b></th> <th style="text-align: center;"><b>Line/Var.</b></th> <th style="text-align: center;"><b>Yield (Kg/ha.)</b></th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">B-14002</td> <td style="text-align: center;">3627</td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">B-14011</td> <td style="text-align: center;">3460</td> </tr> <tr> <td style="text-align: center;">3</td> <td style="text-align: center;">B-14009</td> <td style="text-align: center;">3438</td> </tr> <tr> <td style="text-align: center;">9</td> <td style="text-align: center;">Jau-83</td> <td style="text-align: center;">2861</td> </tr> <tr> <td></td> <td style="text-align: center;">LSD (0.05)</td> <td style="text-align: center;">408.00</td> </tr> </tbody> </table> <p>Maximum grain yield was shown by Entry No. B-14002 (3627 kg ha<sup>-1</sup>) followed by Entry No. B-14011(3460 kg ha<sup>-1</sup>) while the check variety Jau-83 produced grain yield of 2861 kg ha<sup>-1</sup>.</p>	<b>BB</b>			<b>Rank</b>	<b>Line/Var.</b>	<b>Yield (Kg/ha.)</b>	1	B-14002	3627	2	B-14011	3460	3	B-14009	3438	9	Jau-83	2861		LSD (0.05)	408.00
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	LSD (0.05)	408.00																				

<b>30 .TITLE</b>	<b>MICRO YIELD TRIAL OF BARLEY VARIETIES</b>												
<b>OBJECTIVES</b>	To assess yield potential of advanced lines against standard check varieties under different agro-climatic conditions.												
<b>RESEARCH WORKER (S)</b>	Dr. GhulamMahboobSubhani, Dr. MakhdoomHussain Mr. Abdullahand Muhammad Tariq												
<b>PROJECT DURATION</b>	2015-16												
<b>LOCATION</b>	Punjab Province												
<b>TREATMENTS &amp; METHODOLOGY</b>	<table border="1"> <tr> <td>Varieties/lines</td> <td>11 + 01 Haider-93 (Check)</td> </tr> <tr> <td>Layout</td> <td>RCBD</td> </tr> <tr> <td>Reps</td> <td>3</td> </tr> <tr> <td>Plot size</td> <td>1.2 m × 5 m</td> </tr> <tr> <td>Fertilizer NPK (Kg/ha.)</td> <td>50 – 50 – 0</td> </tr> <tr> <td>Sowing date</td> <td>Mid of November</td> </tr> </table>	Varieties/lines	11 + 01 Haider-93 (Check)	Layout	RCBD	Reps	3	Plot size	1.2 m × 5 m	Fertilizer NPK (Kg/ha.)	50 – 50 – 0	Sowing date	Mid of November
Varieties/lines	11 + 01 Haider-93 (Check)												
Layout	RCBD												
Reps	3												
Plot size	1.2 m × 5 m												
Fertilizer NPK (Kg/ha.)	50 – 50 – 0												
Sowing date	Mid of November												
<b>PREVIOUS YEAR'S RESULTS</b>	On overall mean basis the advanced line B-12045 produced maximum grain yield (3297 kg/ha) followed by B-05011 (3233 kg/ha) while check variety Jau-83 could produce the grain yield of 3051kg/ha and the advanced line B-12035 produced minimum grain yield of 2380 kg/ha.												

<b>31. TITLE</b>	<b>INTERNATIONAL NURSERIES/YIELD TRIALS</b>
<b>OBJECTIVES</b>	To test adaptability of different exotic genotypes of barley for yield and other desirable traits.
<b>RESEARCH WORKER (S)</b>	Dr. GhulamMahboobSubhani and Mr. Abdullah
<b>PROJECT DURATION</b>	2015-16
<b>LOCATION</b>	Wheat Research Institute, Faisalabad

<b>TREATMENTS &amp; METHODOLOGY</b>	The following expected international nurseries/yield trials will be planted as per instructions of donor agency:		
	S. No.	Trial Name	Source
	1	International Barley Observation Nursery 2014-15	ICARDA
	2	Global Spring Barley Screening Nursery 2014-15	ICARDA
	3	International Naked Barley Observation Nursery 2014-15	ICARDA
	4	Global Spring Barley Yield Trial 2014-15	ICARDA
	5	International Barley Yield Trial 2014-15	ICARDA
	6	International Naked Barley Yield Trial 2014-15	ICARDA
Total		06	

<b>PREVIOUS YEAR'S RESULTS</b>	S. No.	Trial Name	Entries studied	Entries selected
	1	International Barley Observation Nursery 2014-15	167	30
	2	Global Spring Barley Screening Nursery 2014-15	150	6
	3	International Naked Barley Observation Nursery 2014-15	80	7
	4	Global Spring Barley Yield Trial 2014-15	25	5
	5	International Barley Yield Trial 2014-15	25	3
	6	International Naked Barley Yield Trial 2014-15	25	6
	Total		472	57

<b>32.TITLE</b>	<b>SOWING DATE TRIAL OF BARLEY.</b>
<b>OBJECTIVES</b>	To find out best sowing time of barley advanced lines.
<b>RESEARCH WORKER (S)</b>	Dr. GhulamMahboobSubhani, Dr. MakhdoomHussain and Mr. Abdullah
<b>PROJECT DURATION</b>	2015-16
<b>LOCATION</b>	Wheat Research Institute, Faisalabad.

<b>TREATMENTS &amp; METHODOLOGY</b>	Varieties/lines	09
	Check Variety	Haider-93
	Layout	RCBD
	Rep	3
	Plot size	1.2 m × 5 m
	Date of Sowing	3 = (D <sub>1</sub> = 5 <sup>th</sup> November D <sub>2</sub> = 20 <sup>th</sup> November D <sub>3</sub> = 5 <sup>th</sup> December)

<b>PREVIOUS YEAR'S RESULTS</b>	Seven advanced lines of barley alongwith check variety (Jau-83) were tested at two sowing dates and results are as under:			
	<b>Entry Name</b>	<b>Yield kg/ha</b>		
		<b>D1</b>	<b>D2</b>	<b>GM</b>
	B-12045	3683	3628	3656
	B-09006	3131	3862	3496
	B-12025	3386	3400	3393
	B-10008	3669	2651	3160
	Jau 83	3322	2808	3065
	B-05011	2867	3214	3040
	B-10007	3114	2299	2706
B-12035	2758	2281	2520	
CD1 for sowing dates 168, for varieties 171 and for interaction 377				

<b>33.TITLE</b>	<b>Barley Barani Yield Trial</b>
<b>OBJECTIVES</b>	To test different lines/varieties of barley for yield potential and other desirable traits.
<b>RESEARCH WORKER(S)</b>	Dr. GhulamMahboobSubhani and Mr. Abdullah
<b>DURATION</b>	2015-16 (continuous nature)
<b>LOCATION</b>	Wheat Research Institute, Faisalabad and Barani Agricultural Research Institute, Chakwal

<b>TREATMENTS &amp; METHODOLOGY</b>	Varieties/lines	09
	Check Variety	Haider-93
	Layout	RCBD
	Reps	3
	Plot size	1.2 m × 5 m
	Sowing date	Mid of November
<b>PREVIOUS YEAR' S RESULTS</b>	Maximum grain yield (3196 kg ha <sup>-1</sup> ) was obtained from advanced line B-12045 followed by B-05011 (3036 kg ha <sup>-1</sup> ), B-12025 (3014 kg ha <sup>-1</sup> ) B-10007 (2935 kg ha <sup>-1</sup> ) and check Jau-83 (2804 kg ha <sup>-1</sup> ).	

<b>34. TITLE</b>	<b>SEED PRODUCTION OF BARLEY VARIETIES AND ADVANCED LINES.</b>					
<b>OBJECTIVES</b>	To produce pure seed of barley/lines for experimental use and farmers					
<b>RESEARCH WORKER(S)</b>	Dr. GhulamMahboobSubhani and Mr. Abdullah					
<b>DURATION</b>	2015-16 (continuous nature)					
<b>LOCATION</b>	Wheat Research Institute, Faisalabad.					
<b>TREATMENTS &amp; METHODOLOGY</b>	One kanal to one acre of barley varieties and advanced lines will be sown.					
<b>PREVIOUS YEAR' S RESULTS</b>	The following quantity of seed was produced:					
	<b>Sr. No.</b>	<b>Varieties/lines</b>	<b>Quantity (kg)</b>	<b>Sr. No.</b>	<b>Varieties/lines</b>	<b>Quantity (kg)</b>
	1	B-09006	710	9	Aus-1	54
	2	B-05011	324	10	Aus-2	60
	3	B-09008	222	11	B-09005	52
	4	B-10007	48	12	B-12026	43
	5	B-10008	51	13	B-12053	48
	6	B-12045	50	14	Jau-83	155
	7	B-12025	51	15	B-11001	40
	8	B-12035	50			

# AGRONOMY

<b>35.TITLE</b>	<b>EFFECT OF CLIMATE CHANGE ON SOWING TIME OF WHEAT CROP</b>																																																						
<b>OBJECTIVES</b>	<ul style="list-style-type: none"> <li>i. To determine the shift in sowing time of wheat under changing climatic scenario.</li> <li>ii. To explore optimum sowing time of promising lines of wheat.</li> </ul>																																																						
<b>RESEARCH WORKER(S)</b>	Dr. Abdul Ghaffar, Yasir Ramzan, Dr. Ghulam Mahboob Subhani and Dr. Makhdoom Hussain,																																																						
<b>PROJECT DURATION</b>	2015-16 (Continuous)																																																						
<b>LOCATION</b>	Wheat Research Institute, Faisalabad.																																																						
<b>TREATMENTS &amp; METHODOLOGY</b>	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td colspan="2"><b>A) Date of sowing = 7</b></td> </tr> <tr> <td>D<sub>1</sub> = 1<sup>st</sup> November</td> <td>D<sub>2</sub> = 10<sup>th</sup> November</td> </tr> <tr> <td>D<sub>3</sub> = 20<sup>th</sup> November</td> <td>D<sub>4</sub> = 30<sup>th</sup> November</td> </tr> <tr> <td>D<sub>5</sub> = 10<sup>th</sup> December</td> <td>D<sub>6</sub> = 20<sup>th</sup> December</td> </tr> <tr> <td>D<sub>7</sub> = 30<sup>th</sup> December</td> <td></td> </tr> </table> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td colspan="2"><b>B) Varieties/Advanced lines = 12</b></td> </tr> <tr> <td>V<sub>1</sub> = Faisalabad 08</td> <td>V<sub>7</sub> = V-12304</td> </tr> <tr> <td>V<sub>2</sub> = Punjab-11</td> <td>V<sub>8</sub> = V-11138</td> </tr> <tr> <td>V<sub>3</sub> = Millat-11</td> <td>V<sub>9</sub> = V-11098</td> </tr> <tr> <td>V<sub>4</sub> = Galaxy 2013</td> <td>V<sub>10</sub> = V-12226</td> </tr> <tr> <td>V<sub>5</sub> = V-10110</td> <td>V<sub>11</sub> = V-11183</td> </tr> <tr> <td>V<sub>6</sub> = V-11160</td> <td>V<sub>12</sub> = V-12001</td> </tr> </table> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>Layout</td> <td>RCBD</td> </tr> <tr> <td>Rep</td> <td>3</td> </tr> <tr> <td>Plot size</td> <td>1.62x 6 m</td> </tr> <tr> <td>Fertilizer NPK (Kg/ha.)</td> <td>120-90-60</td> </tr> <tr> <td>Seed Rate</td> <td>100 kg /ha</td> </tr> </table> <p>The following observations will be recorded:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>1.</td> <td>Plant count per m<sup>2</sup></td> <td>2.</td> <td>Productive tillers/m<sup>2</sup></td> </tr> <tr> <td>3.</td> <td>Days to heading</td> <td>4.</td> <td>Physiological maturity</td> </tr> <tr> <td>5.</td> <td>Plant height (cm)</td> <td>6.</td> <td>Lodging % age</td> </tr> <tr> <td>7.</td> <td>No. of grains/spike.</td> <td>8.</td> <td>1000-grain weight (g)</td> </tr> <tr> <td>9.</td> <td>Grain yield (kg ha<sup>-1</sup>).</td> <td></td> <td></td> </tr> </table> <p>The meteorological data (Temperature, rainfall, fog and cloudy days etc )will also be recorded for comparison.</p>	<b>A) Date of sowing = 7</b>		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		<b>B) Varieties/Advanced lines = 12</b>		V <sub>1</sub> = Faisalabad 08	V <sub>7</sub> = V-12304	V <sub>2</sub> = Punjab-11	V <sub>8</sub> = V-11138	V <sub>3</sub> = Millat-11	V <sub>9</sub> = V-11098	V <sub>4</sub> = Galaxy 2013	V <sub>10</sub> = V-12226	V <sub>5</sub> = V-10110	V <sub>11</sub> = V-11183	V <sub>6</sub> = V-11160	V <sub>12</sub> = V-12001	Layout	RCBD	Rep	3	Plot size	1.62x 6 m	Fertilizer NPK (Kg/ha.)	120-90-60	Seed Rate	100 kg /ha	1.	Plant count per m <sup>2</sup>	2.	Productive tillers/m <sup>2</sup>	3.	Days to heading	4.	Physiological maturity	5.	Plant height (cm)	6.	Lodging % age	7.	No. of grains/spike.	8.	1000-grain weight (g)	9.	Grain yield (kg ha <sup>-1</sup> ).		
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**PREVIOUS YEAR'S RESULTS**

Advanced lines/ Varieties	<sup>st</sup> 1 Nov.	<sup>th</sup> 10 Nov.*	<sup>th</sup> 20 Nov.*	<sup>th</sup> 30 Nov.	<sup>th</sup> 10 Dec.	<sup>th</sup> 20 Dec.	<sup>th</sup> 30 Dec.	Mean
Fsd-08	5831	5309	5283	5291	4177	3567	2614	4582 d
Punjab-11	5324	5743	5460	4727	3963	3524	2574	4474 de
Millat-11	4773	5408	4666	4684	3832	3451	2911	4246 f
Galaxy-13	6319	6116	6134	5913	4869	4130	3014	5214 a
V-10110	5008	5916	5198	5067	4169	3495	2479	4476 de
V-11160	6065	5759	5399	5242	4388	3567	3207	4804 c
V-12304	5898	5831	5501	5512	4612	3691	3135	4883bc
V-11138	5730	5267	4758	5082	4028	3290	2644	4400 e
V-11098	5470	5473	5211	5145	4177	3416	2585	4497 de
V-12266	4622	4943	4797	5293	4012	3267	2649	4226 f
V-11183	5733	6348	5609	5856	4506	3539	2860	4922 b
V-12001	5033	5183	5334	4971	4336	3770	2813	4491 de
Mean	5484 b	5608 a	5279 c	5232 c	4256 d	3559 e	2790 f	
LSD (0.05) for sowing dates 90, for varieties 118 and for interaction 312								

<b>36.TITLE</b>	<b>RESPONSE OF SEED RATE ON GRAIN YIELD OF WHEAT ADVANCED LINES</b>								
<b>OBJECTIVES</b>	To determine optimum seed rate of advanced lines								
<b>RESEARCH WORKER(S)</b>	Dr. Abdul Ghaffar and Yasir Ramzan								
<b>PROJECT DURATION</b>	2015-16 (Continuous)								
<b>LOCATION</b>	Wheat Research Institute, Faisalabad.								
<b>TREATMENTS &amp; METHODOLOGY</b>	<table border="1"> <tr> <td>Layout</td> <td>RCBD (Split plot arrangement)</td> </tr> <tr> <td>Rep</td> <td>03</td> </tr> <tr> <td>Plot size</td> <td>1.62x 6 m</td> </tr> <tr> <td>Fertilizer NPK (Kg/ha.)</td> <td>120-90-60</td> </tr> </table>	Layout	RCBD (Split plot arrangement)	Rep	03	Plot size	1.62x 6 m	Fertilizer NPK (Kg/ha.)	120-90-60
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<b>37.TITLE</b>	<b>EFFECT OF DIFFERENT LEVELS OF FERTILIZER ON GRAIN YIELD OF WHEAT</b>																																																																						
<b>OBJECTIVES</b>	To explore optimum fertilizer requirement of advanced lines of wheat																																																																						
<b>RESEARCH WORKER(S)</b>	Dr. Abdul Ghaffar, Dr.GhulamMahboobSubhani and YasirRamzan																																																																						
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<b>LOCATION</b>	Wheat Research Institute Faisalabad																																																																						

**TREATMENTS & METHODOLOGY**

(a) Varieties/advanced lines = 8 (b) Fertilizer level = 4

Varieties/advanced lines	NPK (kg ha <sup>-1</sup> )
V <sub>1</sub> =Faisalabad 08	F <sub>1</sub> = 0 – 0 – 0
V <sub>2</sub> = Galaxy-13	F <sub>2</sub> = 120 – 90 – 60
V <sub>3</sub> = V-10110	F <sub>3</sub> = 120-114-60
V <sub>4</sub> = V-11160	F <sub>4</sub> = 160-171-60
V <sub>5</sub> = V-12304	
V <sub>6</sub> = V-11138	
V <sub>7</sub> = V-11098	
V <sub>8</sub> = V-12226	

Layout	RCBD (Strip plot arrangement)
Rep	3
Plot size	1.62x 6 m
Fertilizer NPK (Kg/ha.)	According to treatment
Seed Rate	100 kg /ha
Sowing time	1 <sup>st</sup> fortnight of Nov

The pre and post soil analysis will be done. Plants count/m<sup>2</sup>, plant height (cm), productive tillers/m<sup>2</sup>, no. of grains/spike, 1000-grain weight (g) and grain yield (kg ha<sup>-1</sup>) will be recorded.

**PREVIOUS YEAR'S RESULTS****Grain yield (kg ha<sup>-1</sup>)**

Advanced lines/ Varieties	Fertilizer levels NPK (kg ha <sup>-1</sup> )				Mean
	F1 0-0-0	F2 120-90-60	F3 120-114-60	F4 160-171-60	
Fsd -08	1890	4408	4427	4174	3724e
Galaxy -13	2239	4990	4991	4789	4252a
V-10110	1891	4729	4649	4396	3916cd
V-11160	1840	4578	4552	4450	3855d
V-12304	1907	4952	4909	4823	4147b
V-11138	1823	4222	4112	3884	3509f
V-11098	1761	5009	5000	4859	4157b
V-12266	1893	4691	4678	4611	3968c
Mean	1905c	4697a	4665a	4498b	
LSD (0.05) for varieties 86, for Fertilizer rates 71 and for V × F 194					

<b>38.TITLE</b>	<b>EFFECT OF CLIMATE CHANGE ON IRRIGATION SCHEDULING OF WHEAT</b>
<b>OBJECTIVES</b>	To determine the proper stage of crop and optimum requirement of water for yield enhancement.
<b>RESEARCH WORKER(S)</b>	Dr. Abdul Ghaffar, Dr.GhulamMahboobSubhani, YasirRamzan and Dr. MakhdoomHussain

<b>PROJECT DURATION</b>	2015-16																																				
<b>LOCATION</b>	Wheat Research Institute, Faisalabad																																				
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### PREVIOUS YEAR'S RESULT

Treatments	Mean yield (kg/ha)
T <sub>1</sub> = no irrigation	2938 e
T <sub>2</sub> = 1 irrigation (at crown root stage)	3786 d
T <sub>3</sub> = 2 irrigations (1st at crown root and 2nd at booting)	4132 c
T <sub>4</sub> = 2 irrigations (1st at crown root and 2nd at heading)	3892 d
T <sub>5</sub> = 2 Irrigations (1st at crown root and 2nd at grain filling)	4036 c
T <sub>6</sub> = 3 irrigations (1st at crown root, 2nd at booting and 3rd at heading)	4515 b
T <sub>7</sub> = 3 Irrigations (1st crown root, 2 <sup>nd</sup> at booting and 3rd at grain filling)	4657 a
T <sub>8</sub> = 3 Irrigations (1st at crown root , 2 <sup>nd</sup> at heading and 3rd grain filling)	4513 b
T <sub>9</sub> = 4 irrigations (1st at crown root , 2nd at booting, 3rd at heading and 4th at grain filling)	4592 ab
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)	4661 a
LSD (0.05) = 140	

<b>39.TITLE</b>	<b>BIOFORTIFICATION OF WHEAT THROUGH APPLICATION OF IRON AND ZINC</b>																																						
<b>OBJECTIVES</b>	To improve the Fe and Zn concentration in wheat grain.																																						
<b>RESEARCH WORKER(S)</b>	Dr. Abdul Ghaffar, YasirRamzan, Dr.GhulamMahboobSubhani and Dr. MakhdoomHussain, Dr Muhammad Abrar.																																						
<b>PROJECT DURATION</b>	2015-16																																						
<b>LOCATION</b>	Wheat Research Institute, Faisalabad.																																						
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# WHEAT PATHOLOGY

<b>40. TITLE</b>	<b>RUST TRAP NURSERIES (Monitoring of virulence pattern under different climatic conditions)</b>										
<b>OBJECTIVES</b>	<ul style="list-style-type: none"> <li>) To trap the early landed rust inoculums and its multiplication.</li> <li>) To monitor the rust virulence pattern at different locations.</li> </ul>										
<b>RESEARCH WORKER (S)</b>	Faqir Muhammad, Dr. ArshadMehmood and Muhammad MakkyJavaid										
<b>PROJECT DURATION</b>	2015-16 (Continuous Nature)										
<b>LOCATION</b>	Wheat Research Institute, Faisalabad and seven locations (Kala Shah Kaku, Bahawalpur, Khanewal, Islamabad, KotNaina, Pirsabak and Peshawar)										
<b>TREATMENTS &amp; METHODOLOGY</b>	<table border="1"> <tr> <td>No. of entries</td> <td>LR Differentials = 40 YR Differentials = 28 SR Differentials = 16 Commercial Varieties/lines = 100</td> </tr> <tr> <td>Susceptible Check</td> <td>Morocco at border and every 10<sup>th</sup> entry</td> </tr> <tr> <td>Sowing Date</td> <td>At Faisalabad: 4<sup>th</sup> week of September (1<sup>st</sup> Trap) 2<sup>nd</sup> week of November (2<sup>nd</sup> Trap) 4<sup>th</sup> week of December (3<sup>rd</sup> Trap) At other locations : Mid November</td> </tr> <tr> <td>Plot Size</td> <td>2 rows x 2 m</td> </tr> <tr> <td>Assessment Scale</td> <td>Rust data will be recorded on Modified Cobb's Scale (Peterson et al., 1948).</td> </tr> </table>	No. of entries	LR Differentials = 40 YR Differentials = 28 SR Differentials = 16 Commercial Varieties/lines = 100	Susceptible Check	Morocco at border and every 10 <sup>th</sup> entry	Sowing Date	At Faisalabad: 4 <sup>th</sup> week of September (1 <sup>st</sup> Trap) 2 <sup>nd</sup> week of November (2 <sup>nd</sup> Trap) 4 <sup>th</sup> week of December (3 <sup>rd</sup> Trap) At other locations : Mid November	Plot Size	2 rows x 2 m	Assessment Scale	Rust data will be recorded on Modified Cobb's Scale (Peterson et al., 1948).
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Plot Size	2 rows x 2 m										
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<b>PREVIOUS YEAR'S RESULTS</b>	<p>In 1<sup>st</sup> trap nursery</p> <ul style="list-style-type: none"> <li>) Leaf rust was trapped on 25-11-2014 while yellow rust on 28-01-2015 during 2014-15.</li> <li>) During the cropping year 2013-14 the leaf rust was trapped on 27-11-2013 and yellow rust appear in 13-01-2014.</li> <li>) While during 2012-13 the leaf rust appear on 11-11-2012 and yellow rust 15-01-2013.</li> </ul> <p>The results regarding virulence pattern indicated that the isogenic lines for leaf rust including Lr 19, Lr 27 +31, Lr 28, Lr 36 and Lr 23+Gaza and the isogenic lines for yellow rust including Yr 5, Yr 10, Yr 15, Yr 24 and Yr28 were found resistant. However, none of the tested entries showed the symptoms of stem rust during 2014-15</p>										

<b>41. TITLE</b>	<b>ESTABLISHMENT OF HOST RESISTANCE (RUSTS) PRE-BREEDING NURSERY</b>
<b>OBJECTIVES</b>	i. 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 and conformation through application of molecular markers ii. To strengthen the rust resistant breeding program.										
<b>RESEARCH WORKER (S)</b>	Faqir Muhammad, Muhammad Makky Javaid, Dr. Arshad Mehmood, Dr. Javed Ahmed, Muhammad Hussain, Muhammad Zulkiffal, Dr. Makhdoom Hussain, Dr. Sajidur Rehman and Dr. Muhammad Zaffar Iqbal.										
<b>PROJECT DURATION</b>	2015-16										
<b>LOCATION</b>	<ul style="list-style-type: none"> <li>) Wheat Research Institute, Faisalabad</li> <li>) Agricultural Biotechnology Research Institute, Faisalabad</li> </ul>										
<b>TREATMENTS &amp; METHODOLOGY</b>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;">No. of entries</td> <td> <ul style="list-style-type: none"> <li>) 9<sup>th</sup> Stem Rust Resistance Nursery = 102</li> <li>) 5<sup>th</sup> Baseline resistance study = 411</li> </ul> </td> </tr> <tr> <td>Susceptible Check</td> <td>Morocco at border and every 10<sup>th</sup> entry</td> </tr> <tr> <td>Sowing Date</td> <td>Mid of November</td> </tr> <tr> <td>Plot Size</td> <td>2 rows x 2 m</td> </tr> <tr> <td>Observations</td> <td> <ul style="list-style-type: none"> <li>) Rust data will be recorded on Modified Cobb's Scale (Peterson et al., 1948).</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 (plant height, days to heading, days to maturity, tiller plant<sup>-1</sup> 1000 grain weight and leaf traits).</li> <li>) The entries showing Ltn and PBC will be confirmed by the application of molecular markers at ABRI, Faisalabad</li> </ul> </td> </tr> </table>	No. of entries	<ul style="list-style-type: none"> <li>) 9<sup>th</sup> Stem Rust Resistance Nursery = 102</li> <li>) 5<sup>th</sup> Baseline resistance study = 411</li> </ul>	Susceptible 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 (Peterson et al., 1948).</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 (plant height, days to heading, days to maturity, tiller plant<sup>-1</sup> 1000 grain weight and leaf traits).</li> <li>) The entries showing Ltn and PBC will be confirmed by the application of molecular markers at ABRI, Faisalabad</li> </ul>
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<b>PREVIOUS YEAR'S RESULTS</b>	New experiment										

<b>42. TITLE</b>	<b>SCREENING OF WHEAT AND BARLEY ADVANCED LINES/VARIETIES AGAINST RUSTS AT DIFFERENT LOCATIONS</b>										
<b>OBJECTIVES</b>	To screen advanced lines of wheat and barley against leaf, yellow and stem rusts at adult stage.										
<b>RESEARCH WORKER (S)</b>	Faqir Muhammad, Muhammad MakkyJavaid, Dr. ArshadMahmood and Dr. MakhdoomHussain										
<b>PROJECT DURATION</b>	2015-16 (Continuous Nature)										
<b>LOCATION</b>	i. WRI, Faisalabad & RARI, Bahawalpur (Artificial Screening) ii. Kala Shah Kaku, Khanewal, KotNaina, Islamabad, Pirsabak & Peshawar (Natural)										
<b>TREATMENTS &amp; METHODOLOGY</b>	<table border="1"> <tr> <td>No. of entries</td> <td>~400</td> </tr> <tr> <td>Susceptible Check</td> <td>Morocco at boarder &amp; at every 10<sup>th</sup> entry</td> </tr> <tr> <td>Sowing Date</td> <td>At Faisalabad: 1<sup>st</sup> week of November Other Locations: Last week of November</td> </tr> <tr> <td>Plot Size</td> <td>1 row x 2 m</td> </tr> <tr> <td>Rust Assessment date (s)</td> <td>) At adult plant stage ) 2<sup>nd</sup> and 4<sup>th</sup> week of March</td> </tr> </table>	No. of entries	~400	Susceptible Check	Morocco at boarder & at every 10 <sup>th</sup> entry	Sowing Date	At Faisalabad: 1 <sup>st</sup> week of November Other Locations: Last week of November	Plot Size	1 row x 2 m	Rust Assessment date (s)	) At adult plant stage ) 2 <sup>nd</sup> and 4 <sup>th</sup> week of March
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<b>PREVIOUS YEAR'S RESULTS</b>	All the entries were found free from stem rust. Among tested entries, ten entries showed susceptible reaction to yellow rust, twenty two entries showed susceptibility to leaf rust while three entries showed susceptibility to both rusts (LR & YR). The entries showing rust score upto 30 MRMS under stress conditions have been promoted/selected for further study										

<b>43. TITLE</b>	<b>EVALUATION OF ADVANCED LINES/VARIEITIES FOR SEEDLING AND ADULT PLANT RESISTANCE TO LEAF RUST</b>
<b>OBJECTIVES</b>	To identify rust resistant genes in advanced lines/varieties of wheat.
<b>RESEARCH WORKER (S)</b>	Muhammad MakkyJavaid, Faqir Muhammad, Muhammad Hussain, Dr. ArshadMahmood, Dr. MakhdoomHussain, Sabina Asghar, Dr. Sajid-ur-Rehman and Dr. Muhammad ZaffarIqbal
<b>PROJECT DURATION</b>	2015-16
<b>LOCATION</b>	Wheat Research Institute, Faisalabad and Wheat Research Sub-Station, Murree



<p><b>TREATMENTS &amp; METHODOLOGY</b></p>	<p><b>For Seedling Study</b>  ) 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.</p> <p><b>For Adult Plant Study</b>  ) Inoculation of rust to create artificial epidemic conditions will be done in field.  ) Rust data will be recorded twice at adult plant stage.</p> <p><b>For Molecular Study</b>  ) Molecular markers will be applied for gene identification.</p>
<p><b>PREVIOUS YEAR'S RESULTS</b></p>	<p>In glass house, the eleven entries i.e. V-13372, V-12213, V-12234, V-13005, V-13013, V-13016, V-12126, V-12120, V-12082, V-12056, V-12130, V-13244, V-13248, V-13252, V-13258, V-112066, V-12103, V-13266, V-12CO22, V-12CO27, V-13CO43, 13CO48 and NW-1-8183-8 showed low infection type (score ;,1, 2 &amp;3-) at seedling stage. While the entries i.e. V-12001, V-13001, V-10110, V-11160, V-12266, V-11098, V-11138, V-12304, V-13371, V-12053, V-12054, V-12057, V-13241, V-13255, V-13269, V-13270, V-13273, TWS-1101, TWS-12268, TWX-424, V-12BT004, V-12BT012, V-12BT009, NW-5-20-1V-12130, V-13244, V-13248, V-13252, V-13258, V-112066, V-12103, V-13266, V-12CO22, V-12CO27, V-13CO43, 13CO48 and NW-1-8183-8 showed high infection type (score, 3 &amp; 4). 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 and the application of molecular markers confirm the presence of Lr 34/Yr18/Pm38 &amp; Lr46/Yr29/Pm39 (Results awaited from ABRI, Faisalabad)</p>

<p><b>44. TITLE</b></p>	<p><b>ESTIMATION OF YIELD LOSSES DUE TO LEAF RUST</b></p>
<p><b>OBJECTIVES</b></p>	<p>To estimate yield losses due to leaf rust.</p>
<p><b>RESEARCH WORKER (S)</b></p>	<p>Muhammad MakkyJavaid, Faqir Muhammad, Dr. ArshadMahmood and Dr. MakhdoomHussain</p>
<p><b>PROJECT DURATION</b></p>	<p>2015-16</p>
<p><b>LOCATION</b></p>	<p>Wheat Research Institute, Faisalabad</p>

<b>TREATMENTS &amp; METHODOLOGY</b>	Varieties	LR	1. Seher-06 (Susceptible) 2. Aas-11 (Resistant) 3. Morocco
	Treatments	T1=Propiconazole (once applied)	T5= Propiconazole (twice applied)
		T2=Tebuconazole (once applied)	T6=Tebuconazole (twice applied)
		T3= Nativo (once applied)	T7= Nativo (twice applied)
		T4= UTC	T8=Inoculated
	Sowing Date	) Mid of November, 2015 ) Mid of December, 2015	
	Design	Split plot with three replications	
	Plot Size	6 rows x 5 m	
	Rust Assessment Scale	Rust data will be recorded on Modified Cobb's Scale (Peterson et al., 1948).	
	Rust Assessment Stage	Pre-treatment	Before application of rusticides
		Post -treatment	After one week intervals & final data during last week of March
Estimation of yield losses	Grain yield, number of grain/spike and 1000-grain weight of treated and untreated plots will be compared.		
<b>PREVIOUS YEAR'S RESULTS</b>	<p>During the cropping season, the environment was not favorable for yellow rust development and disease not appeared even on universal susceptible wheat variety i.e. Morocco. However, the rust severity and response of leaf rust was recorded before and after the application of fungicides in protected plots and also in unprotected plots. But most of the plots of experiments were badly lodged (30-80%) due to heavy rain and wind storm during the month of March and also the high temperature during the 1<sup>st</sup> fortnight of February which adversely affected the grain formation that ultimately reduced the yield significantly as the highest yield performance of Seher-06, Aas-11 and Morocco was 3029.6kg ha<sup>-1</sup>, 3048.1 kg ha<sup>-1</sup>, 922.2 kg ha<sup>-1</sup> respectively even in fungicide protected plots. Therefore, the exact estimation of yield losses due to rust is very difficult and for the confirmation of results, the trial will be repeated in coming cropping season, 2015-16. However, the yield performance of wheat variety Seher-06, Aas-11 and Morocco against Leaf Rust is given in the following table</p>		

<b>Yield performance of wheat varieties Seher-06 , Aas-11 &amp; Morocco against Leaf Rust under protected, inoculated and natural conditions</b>						
<b>Treatments</b>		<b>Rust response</b>		<b>1000 grain wt. (g)</b>	<b>Yield (kg ha<sup>-1</sup>)</b>	<b>% Inc./Dec. over UTC</b>
<b>Conditions</b>	<b>Varieties</b>	<b>Final rust severity</b>	<b>Greenness</b>			
C1:Tilt (1 times)	Seher-06	80MSS	0.47	26.5	1066.7	15.7
C2:Folicur (1 times)	-do-	70MSS	0.57	31.25	1070.4	16.1
C3: Nativo (1 times)	-do-	70MSS	0.58	31.7	937.0	1.6
C4: Natural (UTC)	-do-	100MSS	0.36	22.8	922.2	check
C5:Tilt (2 times)	-do-	60MSS	0.53	31.9	1022.2	10.8
C6:Folicur (2 times)	-do-	30MSS	0.58	38	1822.2	97.6
C7: Nativo (2times)	-do-	30MSS	0.62	39.75	2529.6	174.3
C8: (Inoculated)	-do-	100S	0.39	23.35	1155.6	25.3
C1:Tilt (1 times)	Aas-11	0	0.5	39.15	1596.3	-17.6
C2:Folicur (1 times)	-do-	0	0.53	38.5	1781.0	-8.1
C3: Nativo (1 times)	-do-	0	0.51	38.65	2003.7	3.4
C4: Natural (UTC)	-do-	5MRMS	0.5	39.4	1937.0	Check
C5:Tilt (2 times)	-do-	0	0.49	37.8	3048.1	57.4
C6:Folicur (2 times)	-do-	0	0.56	38.25	2444.4	26.2
C7: Nativo (2times)	-do-	0	0.51	38.35	1888.9	-2.5
C8: (Inoculated)	-do-	0	0.53	37.6	2403.7	24.1
C1:Tilt (1 times)	Morocco	80S	0.42	23.4	614.8	76.6
C2:Folicur (1 times)	-do-	50S	0.53	25.5	591.9	70.0
C3: Nativo (1 times)	-do-	40S	0.59	28.85	722.2	107.5
C4: Natural (UTC)	-do-	100 S	0.38	19.4	348.1	check
C5:Tilt (2 times)	-do-	40S	0.6	28.5	559.2	60.6
C6:Folicur (2 times)	-do-	30S	0.58	32.25	922.2	164.9
C7: Nativo (2 times)	-do-	10S	0.6	33.9	711.0	104.3
C8: (Inoculated)	-do-	100S	0.32	19.9	388.9	0.4

<b>45. TITLE</b>	<b>SCREENING OF ADVANCED WHEAT MATERIAL AGAINST KARNAL BUNT (<i>Tilletia indica</i>) UNDER NORMAL AND LATE SOWING CONITIONS.</b>
<b>OBJECTIVES</b>	<ul style="list-style-type: none"> <li>i. To identify bunt resistant material for utilization in hybridization program.</li> <li>ii. To understand the correlation of environmental factors with disease development under different sowing dates.</li> </ul>
<b>RESEARCH WORKER (S)</b>	Dr. ArshadMahmood, Faqir Muhammad, Muhammad MakkyJavaid and M. AslamJaved.
<b>PROJECT DURATION</b>	2015-16 (continuous nature).
<b>LOCATIONS</b>	Wheat research Institute, Faisalabad
<b>TREATMENT</b>	Advanced lines selected for MWYT & NUWYT, 2015-16 as well as

<b>S &amp; METHOD OLOGY</b>	commercial varieties of bread wheat will be tested under inoculated condition in the field in two different sowing dates (2 <sup>nd</sup> week of November & 2 <sup>nd</sup> week of December) in order to check the effect of different environmental conditions on disease development and disease escape. Each entry will be sown in single row of 2 m. Susceptible varieties i.e. AS-2002, PAK-81 and WL-711 will be sown alternatively at every 10 <sup>th</sup> entry. The 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 <i>et al.</i> , (1989), where 0 is (Highly resistant), 0.1-1.0 (Resistant), 1.1-2.0 (Moderately resistant), 2.1-5.0 (Moderately susceptible), 5.1-10.0 (Susceptible) 10.0 and above (Highly susceptible).
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### PREVIOUS YEAR'S RESULTS

The results are given in the following table.

<b>Reaction of various varieties/lines of wheat against Karnal or Partial Bunt (Tilletiaindica)</b>				
<b>Scale</b>		<b>Reaction</b>	<b>No. of lines/varieties</b>	<b>No. of Entries</b>
0	No Symptoms of bunt on head and grains	HR	V-13001, V-10110, V-11160, V-12304, V-13372, V-12234, V-13005, V-12126, V-12056, V-12057, V-13252, V-12103, V-13266, V-13273, TWS-12268, TWX-424, V-12-CO-27, V-12BT009, V-2557, V-2095, V-9493, Galaxy-13, Punjab-11 & Aas-11	24
1	1% or less grains bunted	R	V-11138, V-13255, V-13270, V-BT004, N-NW-1-8183-8 & V-2559	06
3	1-2 % of grains bunted	MR	V-12001, V-12266, V-12120, V-12054, V-13244, V-13248, V-12066, V-TWS-1101, V-12CO22, V-13CO43, V-2526 & V-10FJ-01	12
5	2-5 % of grains bunted	MS	V-12213, V-13013, V-13016, V-12082, V-13269, V-12BT012, V-1136 & AARI-11	08
7	5-10 % of grains bunted	S	V-13371, V-13258, V-2526 & Millat-11	04
9	More than 10% of grains bunted	HS	AS-2002 Pak-81	02
<b>Total</b>				<b>56</b>

<b>46. TITLE</b>	<b>SURVEY OF KARNAL BUNT AND BLACK POINT OF WHEAT</b>
<b>OBJECTIVES</b>	To find out the prevalence of karnal bunt and black point diseases in different agro ecological zones of Punjab and its correlation with environmental factors i.e. temperature & rainfall.
<b>RESEARCH WORKER (S)</b>	Dr. ArshadMahmood, Faqir Muhammad, M. MakkyJavaid, DrMakhdoomHussain and Muhammad Tariq
<b>PROJECT DURATION</b>	2015-16 continuous nature.
<b>LOCATION</b>	Punjab Districts (all locations of MWYT )
<b>TREATMENTS &amp; METHOD OLOGY</b>	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. to record the percentage incidence of karnal bunt and black point in wheat.
<b>PREVIOUS YEAR'S RESULTS</b>	The results of karnal bunt and black point infestation and disease prevalence (%) in seed samples of NUWYT & MWYT (2014-15) received from twelve locations of Punjab are as under,

Locations	Infected Samples							
	NUWYT (out of 40 samples)				MWYT			
	Karnal Bunt		Black Point		Karnal Bunt		Black Point	
	Infected	Prevalence (%)	Infected	Prevalence (%)	Infected	Prevalence (%)	Infected	Prevalence (%)
Faisalabad	1	2.5	0	0	3	6.8	16	36.4
Yousafwala	1	2.5	15	37.5	0	0.0	14	31.8
R.Khurd	1	2.5	25	62.5	1	2.3	37	84.1
Dhakar Farm	0	0	13	32.5	0	0.0	7	15.9
Bahwalnagar	0	0	16	40	0	0.0	19	43.2
Kaloorkot	0	0	15	37.5	1	2.3	18	40.9
Khannewal	0	0	6	15	1	2.3	13	29.5
Karoor	0	0	15	37.5	0	0.0	3	6.8
K.S. Kaku	21	52.5	18	45	13	29.5	18	40.9
Kot Nina	20	50	37	92.5	12	27.3	30	68.2
Gujjarwala	3	7.5	30	75	7	15.9	13	29.5
Sargodha	0	0	32	80	3	6.8	30	68.2
Total	47 out of 480	9.8%	222 out of 480	46.2%	41 out of 528	7.8%	218 out of 528	41.3%

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

# WHEAT ENTOMOLOGY

<b>47.TITLE</b>	<b>EFFECT OF DIFFERENT CLIMATIC FACTORS ON APHID POPULATION IN WHEAT CROP</b>
<b>OBJECTIVES</b>	To know the population intensities of wheat aphid in relation to climatic factors.
<b>RESEARCH WORKER(S)</b>	Muhammad Saleem , MakhdoomHussain Wheat Research Institute, AARI, Faisalabad
<b>PROJECT DURATION</b>	2015-16 (Continuous nature)
<b>LOCATION</b>	Wheat Research Institute, Faisalabad.
<b>TREATMENTS &amp; METHODOLOGY</b>	Three 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 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 a-climatic factors. by taking average aphid population throughout the season.

## PREVIOUS YEAR'S RESULTS

### Average Wheat Aphid Population/ trap/ day And weather Coinciding dates

Month/ Years	Climatic factors							Aphid Pop/trap/day
	Temperature C <sup>0</sup>		Humidity (%)		Cloudy Nights	Rain fall	Frost y Night s	
	Max C <sup>0</sup>	Min C <sup>0</sup>	8 pm	5pm	No	(mm)		
<b>January,2015</b>								
1 <sup>st</sup> week	17.3	6.2	90.1	75.1	0	0	0	1.2
2 <sup>nd</sup> week	14.1	6.9	88.7	76.8	1	3.6	0	3.5
3 <sup>rd</sup> week	19.16	6.1	89.6	65.1	2	8.8	0	5.2
4 <sup>th</sup> week	17.8	5.3	88.3	56.1	0	0	0	6.97
<b>February,2015</b>								
1 <sup>st</sup> week	17.8	7.9	86.8	64.8	3	15.0	0	4.6
2 <sup>nd</sup> week	24.5	7.3	83.5	44.4	0	0.0	0	13.15
3 <sup>rd</sup> week	23.8	11.2	84.5	65.4	5	7.7	0	25.47
4 <sup>th</sup> week	23.	11.4	81.8	52.0	1	0.6	0	97.90

<b>March, 2015</b>								
1 <sup>st</sup> week	19.18	10.1	87.7	68.28	5	30.5	0	70.5
2 <sup>nd</sup> week	23.43	10.5	84.5	56.5	2	27.0	0	95.24
3 <sup>rd</sup> week	27.75	13.8	84.1	52.62	1	1.2	0	145.0
4 <sup>th</sup> week	30.61	17.0	75.7	51.25	0	1	0	190.8
<b>April, 2015</b>								
1 <sup>st</sup> week	28.15	17.9	71.7	59.7	3	20.8	0	32.68

<b>48.TITLE</b>	<b>VARIETAL SCREENING OF WHEAT AGAINST APHID IN RELATION TO CLIMATIC AND BIOTIC FACTORS</b>
<b>OBJECTIVES</b>	<ul style="list-style-type: none"> <li>) To evaluate the wheat varieties / advance lines against aphids.</li> <li>) The determine correlation of aphids with predators</li> </ul>
<b>RESEARCH WORKER(S)</b>	Muhammad Saleem , MakhdoomHussain Wheat Research Institute, AARI, Faisalabad
<b>PROJECT DURATION</b>	2015-16 (Continuous nature)
<b>LOCATION</b>	Wheat Research Institute, Faisalabad.
<b>TREATMENTS &amp; METHODOLOGY</b>	<p>The trial will be conducted in RCB Design having 3 repeats with plot size 5m x 1.8m. The data regarding aphids, <i>Coccinellids</i>, <i>chrysoperla</i> and <i>syrphid</i> 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.</p> <p>Varieties/ lines will be screened out by taking average aphid population throughout the season.</p>

<b>PREVIOUS YEAR'S RESULTS</b>	<b>AVERAGE POPULATION OF APHID &amp; PERDATORS (COCCINELLIDS) PER TILLER &amp; PLANT IN WHEAT CROP</b>		
	<b>Sr. No.</b>	<b>Varieties</b>	<b>Aphid population / tiller</b>
	1	FSD-08	11.78 cd
	2	Punjab-11	12.9 cd
	3	Millat-11	18.93 a
	4	Glaxxy-13	11.57 cde
	5	V-10110	8.0 ef
	6	V-11160	10.9 def
	7	V-12304	7.33 f
	8	V-11138	14.8 bc
	9	V-11098	9.2 def
	10	V-12266	17.23 ab
	11	V-11183	17.33 ab
	12	V-12001	17.07 ab
LSD (0.05)		3.704	N.S

<b>49.TITLE</b>	<b>MASS SCREENING OF WHEAT GERMPLASM AGAINST APHIDS</b>
<b>OBJECTIVES</b>	To find out resistant/ tolerant varieties/lines against aphid attack.
<b>RESEARCH WORKER(S)</b>	Muhammad Saleem and MakhdoomHussain, WRI, FSD.
<b>PROJECT DURATION</b>	2015-16 (Continuous nature)
<b>LOCATION</b>	Wheat Research Institute, Faisalabad.
<b>TREATMENTS &amp; METHODOLOGY</b>	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**  
**Average Aphid Population / Tiller on wheat Germplasm**

Material	Total Entries	Average Aphid population/ Tiller on each variety/line(Mean values)										
		0-5	5-10	10-15	15-25	25-35	35-45	45-55	55-65	65-75	75-85	85-95
Crossing block	520	7	68	107	145	80	48	25	26	09	04	01



<b>50. TITLE</b>	<b>SURVEY OF APHID POPULATION ON WHEAT CROP IN DIFFERENT CLIMATIC ZONES OF THE PUNJAB DURING FEBURARY TO MARCH</b>
<b>OBJECTIVES</b>	To find out the occurrence and fluctuation of aphids population on wheat crop in different ecological zones of the Punjab .
<b>RESEARCH WORKER(S)</b>	Muhammad Saleem and MakhdoomHussain, WRI, FSD.
<b>PROJECT DURATION</b>	2015-16( Continuous nature)
<b>LOCATIONS</b>	Shaikhupura, Gujranwala, Sialkot, Narowal, Nankana , Jhang, Layyah, BhakkharMianwali, Khushab, Sargodha , Chinniot, Sahiwal, Okara, Kasur, Lahore, and Faisalabad in the Punjab Province.
<b>TREATMENTS &amp; METHODOLOGY</b>	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, 2016.
<b>PREVIOUS YEAR'S RESULTS</b>	Aphid and coccinellids population in the different areas of the Punjab was found in the range 4-12. /tiller and 0.01 to 0.82/plant, respectively on different wheat varieties in different areas. While regarding wheat varietal basis aphid and coccinellid population remained in the range of 4-11, 6-12,5-9,6-11,4-11, and 5-11 while 0.02-0.76,0.11-0.73,0.14-0.61,0.01-0.81,0.03-0.82 and 0.12-0.49 per plant, respectively on Fsd-08, Lasani-08, Galaxy-13,Punjab-11,Aas-11, Millat-11 .So aphid population was recorded more in Faisalabad (12.0) /tiller on Lasani-08 and low in Gujranwala on Ass-11(4.0)/tiller

# SEED PRODUCTION

<b>51. TITLE</b>	<b>PRODUCTION OF BREEDERS NUCLEUS SEED OF WHEAT ADVANCED LINES AND VARIETIES</b>																								
<b>OBJECTIVES</b>	<ul style="list-style-type: none"> <li>i. To maintain true to type seed of bread/durum wheat varieties.</li> <li>ii. To obtain the phenotypic stability of advanced wheat lines.</li> </ul>																								
<b>RESEARCH WORKER(S)</b>	Javed Anwar and Muhammad HammadTanveer																								
<b>PROJECT DURATION</b>	2015-16 (continuous)																								
<b>LOCATION</b>	Wheat Research Institute, Faisalabad.																								
<b>TREATMENTS &amp; METHODOLOGY</b>	<p>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. The detail of varieties is given below:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Sr. No.</th> <th>Varieties</th> <th>Sr. No.</th> <th>Varieties</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>Punjab-11</td> <td>6.</td> <td>Pasban-90</td> </tr> <tr> <td>2.</td> <td>Millat-11</td> <td>7.</td> <td>Galaxy-13</td> </tr> <tr> <td>3.</td> <td>AARI-11</td> <td>8.</td> <td>Ujalla-2014</td> </tr> <tr> <td>4.</td> <td>Faisalabad-08</td> <td>9.</td> <td>20 advanced lines</td> </tr> <tr> <td>5</td> <td>Lasani-08</td> <td></td> <td></td> </tr> </tbody> </table> <p>The seed of advanced lines included in Micro Wheat Yield Trial and National Uniform Wheat Yield Trial will also be multiplied.</p>	Sr. No.	Varieties	Sr. No.	Varieties	1.	Punjab-11	6.	Pasban-90	2.	Millat-11	7.	Galaxy-13	3.	AARI-11	8.	Ujalla-2014	4.	Faisalabad-08	9.	20 advanced lines	5	Lasani-08		
Sr. No.	Varieties	Sr. No.	Varieties																						
1.	Punjab-11	6.	Pasban-90																						
2.	Millat-11	7.	Galaxy-13																						
3.	AARI-11	8.	Ujalla-2014																						
4.	Faisalabad-08	9.	20 advanced lines																						
5	Lasani-08																								
<b>PREVIOUS YEAR' S RESULTSS</b>	<p>Head rows of eight commercial varieties and 24 advanced lines were selected. 40 to 200 head rows of each commercial cultivar and advanced lines were kept for head row progeny studies. The detail is as under,</p>																								

Sr. No.	Varieties/ lines	No. of heads	Sr. No.	Varieties/ lines	No. of heads
1	Punjab.11	300	10	V-12001	200
2	Millat.11	300	11	V.11160	200
3	AARI.11	100	12	V-08203	300
4	FSD.08	300	13	V-12304	100
5	Lasani.08	100	14	V-13001	200
6	Galaxy.2013	300	15	V.11098	100
7	Pasban.90	100	16	V.11183	100
8	Uqab-2000	100	17	V.11138	100
9	V-10110	200			

<b>52. TITLE</b>	<b>PRE-BASIC SEED PRODUCTION OF BREAD AND DURUM WHEAT CULTIVARS AND ADVANCED LINES.</b>																								
<b>OBJECTIVES</b>	To produce pure seed of commercial wheat cultivars/ lines for supplying to the Punjab Seed Corporation and Private Seed Companies.																								
<b>RESEARCH WORKER(S)</b>	Javed Anwar and Muhammad HammadTanveer																								
<b>PROJECT DURATION</b>	2014-15 (continuous nature)																								
<b>LOCATION</b>	Wheat Research Institute, Faisalabad.																								
<b>TREATMENTS &amp; METHODOLOGY</b>	<p>Two to four kanals of the following 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.</p> <table border="1" data-bbox="636 1675 1326 1944"> <thead> <tr> <th>Sr. No.</th> <th>Varieties</th> <th>Sr. No.</th> <th>Varieties</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>Punjab-11</td> <td>6.</td> <td>Uqab-2000</td> </tr> <tr> <td>2.</td> <td>Millat-11</td> <td>7.</td> <td>Pasban-90</td> </tr> <tr> <td>3.</td> <td>AARI-11</td> <td>8.</td> <td>Galaxy-13</td> </tr> <tr> <td>4.</td> <td>Faisalabad-08</td> <td>9.</td> <td>Ujalla-2014</td> </tr> <tr> <td>5.</td> <td>Lasani-08</td> <td>10.</td> <td></td> </tr> </tbody> </table>	Sr. No.	Varieties	Sr. No.	Varieties	1.	Punjab-11	6.	Uqab-2000	2.	Millat-11	7.	Pasban-90	3.	AARI-11	8.	Galaxy-13	4.	Faisalabad-08	9.	Ujalla-2014	5.	Lasani-08	10.	
Sr. No.	Varieties	Sr. No.	Varieties																						
1.	Punjab-11	6.	Uqab-2000																						
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3.	AARI-11	8.	Galaxy-13																						
4.	Faisalabad-08	9.	Ujalla-2014																						
5.	Lasani-08	10.																							

<b>PREVIOUS YEAR'S RESULTS</b>	The seed of following varieties/lines was produced					
	<b>Sr. No.</b>	<b>Varieties</b>	<b>kg</b>	<b>Sr. No.</b>	<b>Varieties</b>	<b>kg</b>
	1.	Faisalabad-08	815	6.	Punjab-11	700
	2.	Lasani-08	380	7.	Galaxy-13	1560
	3.	AARI-11	360	8.	V-08203	1545
	4.	Pasban-90	200			
	5.	Millat-11	700			

<b>53. TITLE</b>	<b>SEED PRODUCTION OF BREAD AND DURUM WHEAT CULTIVARS AND ADVANCED LINES</b>																								
<b>OBJECTIVES</b>	To produce pure seed of commercial wheat cultivars/lines for farmers																								
<b>RESEARCH WORKER(S)</b>	Dr. Muhammad Munir, Javed Anwar and Muhammad HammadTanveer																								
<b>PROJECT DURATION</b>	2014-15 (continuous nature)																								
<b>LOCATION</b>	Wheat Research Institute, Faisalabad.																								
<b>TREATMENTS &amp; METHODOLOGY</b>	One to four acres of the following cultivars will be sown: <table border="1" data-bbox="662 1144 1302 1413"> <tr> <td><b>Sr. No.</b></td> <td><b>Varieties</b></td> <td><b>Sr. No.</b></td> <td><b>Varieties</b></td> </tr> <tr> <td>1.</td> <td>Punjab-11</td> <td>6.</td> <td>Uqab -2000</td> </tr> <tr> <td>2.</td> <td>Millat-11</td> <td>7.</td> <td>Pasban-90</td> </tr> <tr> <td>3.</td> <td>AARI-11</td> <td>8.</td> <td>Galaxy-13</td> </tr> <tr> <td>4.</td> <td>Faisalabad-08</td> <td>9.</td> <td>V-08203</td> </tr> <tr> <td>5.</td> <td>Lasani-08</td> <td></td> <td></td> </tr> </table>	<b>Sr. No.</b>	<b>Varieties</b>	<b>Sr. No.</b>	<b>Varieties</b>	1.	Punjab-11	6.	Uqab -2000	2.	Millat-11	7.	Pasban-90	3.	AARI-11	8.	Galaxy-13	4.	Faisalabad-08	9.	V-08203	5.	Lasani-08		
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<b>PREVIOUS YEAR'S RESULTS</b>	Seed of following varieties/lines was produced: <table border="1" data-bbox="550 1547 1414 1738"> <tr> <td><b>Sr. No.</b></td> <td><b>Varieties</b></td> <td><b>kg</b></td> <td><b>Sr. No.</b></td> <td><b>Varieties</b></td> <td><b>kg</b></td> </tr> <tr> <td>1.</td> <td>Faisalabad-08</td> <td>6740</td> <td>4.</td> <td>Galaxy-13</td> <td>13788</td> </tr> <tr> <td>2.</td> <td>Lasani-08</td> <td>1348</td> <td>5.</td> <td>V-08203</td> <td>1153</td> </tr> <tr> <td>3.</td> <td>Punjab-11</td> <td>5600</td> <td>6.</td> <td>Millat-11</td> <td>2688</td> </tr> </table>	<b>Sr. No.</b>	<b>Varieties</b>	<b>kg</b>	<b>Sr. No.</b>	<b>Varieties</b>	<b>kg</b>	1.	Faisalabad-08	6740	4.	Galaxy-13	13788	2.	Lasani-08	1348	5.	V-08203	1153	3.	Punjab-11	5600	6.	Millat-11	2688
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1.	Faisalabad-08	6740	4.	Galaxy-13	13788																				
2.	Lasani-08	1348	5.	V-08203	1153																				
3.	Punjab-11	5600	6.	Millat-11	2688																				

# CEREAL TECHNOLOGY

<b>54. TITLE</b>	<b>IMPACT OF PACKAGING MATERIAL ON QUALITY OF STORED WHEAT GRAIN</b>
<b>OBJECTIVES</b>	To determine the impact of different packaging material on quality of wheat grain during storage
<b>RESEARCH WORKERS</b>	Dr. Muhammad Abrar, AnjumJaved and Dr. MakhdoomHussain
<b>PROJECT DURATION</b>	2015-16
<b>LOCATION</b>	Wheat Research Institute, Faisalabad.
<b>TREATMENTS &amp; METHODOLOGY</b>	Grains of three promising bread wheat varieties i.e. Millat-11, Punjab-11 and Galaxy-13 will be packed in different packaging materials i.e., jute bag, polypropylene and grain pro super grain bag and stored at room temperature for three months. Stored samples will be analysed for moisture, protein, gluten, starch, alpha-amylase activity, water absorption, dough development time, dough stability and softening of dough at fortnightly interval.
<b>PREVIOUS YEAR'S RESULTS</b>	New experiment

<b>55. TITLE</b>	<b>IMPACT OF SOWING TIME ON IRON AND ZINC CONTENTS IN WHEAT GRAIN</b>
<b>OBJECTIVES</b>	To determine the variation in iron and Zinc contents due to different sowing time in wheat varieties.
<b>RESEARCH WORKERS</b>	SadafShamim, AnjumJaved,and Dr. MakhdoomHussain
<b>PROJECT DURATION</b>	2015-16
<b>LOCATION</b>	Wheat Research Institute, Faisalabad. Institute of soil chemistry and environmental sciences,AARI, Faisalabad
<b>TREATMENTS &amp; METHODOLOGY</b>	Grains of three promising bread wheat varieties i.e. Millat-11, Punjab-11 and Galaxy-13 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 iron contents. Zn contents will be determined using Atomic Absorption Spectro photo meter.
<b>PREVIOUS YEAR'S RESULTS</b>	Grains of three leading varieties i.e., Millat-11, Punjab-11 and Galaxy-13 from three planting dates (1 <sup>st</sup> November,

	30 <sup>th</sup> November & 30 <sup>th</sup> December) were selected to determine the impact of sowing time on iron and zinc content. Zinc content ranged from 17.1-25.8 ppm and its effect on sowing time was non significant, whereas iron content increased slightly with later planting dates. Millat-11 gave best values of zinc contents i.e., 25.8 ppm and iron content 119 ppm.
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<b>56. TITLE</b>	<b>EFFECT OF STORAGE LENGTH ON VITAMIN E CONCENTRATION IN WHEAT GRAIN AND FLOUR</b>
<b>OBJECTIVES</b>	To determine the losses of Vitamin E during long term and short term storage of wheat
<b>RESEARCH WORKERS</b>	Dr. Muhammad Abrar, HiraShair and SadafShamim
<b>PROJECT DURATION</b>	2015-16
<b>LOCATION</b>	Wheat Research Institute, Faisalabad.
<b>TREATMENTS &amp; METHODOLOGY</b>	Grains and whole wheat flour of wheat variety Galaxy-13 will be stored at ambient temperature for a period of two months and samples will be evaluated fortnightly through HPLC to determine the levels of Vitamin E.
<b>PREVIOUS YEAR'S RESULTS</b>	Grain and whole flour of Galaxy-13 was stored at ambient temperature for a period of two months and analyzed fortnightly to determine the stability of vitamin-E content (Through HPLC) during storage. In grains, Vitamin E content ranges from 14.0 to 13.5 microgram per gram of oil (Throughtsoxhlet apparatus) during storage and the amount of Vitamin-E decreased from 13.8 to 9.7 microgram per gram of oil during two month storage of flour.

<b>57. TITLE</b>	<b>COMPARISON OF BREAD AND DURUM WHEAT FOR PREPARATION OF VALUE ADDED PRODUCTS</b>
<b>OBJECTIVES</b>	To determine the comparative suitability of bread and durum wheat for different value added bakery products.
<b>RESEARCH WORKERS</b>	SadafShamim, HiraShair, Dr. Muhammad Abrar and Dr. MakhdoomHussain
<b>PROJECT DURATION</b>	2015-16
<b>LOCATION</b>	Wheat Research Institute, Faisalabad.
<b>TREATMENTS &amp;</b>	Wheat varieties\advanced lines (Lasani-08, Galaxy-13, Durum-97

<b>METHODOLOGY</b>	and D-12306) will be milled and their fine flours will be analyzed for rheological properties using Farinograph and Extensograph. Protein and gluten contents will also be determined. Value added products i.e. chapatti, muffins, biscuits and pizza will be prepared and evaluated to determine the suitability.
<b>PREVIOUS YEAR'S RESULTS</b>	A comparative study of bread wheat and durum wheat was planned to check their potential for value added products. Pizza, muffins and chapatti prepared from bread wheat were far better in quality than off durum wheat. In case of biscuits, the product made using durum wheat had also been acceptable

<b>58. TITLE</b>	<b>QUALITY EVALUATION OF BREAD WHEAT ADVANCED LINES/VARIETIES</b>
<b>OBJECTIVES</b>	To screen advanced lines for different quality traits
<b>RESEARCH WORKERS</b>	AnjumJaved, SadafShamim and HiraShair
<b>PROJECT DURATION</b>	2015-16 (Continuous nature)
<b>LOCATION</b>	Wheat Research Institute, Faisalabad
<b>TREATMENTS &amp; METHODOLOGY</b>	Advanced lines included in National Uniform Wheat Yield Trials and Micro Wheat Yield Trials for the year 2015-16 will be tested for comprehensive quality parameters especially grain weight ( using seed counter & electric balance), test weight (through bushel weight apparatus), protein, starch, gluten contents (using Kernelyzer), amylase activity (through falling number), bread making (through dough pin mixer, baking oven and fermentation cabinet) and chapatti quality (using mixer and hot plate).

### PREVIOUS YEAR'S RESULTS

Trial	1000 grain wt. (g)	Test Wt. (kg hl <sup>-1</sup> )	Protein (%)	Starch (%)	Gluten (%)	-Amylase Activity	Chapati Quality
NUDYT	32.00-44.7	74.20-79.60	13.70-15.80	52.90-54.70	25.00-33.30	335-405	Un satisfactory
NUWYT (N.C)	31.20-44.00	74.60-79.90	12.40-16.20	52.70-56.80	23.00-36.00	346-436	Good
NUWYT (N)	31.65-43.25	72.90-80.70	13.25-16.20	50.40-56.45	23.00-37.50	427-563	Good
NUWYT (R.F)	32.90-49.00	72.50-79.55	13.45-16.00	51.95-56.30	24.50-34.00	410-574	Good
MWYT (N)	33.00-47.75	76.20-80.55	12.20-15.60	53.75-56.75	21.00-31.50	398-543	Good
MWYT (R.F)	36.80-48.00	75.40-80.50	13.75-15.95	53.35-55.80	27.50-34.50	417-563	Good

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

Protein and gluten content more than 14 % and 28 % were observed in large number of the genotypes whereas 22 entries out of 40 from NUWYT and 40 entries out of 44 from MWYT are screened out best regarding 1000 grain weight exceeding 38 g. Chapatti quality scores were also within desirable range.

<b>59. TITLE</b>	<b>EFFECT OF PLANTING TIME ON GRAIN QUALITY TRAITS</b>
<b>OBJECTIVES</b>	To study the effect of planting time on grain quality traits
<b>RESEARCH WORKERS</b>	SadafShamim and Dr. MakhdoomHussain
<b>PROJECT DURATION</b>	2015-16 (Continuous nature)
<b>LOCATION</b>	Wheat Research Institute, Faisalabad
<b>TREATMENTS &amp; METHODOLOGY</b>	Advanced wheat lines included in sowing date trials for the year 2014-15 will be tested for comprehensive quality parameters especially grain weight (using seed counter & electric balance), test weight (through test weight/bushel weight apparatus), starch content, gluten and protein content(using kernelyzer).

<b>PREVIOUS YEAR'S RESULTS</b>	Twelve varieties/liners were selected to study the effect of planting dates on their quality. The results are as under,							
	Paramerters	D1	D2	D3	D4	D5	D6	D7
	1000 grain weight (g)	34.1-45.2	31.8-42.7	38.3-44.3	35.8-43.9	31.8-40.8	27.5-34.9	23.0-33.1
	Protein (%)	12.0-14.6	13.3-15.6	13.3-16.0	13.1-16.2	13.6-15.6	12.3-15.4	12.6-15.6
	Gluten (%)	21.3-28.7	24.5-31.5	25.5-34.0	24.0-34.0	24.5-30.0	24.0-30.5	24.0-32.0
	Strach (%)	54.2-56.5	53.0-55.8	52.6-55.7	53.1-55.7	51.9-55.4	53.4-56.0	52.3-55.3

<b>60. TITLE</b>	<b>EFFECT OF DIFFERENT FERTILIZER TREATMENTS ON WHEAT GRAIN QUALITY</b>
<b>OBJECTIVES</b>	To study the effect of fertilizer combinations and time of their



	application on physico-chemical quality parameters in advanced wheat lines/varieties.
<b>RESEARCH WORKERS</b>	HiraShair, AnjumJaved and Dr. Muhammad Abrar
<b>PROJECT DURATION</b>	2015-16 (Continuous nature)
<b>LOCATION</b>	Wheat Research Institute, Faisalabad.
<b>TREATMENTS &amp; METHODOLOGY</b>	Advanced wheat lines included in fertilizer trials for the year 2014-15 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) and chapatti quality.

### PREVIOUS YEAR'S RESULTS

Eight varieties/lines included in fertilizer trials were tested for quality parameters to study the effect of different fertilizer treatments on wheat grain quality. Among these V-10110 revealed the highest thousand grain weight (43.4g) and maximum test weight (80.2 kg/hL) with the same fertilizer treatment i.e. F<sub>3</sub> (NPK 120- 90- 60 kg/ha) whereas V-11160 gave topmost values of protein (14.9 %) and gluten (31%) at F<sub>4</sub> i.e. NPK 160- 90- 60 kg/ha. The overall acceptability has been promising, in almost all varieties, regarding chapatti quality.

Parameters	1000 Grain weight (g)				Protein (%)				Gluten (%)			
	F1	F2	F3	F4	F1	F2	F3	F4	F1	F2	F3	F4
FSD-08	35.6	35.8	35.0	34.9	12.5	13.3	13.9	14.2	25.0	27.0	27.3	29.0
Galaxy-13	38.1	39.9	39.8	39.1	11.7	12.2	12.8	12.1	21.7	23.0	24.3	22.3
V-10110	39.7	42.4	43.4	42.5	12.8	13.4	13.1	13.1	24.0	25.3	26.0	25.3
V-10160	36.9	39.9	39.2	38.3	13.2	13.8	14.5	14.9	25.0	30.7	29.0	31.0
V-11138	39.2	38.3	38.9	35.7	13.2	14.9	14.6	13.7	24.3	29.3	30.3	27.0
Averages	36.7	38.5	38.3	37.5	12.5	13.5	13.7	13.7	23.7	27.0	26.9	27.0

From means of results, it is revealed that in case of F<sub>4</sub>, doze of N was highest, thus vegetative growth increased, thereby affecting yield related parameters. Whereas N related parameters i.e. protein and gluten showed no significant change.

#### Fertilizer levels NPK (kg ha<sup>-1</sup>)

F<sub>1</sub> = 0 – 0 – 0, F<sub>2</sub> = 80 – 60 – 60, F<sub>3</sub> = 120 – 90 – 60, F<sub>4</sub> = 160 – 120 – 60

### 61. TITLE

**EFFECT OF SPLIT APPLICATION OF NITROGEN ON GRAIN QUALITY OF WHEAT**

<b>OBJECTIVES</b>	To study the effect of split nitrogen application on different physico-chemical quality parameters.
<b>RESEARCH WORKERS</b>	HiraShair and Dr. Muhammad Abrar
<b>PROJECT DURATION</b>	2015-16 (Continuous nature)
<b>LOCATION</b>	Wheat Research Institute, Faisalabad.
<b>TREATMENTS &amp; METHODOLOGY</b>	Wheat variety Punjab-11 will be tested for comprehensive quality parameters especially, 1000-grain weight (using seed counter), test weight (using bushel weight apparatus), protein, gluten and starch contents.

### PREVIOUS YEAR'S RESULTS

<b>Treatments (NPK kg/ha)</b>	<b>1000 Grain wt. (g)</b>	<b>Test wt. (kg/hL)</b>	<b>Protein (%)</b>	<b>Gluten (%)</b>	<b>Starch (%)</b>
F <sub>1</sub> = 120- 114- 60 (All N at sowing)	41.9	78.8	14.7	31.3	54.2
F <sub>2</sub> = 120- 114- 60 (½ N at sowing and ½ N at booting)	41.9	78.9	15.1	30.0	53.5
F <sub>3</sub> = 120- 114- 60 (½ N at sowing and ½ N at tillering)	42.1	78.9	14.4	28.0	53.6
F <sub>4</sub> = 120 - 144- 60 (All N at sowing)	43.1	79.2	14.7	28.0	53.7
F <sub>5</sub> = 120 - 144- 60 (½ N at sowing and ½ N at booting)	41.0	78.5	16.2	33.0	52.9
F <sub>6</sub> = 120 - 144- 60 (½ N at sowing and ½ N at tillering)	41.9	78.7	15.0	29.7	53.6
F <sub>7</sub> = 120- 114- 94 (All N at sowing)	41.3	79.0	14.5	28.0	54.2
F <sub>8</sub> = 120- 114- 94 (½ N at sowing and ½ N at booting)	42.5	79.8	15.0	30.0	54.2
F <sub>9</sub> = 120- 114- 94 (½ N at sowing and ½ N at tillering)	41.2	79.1	14.9	29.7	53.2
F <sub>10</sub> = 120- 144- 94 (All N at sowing)	41.1	78.8	14.6	28.3	53.8
F <sub>11</sub> = 120- 144- 94 (½ N at sowing and ½ N at booting)	43.3	79.1	14.9	29.3	54.1
F <sub>12</sub> = 120- 144- 94 (½ N at sowing and ½ N at tillering)	41.3	78.9	14.9	29.3	53.2

To use the maximum potential of nitrogen, it was applied in split doses with 12 different combinations and the effect was studied on Punjab-11. F<sub>8</sub> scored the highest test weight (79.8g) and maximum starch i.e. 54.2%. F<sub>5</sub> brought the maximum contents of protein (16.2 %) and gluten (33%).

F<sub>11</sub> was the treatment that revealed acceptable results not only with the highest grain weight (43.3g) but also high scoring protein, gluten and starch contents.

Nitrogen application has non significant affect on yield parameter. Nitrogen when split and applied gave better i.e. increased results in protein and gluten content, than Nitrogen applied all at sowing.

<b>62. TITLE</b>	<b>DETERMINATION OF QUALITY TRAITS IN ADVANCED LINES OF BARLEY</b>
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<b>OBJECTIVES</b>	To evaluate high yielding barley lines for different quality parameters														
<b>RESEARCH WORKERS</b>	HiraShair and Dr. MakhdoomHussain														
<b>PROJECT DURATION</b>	2015-16 (Continuous nature)														
<b>LOCATION</b>	Wheat Research Institute, Faisalabad														
<b>TREATMENTS &amp; METHODOLOGY</b>	Advanced lines of barley will be evaluated for 1000 kernel weight, test weight and protein content														
<b>PREVIOUS YEAR'S RESULTS</b>	<table border="1"> <thead> <tr> <th><b>Trial</b></th> <th><b>1000-grain weight (g)</b></th> <th><b>Test Weight (kg hL<sup>-1</sup>)</b></th> <th><b>Protein (%)</b></th> </tr> </thead> <tbody> <tr> <td><b>Preliminary Yield</b></td> <td>35.8-48.6</td> <td>41.2-53.6</td> <td>10.6-12.5</td> </tr> <tr> <td><b>Advanced Yield</b></td> <td>38.3-48.2</td> <td>47.9-63.1</td> <td>11.0-13.4</td> </tr> </tbody> </table> <p>Barley grain samples of Preliminary Yield Trial (24) and Advanced Yield Trial (30) were analyzed for their quality traits. Out of the Preliminary yield trial, B-14037 has not only revealed highest test weight (53.6 kg/hL), but also the highest protein content and promising 1000 grain weight along with B-14038 having the highest 1000 grain weight (48.6g). In case of Advanced Yield Trial, all lines have shown excellent test weights with B-14005 having not only the highest test weight (63.1 kg/hL) but also the highest 1000 grain weight (47.7g). B-14001 has given a good protein percentage (13.4%).</p>			<b>Trial</b>	<b>1000-grain weight (g)</b>	<b>Test Weight (kg hL<sup>-1</sup>)</b>	<b>Protein (%)</b>	<b>Preliminary Yield</b>	35.8-48.6	41.2-53.6	10.6-12.5	<b>Advanced Yield</b>	38.3-48.2	47.9-63.1	11.0-13.4
<b>Trial</b>	<b>1000-grain weight (g)</b>	<b>Test Weight (kg hL<sup>-1</sup>)</b>	<b>Protein (%)</b>												
<b>Preliminary Yield</b>	35.8-48.6	41.2-53.6	10.6-12.5												
<b>Advanced Yield</b>	38.3-48.2	47.9-63.1	11.0-13.4												

<b>63. TITLE</b>	<b>EFFECT OF DIFFERENT TEMPERING CONDITIONS ON MILLING YIELD OF CURRENT WHEAT VARIETIES</b>
<b>OBJECTIVES</b>	To determine the suitable amount of moisture and time required for proper tempering of commercial wheat varieties
<b>RESEARCH WORKERS</b>	SadafShamim, HiraShair and Dr. Muhammad Abrar
<b>PROJECT DURATION</b>	2015-16 (Continuous nature)
<b>LOCATION</b>	Wheat Research Institute, Faisalabad.
<b>TREATMENTS &amp; METHODOLOGY</b>	Three wheat varieties viz. Punjab-11, Millat-11 and Galaxy-13 will be studied for determination of suitable tempering conditions. Each wheat variety will be tempered at moisture contents of 14.5, 15.0, 15.5 and 16% for time intervals of 16, 24, 32 and 48 hours. Milling will be carried out through Buhler mill and data for flour

	yield will be recorded to appraise the suitable tempering moisture content and time for maximum flour recovery
<b>PREVIOUS YEAR'S RESULTS</b>	Three wheat varieties viz. Punjab-11, Millat-11 and Galaxy-13 were studied for determination of suitable tempering conditions. Galaxy-13 gave maximum flour yield at 15 % moisture when it was tempered for 16 hours.

## SHUTTLE BREEDING PROGRAM

### i) Summer Agricultural Research Station, Kaghan

<b>64. TITLE</b>	<b>SUMMER WHEAT SCREENING NURSERY KAGHAN</b>
<b>OBJECTIVES</b>	<ul style="list-style-type: none"> <li>) To screen the wheat germplasm against rusts and powdery mildew.</li> <li>) To incorporate effective rust resistant genes in local germplasm.</li> <li>) To select the resistant material for further studies.</li> <li>) To advance the generations for speedy variety development.</li> </ul>
<b>RESEARCH WORKER (S)</b>	Dr. GhulamMahboobSubhani, Dr. MakhdoomHussain and Dr. ArshadMahmood
<b>PROJECT DURATION</b>	2015-16
<b>LOCATION</b>	Summer Agricultural Research Station, Kaghan
<b>TREATMENTS &amp; METHODOLOGY</b>	About 1500 entries will be planted during last week of May, 2015 in paired rows of 2 meter 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, 2014 for evaluation at WRI, Faisalabad.
<b>PREVIOUS YEAR'S RESULTS</b>	Thirty six entries showed susceptible reaction to Lr while all other entries showed escape from Yr and Sr.

### ii) Wheat Research Sub Station, Murree

<b>65.TITLE</b>	<b>RACE ANALYSIS OF YELLOW, LEAF AND STEM RUST</b>
<b>OBJECTIVES</b>	To identify rust races prevailing in the fields during 2014-15
<b>RESEARCH WORKER (S)</b>	Rabia Sultan
<b>PROJECT DURATION</b>	2015-16
<b>LOCATION</b>	Wheat Research Sub Station, Murree
<b>TREATMENTS &amp; METHODOLOGY</b>	Rust samples from different field locations will be obtained and increased on morocco. After increase these samples will be inoculated individually on differential sets for each stem, leaf and yellow rusts. The data obtained from these differential sets will reveal the information about the races prevailing in the fields during the season

<b>PREVIOUS YEAR'S RESULTS</b>	<b>Sr. No.</b>	<b>Number of Samples processed</b>	<b>Rust Type</b>	<b>Race Identified</b>
	1	08	Stem Rust	RRTTF
	2	10	Stripe Rust	-

<b>66.TITLE</b>	<b>SEED INCREASE OF RUST DIFFERENTIAL SETS (NEAR ISOGENIC LINES)</b>
<b>OBJECTIVES</b>	To produce sufficient quantity of differentials seed for their use in rust race analysis
<b>RESEARCH WORKER (S)</b>	Rabia Sultan
<b>PROJECT DURATION</b>	2015-16
<b>LOCATION</b>	Wheat Research Sub Station, Sunny Bank, Murree
<b>TREATMENTS &amp; METHODOLOGY</b>	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
<b>PREVIOUS YEAR'S RESULTS</b>	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

<b>67. TITLE</b>	<b>Sowing of Rust trap nursery</b>
<b>OBJECTIVES</b>	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.
<b>RESEARCH WORKER (S)</b>	Rabia Sultan
<b>PROJECT DURATION</b>	2015-16
<b>LOCATION</b>	Wheat Research Sub Station, Sunny Bank, Murree
<b>TREATMENTS &amp; METHODOLOGY</b>	A set of germplasm including existing varieties and differentials for different setwheat advanced lines will be sown in field area. Screening of these advanced lines will be carried out against rust diseases.

<b>PREVIOUS YEAR'S RESULTS</b>	A set of 186 wheat lines was sown in field area to screen them against rust diseases. 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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**iii) Rice Research Institute, Kala Shah Kaku**

<b>68. TITLE</b>	<b>DEVELOPMENT OF HIGH YIELDING AND DISEASE RESISTANT WHEAT VARIETY FOR RICE ZONE</b>
<b>OBJECTIVES</b>	<ul style="list-style-type: none"> <li>i. To screen wheat germplasm for specific micro climatic conditions under present changing climatic scenario.</li> <li>ii. To screen wheat germplasm against rusts.</li> <li>iii. To develop high yielding, disease resistant and well adapted wheat varieties for rice zone.</li> </ul>
<b>RESEARCH WORKER (S)</b>	Muhammad Muzaffar Iqbal, Muhammad Saleem, Dr. Makhdoom Hussain, Dr. Ghulam Mahboob Subhani and Dr. Arshad Mahmood
<b>PROJECT DURATION</b>	2015-16 (Continuous nature)
<b>LOCATION</b>	Rice Research Institute, Kala Shah Kaku
<b>TREATMENTS &amp; METHODOLOGY</b>	<p>Following material will be planted:</p> <ul style="list-style-type: none"> <li>i. Exotic and indigenous wheat material</li> <li>ii. Segregating generations</li> <li>iii. Commercial varieties and advanced wheat lines (MICRO, NUWYT, B-Trials).</li> <li>iv. Local Disease screening nursery (LDSN)</li> </ul>

<b>PREVIOUS YEAR'S RESULTS</b>	<b>i. Selected varieties/lines in track record of wheat varieties</b>					
	<b>Varieties</b>	<b>Disease reaction</b>		<b>Varieties</b>	<b>Disease reaction</b>	
		<b>LR</b>	<b>YR</b>		<b>LR</b>	<b>YR</b>
	Fsd-85	TMS	TMS	Lasani-08	TMR0	0
	Pasban-90	20MS	0	Millat-11	TMS	0
	Chenab-2000	0	0	Punjab-11	5MRMS	TMS
	Iqbal-2000	TMS	0	AAS-11	0	TMR
	SH-2002	TMR	5MS	AARI-11	0	10MRMS
	AS-2002	0	5MS	Galaxy-13	0	TMS
	Fareed-06	TMS0	TMS	V-11183	TMR	0
Fsd-08	TMS	0	V-08203	0	0	
	<b>ii. F<sub>2</sub> generation</b>					
	Out of 500 crosses, 375 crosses were selected on the basis of disease resistance and other agronomic traits.					
	<b>iii. Commercial varieties and advanced lines</b>					
	<b>Varieties/ Lines</b>	<b>Disease reaction</b>		<b>Yield kg ha<sup>-1</sup></b>		
		<b>LR</b>	<b>YR</b>			
	V-11183	10MR	0	6010		
	FSD-08	5MS	0	5766		
	V-08203	0	TMR	5320		
	Punjab-11	0	TMR	4770		
	Galaxy-13	0	5MS	4870		
	Pasban-90	0	5MRMS	4750		
	Millat-11	0	TMS	4335		
	AARI-11	0	10MRMS	3690		
	Lasani-08	0	5MSS	3490		

**iv) Kenya Agricultural Research Institute, Kenya**

<b>69.TITLE</b>	<b>STEM RUST SCREENING NURSERY KENYA</b>
<b>OBJECTIVES</b>	To screen the promising wheat genotypes against stem rust especially Ug-99 race
<b>RESEARCH WORKER (S)</b>	Dr. Makhdoom Hussain and Dr. Arshad Mahmood
<b>PROJECT DURATION</b>	2015-16
<b>LOCATION</b>	KARI, Kenya
<b>TREATMENTS &amp;</b>	Sixty nine promising genotypes will be sent to KARI., Kenya with the



<b>METHODOLOGY</b>	coordination of National Wheat Coordinator PARC, 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.
<b>PREVIOUS YEAR'S RESULTS</b>	Results awaited

## **PROJECTS**

<b>70. TITLE</b>	<b>DEVELOPMENT OF NOVEL SALT TOLERANT FORAGE AND CEREAL CROPS</b>
<b>OBJECTIVES</b>	To change the physiology of the wheat plant making it halophytic.
<b>RESEARCH WORKER (S)</b>	Dr. Makhdoom Hussain, Dr. Javed Ahmad, Muhammad Sarfraz (SSRI, Pindi Bhattian), Jan Dvorak and M. JavedIqbal (Dept. of Plant Sciences,University of California, Davis, USA)
<b>PROJECT DURATION</b>	2012-16 (Four years)
<b>LOCATION</b>	Wheat Research Institute, Faisalabad and University of California, Davis, USA.
<b>TREATMENTS &amp; METHODOLOGY</b>	<p>Wheat x <i>Lophopyrumelongatum</i> amphiploids has high levels of salt and water logging tolerance. A <i>ph1c</i> amphiploid (genomes AABBEE) will be crossed with the <i>ph1b</i> mutants of <i>T. aestivum</i> (genomes AABBDD). The homozygosity for the <i>ph1</i> state will allow homologous recombination between the E and D chromosomes.</p> <p>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.</p> <p>Current year work plan</p> <ol style="list-style-type: none"> <li>i. Salinity trials under Wheat Research Institute, Faisalabad. <ol style="list-style-type: none"> <li>a. Wheat Research Institute, Faisalabad.</li> <li>b. Pacca Anna, Faisalabad.</li> <li>c. Tandojam, Sindh.</li> </ol> </li> <li>ii. Salinity trials under Soil salinity Research Institute, PindiBhattian. <ol style="list-style-type: none"> <li>a. SSRI, PindiBhattian</li> </ol> </li> <li>iii. Amphiploid Yield Trial consists of following entries/varieties <ol style="list-style-type: none"> <li>a. AgCS, BeCS, CSLe, YecoraRojo, Chinese spring, Ishi, Auqab-2000, Pasban-90 and Haider-93</li> <li>b. Salinity levels (Low, Medium and High salinity)</li> </ol> </li> <li>iv. Soil analysis of amphiploid trials and minerals analysis of wheatgrass will be conducted.</li> <li>v. Data of biomass and grain yield of amphiploid trials will be recorded and analyzed.</li> <li>vi. Training of one Pakistani scientist at UC, Davis.</li> </ol>
<b>PREVIOUS YEAR'S RESULTS</b>	Two amphiploid viz AgCs and BeCs performed better than the checks under medium and high salinity levels
<b>71. TITLE</b>	<b>WHEAT PRODUCTIVITY ENHANCEMENT PROGRAMME (W-PEP)</b>
<b>OBJECTIVES</b>	To enhance wheat productivity by provision of high yielding varieties with rust resistance especially Ug99.
<b>RESEARCH WORKER (S)</b>	Dr. Makhdoom Hussain, Dr. Muhammad Imtiaz, Javed Anwar, Muhammad makky Javed and Dr. Javed Ahmad

<b>PROJECT DURATION</b>	2010-15 (Five years)
<b>LOCATION</b>	Wheat Research Institute, Faisalabad
<b>TREATMENTS &amp; METHODOLOGY</b>	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.
<b>PREVIOUS YEAR'S RESULTS</b>	Annual report W-PEP 2014-15

<b>72. TITLE</b>	<b>AGRICULTURAL INNOVATION PROGRAM (AIP) A. Yield loss assessment of wheat due to leaf rust using fungicides</b>
<b>OBJECTIVES</b>	<ul style="list-style-type: none"> <li>)] Rust control in high yielding wheat cultivars by the application of fungicides</li> <li>)] To ascertain losses caused by rusts in wheat crop.</li> </ul>
<b>RESEARCH WORKER (S)</b>	Muhammad makky javed, K.D. Joshi, Dr. Makhdoom Hussain and Dr. Javed Ahmad
<b>PROJECT DURATION</b>	2014-17 (Three years)
<b>LOCATION</b>	Wheat Research Institute, Faisalabad
<b>TREATMENTS &amp; METHODOLOGY</b>	Will be mutually finalized by WRI and AIP scientists
<b>PREVIOUS YEAR'S RESULTS</b>	Annual report AIP 2014-15 (Under compilation)

<b>73. TITLE</b>	<b>AGRICULTURAL INNOVATION PROGRAM (AIP) B. Diamond trial to ascertain the effect of using certified seed of new varieties</b>
<b>OBJECTIVES</b>	To enhance wheat productivity by provision of high yielding varieties with rust resistance especially Ug99.
<b>RESEARCH WORKER (S)</b>	Dr. Makhdoom Hussain, K.D. Joshi and Dr. Javed Ahmad
<b>PROJECT DURATION</b>	2014-17 (Three years)
<b>LOCATION</b>	Wheat Research Institute, Faisalabad
<b>TREATMENTS &amp; METHODOLOGY</b>	Varieties: 2 (One new and one old variety) Treatments: 2 (Certified seed and farmer's own seed)

	Plot size: 250 m <sup>2</sup>
<b>PREVIOUS YEAR'S RESULTS</b>	Annual report AIP 2014-15 (Under compilation)

<b>74. TITLE</b>	<b>AGRICULTURAL INNOVATION PROGRAM (AIP) C. Conservation trials (Agronomy)</b>
<b>OBJECTIVES</b>	<ul style="list-style-type: none"> <li>i. Wheat planting in standing cotton</li> <li>ii. Wheat-Rice-Wheat rotation</li> <li>iii. Zero tillage in rice</li> <li>iv. Direct seeded rice</li> <li>v. Bed planting of wheat</li> </ul>
<b>RESEARCH WORKER (S)</b>	Abdul hameed, Dr. Makhdoom Hussain, Dr. Imtiaz Hussain, Dr. Abdul Ghaffar and YasirRamzan
<b>PROJECT DURATION</b>	2010-15 (Five years)
<b>LOCATION</b>	Wheat Research Institute, Faisalabad and farmer fields
<b>TREATMENTS &amp; METHODOLOGY</b>	Will be mutually finalized by WRI and AIP scientists
<b>PREVIOUS YEAR'S RESULTS</b>	Annual report AIP 2014-15 (Under compilation)