ANNUAL PROGRAMME OF RESEARCH WORK, 2018-19

DR. MUHAMMAD AKHTER
(*Director*)

RICE RESEARCH INSTITUTE

KALA SHAH KAKU, 17 KM G.T. ROAD, LAHORE

PLANT BREEDING & GENETICS

1.	**TITLE**	**MAINTENANCE OF RICE GERMPLASM**	

OBJECTIVE To maintain and study the genetic stock for utilization in rice breeding programme

RESEARCH WORKER Ms. Fariha Shahzadi

PROJECT DURATION 2018-19 (Continuous)

LOCATION Kala Shah Kaku

TREATMENT

Type	Set-I
Local:	511 lines / varieties
Exotic:	341 lines / varieties
Total:	**852 lines / varieties**

PLAN OF WORK
Plot size   0.5m x 6.5m
Fertilizer   133-85-62 NPK kg/ha

PREVIOUS YEAR'S RESULTS Eight hundred and fifty-two entries of germplasm collection from local and exotic origin were planted respectively. At maturity, the seed from one representative plant was harvested and stored properly after drying and cleaning.

Plant Traits	Minimum	Maximum
Plant height (cm)	61	171
No. of tillers / plant	6	31
Flowering days	41	110
Maturity days	72	140
1000 Grain weight (g)	20	29.5
Panicle length (cm)	15	33
Grain length (mm)	5.5	9.7
Gelatinization temperature (^{o}C)	40	100
Amylose content (%)	6	30
Alkali Spread Value (range:0-7)	0	7

2. **TITLE**   **HYBRIDIZATION BLOCK**

OBJECTIVE   To induce genetic variability for selecting desirable recombinants possessing high yield potential, earliness, insect pests and disease resistance/tolerance and better grain quality for the development of new rice varieties.

RESEARCH WORKER   Mrs. Hira Saher

Mrs. Tahira Bibi

PROJECT DURATION   2018-19 (Continuous)

LOCATION   Kala Shah Kaku

PLAN OF WORK   Entries   200 parental lines / varieties

Fresh crosses   235

Fresh crosses will be made with following target traits:

High yielding	80	Hopper	15
Quality	20	Early maturity	10
Aroma	08	Flood resistance	10
Plant type	05	Aerobic	02
Salt tolerance	10	Genetic diversity	05
Drought	15	BLB	30
Earliness & Short stature	15	Blast	05

Plot size   0.5 m x 6.5m

Fertilizer   133-85-62 NPK kg/ha

Transplanting dates   25/6 & 15/7

PREVIOUS YEAR'S RESULTS   Three hundred and seventy crosses were attempted and 260 successful crosses were harvested for evaluation. Detail of these crosses against various objectives is given below:

High Yielding	40	Quality	25
Salt tolerance	12	BLB	50
Genetic diversity	10	Extra-long grain	13
Drought	12	Blast	05
Earliness & Short Stature	21	Plant Hopper	10
Plant type	05	Aroma	08
Flood tolerance	40	Back crosses	09
Drought	12		

3. **TITLE**   **EVALUATION OF FILIAL GENERATIONS (08 Trials)**

OBJECTIVE   To evaluate and select desirable recombinants from early ($F_1 - F_3$) and advance ($F_4 - F_8$) generations for the evolution of improved rice lines.

RESEARCH   Mr. Ahsan Raza Khan

WORKERS

PROJECT DURATION   2018-19 (Continuous)

LOCATION   Kala Shah Kaku

PLAN OF WORK

Generations	Crosses / Progeny lines to be studied	Planting Method	Plot size
F_1	260 crosses	Transplanting	-
F_2	118 crosses	DSR	2.25m x 25m
F_3	899 progeny lines	Transplanting	0.5m x 4.1m
F_4	606 progeny lines	Transplanting	0.5m x 4.1m
F_5	67 progeny lines	Transplanting	0.5m x 4.1m
F_6	39 progeny lines	Transplanting	0.5m x 4.1m
F_7	06 progeny lines	Transplanting	2.1m x 4.1m

PREVIOUS YEAR'S RESULTS

Generation	Crosses / Progeny lines studied	Selections made
F_1	214 crosses	118 crosses
F_2	192 crosses	899 single panicles
F_3	1006 progeny lines	606 single panicles
F_4	521 progeny blocks	67 selections & 06 uniform lines for quality testing
F_5	85 progeny blocks	39 selections & 10 uniform lines for quality testing
F_6	44 progeny blocks	06 selections & 11 uniform lines for quality testing
F_7	14 progeny blocks	02 uniform lines for quality testing

4. **TITLE**   **DEVELOPMENT OF BACTERIAL LEAF BLIGHT (BLB) RESISTANT BASMATI VARIETIES / LINES**

OBJECTIVE   To develop BLB resistant lines / varieties

RESEARCH WORKER   Mr. Awais Riaz
Dr. Ayesha Bibi
Dr. Muhammad Sabar

PROJECT DURATION   2018-19 (continuous)

LOCATION   Kala Shah Kaku

PLAN OF WORK

Generation	Entries	Plot size
F_1	40	5 plants / cross
F_2	25	500-700 plants / cross
F_3	24	2 rows / progeny
F_4	60	-do-
F_5	55	-do-

Fertilizer   133-85-62 NPK kg/ha

Data to be recorded: Disease response against BLB will be studied.

Target gene selection will be done using linked DNA marker for BLB resistant genes in filial generations F_3-F_5.

PREVIOUS YEAR'S RESULTS

Generation / lines	Crosses/ lines studied	Crosses / lines selected
F_1	37 crosses	The seed of all crosses was harvested
F_2	45 populations	Single panicles from the segregating generation were selected having single or combination of genes *Xa4, xa5, Xa7, xa13,Xa21*
F_3	130 progenies of 30 crosses	Single panicles from the segregating generation were selected having single or combination of genes *Xa4, xa5, Xa7, xa13,Xa21*
F_4	57 progeny lines	55 single panicles were selected.
OP lines	23 lines	10 lines selected

5. **TITLE**   **EVALUATION OF UNIFORM LINES AT BLB HOTSPOT SITES**

OBJECTIVE To test the performance of advance uniform lines at three hotspots locations i.e; KSK, Hafizabad and Gujranwala.

RESEARCH WORKER
Dr. Muhammad Sabar
Dr. Ayesha Bibi
Mr. Awais Riaz

PROJECT DURATION 2018-19 (Continuous)

LOCATION Kala Shah Kaku

PLAN OF WORK

Layout   : RCBD

Repeat   : 3

Plot size : 2.5 m^2

Methodology : Thirty days old seedlings of advance uniform lines and NILs will be transplanted during 2nd week of July. All other agronomic practices will be kept uniform. Data on yield and BLB disease incidence under natural conditions will be recorded.

Near Isogenic Lines (NILs) carrying resistant genes	30 NILs	Disease response of 30 NILS (2 rows each) were studied at 3 hotspot sites i.e. Hafizabad, Gujranwala and KSK.

		Ten uniform lines were studied at 3 hotspot sites i.e. Hafizabad, Gujranwala and KSK under natural conditions. Paddy yield performance of uniform lines at Hafizabad site was better than the other 2 sites.
Uniform lines	10 uniform lines	

Performance of uniform lines at 3 hotspots

Rank	Designation	KSK (t/ha)	HFD (kg/ha)	GRW (kg/ha)	Ave. Paddy yield (Kg/ha)	BLB resistant genes status
1	PKBB 1503	6.81	6.37	5.97	6.38	*Xa4,Xa7,xa13*
2	PKBB 1501	5.99	6.06	5.87	5.97	*xa5,Xa7*
3	PKBB 1507	5.56	5.62	5.28	5.49	*Xa7*
4	PKBB 1506	5.49	4.79	5.84	5.37	*Xa4*
5	PKBB 1504	5.41	5.58	5.73	5.57	*xa5,Xa7*
6	PKBB 1502	5.25	5.18	5.62	5.35	*xa5,Xa7*
7	Bas 515	4.88	5.48	4.91	5.09	---
8	PKBB 1509	4.84	5.68	4.67	5.06	*Xa7*
9	PKBB 1508	3.93	3.84	4.5	4.09	*xa5,Xa7*
10	PS-2	4.80	3.58	4.15	4.18	-
11	PKBB 1505	3.17	4.08	3.97	3.74	*xa5,Xa7*
12	Super Bas	3.11	4.32	3.93	3.79	-

6. TITLE   OBSERVATIONAL YIELD TRIALS

OBJECTIVE   To evaluate high yielding, early maturing, lodging resistant with better grain quality and insect-pests and disease tolerant rice lines.

RESEARCH WORKER   Dr. Muhammad Sabar
Mr. Awais Riaz

PROJECT DURATION   2018-19 (Continuous)

LOCATION   Kala Shah Kaku

PLAN OF WORK
Lines   = 260
Checks   = Basmati 515, PS-2 and Super Basmati.
Plot size   = 2.0m x 5.0m
Fertilizer   = 133-85-62 NPK kg/ha

Uniform lines selected from advance filial generations will be studied to evaluate their field performance for uniformity, maturity days, plant height, number of tillers per plant, paddy yield and cooking quality will be recorded.

Previous Year's Results	One hundred seventy (170) lines were tested in two trials OP1 & OP2. The data of the better performing lines / varieties were recorded as under.

OP1 - 2017

Rank No.	Designation	Plant Height (cm)	Tillers/ plant	Maturity days	AGL (mm)	Paddy Yield (t/ha)	Cooking
1.	OP9	142	17	139	7.3	7.66	Good
2.	OP19	134	13	137	8.9	5.81	Good
3.	OP60	153	11	124	7.7	5.60	Good
4.	OP49	140	18	130	8.4	5.48	Excellent
5.	OP39	121	10	135	7.9	5.46	Excellent
6.	Bas 515 (Check-II)	143	15	121	7.6	5.13	Good
7.	PS-2 (Check-I)	123	16	120	8.3	4.05	Excellent
8.	Super Bas (Check-III)	128	17	121	7.4	4.36	Good

OP2 - 2017

Rank No.	Designation	Plant Height (cm)	Tillers/ plant	Maturity days	AGL (mm)	Paddy Yield (t/ha)	Cooking
1.	OP4	145	12	131	9.3	6.41	Excellent
2.	OP75	129	14	136	8.0	6.23	Good
3.	OP74	151	12	137	7.4	6.18	Excellent
4.	OP2	135	14	138	7.7	5.08	Excellent
5.	Bas 515 (Check-II)	143	15	121	7.6	4.93	Excellent
6.	OP54	119	14	125	8.4	4.58	Good
7.	PS-2 (Check-I)	123	16	120	8.2	4.35	Excellent
8.	Super Bas (Check-III)	128	17	121	7.4	4.61	Good

7.   TITLE   COARSE GRAIN YIELD TRIAL – A

OBJECTIVE   To evaluate high yielding, early maturing, insect-pests and disease resistant medium grain lines.

RESEARCH WORKER   Ms. Fariha Shehzadi
Mr. Muhammad Iqbal

PROJECT DURATION   2018-19 (Continuous)

LOCATION   Kala Shah Kaku

	PLAN OF WORK		
	Lines	=	10
	Checks	=	KSK 434
	Design	=	RCBD
	Replications	=	3
	Plot size	=	2.0 m x 5.0 m
	Fertilizer	=	170-100-62 NPK kg/ha

Lines selected from observational plots will be studied in Trial-A to evaluate their yield performance in replicated trials and to confirm grain quality. Data on 50% flowering, maturity days, plant height, number of tillers per plant and yield will be recorded.

PREVIOUS YEAR'S RESULTS

Rank No.	Strain / variety	Yield (t/ha)	Cooking
4	KSK 515	8.89	Good
8	KSK 519	8.55	Good
3	KSK 514	8.55	Good
6	KSK 517	8.25	Excellent
14	KSK 434 (Check)	7.64	Good
5	KSK 516	7.63	Excellent
2	KSK 513	7.62	Good
13	KSK133 Check	6.94	Excellent
1	KSK 512	6.52	Good
7	KSK 518	6.19	Good
9	KSK 520	6.08	Excellent
10	KSK 521	5.75	Excellent
11	KSK 522	5.32	Fair
12	KSK 523	5.06	Good
			LSD = 0.498

8. TITLE   **COARSE GRAIN YIELD TRIAL – B**

OBJECTIVE   To evaluate high yielding, early maturing and insect-pests and disease resistant medium grain lines.

RESEARCH WORKER   Ms. Fariha Shehzadi
Mr. Muhammad Iqbal

PROJECT DURATION   2018-19 (Continuous)

LOCATION   Kala Shah Kaku

PLAN OF WORK	Lines	= 10
	Checks	= KSK 434
	Design	= RCBD
	Replications	= 3
	Plot size	= 2.0 m x 5.0 m
	Fertilizer	= 170-100-62 NPK kg/ha

Lines selected from A Trial will be studied in B Trial to evaluate their yield performance. Data on 50% flowering, maturity days, plant height, number of tillers per plant and grain yield will be recorded.

PREVIOUS YEAR'S RESULTS

Fourteen lines were tested in this trial. Yield performance of the lines is as under:

Rank No.	Strain / variety	Yield (t/ha)	Cooking
7	KSK 505	6.94	Excellent
1	KSK 499	5.93	Good
6	KSK 504	5.79	Excellent
14	KSK 434 Check	5.75	Good
11	KSK 509	5.58	Good
5	KSK 503	4.96	Good
8	KSK 506	4.79	Excellent
12	KSK 510	4.44	Fair
9	KSK 507	4.31	Good
2	KSK 500	4.19	Fair
3	KSK 501	4.16	Good
13	KSK 511	4.15	Excellent
4	KSK 502	4.07	Good
10	KSK 508	3.38	Poor

LSD = 0.477

9. TITLE   **COARSE GRAIN YIELD TRIAL – C**

OBJECTIVE To evaluate high yielding, early maturing and insect-pests and disease resistant medium grain lines.

RESEARCH WORKER
Ms. Fariha Shehzadi
Mr. Muhammad Iqbal

PROJECT DURATION 2018 -19

LOCATION Kala Shah Kaku

PLAN OF WORK	Lines	= 10
	Checks	= KSK 434
	Design	= RCBD
	Replications	= 3
	Plot size	= 2.0 m x 5.0 m
	Fertilizer	= 170-100-62 NPK kg/ha

Lines selected from B Trial will be studied in Trial-C to evaluate their yield performance. Data on 50% flowering, maturity days, plant height, number of tillers per plant and grain yield will be recorded.

PREVIOUS YEAR'S RESULTS

Eleven lines were tested in this trial. Yield performance of the lines is as under:

Rank No.	Strain / variety	Yield (t/ha)	Cooking
1	KSK 489	9.17	Good
10	KSK 498	7.68	Good
9	KSK 497	7.6	Good
3	KSK 491	7.24	Good
11	KSK 434 (Check)	7.07	Good
2	PK 490	6.34	Good
6	KSK 494	5.99	Fair
7	KSK 495	5.89	Good
4	KSK 492	5.65	Fair
5	KSK 493	5.51	Fair
8	KSK 496	5.44	Good

LSD = 0.477

10. TITLE   **FINE GRAIN YIELD TRIAL – A**

OBJECTIVE   To evaluate high yielding, early maturing, lodging resistant with better grain quality and insect-pests and disease tolerant fine grain strains.

RESEARCH WORKER   Dr. Muhammad Sabar
Mr. Awais Riaz

PROJECT DURATION   2018-19 (Continuous)

LOCATION   Kala Shah Kaku

PLAN OF WORK	Lines	= 12
	Checks	= Basmati 515, PS-2 and Super Basmati.
	Design	= RCBD
	Replications	= 3
	Plot size	= 2.0m x 5.0m

Fertilizer   = 133-85-62 NPK kg/ha

Lines selected from observation plots will be studied in Trial A to evaluate their yield. maturity days, plant height, number of tillers per plant and paddy yield will be recorded.

Previous Year's Results   Twenty-nine lines were tested in two trials. The data for different plant traits lines / varieties are as under.

A1 Trial-2017

Rank No.	Designation	Plant height (cm)	Tillers per plant	Mat. Days	Paddy Yield (t/ha)	Cooking
2	PK 10975-25-1-1	124	17.6	93	6.01	Good
8	PK 10358-7-2-1-1	127	14.6	98	5.43	Good
9	PK 10461-7-2-1-2	130	19.6	99	5.20	Excellent
1	PK 11369-8-1	122	14.2	105	5.12	Good
4	PK 10640-10-1-1-1-1	148	12.6	93	5.08	Good
5	PK 10684-3-1-2	151	14.6	108	4.50	Excellent
10	PK 10424-4-2-1-2	117	15.8	97	4.42	Average
6	PK 10686-2-1-1	129	19.0	99	4.32	Good
3	PK 10680-3-6-2-1	114	13.6	95	4.31	Excellent
7	PK 10938-3-1-1	117	19.0	97	4.25	Fair
11	PS2 (Check-I)	140	16.6	104	4.02	Excellent
12	Bas 515 (Check-II)	125	20.2	108	3.92	Good
13	Super basmati (Check-III)	123	17.8	107	3.58	Good

LSD = 0.42

A2 Trial-2017

Rank No.	Designation	Plant height (cm)	Tillers per plant	Mat. Days	Paddy Yield (t/ha)	Cooking
7	PK 10825-5-1-4	139	14.4	103	5.54	Good
13	PK 10436-4-2-2-1	140	15.6	96	5.14	Good
9	PK 10835-9-1-1	142	14.6	104	5.05	Poor
8	PK 10825-13-1-1	145	15.4	104	4.93	Excellent
10	PK 10843-7-2-2	148	14.4	104	4.75	Good
1	PK 10677-3-1-1	129	11.8	93	4.64	Excellent
16	Super Basmati (Check-III)	133	18.6	107	4.64	Good
14	PS2 (Check-I)	130	18.2	104	4.52	Excellent
3	PK 10684-6-1-1	151	12.2	93	4.49	Excellent
5	PK 10824-9-1-3	138	13.4	103	4.48	Excellent
15	Basmati 515 (Check-II)	147	16.2	108	4.47	Good
2	PK 10678-2-1-1	125	14.4	89	4.43	Poor
12	PK 10663-6-1-2-1	129	14.8	100	4.21	Good

6	PK 10824-9-1-5	133	12.4	103	4.18	Good
4	PK 10816-5-3-1	113	19.0	90	4.15	Good
11	PK 10845-6-2-2	123	20.0	86	4.12	Good

LSD = 0.51

11.	**TITLE**	**FINE GRAIN YIELD TRIAL – B**
	OBJECTIVE	To evaluate high yielding, early maturing, lodging resistant with better grain quality and insect-pests and disease tolerant fine grain strains.
	RESEARCH WORKER	Dr. Muhammad Sabar Mr. Awais Riaz
	PROJECT DURATION	2018-19 (Continuous)
	LOCATION	Kala Shah Kaku

PLAN OF WORK	Lines	= 12
	Check	= Basmati 515, PS-2 and Super Basmati.
	Design	= RCBD
	Replications	= 3
	Plot size	= 2.0m x 5.0m
	Fertilizer	= 133-85-62 NPK kg/ha

Lines selected from Trial A will be studied in Trial B. Data on 50% flowering, maturity days, No. of grains / panicle, plant height, number of tillers per plant and grain yield will be recorded.

PREVIOUS YEAR'S RESULTS	Thirteen lines were tested in this trial. Yield performance data of the lines /varieties are as under.

B Trial-2017

Rank No.	Designation	Plant height (cm)	Tillers per plant	Mat. Days	Paddy Yield (t/ha)	Cooking
1	PK 10495-7-3-1	116	15	107	4.92	Good
2	PK 10355-13-2-1	123	15	114	4.92	Good
9	PK 10434-6-2-1	121	13	110	4.83	Fair
3	PK 10683-12-1	119	18	108	4.78	Poor
5	PK 9832-4-1	126	17	111	4.70	Good
4	PK 10350-7-2-1	118	15	107	4.63	Fair
12	Bas 515 (Check-II)	131	20	115	4.63	Excellent
8	PK 10419-2-1-1	145	11	102	4.60	Good
6	PK 9847-10-1	131	17	111	4.57	Fair
10	PK 10437-14-2-1	150	11	107	4.57	Good
11	PS2 (Check-I)	115	19	109	4.24	Excellent
7	PK 10436-2-1-1	129	16	109	3.88	Good

| 13 | Super basmati (Check-III) | 128 | 22 | 114 | 3.70 | Excellent |

LSD = 0.43

12. **TITLE**   **FINE GRAIN YIELD TRIAL – C**

OBJECTIVE   To evaluate high yielding, early maturing, lodging resistant with better grain quality and insect-pests and disease tolerant fine grain strains.

RESEARCH WORKER   Dr. Muhammad Sabar
Mr. Awais Riaz

PROJECT DURATION   2018-19 (Continuous)

LOCATION   Kala Shah Kaku

PLAN OF WORK
Lines	= 10
Check	= Basmati 515, PS-2 and Super Basmati
Design	= RCBD
Replications	= 3
Plot size	= 2.0m x 5.0m
Fertilizer	= 133-85-62 NPK kg/ha

Lines selected from Trial B will be studied in Trial C to evaluate their yield performance and confirm grain quality. Data on 50% flowering, maturity days, No. of grains / panicle, plant height, number of tillers per plant and grain yield will be recorded.

Previous Year's Result   Sixteen lines were tested in this trial. Yield data of the better performing lines / varieties are as under.

C-Trial-2017

Rank No.	Designation	Plant height (cm)	Tillers per plant	Mat. Days	Paddy Yield (t/ha)	Cooking
2	PK 10324-1-1	109	16	96	6.26	Good
4	PK 10029-13-2-1	130	14	104	5.69	Excellent
6	PK 9966-10-1	114	19	102	5.65	Fair
1	PK 10306-15-5	105	16	99	5.56	Fair
5	PK PB-8	115	18	105	5.48	Good
3	PK 9444-8-1-2	112	15	97	5.43	Good
8	PK 10161-1-5-1	119	22	105	5.21	Poor
12	PK 10969-39-1	103	20	108	5.12	Fair
7	PK 9533-9-6-1-1	121	21	102	4.87	Good
11	PK 10967-30-1	110	20	93	4.57	Fair
16	Super basmati (Check-III)	130	23	107	4.54	Good
9	PK 10101	133	25	107	4.40	Poor
14	PS2 (Check-I)	112	21	104	4.11	Excellent
10	PK 10198-7-2	118	22	104	4.07	Excellent
15	Bas 515 (Check-II)	127	19	108	4.90	Excellent
13	PK 10749-18-1-1	114	20	107	3.79	Good

LSD = 0.52

13. **TITLE**   **NATIONAL UNIFORM RICE YIELD TRIALS**

OBJECTIVE	To evaluate the performance of the most promising strains evolved at different research institutions of the country under local conditions.
RESEARCH WORKER	Mr. Zulqarnain Haider
PROJECT DURATION	2018-19 (continuous)
LOCATION	Kala Shah Kaku
TREATMENT	The material will be received from the Pakistan Agricultural Research Council, Islamabad under code numbers.
PLAN OF WORK	All the experimental details will be supplied by the Pakistan Agricultural Research Council.
PREVIOUS YEAR'S RESULTS	Fifteen varieties of aromatic group and fifteen varieties of coarse group were tested. Yield data results at different locations is given below:

National Uniform Rice Yield Trial 2017 (Fine)

Entry	Plant Height (cm)	Tillers per Plant	Days to 50% flowering	Days to Maturity	Panicle Length (cm)	Grains per panicle (g)	Thousand Grain Weight (g)	Paddy Yield (kg/ha)
FR1	107	16	70	101	28.7	121	23.68	4385
FR2	131	13	71	116	27.4	99	24.38	3089
FR3	122	17	66	103	29.3	114	23.98	3958
FR4	125	18	70	112	29.4	125	23.84	3415
FR5	104	18	70	99	31.2	137	25.32	4882
FR6	123	15	69	114	31.4	129	23.60	3920
FR7	126	18	63	108	30.7	117	21.16	3522
FR8	129	19	68	113	28.5	140	22.34	3561
FR9	124	17	66	111	29.4	134	25.90	2751
FR10	119	19	70	115	27.5	114	23.18	2314
FR11	128	14	68	113	27.4	111	20.82	2339
FR12	115	12	70	115	28.8	129	22.14	3392
FR13	121	14	66	109	27.9	125	23.64	3471
FR14	117	18	68	110	30.2	139	25.60	3841
FR15	132	13	69	114	27.5	111	24.76	2462

National Uniform Rice Yield Trial 2017 (Coarse)

Entry	Plant Height (cm)	Tillers per Plant	Days to 50% flowering	Days to Maturity	Panicle Length (cm)	Paddy Yield (kg/ha)
CR1	116.6	14.8	101	131	26.4	4400
CR2	110.2	13.0	100	130	25.6	6350
CR3	103.4	7.4	115	145	25.6	6700

CR4	98.8	15.2	96	126	24.4	8600
CR5	107	18.8	115	145	25.3	5700
CR6	107	10.2	110	140	24.8	7250
CR7	105.8	13.0	113	143	26.6	6500
CR8	102.8	15.4	95	125	27.0	7900
CR9	50.8	14.4	98	128	26.2	6150
CR10	87.6	12.6	116	146	25.6	7200
CR11	86.4	17.2	106	136	23.4	6500
CR12	93.4	15.0	111	141	27.8	5600
CR13	107.0	17.1	96	126	25.0	8700
CR14	97.2	12.4	105	135	25.8	7550
CR15	97.8	16.6	104	134	25.6	7700

14. **TITLE** — **MAINTENANCE AND MULTIPLICATION OF RICE LINES/ VARIETIES**

OBJECTIVE — To maintain the seed purity and seed multiplication of promising lines/ varieties

RESEARCH WORKER — Mr. Zulqarnain Haider

PROJECT DURATION — 2018-19 (Continuous)

LOCATION — Kala Shah Kaku

TREATMENT — Strains/lines — 30 (Fine 20 + Coarse 10)

PLAN OF WORK — Plot size — 2 m x 45 m (Fine) / 2 m x 25 m (Coarse)

Data to be recorded: Data regarding yield and yield components will be recorded.

PREVIOUS YEAR'S RESULTS

Sr. No.	Varieties/Lines (Fine)	Seed quantity (kgs)
1.	PK 8892-4-1-3-1	11
2.	PK9194	10
3.	RRI 3	12
4.	PKBB15-1	08
5.	PKBB15-6	08
6.	PKPB8	09
7.	PK10683	11
8.	PK10355	10
9.	PKBB15-116	09
10.	PK10029-13-2-1	10
11.	PK9966-10-1	09
12.	PK9533-9-6-1-1	09
13.	PK10161-1-5-1	08
14.	PK10967-30-1	09

S. No	Varieties / Promising lines	Quantity (kg)

	(coarse)	
1	IR 9	25
2	KSK 133	27
3	KSK 434	30
4	KSK 449	25
5	KSK 452	20
6	KSK 454	27
7	KSK 462	21
8	KSK 463	20
9	KSK 464	23
10	KSK 466	32
11	KSK 471	25
12	KSK 474	32
13	PK 8432-3-2-12-1-1	32
14	PK 7688-1-1-3-2	26

15. **TITLE**   **SCREENING OF RICE LINES FOR DROUGHT STRESS**

OBJECTIVE   To evaluate the field performance of fine and coarse rice lines under drought stress condition for developing drought tolerant rice varieties.

RESEARCH WORKERS   Mr. Zulqarnain Haider

PROJECT DURATION   2018-19

LOCATION   Kala Shah Kaku

TREATMENT   Strains/lines   50 (Fine 35 + Coarse 15)

PLAN OF WORK   Plot size   0.5m x 5m

Data to be recorded: Evaluation of rice lines under drought stress at reproductive phase by stopping irrigation. Stress will be continued until the tolerant check shows the stress symptoms. Data regarding stress score, tolerance index and paddy yield will be recorded.

PLAN OF WORK   First year experiment

16. **TITLE**   **SCREENING OF RICE LINES FOR SUBMERGENCE / FLOOD TOLERANCE IN SUBMERGECE TANK**

OBJECTIVE   To evaluate the genotypic and phenotypic performance of fine and coarse rice lines under submergence stress condition for developing flood tolerant rice lines.

RESEARCH WORKER   Mr. Zulqarnain Haider

PROJECT DURATION   2018-19 (Continuous)

LOCATION	Kala Shah Kaku	
TREATMENT	Strains/lines	125 (Fine 50 + Coarse 75)
PLAN OF WORK	Plot size	0.5m x 5m
	Data to be recorded:	Evaluation of rice lines under submergence stress of 15 days, using 1.75m canal water depth in submergence tank at 25DAT. Data regarding stress score, tolerance index and paddy yield will be recorded.

PREVIOUS YEAR'S RESULTS

Sr. No.	Stress response	No. of rice lines
1.	Tolerant	8
2.	Moderately Tolerant	10
3.	Moderately Susceptible	17
4.	Susceptible	32
5.	Highly Susceptible	49
	Total	**116**

Chenab Basmati, IR6/RH304, PARC99/PK8337, PARC99/PK8677, 99723/PK7392, Bas2000/Shaheen Bas, 4086/4048-11, Swarna sub1 showed tolerant response under flood stress.

17. **TITLE**   **SCREENING OF RICE LINES FOR HEAT TOLERANCE**

OBJECTIVE   To evaluate the genotypic and phenotypic performance of fine and coarse rice lines under heat stress.

RESEARCH WORKER	Dr. Muhammad Sabar Rice Botanist (Bahawalnagar)	
PROJECT DURATION	2018-19	
LOCATION	Kala Shah Kaku & Bahawalnagar	
TREATMENT	Strains/lines	20
PLAN OF WORK	Plot size	2m x 5m

The 25 days old seedlings will be transplanted into earthen pots (one plant per pot with 3 replications) in a net house with natural temperature and light. When the plant will start heading, it will be transferred to green house / tunnel 37-39 °C day temperature and 75-85% relative humidity. The plants will be transferred to the net house after high temperature treatment upto 14 days until all the panicles finished flowering. Then plants will be moved back to the net house until maturity, and spikelet fertility will be investigated.

PREVIOUS YEAR'S RESULTS   First year of the project

18. **TITLE** **DEVELOPMENT OF CULTIVARS WITH ENRICHED LEVEL OF IRON AND ZINC SUITABLE FOR DIRECT SEEDED RICE (DSR) AND TRANSPLANTED RICE**

OBJECTIVE Rice germplasm screening to identify donors with high grain Iron and Zinc densities.

RESEARCH WORKER
Dr. Muhammad Sabar
Mrs. Tahira Bibi
Mrs. Hira Saher

PROJECT DURATION 2018-19

LOCATION Kala Shah Kaku

PLAN OF WORK

Lines	= 50
Design	= Factorial RCBD
Replications	= 3
Factors/Treatments	= Genotypes, Soil Fe & Zn application, Foliar Fe & Zn application
Treatment Levels	= Control, Soil applications of Fe & Zn (0, 100%, 200% of optimum soil nutrient level), Single foliar application of Fe & Zn based solutions (Zn @ 0.1%, Fe @ 0.2%)
Plot size	= 2.0 m × 5.0 m
Fertilizer	= 133-85-62 NPK kg/ha

Germplasm will be screened for high grain Fe & Zn densities through chemical analysis. Soil and water sampling before transplantation and after harvesting of the crop will be done. Soil and foliar applications of Fe & Zn based fertilizers as per treatments will be followed. All other agronomic practices will be kept uniform. Root, stem and leaf samples will be collected at three stages (tillering, heading and maturity) for determination of Fe & Zn contents. At vegetative stage, genotypes will be scored for Fe & Zn deficiency symptoms. Foliar application of Fe & Zn solutions at heading stage will be done. At maturity, morphometric data of yield related traits will be collected and Fe & Zn contents will be determined in brown, polished and parboiled Rice grains.

PREVIOUS YEAR'S RESULTS First year of the experiment

19. **TITLE** **PRE-BASIC SEED PRODUCTION**

OBJECTIVE To produce Pre-Basic seed of the approved rice varieties for multiplication by the Punjab Seed Corporation, Private seed companies and Rice Research

Institute, Kala Shah Kaku.

RESEARCH WORKER	Mr. Ahsan Raza Khan
PROJECT DURATION	2018-19 (Continuous)
LOCATION	Kala Shah Kaku
TREATMENT	Varieties: 11 (Super Basmati, Basmati 515, Punjab Basmati, Chenab Basmati, Kissan Basmati, PS 2, PK 386, IR6, KS 282, KSK 133 & KSK 434).
PLAN OF WORK	The seed of the single panicles of each variety will be planted in progeny rows with 60 x 30 cm spacing. Selected progeny rows will be harvested to raise progeny blocks to critically examine and ensure uniformity of each variety. The seed of the selected uniform, disease free and vigorous progeny blocks will be bulked and used to produce pre-basic seed. This pre-basic seed will be supplied to the Punjab Seed Corporation for multiplication on its own farms and a part of the pre-basic seed will be used for multiplication at the Rice Research Institute, Kala Shah Kaku.
PREVIOUS YEAR'S RESULTS	The following quantity of pre-basic seed of different varieties was produced during the year 2017-18.

S. No.	Variety	Quantity (kg)	Total
1.	Super Basmati	694	Basmati 4030 kg
2.	Basmati 515	920	
3.	Punjab Basmati	762	
4.	Chenab Basmati	927	
5.	Kissan Basmati	727	
6.	IR 6	461	Coarse 1944 kg
7.	KS 282	559	
8.	KSK 133	498	
9.	KSK 434	426	
10.	PS 2	894	Non Aromatic Fine 2129 kg
11.	PK 386	1235	

HYBRID RICE

1. **TITLE**   **EVALUATION, MAINTENANCE AND DEVELOPMENTOF CYTOPLASMIC MALE STERILE (CMS) LINES FOR HYBRID RICE BREEDING**

OBJECTIVE   To maintain genetically diverse exotic and locally bred CMS lines.

RESEARCH WORKER   Mr. Tahir Latif
Syed Sultan Ali

PROJECT DURATION   2018-19 (Continuous)

LOCATION   Kala Shah Kaku

PLAN OF WORK   12CMS lines with their respective maintainers

     Plot size   2.25 m x 0.45 m

     Fertilizer   170-100-62 NPK (kg/ha)

PREVIOUS YEAR'S RESULTS   Twelve (12) CMS lines and their respective maintainers were evaluated and maintained for agronomic and floral traits. At maturity the seed of 'A' and 'B' lines were collected.

Table 1: Characteristics of most promising CMS lines 2017-18

S.No.	Designation	Type	Pl. height (cm)	Tillers / plant	Maturity days	Out crossing rate (%)
1	**KSK1601A**	**Basmati**	120	22	105	32
2	**KSK1403A**	**Basmati**	69	15	85	25
3	**KSK1301A**	**Fine**	77	20	93	30
4	KSK1302A	Coarse	78	23	79	38
5	KSK1308A	Coarse	68	16	85	46
6	KSK1310A	Coarse	76	19	95	29
7	KSK1314A	Coarse	78	16	92	29
8	KSK1315A	Coarse	82	14	89	31
9	KSK1317A	Coarse	75	16	85	30
10	KSK1319A	Coarse	78	12	90	36
11	**KSK1501A**	**Coarse**	100	12	96	30
12	**KSK1502A**	**Coarse**	82	18	98	27

2. **TITLE**   **SOURCE NURSERY FOR HYBRID RICE DEVELOPMENT**

OBJECTIVE   To evaluate the genotypes of diverse genetic origin for making test crosses with the best available CMS lines.

RESEARCH WORKER   Mr. Tahir Latif
Ms. Misbah Riaz

PROJECT DURATION   2018-19 (Continuous)

LOCATION   Kala Shah Kaku

PLAN OF WORK	Source Nursery:	80 Genotypes / lines	
	Transplanting dates		25/6 & 10/7
	Fertilizer		170-100-62 NPK (kg/ha)

PREVIOUS YEAR'S RESULT	One Hundred seventy one (171) fresh testcrosses were attempted by crossing CMS lines with elite parental lines. One hundred fifty six(156) successful fresh test crosses were harvested.
	Forty genotypes of source nursery were subjected to molecular testing for fertility restoring genes (Rf3). Twenty three genotypes were confirmed for Rf3 gene.

3. **TITLE**   **TEST CROSS AND BACK CROSS NURSERY FOR HYBRID RICE DEVELOPMENT**

OBJECTIVE	To identify maintainers & restorers and to select heterotic rice hybrids.
	To transfer CMS system into nuclear background of elite maintainer lines.

RESEARCH WORKER	Ms. Misbah Riaz
	Mr. Tahir Latif

PROJECT DURATION	2018-19 (Continuous)

LOCATION	Kala Shah Kaku

PLAN OF WORK	Fresh testcrosses:	156 alongwith their respective male parents.			
	Back crosses:	25 alongwith their respective male parents.			
		BC1 = 9		BC2 =	3
		BC3 = 1		BC4 =	5
		BC5 = 6		BC6 =	1
	Transplanting dates	25/6 & 10/7			
	Fertilizer	170-100-62 NPK (kg/ha)			

PREVIOUS YEAR'S RESULTS	• Fifty two (52) testcrosses were studied. Nine (9) maintainers and ten (10) restorers were identified.
	• All the maintainers were backcrossed with the recurrent parent.
	• Thirty four (34) backcrosses were studied viz; BC1 (10), BC2 (5), BC3 (10), BC4 (6), BC5 (01) and BC6 (02).
	• Sixteen (16) desirable BCs were again back crossed with respective recurrent parent.
	• One new CMS line **KSK1701A** has been developed in Basmati background.
	• Two coarse test hybrids **(KSK 81H and KSK 91H)** were developed yielding more than 10 t/ha are in evaluation process.

4. **TITLE**   **DEVELOPMENT OF DESIREABLE PARENTAL LINES**

OBJECTIVE	To transfer resistant genes in parental lines for the development of hybrids.

RESEARCH WORKER	Mr. Tahir Latif
	Syed Sultan Ali
	Ms. Misbah Riaz

PROJECT DURATION	2018-19

LOCATION	Kala Shah Kaku					
PLAN OF WORK	**Total entries**		**=**		**440**	
	F1 (B x B)	=	17	F1 (R X R)	=	03
	F2 (A x R)	=	60	F3 (A x R)	=	50
	F4 (A x R)	=	13	F5 (A x R)	=	18
	Targeted Back crosses	=	37			
	Uniform Lines		=	76		
	Single plants		=	47		
	Single panicles		=	119		

	Plot size	2.45 m x 0.45 m
	Fertilizer	170-100-62 (NPK Kg/ha)

PREVIOUS YEAR'S RESULTS

- Five hundred and eighty one (581) lines from AxR crosses of F2 to F5, eighty (80) single plants and thirty nine (39) HRDC selected lines along with one check were studied in the field.
- At maturity two hundred and sixty (260) single panicles were selected on field performance basis for further evaluation in subsequent generations.
- Seventy-six (76) uniform lines were selected for evaluation in non-replicated yield trial.
- Forty seven (47) single plants were also selected for further evaluation.

5. TITLE

DEVELOPMENT OF PARENTAL LINES RESISTANT TO BLB, SUBMERGENCE AND SALINITY USING MAS APPROACH

OBJECTIVE To develop new parental lines carrying resistant genes and to transfer resistant genes in potential parental lines for the development of hybrids

RESEARCH WORKER Syed Sultan Ali
Dr. Aysha Bibi

PROJECT DURATION 2018-19 (Continuous)

LOCATION Kala Shah Kaku

PLAN OF WORK 30 new targeted crosses will be attempted and 16 test crosses will be studied (Submergence=3, BLB=9, Salinity= 4).
21 Backcrosses will be studied (Submergence =8, BLB =7, Salinity =6).

Molecular and field screening of these targeted crosses will also be done.

	Plot Size	2.45 m x 0.45 m
	Fertilizer	170-100-62 (NPK Kg/ha)

PREVIOUS YEAR RESULTS Thirty two (32) crosses were attempted and out of these sixteen (16) successful crosses were harvested for further evaluation. (Salinity = 4, BLB = 9, Submergence = 3)
Twenty one (21) back crosses were also attempted for the gene transfer of Submergence (8) Salinity (6) and BLB (7).

6. TITLE **EVALUATION OF NEW RICE HYBRIDS**

OBJECTIVE To find out most promising heterotic hybrids.

RESEARCH WORKER	Mr. Muhammad Iqbal Syed Sultan Ali	
PROJECT DURATION	2018-19	
LOCATION	Kala Shah Kaku	
PLAN OF WORK	Entries	16 (14 test hybrids & 2 checks)
	Plot size	4.5m x 1.80m
	Fertilizer	170-100-62 NPK (kg/ha)

PREVIOUS YEAR'S RESULTS

Thirteen (13) local hybrids were tested in non-replicated yield trials. Five (5) Basmati and three (3) coarse test hybrids out yielded the check variety KSK133.

S. No	Hybrid	Yield (t/ha)	Type	Cooking Quality
1.	KSK 140H	6.0	Fine grain	V.Good
2.	KSK 142H	5.6	Basmati	V.Good
3.	KSK 131H	4.5	Basmati	Good
4.	KSK 141H	4.5	Basmati	Good
5.	KSK 111H	4.4	Basmati	Good
6.	**Super Bas. (Chk)**	4	Basmati	V.Good
7.	KSK 132H	4	Basmati	Good
8.	KSK 134H	4	Basmati	Fair
9.	KSK 133H	3	Basmati	Fair
10.	KSK 143H	6.3	Coarse	Fair
11.	KSK 139H	6.2	Coarse	Fair
12.	KSK 118H	6.0	Coarse	Good
13.	**KSK 133 (Chk)**	5.8	Coarse	V.Good
14.	KSK 144H	5.4	Coarse	Fair
15.	KSK 138H	3.4	Coarse	Fair

7. TITLE   **SEED MULTIPLICATION OF CMS LINES**

OBJECTIVE	To produce nuclear seed of CMS and maintainer lines.
RESEARCH WORKER	Syed Sultan Ali Mr. Muhammad Iqbal
PROJECT DURATION	2018-19 (Continuous)
LOCATION	Kala Shah Kaku
PLAN OF WORK	Entries 14 (7 CMS & 7 Maintainers)

Plot size 2:10 rows ,10 m X 60 m

Fertilizer 170-100-62 NPK (kg/ha)

PREVIOUS YEAR'S RESULTS	Forty eight (48) Kg seed of CMS line KSK1301A and thirty six (36) Kg seed of KSK1317A was produced for its maintenance and seed production of rice hybrids.		

8.   TITLE   HYBRID RICE SEED PRODUCTION

OBJECTIVE	Seed production of new rice hybrids.
RESEARCH WORKER	Syed Sultan Ali Mr. Muhammad Iqbal
PROJECT DURATION	2018-19
LOCATION	Kala Shah Kaku
PLAN OF WORK	Entries 4 (KSK111H , KSK118H, KSK140H & KSK142H) Plot size 10 m x 60 m Fertilizer 170-100-62 NPK (kg/ha)
PREVIOUS YEAR'S RESULTS	Thirty Four (34) Kg seed of KSK111H and Ten Kg (10) seed of KSK118H was produced.

9.   TITLE   MULTILOCATIONAL HYBRID YIELD TRIAL

OBJECTIVE	To test the international hybrids under local conditions.
RESEARCH WORKER	Ms. Misbah Riaz Mr. Muhammad Iqbal
PROJECT DURATION	2018-19
LOCATION	Kala Shah Kaku
PLAN OF WORK	All the experimental details will be supplied by the International Rice Research Institute (IRRI) through HRDC, Philippines.
PREVIOUS YEAR'S RESULTS	Thirty-five (35) entries were received from IRRI and tested under local conditions along with check KSK118H. Eight (8) hybrids out yielded the check hybrid KSK118H (6.3 t/ha).

S.No	HRDC No.	Plant Height (cm)	No. of tillers	Panicle length	Yield (ton/ha)	Cooking Quality
1	HRDC 1712	111	18	30	8.0	V.Good
2	HRDC 1713	112	16	26	7.4	V.Good
3	HRDC 1728	128	19	30	7.2	Poor
4	HRDC 1701	121	19	33	7.0	Fair
5	HRDC 1716	120	15	29	6.9	V.Good
6	HRDC 1714	112	16	26	6.7	V.Good
7	HRDC 1709	123	15	27	6.5	Poor
8	HRDC 1707	121	16	28	6.4	Good

9	KSK 118 H	121	21	28	6.3	Good
10	HRDC 1710	111	19	25	6.2	Fair
11	HRDC 1711	136	22	31	6.2	V.Good
12	HRDC 1715	133	22	33	6.2	V.Good
13	HRDC 1733	125	17	29	5.9	Fair
14	HRDC 1721	115	16	28	5.6	Fair
15	HRDC 1703	107	24	27	5.5	Fair
16	HRDC 1726	120	18	27	5.2	
17	HRDC 1729	118	17	31	5.2	
18	HRDC 1738	105	20	30	5.1	
19	HRDC 1702	107	18	32	5.0	
20	HRDC 1706	117	20	28	5.0	
21	HRDC 1708	134	12	29	5.0	
22	HRDC 1725	129	13	26	4.7	
23	HRDC 1739	108	22	37	4.6	
24	HRDC 1720	115	18	28	4.5	
25	HRDC 1735	110	15	15	4.5	
26	HRDC 1736	104	20	29	4.5	
27	HRDC 1705	132	14.	28	4.4	
28	HRDC 1717	116	19	26	4.2	
29	HRDC 1718	144	21	31	4.2	
30	HRDC 1732	133	17	29	4.2	
31	HRDC 1704	126	15	28	4.1	
32	HRDC 1722	117	16	28	3.9	
33	HRDC 1727	118	18	29	3.9	
34	HRDC 1734	102	15	26	3.6	

| 35 | HRDC 1740 | 104 | 28 | 30 | 2.9 | |
| 36 | HRDC 1719 | 106 | 15 | 31 | 0.0 | |

10. **TITLE**   **ADAPTABILITY TRIALS ON RICE HYBRIDS**

OBJECTIVE   To test the exotic hybrids under local conditions.

RESEARCH WORKER   Syed Sultan Ali
Mr. Muhammad Iqbal
Ms. Misbah Riaz

PROJECT DURATION   2018-19

LOCATION   Kala Shah Kaku

PLAN OF WORK   All the experimental details will be supplied by the National Agricultural Research Council, Islamabad.

TREATMENTS   The seed of the test materials (Hybrids) will be received from the National Agricultural Research Council, Islamabad.

PREVIOUS YEAR'S RESULTS   Eighty two (82) hybrids were tested in three replications. Data regarding maturity days, plant height, productive tillers, panicle length, yield t/ha were recorded.

S.No	Designation	Plant Height (cm)	No of tillers	Panicle length (cm)	Yield (Ton/ha)
1	17008	118	11	23	8.8
2	17006	119	15	24	8.2
3	17022	119	11	26	8.2
4	17002	123	12	23	7.9
5	17019	124	11	26	7.8
6	17017	105	18	25	7.4
7	17020	120	11	24	7.4
8	17045	115	13	28	7.3
9	17004	115	11	29	7.2
10	17010	117	12	28	7.2
11	17041	118	13	25	7.2

12	17055	113	10	22	7.2
13	17075	106	12	26	7.2
14	17007	117	14	23	7.1
15	17048	117	11	22	7.1
16	17054	117	9	23	7.1
17	17005	118	9	26	7.0
18	17052	111	8	25	6.8
19	17001	120	11	25	6.7
20	17009	120	12	23	6.7
21	17011	123	11	24	6.7
22	17018	122	12	29	6.7
23	17021	119	14	28	6.7
24	17047	116	10	26	6.7
25	17072	113	11	28	6.7
26	17016	126	10	25	6.6
27	17070	111	11	23	6.6
28	17083	128	20	30	6.5
29	17056	110	8	25	6.5
30	17058	121	10	25	6.5
31	17067	100	12	25	6.5
32	17042	115	16	26	6.4
33	17053	106	9	23	6.4
34	17077	109	15	26	6.4
35	17028	105	12	21	6.3
36	17073	105	10	24	6.3
37	17037	117	11	23	6.2

38	17029	103	12	24	6.1
39	17065	112	10	26	6.1
40	17074	106	11	28	6.1
41	17015	112	18	27	6.0
42	17036	113	11	23	6.0
43	17039	119	16	29	6.0
44	17051	110	9	26	6.0
45	17064	101	13	24	6.0
46	17044	119	10	25	5.9
47	17049	114	15	26	5.9
48	17066	114	13	24	5.9
49	17035	116	11	23	5.8
50	17038	110	10	22	5.8
51	17061	114	9	27	5.8
52	17012	115	12	25	5.6
53	17024	118	15	22	5.6
54	17046	115	9	25	5.5
55	17063	102	14	27	5.5
56	17071	99	14	23	5.5
57	17043	118	16	26	5.4
58	17003	103	11	26	5.3
59	17014	128	19	29	5.3
60	17025	95	11	23	5.3
61	17026	102	11	23	5.3
62	17040	125	13	25	5.3
63	17050	108	10	24	5.3

64	17031	121	10	22	5.2
65	17057	106	11	23	5.1
66	17078	109	9	26	5.1
67	17023	110	14	24	5.0
68	17081	96	11	24	5.0
69	17069	111	10	27	4.8
70	17013	128	20	30	4.7
71	17027	104	13	22	4.7
72	17059	105	9	23	4.7
73	17068	109	14	25	4.7
74	17076	105	13	25	4.7
75	17030	103	12	24	4.6
76	17032	126	12	24	4.6
77	17033	116	14	23	4.6
78	17082	91	10	22	4.5
79	17060	116	12	24	4.4
80	17034	116	12	24	4.3
81	17079	97	16	26	4.1
82	17080	110	13	26	4.1
83	17062	87	10	23	3.2

AGRONOMY

1. TITLE   **DEMONSTRATION OF INNOVATIVE TECHNOLOGIES AT 20 SITES IN 5 DISTRICTS OF RICE GROWING AREA OF PUNJAB**

OBJECTIVE   To demonstrate and popularise the innovative technologies such as

- ➢ Use of certified seed
- ➢ Resource saving rice production technology (DSR) to save labour, water and energy
- ➢ New post-emergence herbicide

at farmers' fields in 5 districts (Gujranwala, Sheikhupura, Narowal, Sialkot, and Hafizabad) of traditional rice growing area of Punjab.

RESEARCH WORKERS   Mr. Muhammad Usman Saleem
Dr. Tahir Hussain Awan
Mr. Shawaiz Iqbal

PROJECT DURATION   2018-19

PLAN OF WORK   Demonstrations will be done at 40 sites (20 previous + 20 new selected) at farmers' fields in 5 districts (Gujranwala, Sheikhupura, Narowal, Sialkot, and Hafizabad) of traditional rice growing area of Punjab.

PREVIOUS YEAR RESULTS:

Table-1: Yield of DSR Demonstration plots at 20 sites in 5 districts of rice growing area of Punjab

Sr. No.	Name of Farmer	Contact No.	Village	Tehsil	District	DSR Yield monds/acre	Transplanted yield monds/acre
1	Nawabzada Riffat Ali Khan	0300-8484100	Ugochak	Daska,	Sialkot	35	31
2	M. Afzal Bajwa s/o Muhammad Khan	0300-7115611	Chak Ishaq	Pasrur	Sialkot	46	35
3	Ch. Sajjad S/O Haji Azhar	0342-8401019	Manga Qadeem	Pasrur	Sialkot	49	37
4	Baba Rahm Din	0341-6829546	Sokanwind	Pasrur	Sialkot	27	35
5	Ejaz Ahmad	0333-8277291	Gakharwali	Pasrur	Sialkot	60	45
6	Riffat Mehmood	0333-8876050	Mangian	Narowal	Narowal	58	40
7	Haji Gulzar Ahmad	0345-4518933	Panj Hatha	Hafizabad	Hafizabad	44	50
8	Abid Hussain Dogar	0301-4348199	Pooran Pur	Gujranwala	Gujranwala	40	33
9	Mazhar Cheema	0302-5555646	Budha Rajadha	Wazirabad	Gujranwala	50	45
10	Ghulam Abbas	0336-7796888	RakhBharo kay	Wazirabad	Gujranwala	42	38
11	Ikhlaq Ahmad S/O imtiaz Ahmad	0334-4500623	New Ghania Kalan	Kamoki	Gujranwala	38	35
12	Malik Azhar Awan	0343-4535601	Chak Ramdas	Kamoki	Gujranwala	40	32
13	Shahid khan	0331-7860544	Kot Harry Chand	Kamoki	Gujranwala	37	34
14	Ch Zulifiqar ahmad Sehol	0321-8475588	Hardo Sehol Muslim	Muridkay	Sheikhupra	35-64	35
15	Muhammad Afzal	0343-4491801	Roranwala Dera	Muridkay	Sheikhupra	45	36
16	Salman Raja	0300-8436110	Islam Pura	Muridkay	Sheikhupra	25	40
17	Rana Saleem	0301-8645802	Gorian, Sidhanwali	Ferozwala	Sheikhupra	38	32
18	Muhammad Hussain	0345-4663216	Kot Hadayat Ali	Ferozwala	Sheikhupra	38	28
19	Muhammad Imran	0345-4478852	Manawala,	Narang Mandi	Sheikhupra	45	38
20	Bilal Ahmad	0340-4108425	Loharian	Ferozwala	Sheikhupra	31	25

DSR Demonstration Plots at Different Farmers Fields:

Ugochak	*Manga Qadeem*	*Qilla Manawala*
Kot Harry Chand Kamoki	*Ghakarwali*	*Chak Ramdas*
Chak Ishaq	*Budha Rajadah*	*Sokin wind*
Rakh Barokay	*Purn Pur Kamoki*	*Village Panj Hatha*

Farmers Training Programme:
Training of farmers and master trainers

- ➢ Farmers trained = 500
- ➢ Master trainers = 100

Farmer Training at Sidhanwali	*Farmer Training at Roranwala Dera, Narang*	*Farmer Training at Manga Qadeem*
Farmer Training at Manga Qadeem	*Farmer training at Village Purn Pur*	*Farmer Training at Kamoki*
Farmer Training at Hardo Sehol Muslim	*Farmer Training at Wazirabad*	*Farmer Training at Wazirabad*

Figure: Pics of Training of farmers and master trainers

2.	**TITLE**	**EFFECT OF TIME OF NITROGEN APPLICATION ON EFFICACY OF DIFFERENT POST-EMERGENCE HERBICIDES IN DRY SEEDED RICE SYSTEMS**

OBJECTIVE

To study the effect of time of Nitrogen on the efficacy of Post-emergence herbicides and to find out most appropriate herbicides to control weeds flora along with three noxious weed of rice i.e *Dactyloctenium aegyptium, Eragrostis japonica* and *Leptochloa chinensis.*

RESEARCH WORKERS

Dr. Tahir Hussain Awan
Mr. Shawaiz Iqbal

PROJECT DURATION

2018-19

PLAN OF WORK

Treatments:

Factor 1= Nitrogen application
N1 = 57 kg N /ha applied at 20 DAS or 5 days before spray (remaining 53 kg will be applied at 50-55 DAS)
N2 = No N applied before spray (110 kg N will be applied at 35 and 50-55 DAS)

Factor 2 = Herbicides
H_1: Pendimehalin at 1DAS + Erazer at 25 DAS.
H_2: Pendimehalin at 1DAS + Metamifop at 25 DAS
H_3: Pendimehalin at 1DAS + fenoxaprop-p-ethyl at 25 DAS.
H_4: Erazer at 25 DAS
H_5: Metamifop at 25 DAS
H_6: fenoxaprop-p-ethyl at 25 DAS.
H_7: Weed free
H_8: Control (No weedicides).

(Erazer = Fenoxaprop-p-ethyl+ Ethoxyxulfuron + Isoxadifen-ethyl)

Layout	:	RCBD with split plot
Repeat	:	3
Plot size	:	8m x 15m
Fertilizer	:	133-85-62 NPK Kg/ha
Methodology :		Sowing of Super Basmati with DSR drill will be made in 1st week of June. Applying one bag of DAP and ½ bag of Potash will applied as a basal dose. All other agronomic and crop management practices will be kept standard. Recommended doses of pre and post-emergence herbicides will be applied as per schedule. Data on rice plant population, weed density and weed biomass m^{-2} of different weed species after herbicide application, toxicity of herbicides, number of fertile tillers m^{-2}, plant height, number of grains per panicle, 1000- grain weight and grain yield will be recorded.

PREVIOUS YEAR'S RESULTS

First year of the experiment

Results of Previous of Experiment

Table-2: Effect of different post-emergence herbicides on percent weed control and grain yield of basmati rice

Treatments	1000 grain Wt.	Yield (t/ha)	% Weed control
Bis + Ben + Fenoxa	20.97ab	3.74 b	77
NewCh	23.19a	5.13 a	85
Pyranax gold + Sunstar	18.46b	1.81 d	55
Puma-super + Sunstar	20.56ab	2.82 c	70
Puma-super	0	0	30
Pyranax gold	0	0	25
Bis+Bin+Clodinofop	0	0	10
Control	0	0	0
LSD	2.8123	7.606	

Table-3: Post-emergnce herbicide sprayed at different leave stages of Ghora grass) Leptochloa chinensis

	Plant survived			Weed BM			
	Leave stages						
	2 to 4	5 to 6	6 to 10	2 to 4	5 to 6	6 to 10	Rice
Fenoxaprop-p-ethyl + Ethoxyxulfuron + Isoxadifen-ethyl	0	0	1			10	33
Bis+Ben+Fenoxaprop	0	2	2		4	13	33
Fenoxaprop-p-ethyl	1	1	2	2	5	14	17
Bis+Ben+Clodinofop	2	5	13	14	42	125	27
Bispyribac sodium + Bensulfuron	5	7	10	11	32	97	31
Ethoxysulfuron+triamon	15	15	15	16	48	143	12
Control	19	18	18	21	62	185	8

Table-4: Post-emergnce herbicide sprayed at different leave stages of (Madhana) *Dactyloctenium Aegyptium,*

	Plant survived			Weed BM			
	Leave stage						
	2 to 4	5 to 6	6 to 10	2 to 4	5 to 6	6 to 10	Rice
Fenoxaprop-p-ethyl + Ethoxyxulfuron + Isoxadifen-ethyl	1	1	2	1	3	8	46
Bis+Ben+Fenoxaprop	1	2	2	1	4	12	49
Fenoxaprop-p-ethyl	0	1	3	0	5	15	24
Bis+Ben+Clodinofop	5	3	11	5	16	49	31
Bispyribac sodium + Bensulfuron	6	5	17	10	29	86	24
Ethoxysulfuron+triamon	13	13	18	15	45	136	11
Control	18	17	19	20	61	183	9

3. **TITLE**   **SCREENING OF PRE-EMERGENCE HERBICIDES TO CONTROL WEEDS IN TRANSPLANTED RICE**

OBJECTIVE   To select suitable pre-emergence herbicides for effective weed control in transplanted rice.

RESEARCH WORKERS   Ms. Adila Iram
Mr. Muhammad Usman Saleem
Dr. Tahir Hussain Awan

PROJECT DURATION   2018-19

LOCATION   Kala Shah Kaku

PLAN OF WORK

Treatments   : T_1: Council Active (Triafamone 10%+ Ethoxy sulfurone methyl 20%)
T_2: Kelion (Orthoxysulfomuron).
T_3: Topstar (Oxadyragel)
T_4: New Chemical (Oxaziclomefone 1% EC)
T_5: Rifit (Pretilachlor)
T_6: Control

Layout   :   RCBD
Repeat   :   3
Plot size   :   6m × 4m
Fertilizer   :   133-85-62 NPK Kg/ ha
Methodology :   To evaluate the effect of herbicides on weeds in transplanted rice pre-emergence herbicides will be sprayed after 4 days of transplanting. Standard crop management practices will be adopted. Data of weeds, 100% flowering, plant height, productive tillers/plant, grains per panicle,1000-grain weight and paddy yield will be recorded.

PREVIOUS YEAR'S RESULTS

Table-5: Effect of different pre-emergence herbicides on percent (%) weed control and grain yield of rice

Treatments	No. of weeds/m^2	Percent(%) Control	Paddy yield (t/ha)
Council Active	6.5	80	3.47
Kelion	13.4	59	3.21
Control	32.5	-	1.73
LSD	**7.536**	**-**	**0.718**

4.	**TITLE**	**EFFECT OF METHOD AND TIME OF APPLICATION OF DIFFERENT PRE- AND EARLY POST-EMERGENCE HERBICIDES ON WEEDS ESPECIALLY *ERAGROSTIS JAPONICA, DACTYLOCTENIUM AEGYPTIUM,* AND *LEPTOCHLOA CHINENSIS***
	OBJECTIVE	To find out the appropriate herbicides, their method and time of application to control weeds especially three noxious weed of DSR i.e *Eragrostis japonica, Dactyloctenium aegyptium,* and *Leptochloa chinensis,* without effecting rice germination and causing phytotoxicity to rice seedlings.
	RESEARCH WORKERS	Dr. Tahir Hussain Awan Muhammad Usman Saleem
	PROJECT DURATION	2018-19
	LOCATION	Kala Shah Kaku

PLAN OF WORK

Treatments :   **Factor 1**: Herbicides
H_1: Pendimethalin (Stomp 330 EC).
H_2: New chemical (Council active)
H_3: New chemical (Oxaziclomefone 1%EC)
$H_{4:}$ Pretilachlor.
$H_{5:}$ Control.
Factor 2: Time and method of application
TM_1: 0 DAS with shaker bottle
TM_2: 1 DAS with knapsack sprayer
TM_3: 5 DAS with knapsack sprayer
TM_4: 10 DAS with knapsack sprayer
TM_5: 15 DAS with knapsack sprayer

Layout   :   RCBD with split plot
Repeat   :   3
Methodology :   After sowing the rice with DSR drill, immediately irrigation will be applied and in the standing water all herbicides will be applied with shaker bottle. All other herbicide application at 1 (24 hours after 1st irrigation)., 5, 10, and 15 DAS will be done with knapsack sprayer.
Weed and rice seedling emergence will be counted at 15 DAS for TM 1, 2, and 3 and their biomass will be determined. For TM 4 and 5, weed and rice count and biomass will be determined at 15 days after herbicide application, with the criterion being the appearance of a new leaf. Plants will be oven-dried at 70°C for constant biomass determination.

PREVIOUS YEAR'S RESULTS

First year of the experiment

5. **TITLE** **EFFECT OF SEED BURIAL DEPTH ON THE EMERGENCE AND BIOMASS PRODUCTION OF THREE IMPORTANT WEEDS OF RICE i.e.** ***DACTYLOCTENIUM AEGYPTIUM, ERAGROSTIS JAPONICA, ECHINOCHLOA CRUSGALLI,* AND *LEPTOCHLOA CHINENSIS*.**

OBJECTIVE Appropriate cultural practices can be adopted to control the noxious weeds of rice after finding out the effect of soil seed burial depth on the emergence and biomass production of *Dactyloctenium aegyptium, Eragrostis japonica, Echinochloa crusgalli*, and *Leptochloa chinensis.*

RESEARCH WORKERS Dr. Tahir Hussain Awan
Ms. Adila Iram

PROJECT DURATION 2018-19

LOCATION Kala Shah Kaku

PLAN OF WORK

Treatments :

Treatments	Seed burial depth
T_1	0 cm
T_2	2 cm
T_3	4 cm
T_4	6 cm
T_5	8 cm

Layout : CRD (glass/screen house experiment)
Repeat : 4
Methodology : In a greenhouse, fifty seeds of each weed species will be covered with soil to the depths of 2, 4, 6, and 8 cm or placed on the soil surface in plastic pots (15 cm in diameter). The soil will be analysed for physio-chemical properties. Soil used for this experiment will be collected from rice fields, and passed through a 3-mm sieve. Pots will be watered initially with an overhead mist sprinkler and later sub-irrigated. Plants will be watered throughout the study as needed to maintain the optimal moisture level for seed germination. Seedlings will be considered emerged when a cotyledon will be visible on the soil surface. Emergence will be counted at 3-day intervals up to 30 days after sowing (DAS). Emerged seedlings will be counted and harvested at 30 DAS. After harvesting, sample plants will be oven-dried at 70°C for 72hrs to obtain dry biomass. After oven-drying, the biomass of plants will be measured.

PREVIOUS YEAR'S RESULTS First year of the experiment

6. TITLE   **EFFECT OF CROP RESIDUE QUANTITY ON EMERGENCE AND BIOMASS OF WEEDS i.e.** ***DACTYLOCTENIUM AEGYPTIUM, ERAGROSTIS JAPONICA, ECHINOCHLOA CRUSGALLI*, AND *LEPTOCHLOA CHINENSIS*.**

OBJECTIVE   Cultural practices can be adopted to control the noxious weeds of rice after finding out the effect of crop residue on the emergence and biomass production of four important weeds of rice such as *Dactyloctenium aegyptium, Eragrostis japonica, Echinochloa crusgalli*, and *Leptochloa chinensis.*.

RESEARCH WORKERS   Dr. Tahir Hussain Awan
Ms. Adila Iram

PROJECT DURATION   2018-19

LOCATION   Kala Shah Kaku

PLAN OF WORK

Treatments :

Treatments	Wheat straw
T_1	0 t ha^{-1}
T_2	1 t ha^{-1}
T_3	2 t ha^{-1}
T_4	4 t ha^{-1}
T_5	6 t ha^{-1}

Layout   :   RCBD (glass/screen house experiment)
Repeat   :   4
Methodology :   Fifty seeds of all testes weed species will be sown on the soil surface in plastic pots. Wheat straw/residue (leaves and stems) will be spread on the soil surface at rates equivalent to 0, 1, 2, 4, and 6 t ha^{-1}. The amounts of rice straw used in this study reflect the amount of straw produced in low-yield rainfed environments and high-yield irrigated environments. The condition of the soil and the pots, emergence counting, and harvesting in this experiment will be done as described above for the seed burial experiment.

PREVIOUS YEAR'S RESULTS   First year of the experiment

7. **TITLE** **EXPLORING OPTIONS FOR RESIDUE MANAGMENTS AND ITS IMPACT ON WEED DYNAMICS IN RICE-WHEAT CROPPING SYSTEM**

OBJECTIVE To find out suitable techniques for crop residue incorporation into soil to safeguard the environment and for crop productivity enhancement

RESEARCH WORKERS Dr. Nadeem Iqbal Mr. Mudassar Ali

Dr. Tahir Hussain Awan, Mr. Shawaiz Iqbal

PROJECT DURATION 2018-19

LOCATION Kala Shah Kaku

PLAN OF WORK :

Main Plots:

Treatments	Residue management	Tillage	Planting method
T_1:	FR	Mulcher + Discing + Cultivator + Planking	DSR
T_2:	FR	Mulcher + Discing + Cultivator + Planking	TR
T_3:	FR	Mulcher + Cultivator + Planking	DSR
T_4:	FR	Mulcher + Cultivator + Planking	TR
T_5:	FR	Mulcher + Rotavator	TR
T_6:	FR	Mulcher + Rotavator	DSR
T_5:	FR	Happy Seeder	ZT DSR
T_6:	B	Cultivator+ Planking	TR

FR: Full retention B: Burning ZT: Zero tillage
DSR: Direct seeded rice TR: Transplanted rice

Sub plots
W1: weedy (no weeding)
W2: Weed free (control weeds by chemicals or hand weeding)
W3: Pre+ Post emergence herbicide
W4: Post emergence herbicide

Layout : RCBD with split plot arrangement
Repeat : 3
Plot size 14m x 5m
Fertilizer : Recommended dose
Methodology: Pre sowing and post harvesting soil analysis will be done. Standard crop management practices will be adopted. Data on weeds, various phenological and agronomic traits will be recorded. Economics of cultivation and cost benefit ratio will be calculated.

PREVIOUS YEAR'S RESULTS First Year

8.	**TITLE**	**EFFECT OF TRANSPLANTING DATES ON YIELD OF FINE GRAIN RICE LINES / VARIETIES**
	OBJECTIVE	To find out the optimum period of transplanting of fine grain lines/varieties for getting maximum paddy yield and quality rice.
	RESEARCH WORKERS	Mr. Usama Bin Khalid Ms. Neelum Shahzadi
	PROJECT DURATION	2018-19 (Continuous)
	LOCATION	Kala Shah Kaku

PLAN OF WORK

No of Entries : 8 lines (Provided by Breeding Section RRI)

Treatments : 4 Viz; 1st June, 23rd June, 14th July and 5th August
(Dates of transplanting)

Layout : RCBD (Factorial)

Repeat : 3

Plot size : 6.75m x2.25m

Fertilizer : 133-85-62 NPK Kg/ ha

Methodology : Standard crop management practices will be adopted. Data on plant height, 50% flowering, lodging, maturity, harvesting date, productive tillers/plant, grains per panicle, 1000-grain weight and paddy yield will be recorded. Quality will be determined by the Technology Section of this institute

PREVIOUS YEAR'S RESULTS

Table-6: Effect of transplanting dates on the yield of fine grain rice lines / varieties

Lines/ varieties	D1 01.06.17	D2 23.06.17	D3 14.07.17	D4 05.08.17	Average
Pk 9194	3.94	4.36	4.23	2.84	**3.84**
Pk BB 15-1	3.14	4.21	4.24	2.85	**3.61**
Pk BB 15-6	3.71	5.57	6.01	2.44	**4.43**
Pk PB 8	3.35	3.92	3.73	2.72	**3.43**
Pk 8892-4-2-1-1	3.51	3.84	3.66	2.86	**3.47**
RRI 3	3.97	4.92	4.91	3.16	**4.24**
BAS 515	4.46	5.11	5.40	3.24	**4.55**
PS2	4.25	4.68	4.76	2.59	**4.07**
Average	**4.245**	**4.439**	**4.214**	**2.838**	

LSD (Varieties)= 0.2684, LSD (Dates)= 0.1898, LSD (DxV)= 0.5368

9. **TITLE** **EFFECT OF TRANSPLANTING DATES ON THE YIELD OF COARSE GRAIN RICE LINES/ VARIETIES**

OBJECTIVE To find out the optimum period of transplanting of coarse grain rice varieties / lines for getting maximum paddy yield.

RESEARCH WORKERS Mr. Shawaiz Iqbal

PROJECT DURATION 2018-19 (Continuous)

LOCATION Kala Shah Kaku

PLAN OF WORK

No of Entries : 8 lines (Provided by the Breeding Section RRI)

Treatments : (Dates of transplanting) 4 dates viz; 5th May, 27th May, 18th June and 10th July

Layout : RCBD (Factorial)
Repeat : 3
Plot size : 6.75m x2.25m
Fertilizer : 170-100-62 NPK Kg/ ha
Methodology : Standard crop management practices will be adopted. Data on plant height, 50% flowering, lodging, maturity, harvesting date, productive tillers/plant, grains per panicle, 1000-grain weight and paddy yield will be recorded. Quality will be determined by the Technology Section of this institute

PREVIOUS YEAR'S RESULTS

Table-7: Effect of transplanting dates on the yield of coarse grain rice lines/ varieties

Line/variety	D1 05.05.2017	D2 27.05.2017	D3 18.06.2017	D4 10.07.2017	Mean (Lines)
KSK-133	6.08	7.20	6.21	4.01	**6.08**
KSK-434	6.48	7.30	6.67	5.35	**6.48**
KSK-476	5.94	6.60	7.72	5.39	**5.94**
KSK-480	6.71	7.56	7.04	5.62	**6.71**
KSK-481	4.25	4.78	4.87	3.56	**4.25**
PK-9259-4-1-1-1	5.20	5.88	5.74	3.86	**5.20**
PK-9379-45-1-4-1-1	4.06	4.80	4.92	3.76	**4.06**
PK-7688-1-1-3-2	5.55	4.88	5.32	4.02	**5.55**
Mean (Dates)	**5.53**	**6.12**	**6.06**	**4.45**	**5.53**
LSD (varieties) =0.7165 ; LSD (Dates)=0.4795 ; LSD (D*V) =1.4330					

10.	**TITLE**		**EFFECT OF LONG TERM RESIDUE MANAGEMENT AND PLANTING TECHNIQUES ON PRODUCTIVITY OF RICE-WHEAT CROPPING SYSTEM**
	OBJECTIVE		To find out an appropriate tillage-residue system for productivity enhancement of rice-wheat cropping system through resource conservation.
	RESEARCH WORKERS		Dr. Nadeem Iqbal Mr. Muhammad Usman Saleem
	PROJECT DURATION		2018-19 (Continuous)
	LOCATION		Kala Shah Kaku

PLAN OF WORK

Treatments	**Kharif**	**Rabi**
T_1: TR – CT (partial burning)	TR (partial burning)	CT-wheat (partial burning)
T_2: TR – CT (incorporation)	TR(incorporation)	CT-wheat (incorporation)
T_3: DSR – ZT (partial retention)	DSR-CT(partial retention)	ZT-wheat (full retention)
T_4: TR – ZT (partial retention)	TR (partial retention)	ZT-wheat (full retention)
T_5: DSR(ZT) - ZT (full retention)	DSR-ZT(full retention)	ZT-wheat (full retention)

CT: Conventional tillage, ZT: Zero tillage, DSR: Direct seeded rice, TR: Transplanted rice

Layout : RCBD with split plot arrangement
Repeat : 3
Plot size : 14m x 5m
Fertilizer : Recommended dose
Methodology : Pre sowing and post harvesting soil analysis will be done. Standard crop management practices will be adopted. Data on weeds, various phenological and agronomic traits will be recorded. Economics of cultivation and cost benefit ratio will be calculated.

PREVIOUS YEAR'S RESULTS

Table-8: Crop yield as affected by different residue management practices

Treatments	**Wheat Yield (t/ha)**	**Paddy Yield (t/ha)**
TR – CT (partial burning)	3.10	3.57
TR – CT (incorporation)	3.31	3.02
DSR – ZT (partial retention)	4.79	4.05
TR – ZT (partial retention)	3.56	3.93
DSR(ZT) - ZT (full retention)	4.62	3.28
LSD	**0.534**	**0.640**

11. TITLE   **SITE SPECIFIC NITROGEN MANAGEMENT IN RICE TO ENHANCE THE ECONOMIC RICE PRODUCTIVITY**

OBJECTIVE   To find out proper nitrogen rate applied on the basis of leaf colour chart and Green Seeker

RESEARCH WORKERS   Mr. Shawaiz Iqbal
Dr. Nadeem Iqbal

PROJECT DURATION   2018-19

LOCATION   Kala Shah Kaku

PLAN OF WORK

Treatments : **Main Plot = Planting methods**
T_1: DSR- Direct Seeded Rice
T_2: TR- Recommended Conventional transplanting
Sub Plot= N fertilizer application
N_1 = 0 kg/ha
N_2 = LCC based Nitrogen application
N_3 = Green seeker based Nitrogen application
N_4 = Recommended dose (133 kg/ha) by three splits

Layout   :   RCBD with split plot
Variety   :   Chenab Basmati
Repeat   :   3
Plot size   :   8m x 5m
Fertilizer   :   Recommended dose P & K
Methodology   :   Pre sowing and post harvesting soil analysis will be done. Standard crop management practices will be adopted. Data on weeds and agronomic traits will be recorded. Economics of cultivation will be calculated.

PREVIOUS YEAR'S RESULTS   First year of experiment

12.	TITLE	EFFECT OF FOLIAR APPLICATION OF NITROGEN AND POTASSIUM ON THE GROWTH AND YIELD OF RICE

OBJECTIVE   To reduce input cost of N & K fertilizer without sacrificing the yield. To estimate the efficiency of foliar application of Nitrogen and Potassium for optimum yield and quality of rice.

RESEARCH WORKERS   Mr. Naeem Ahmed
Dr. Nadeem Iqbal
Dr. Tahir Hussain Awan

PROJECT DURATION   2018-19

LOCATION   Kala Shah Kaku

PLAN OF WORK

Layout	:	RCBD
Variety	:	Super Basmati
Repeat	:	3
Methodology	:	Soil samples before transplanting and after harvest of the crop will be taken for analysis. Fertilizer will be applied as per treatments. All other crop management practices will be kept uniform. Data will be recorded on agronomic traits of the crop. .

Treats.	Description	Soil Application (kg/ha)			Foliar Application @ 2% of N & K Spray
		N	P_2O_5	K_2O	
T1	Recommended Dose of NPK	133	85	62	0
T2	Recommended Dose of PK + 75% N (Soil application) + Two sprays of N @ 2%	100	85	62	1st N spray at maximum tillering & 2nd at panicle initiation
T3	Recommended Dose of PK + 50% N (Soil application) + Three sprays of N @ 2%	67	85	62	1st N spray at maximum tillering, 2nd before panicle initiation & 3rd after panicle initiation
T4	Recommended Dose of NP + 75% K (Soil application) + Two sprays of K @ 2%	133	85	47	1st K spray at maximum tillering & 2nd at Panicle initiation
T5	Recommended Dose of NP + 50% K (Soil application) + Three sprays of K (@ 2 %	133	85	31	1st K spray at maximum tillering, 2nd before panicle initiation & 3rd after panicle initiation
T6	Recommended Dose of NPK + Three sprays of simple water	133	85	62	Simple water spray at maximum tillering, 2nd before Panicle initiation & 3rd after Panicle initiation
T7	Control	0	0	0	0

13. TITLE **COMPARATIVE STUDY OF DIFFERENT STRIPS PLANTING TECHNIQUES FOR EFFECTIVE PESTICIDES SPRAY AGAINST RICE PLANT HOPPER AS TO ENHANCE RICE GRAIN YIELD**

OBJECTIVE To determine the appropriate planting geometry to obtain optimum yield and control of rice plant hopper.

RESEARCH WORKERS
Mr. Naeem Ahmed
Mr. Zafar-ullah-Shah
Dr.Nadeem Iqbal

PROJECT DURATION 2018-19

LOCATION Kala Shah Kaku

PLAN OF WORK

Layout : RCBD
Variety : Chenab Basmati
Repeat : 3
Plot size : 8.0 m x 2.74 m

Treatments	R x R distance (cm)	Path (cm)	No. of lines
T 1	22.5	22.5 (no path)	12
T 2	20.0	30.0	12
T 3	17.5	60.0	12
T 4	15.0	90.0	12

s12 Lines 22.5 cm apart	Path 90 cm	12 Lines 15 cm apart	Path 60 cm	12 Lines 17.5 cm apart	Path 30 cm	12 Lines 20.0 cm apart	12 Lines 22.5 cm apart
		T4		T3		T2	T1

Methodology : All the agronomic practices will be done and data on various agronomic aspects will be recorded by the Agronomy department. All plant protection measures for study and effective control of rice brown hopper will be noted by Entomology department.

PREVIOUS YEAR'S RESULTS First year of experiment

14.	**TITLE**	**STANDARDIZATION OF ORGANIC RICE PRODUCTION TECHNOLOGY FOR RICE-WHEAT CROPPING SYSTEM**

OBJECTIVE

❖ To produce the chemical free rice for improving human nutrition, soil health and environment and to reduce the impact of chemicals and their load on agroecosystem.

RESEARCH WORKER

Mr. Usama bin Khalid
Dr. Tahir Hussain Awan
Ms. Adila Iram

PROJECT DURATION

2018-19 (continuous)

LOCATION

Kala Shah Kaku

PLAN OF WORK

The multiple requirements of the crop will be managed by using Bio-products viz.

1.Nutrition of the crop

Organic compost, Green manuring(sesbania) and Crop residue incorporation

2 Weeds control (use of Allelopatheic chemicals)

Neem, Parthenium, Mango leaves, Eucalyptus extracts and manual weeding

3. **Insect control** (use of Bio-pesticides)

Rotenone 5%, Legend 0.5%, Achta and Tobacco

4. Diseases

Eucalyptus oil and extract etc

PREVIOUS YEAR' S RESULTS

Yield of the Organic rice (Super Basmati 0.8 t/ha)

15. **TITLE**   **PROVINCIAL COORDINATED YIELD TRIAL FOR NEWLY EVOLVED FINE GRAIN RICE VARIETIES/LINES**

OBJECTIVE   To test the performance of newly evolved coarse grain rice varieties/lines under different ecological zones.

RESEARCH WORKER   Mr. Usama bin Khalid
Ms. Neelum Shahzadi

PROJECT DURATION   2018-19(Continues)

LOCATION   Kala Shah Kaku

PLAN OF WORK

Layout	:	RCBD
Repeat	:	3
Plot size	:	7m x 2m

Methodology : Thirty days old seedlings of coarse grain rice varieties/lines will be transplanted during 2nd week of June. All other agronomic practices will be kept uniform. Data on yield and yield components will be recorded.

PREVIOUS YEAR'S RESULTS

Table -9: Yield performance of different fine grain rice lines at different locations

LINES/ VARIETIES	Gujranwala	Faisalabad	Farooqabad	Sargodha	KSK	Average (t/ha)
PK 8892-4-3-1-1	3.81	3.43	3.17	2.17	3.171	**3.15**
PK 9194	4.13	4.19	3.86	2.66	2.99	**3.57**
PK BB 15-1	3.33	3.16	2.9	1.94	3.236	**2.91**
PK BB 15-6	3.44	3.92	3.43	2.62	2.04	**3.09**
PK PB 8	3.41	3.82	3.9	2.18	4.46	**3.33**
PK 8892-4-2-1-1	3.47	3.06	3.34	1.98	2.606	**2.89**
RRI 3	3.54	4.13	3.85	2.15	4.246	**3.58**
Basmati 515	3.44	2.62	3.46	2.43	4.02	**3.02**
Average(t/ha)	**3.57**	**3.54**	**3.48**	**2.26**	**3.34**	

LSD (Lines/Varities)= 0.2711; LSD (Locations)= 0.2291LSD(L*V)= 0.6062

16. **TITLE** **PROVINCIAL COORDINATED YIELD TRIAL FOR NEWLY EVOLVED COARSE GRAIN RICE VARIETIES/LINES**

OBJECTIVE To test the performance of newly evolved fine grain rice varieties/lines under different ecological zones.

RESEARCH WORKER Mr. Shawaiz Iqbal

PROJECT DURATION 2018-19

LOCATION Kala Shah Kaku

PLAN OF WORK
Layout : RCBD
Repeat : 3
Plot size : 7m x 2m

Methodology : Thirty days old seedlings of fine grain rice varieties/lines will be transplanted during 2nd week of July. All other agronomic practices will be kept uniform. Data on yield and yield components will be recorded.

PREVIOUS YEAR'S RESULTS

Table -10: Yield performance of different coarse grain rice lines at different locations

LINES/ VARIETIES	Gujranwala	Faisalabad	Farooqabad	Sargodha	KSK	Average (t/ha)
KSK-434	6.84	6.42	6.46	3.33	4.11	**6.84**
KSK-449	6.67	5.46	5.22	3.12	3.97	**6.67**
KSK-476	6.14	5.03	6.30	3.24	4.35	**6.14**
KSK-480	5.96	6.33	6.79	3.22	4.79	**5.96**
KSK-481	7.03	6.45	7.00	3.80	4.64	**7.03**
PK-7688	5.79	4.71	5.53	3.10	3.56	**5.79**
PK-9379	5.72	6.00	6.30	3.65	3.96	**5.72**
Average(t/ha)	**6.31**	**5.77**	**6.23**	**3.35**	**4.20**	

LSD (Lines/Varities)= 0.2810; LSD (Locations)= 0.2375;LSD(L*V)= 0.6284

17. **TITLE**   **BIO–FORTIFICATION OF FINE GRAIN RICE WITH ZINC AND IRON**

OBJECTIVE   To assess the response of promising fine grain rice varieties to foliar application of Zn and Fe for bio-fortification of rice grains.

RESEARCH WORKER   Dr. Nadeem Iqbal, Mrs. Tahira Bibi (RRI,KSK).
Dr. Nadeem Iqbal & Hafiz Riaz Ahmad (RFS & STI, Lahore)

PROJECT DURATION   2018-19

LOCATION   Kala Shah Kaku

PLAN OF WORK

Treatments :   **Main-plot (Varieties)**
PK 386, Basmati 515, Super Basmati
Sub-plot (Zinc and Fe Application)
Control (no foliar application)
Foliar application of Zn @ 0.1 % and Fe @ 0.2% solution spray at milking and dough stages.

Layout :   Split Plot Design with four replications

Fertilizer :   133-85-62 NPK Kg/ ha

Methodology :   Soil samples before transplanting and after harvest of the crop will be taken for analysis. Fertilizer will be applied as per treatments. All other crop management practices will be kept uniform. Plant samples will be collected for grain analysis for zinc and iron.

PREVIOUS YEAR'S RESULTS

Table-11: Effect of foliar application of Zn and Fe on rice grain contents

Treatment	Variety	Foliar Application	Grain contents in polished rice (ppm)	
			Zn	Fe
T1	PK 386	No foliar application	13.6	7.6
T2	PK 386	Foliar application of Zn & Fe	16.9	9.7
T3	Basmati 515	No foliar application	13.3	12.7
T4	Basmati 515	Foliar application of Zn & Fe	15.9	14.1
T5	Super Basmati	No foliar application	14.0	10.9
T6	Super Basmati	Foliar application of Zn & Fe	18.6	13.9

18. TITLE   **BIO–FORTIFICATION OF COARSE GRAIN RICE WITH ZINC AND IRON**

OBJECTIVE   To assess the response of promising coarse grain rice varieties to foliar application of Zn and Fe for bio-fortification of rice grains.

RESEARCH WORKER   Dr. Nadeem Iqbal, Mrs. Tahira Bibi (RRI,KSK)
Dr. Nadeem Iqbal & Hafiz Riaz Ahmad (RFS & STI, Lahore)

PROJECT DURATION   2018-19

LOCATION   Kala Shah Kaku

PLAN OF WORK   Treatments : **Main-plot (Varieties)**
KS 282, KSK 133, KSK 434
Sub-plot (Zinc and Fe Application)
Control (no foliar application)
Foliar application of Zn @ 0.1 % and Fe @ 0.2% solution spray at milking and dough stages.
Layout   : Split Plot Design with four replications
Fertilizer   : 133-85-62 NPK Kg/ ha
Methodology : Soil samples before transplanting and after harvest of the crop will be taken for analysis. Fertilizer will be applied as per treatments. All other crop management practices will be kept uniform. Plant samples will be collected for grain analysis for zinc and iron.

PREVIOUS YEAR'S RESULTS

Table-12: Effect of foliar application of Zn and Fe on rice grain contents

Treatment	Variety	Foliar Application	Grain contents in polished rice (ppm)	
			Zn	**Fe**
T1	KS 282	No foliar application	19.1	11.0
T2	KS 282	Foliar application of Zn & Fe	26.8	13.9
T3	KSK 133	No foliar application	17.5	12.2
T4	KSK 133	Foliar application of Zn & Fe	17.7	15.0
T5	KSK 434	No foliar application	18.6	14.3
T6	KSK 434	Foliar application of Zn & Fe	23.2	16.3

19. TITLE   **IMPACT OF SOURCE AND METHOD OF ZINC APPLICATION ON YIELD AND NUTRITIONAL VALUE OF RICE GRAINS**

OBJECTIVE   To study the effect of zinc application using different sources and methods on crop yield and concentration in brown, white and parboiled rice.

RESEARCH WORKER   Ms. Adila Iram (RRI, KSK)
Dr. Nadeem Iqbal. (RRI, KSK)
Mr.Hafiz Riaz Ahmed(RFS & STI,Lahore)

PROJECT DURATION   2018-19

LOCATION   Kala Shah Kaku

PLAN OF WORK

Treatments   :   **Factor A:** Source of Zinc
Zinc sulfate
Zinc enriched urea
Chelated zinc
Factor B: Applications techniques
Soil application
Foliar application (30 & 55 DAT)
Soil (1/2 dose) + Foliar application (30 & 55 DAT)

Layout   :   RCBD factorial with 3 reps.
Variety   :   Chenab Basmati
Methodology :   Soil samples before transplanting and after harvest of the crop will be taken for analysis. Fertilizer will be applied as per treatments. All other crop management practices will be kept uniform. Plant samples will be collected for grain analysis for zinc.

PREVIOUS YEAR'S RESULTS   First year of experiment

1 **TITLE** **SCREENING OF RICE LINES/VARIETIES AGAINST BACTERIAL LEAF BLIGHT (*Xanthomonas oryzae* pv. *oryzae*)**

OBJECTIVE **To find resistant sources against BLB for use in the breeding programme.**

RESEARCH WORKERS Ms. Halima Qudsia

Mr. M Saleem Javed

PROJECT DURATION **2018-2019**

LOCATION **Kala Shah Kaku**

PLAN OF WORK

Varieties/lines	Number
Coarse Grain	20
Fine Grain	35
Total	55

Treatments	Coarse and Fine Grain advanced breeding lines.
Design	Augmented
Check Varieties	Basmati 2000, Basmati 515 and Super Basmati
Plot Size	0.5 m x 2.0 m
Fertilizer	Coarse: 170:100:00 NPK (kg/ha) Fine: 133:85:00 NPK (kg/ha)
Sowing Date	2nd week of June
Transplanting	2nd week of July

Methodology

Inoculation will be done with *Xanthomonas oryzae* pv. *oryzae* at booting stage. Data on percent leaf area infected will be recorded 14 and 21 days after inoculations and the determination of reaction will be done following the Standard Evaluation System for Rice -IRRI.

PREVIOUS YEAR'S RESULTS

Reactions	Number of Varieties/lines
Resistant	39
Moderately Resistant	22
Moderately Susceptible	30
Susceptible	07
Total	98

2	**TITLE**	**SCREENING OF RICE LINES/VARIETIES AGAINST BLAST (*Pyricularia oryzae*)**

OBJECTIVE To screen rice lines/varieties against rice blast (*Pyricularia oryzae*) for use in the breeding programme.

RESEARCH WORKER Mr. M. Saleem Javed
Ms. Halima Qudsia

PROJECT DURATION 2018-2019

LOCATION Kala Shah Kaku

PLAN OF WORK

Varieties	Number
Coarse	20
Fine	35
Total	55

Design	Augmented
Plot Size	50 cm line, 10-15 cm apart
Fertilizer	Coarse: 170:100:00 NPK (kg/ha) Fine: 133:85:00 NPK (kg/ha)
Sowing	2nd week of June for field experiment and Last week of August for glass house
Transplanting	2nd week of July for field experiment
Check Variety	Basmati C-622, Super Basmati, Basmati 515
Inoculation	*Pyricularia oryzae*
Observations	HS reaction on susceptible check (SES Score: 9)

Methodology

Test lines/varieties will be sown in the 2nd week of June for field experiment and Last week of August on dry-prepared raised beds. For dry-prepared raised beds, inoculation will be done 3 weeks after sowing and water will be sprinkled twice daily to create high humidity in the plant canopy to facilitate infection. For field experiment, Inoculation will be done with *Pyricularia oryzae* at booting stage. Data on percent leaf area infected will be recorded 14 and 21 days after inoculations and the determination of reaction will be done following the Standard Evaluation System for Rice -IRRI.

| 3 | TITLE | **SCREENING OF RICE LINES/VARIETIES AGAINST BROWN LEAF SPOT (*Bipolaris oryzae*)** |

OBJECTIVE To find resistant sources against BLS for use in the breeding programme.

RESEARCH WORKERS
Ms. Halima Qudsia
Ms. Ruqeyah Abdul Majeed

PROJECT DURATION 2018-2019

LOCATION Kala Shah Kaku

PLAN OF WORK

Varieties/lines	Number
Coarse Grain	20
Fine Grain	35
Total	55

Treatments	Coarse and Fine Grain advanced breeding lines.
Design	Augmented
Check Varieties	Basmati 515, Super Basmati and Chenab Basmati
Plot Size	0.5 m x 2.0 m
Fertilizer	Coarse: 170:100:00 NPK (kg/ha) Fine: 133:85:00 NPK (kg/ha)
Sowing Date	2nd week of June
Transplanting	2nd week of July

Methodology

Seed Inoculation will be done with *Bipolaris oryzae* (old name: *Drechslera oryzae*) before sowing. Test lines/varieties will be sown in the 2nd week of June for field experiment and Last week of August on dry-prepared raised beds. For dry-prepared raised beds, inoculation will be repeated 3 weeks after sowing and water will be sprinkled twice daily to create high humidity in the plant canopy to facilitate infection. For field experiment inoculum will be applied again at booting stage. Data on percent leaf area infected will be recorded 14 and 21 days after inoculations and the determination of reaction will be done following the Standard Evaluation System for Rice -IRRI.

PREVIOUS YEAR'S RESULTS

First year of Experiment

4	TITLE	**EFFICACY OF DIFFERENT SPRAY FUNGICIDES FOR THE CONTROL OF BLAST (*Pyricularia oryzae*) OF RICE**

OBJECTIVE	To find effective control of the disease through spray fungicides.	
RESEARCH WORKER	Halima Qudsia Muhammad Saleem Javed	
PROJECT DURATION	2018-2019	
LOCATION	Kala Shah Kaku	

PLAN OF WORK	**Variety**	Basmati C-622
	Treatments/Dose (Per litre)	**Common Name**
	Amistar Top 325SC (2mL)	Azoxystrobin + Difenoconazole
	Nativo 75WG (0.65 g)	Tebuconazole + Trifloxystrobin
	Switch DF 80WG (08 g)	Sulfur
	Score 250EC (1.25 mL)	Difenoconazole
	Cordate 4 WP (03 g)	Copper hydroxide
	Azomide Super 400 SC (1.25 mL)	Azoxystrobin + Difenoconazole
	Kocide 3000 52.4WG (2.5 g)	Copper hydroxide
	Control	Water
	Design	RCBD
	Replications	3
	Plot Size	2 m x 6 m
	Fertilizer	170:100:62 NPK (kg/ha)
	Inoculation	*Pyricularia oryzae*
	Observations	Blast disease and Paddy Yield
	Methodology	

The crop will be inoculated with *Pyricularia oryzae*. Heavy dose of N-fertilizer @170 kg/ha will be given to encourage disease infection. The test fungicides will sprayed at booting stage and after panicle emergence. The spray will be repeated after 4-5 days Data regarding blast incidence and paddy yield will be recorded following the IRRI scale.

PREVIOUS YEAR'S RESULTS	**TREATMENTS**	**Disease (%)**	**Protection (%)**	**Yield (t/ha)**
	Amistar Top 325SC	13 d	79	4.78 a
	Nativo 75WG	14 cd	77	3.58 bc
	Switch DF 80WG	18 c	71	2.88 d
	Flare 72 SP	28 b	53	3.58 bcd
	Score 250EC	17 cd	71	3.28 bcd
	Cordate 4 WP	14 cd	77	2.98 cd
	Azomide Super 400 SC	13 cd	78	3.88 b
	Control	61 a	-	1.29 e
		LSD=4.97		*LSD=0.0707*

5 TITLE **EFFECT OF DIFFERENT CHEMICALS ON BACTERIAL LEAF BLIGHT (*Xanthomonas oryzae* pv. *oryzae*) OF RICE**

OBJECTIVE To find out the effective control of BLB through different chemicals

RESEARCH WORKER Halima Qudsia

PROJECT DURATION 2018-2019

LOCATION Kala Shah Kaku

PLAN OF WORK

Variety	Basmati 2000
Treatments/Dose (Per litre)	**Common Name**
CCA+Cu (3.5 g)	CCA+Cu
CCAe (3.5 g)	CCA
EV-Cin (3.5 g)	Tetramycine
Kocide 3000 52.4WG (2.5 g)	Copper hydroxide
Flare 72 SP (01 g)	Streptomycine
Cordate 4 WP (03 g)	Kasugamycine
Nativo 75WG (0.65 g)	Tebuconazole + Trifloxystrobin
Control	Water
Design	RCBD
Replications	3
Plot Size	2 m x 6 m
Fertilizer	170:100:62 NPK (kg/ha)
Inoculation	*Xanthomonas oryzae* pv. *oryzae*
Observations	BLB incidence and Paddy Yield

Methodology

The crop will be inoculated with *Xanthomonas oryzae* pv *oryzae*. Heavy dose of N-fertilizer @170 kg/ha will be given to encourage disease. The test fungicides will sprayed at booting stage. The spray will be repeated after 8-10 days. Data regarding BLB incidence will be recorded 2-3 weeks after second spray following the scale devised by IRRI. Data on paddy yield will also be recorded.

PREVIOUS YEAR'S RESULTS

TREATMENTS	Disease (%)	Protection (%)	Paddy Yield (t/ha)
CCA+Cu	11 d	80	4.18 a
CCAe	17 c	69	3.68 ab
EV-Cin	10 d	81	4.38 a
Kocide 3000 52.4WG	16 c	70	3.88 a
Flare 72 SP	18 bc	67	4.28 a
Cordate 4 WP	11 d	79	3.68 ab
Nativo 75WG	22 b	61	3.88 a
Control	55.7 a	-	2.88 b
	LSD=4.49		*LSD=0.0889*

6	TITLE	**EFFICACY OF DIFFERENT SPRAY FUNGICIDES FOR THE CONTROL OF BROWN LEAF SPOT (*Bipolaris oryzae*) OF RICE**

OBJECTIVE To find out the effective control of BLS through different chemicals

RESEARCH WORKER
Halima Qudsia
Ruqeyah Abdul Majeed
Muhammad Saleem Javed

DURATION 2018-2019

LOCATION Kala Shah Kaku

PLAN OF WORK

Variety:	Super Basmati
Treatments/Dose (Per litre) (may change)	**Common Name**
Amistar Top 325SC (02 mL)	Azoxystrobin + Difenconazonle
Kumulus DF 80WG (08 g)	Sulfur
Nativo 75WG (0.65 g)	Tebuconazole + Trifloxystrobin
Kocide 3000 52.4WG (2.5 g)	Copper hydroxide
Score 250EC (1.25 mL)	Difenoconazole
Azomide Super 400 SC (1.25 mL)	Azoxytrobin+Difenconazonle
Flare 72 SP (01 g)	Streptomycine
Control	Water
Design	RCBD
Replications	3
Plot size	2 m X 6 m
Fertilizer	170-100-62 NPK (kg/ha)
Inoculations	*Bipolaris oryzae*
Observations	BLS incidence and Paddy Yield

Methodology

The crop will be inoculated with inoculum of *Bipolaris oryzae*. Heavy dose of N-fertilizer @170 kg/ha will be given to encourage disease infection. The test fungicides will be sprayed at booting stage. The spray will be repeated after 8-10 days. Data regarding BLS incidence will be recorded 2-3 weeks after second spray following the scale devised by IRRI. Data on paddy yield will also be recorded.

PREVIOUS YEAR'S RESULTS

Treatment	Disease (%)	Protection (%)	Paddy Yield (t/ha)
Amistar Top 325SC	11.6 e	79.8	4.88 a
Kumulus DF 80WG	16.3 de	71.7	4.68 a
Nativo 75 WG	16.6 d	71	4.58 a
Kocide 3000 52.4WG	17 de	70	4.58 a
Score 250EC	50.3 b	12	2.68 c
Azomide Super 400 SC	30 c	47	3.58 b
Flare 72 SP	21.6 d	62	3.18 bc
Control	57.6 a	-	1.69 d
	LSD=7.13		*LSD=0.071*

7   **TITLE**   **EFFICACY OF DIFFERENT BOTANICALS FOR THE CONTROL OF BROWN LEAF SPOT (*Bipolaris oryzae*) IN ORGANIC RICE**

OBJECTIVE   To find out the effective control of BLS through different Botanicals in Organic Rice

RESEARCH WORKER   Ruqeyah Abdul Majeed

DURATION   2018-2019

LOCATION   Kala Shah Kaku

PLAN OF WORK

Variety:	Super Basmati
Treatments (may change)	**Common Name**
Essential oil of *Eucalyptus citriodora*	Eucalyptus
Essential oil of *Syzygium aromaticum*	Clove
Essential oil of *Cymbopogon citratus*	Lemongrass
Control	Water
Design	RCBD
Replications	3
Plot size	2 m X 6 m
Fertilizer	170-100-62 NPK (kg/ha)
Inoculations	*Bipolaris oryzae*
Observations	BLS incidence and Paddy Yield

Methodology

The crop will be inoculated with inoculum of *Bipolaris oryzae*. Heavy dose of N-fertilizer @170 kg/ha will be given to encourage disease infection. Seed treatment with test Botanicals will be done and test Botanicals will be also sprayed at booting stage and will be repeated after 8-10 days. Data regarding BLS incidence will be recorded 2-3 weeks after second spray following the scale devised by IRRI. Data on paddy yield will also be recorded.

PREVIOUS YEAR'S RESULTS   **First year of Experiment**

8	TITLE	**STUDY OF MICROFLORA OF DIFFERENT RICE VARIETIES/ LINES**

OBJECTIVE To find out different fungal and bacterial population from different rice varieties/ lines

RESEARCH WORKER Halima Qudsia
Ruqeyah Abdul Majeed
Muhammad Saleem Javed

DURATION 2018-2019

LOCATION Kala Shah Kaku

PLAN OF WORK

Methodology

Rice plant and seeds infected from different diseases will be collected from various fields of Punjab. All the samples will be taken at random. All the samples will be put in plastic and paper bags at each collection site. The sample bags will be properly labeled and transferred to the laboratory for further analysis. Infected leaves/seeds were washed thoroughly in running tap water for 10-15 min to remove the soil particles present on the leave surface. Different fungal colonies emerging from the infected plants will be purified using single spore technique. Each emerging colony will be purified on PDA plates and incubated at 28°C for 5-7 days. Identification of the purified cultures of the pathogens will be made described by Ellis (1971, 1976).

Preservation of fungi:

The fungal colonies will be first grown in PDA culture growth agar media slants at 28°C. Then these PDA slants and Petri plates of purified culture will be stored at 4°C for further multiplication.

PREVIOUS YEAR'S RESULTS

First year of Experiment

9 TITLE **EFFICACY OF DIFFERENT FUNGICIDES AS SEED TREATMENT FOR THE CONTROL OF RICE DISEASES**

OBJECTIVE To check the efficacy of different fungicides as seed treatment

RESEARCH WORKER Halima Qudsia
Ruqeyah Abdul Majeed
Muhammad Saleem Javed

DURATION 2018-2019

LOCATION Kala Shah Kaku

PLAN OF WORK

Variety:	Super Basmati
Treatment / Dose per liter	**Common Name**
Amistar Top 325SC (02 mL)	Azoxystrobin + Difenconazonle
Kumulus DF 80WG (08 g)	Sulfur
Nativo 75WG (0.65 g)	Tebuconazole + Trifloxystrobin
Azomide Super 400 SC (1.25 mL)	Azoxytrobin+Difenconazonle
CCA+Cu (3.5 g)	CCA+Cu
EV-Cin (3.5 g)	Tetramycine
Topsin-M (2.5 g)	Thiophanate methyl
Control	Water

Design	RCBD
Replications	3
Plot size	2 m X 6 m
Fertilizer	Coarse: 170:100:00 NPK (kg/ha) Fine: 133:85:00 NPK (kg/ha)
Inoculations	with different fungal and bacterial pathogens of rice
Observations	Fungal and bacterial incidence and Paddy Yield

Methodology

The seed will be treated with the test fungicide. Then inoculated with inoculum of different fungal and bacterial pathogens. Heavy dose of N-fertilizer @170 kg/ha will be given to encourage disease infection. Data regarding BLS, Blast and BLB incidence will be recorded 2-3 weeks after booting stage following the scale devised by IRRI. Data on paddy yield will also be recorded.

PREVIOUS YEAR'S RESULTS **First year of Experiment**

ENTOMOLOGY

TRAINING OF MASTER TRAINERS

Date	Location	Purpose	Participants
17.05.2017	Murideke	Master trainers of Engro	24
25.07.2017	RRI, KSK	Training of master Trainers of Pest Warning & Quality Control of Pesticides regarding rice IPM.	25
04.10.2017	Gujranwala	Delivered a lecture on IPM of rice pests to the master trainers of DSR with special emphasis on MRL and pesticide residue management.	60
12.10.2017	RRI,KSK	Training of Master Trainers in Real Life Situation in DSR Package of Technology	18
02.11.2017	RRI,KSK	Training of Trainers of NGO regarding IPM in connection of Sustainable Rice Practices based on the Principles of Sustainable Rice Platform	33
08.11.2017	RRI,KSK	Training of Trainers of NGO regarding IPM in connection of Sustainable Rice Practices based on the Principles of Sustainable Rice Platform	35
22.11.2017	RRI,KSK	Training of Trainers of NGO regarding IPM in connection of Sustainable Rice Practices based on the Principles of Sustainable Rice Platform	54
Total master trainings = 7			**249**

TRAINING OF FARMERS

Date	Location	Purpose	Participants
08.07.2017	Phalia (Mandi Bahau Din)	Participated in a rice seminar to deliver lecture on IPM of rice crop.	112
18.08.2017	Sheikhupura	Delivered a lecture regarding integrated pest management of rice in a Farmers' day organized by Rice Partners, Muridke.	45
05.10.2017	RRI, KSK	Farmers Training under AIP- CIMMYT	82
13.10.2017	Manga Qadeem, Pasrur	Delivered a lecture on IPM of rice pests to the master trainers of DSR with special emphasis on MRL and pesticide residue management.	160
01.11.2017	Wazirabad		122
04.11.2017	Chak Ram Das, Gujranwala		115
Total trainings = 6			**636**

TITLE 1:   **MONITORING THE MIGRATORY PATTERN OF PLANTHOPPERS IN THE PUNJAB**

OBJECTIVE   To monitor the population fluctuations of planthopper for their timely and effective control

RESEARCH WORKERS

Mr. Zafar Ullah Shah

Dr. Arshed Makhdoom Sabir

Mr. Bilal Atta

PROJECT DURATION

2018- 19

LOCATION   Yellow sticky traps and Light trap catches of different insect pests will be monitored by installing at 8 districts viz., Narowal, Sialkot, Lahore, Sheikhupura, Hafizabad, Kasur, Bahawalnager and Sadiqabad.

TREATMENT   Natural conditions

METHODOLOGY   The insect pests (Whitebacked planthopper: *Sogatella furcifera* and Brown planthopper: *Nilapervata lugens*) attracted on the light and yellow sticky trap will be collected/ monitored daily and identified in Entomology Laboratory. The weekly/ monthly record will be maintained for population studies for forecasting purpose.

PREVIOUS YEAR'S RESULTS

First year experiment

Light trap data at Kala Shah Kaku is given below:

Table 1:   **Trap catches of planthoppers on rice crop, 2017-18**

Month	Whitebacked planthopper (WBPH)		Brown planthopper (BPH)	
Year	*2016*	*2017*	*2016*	*2017*
March	0	**0**	0	**0**
April	0	**0**	0	**0**
May	0	**0**	0	**0**
June	0	**0**	0	**0**
July	0	**0**	0	**0**
August	0	**0**	0	**0**
September	0	**261**	0	**20**
October	4943	**2826**	0	**1720**
November	3581	**1688**	0	**10446**
December	0	**0**	0	**0**
Total	8524	**4775**	0	**12186**
Trend		⬇		⬆

	TITLE 2:	**MONITORING OF PLANTHOPPERS ON ALTERNATE HOSTS LIKE CROPS AND WEEDS IN RICE ECOSYSTEM**
	OBJECTIVE	To study the temporal distribution of planthoppers in rice- wheat- rice ecosystem on different alternate host plants/ over wintering sites for their timely and effective control
	RESEARCH WORKERS	Mr. Zafar Ullah Shah Dr. Arshed Makhdoom Sabir
	PROJECT DURATION	2018- 19
	LOCATION	Kala Shah Kaku
	METHODOLOGY	❖ Field surveys will be carried out throughout the year on different plants/ weeds. ❖ Net sweepings from randomly selected four sampling sites (1m² each) which will be swept 10 times with an insect net (net size: 30cm in diameter, 80cm in depth). ❖ Identification up to species level will be done in laboratory using available literature.
	PREVIOUS YEAR'S RESULTS	

Table 2: **Temporal distribution of planthoppers on alternate hosts**

Month	Common/ Local Name	Botanical Name	Presence/ absence WBPH	BPH
April	Wheat	*Triticum aestivum*	+	-
	Oat	*Avena sativa*	+	-
	Barley	*Hordeum vulgare*	+	-
May	Dhidan	*Echinochlo acrusgali*	+	-
	Sawanki	*Echinochlo aclona*	+	-
	Sorghum	*Sorghum sp.*	+	-
	Oat	*Avena sativa*	+	-
	Maize	*Zea mays*	+	-
June	Dhidan	*Echinochlo acrusgali*	+	-
	Sawanki	*Echinochlo aclona*	+	-
	Sorghum	*Sorghum sp.*	+	-
	Maize	*Zea mays*	+	-
July	Sawanki	*Echinochloa clona*	+	-
	Dhidan	*Echinochloa crusgali*	+	-
	Naro	*Paspalm distichum*	+	-
	Sorghum	*Sorghum sp.*	+	-
	Maize	*Zea mays*	+	-
August	Dhidan	*Echinochlo acrusgali*	+	-
	Sawanki	*Echinochlo aclona*	+	-
	Sorghum	*Sorghum sp.*	+	-

	Maize	*Zea mays*	+	-
	Naro	*Paspalm distichum*	+	-
September	Rice	*Oryza sativa*	+	+
	Dhidan	*Echinochlo acrusgali*	+	-
	Sawanki	*Echinochlo aclona*	+	-
	Sorghum	*Sorghum sp.*	+	-
	Maize	*Zea mays*	+	-
	Naro	*Paspalm distichum*	+	-
October	Rice	*Oryza sativa*	+	+
	Dhidan	*Echinochlo acrusgali*	+	-
	Sawanki	*Echinochlo aclona*	+	-
	Maize	*Zea mays*	+	-
	Naro	*Paspalm distichum*	+	-
November	Rice, stubbles, sprouts	*Oryza sativa*	+	+
	Khabal	*Cynodon dactylon*	-	+
December	Rice, stubbles, sprouts	*Oryza sativa*	+	-
	Khabal	*Cynodon dactylon*	-	+

+ and - reflects presence and absence, respectively.

TITLE 3:	**SCREENING OF INSECTICIDES FOR THE EFFECTIVE CONTROL OF PLANTHOPPERS UNDER FIELD CONDITIONS**
OBJECTIVE	❖ To evaluate different insecticides for the effective control of whitebacked and brown planthopper ❖ To study the bio-efficacy of different insecticides against beneficial fauna.
RESEARCH WORKERS	Mr. Muhammad Rizwan Dr. Arshed Makhdoom Sabir
PROJECT DURATION	2018- 19
LOCATION	Kala Shah Kaku
TREATMENT	The number of treatments will depend upon the availability of pesticides samples provided by Entomological Research Institute, Faisalabad.

PLAN OF WORK

Variety	Basmati 515
Fertilizer application rate	133-85-62 (NPK Kg/ ha)
Lay out	RCBD (replicated thrice)
Plot size	12.66m^2

METHODOLOGY Test insecticides will be applied at ETL

> ➢ August (15-20 nymphs or adults/ plant)
> ➢ September (20-25 nymphs or adults/ plant) OR
> ➢ 8-10 nymphs or adults per net sweep

Data will be recorded after 72 hours and a week of application of the insecticides. Effect of insecticides on beneficial fauna will be recorded from five plants.

Statistical analysis will be done for all the parameters studied during the experimentation.

Table 3: **Insecticides used against planthoppers**

Sr. #	Planthopper	Candidate insecticides	Common Name	Standard insecticides	Common Name
1.	WBPH & BPH	Plenum 30WG SYNGENTA	pymetrozine	Regent 80 WG BAYER	fipronil
2.	BPH	Buffer 25WP JBL	buprofezin	Sitara 25WP Ali akbar	fipronil
3.	WBPH & BPH	Fipryte 5SC JBL	fipronil	Regent 80 WG BAYER	fipronil

Table 4: **Pre and post- treatment number of whitebacked planthopper (adult/ nymph)/ plant**

S. #	Treatment	Dose/ acre	Pre-treatment (number)	Post- treatment			
				Relative progression in number after		Percent mortality after	
				72 hours	Week	72 hours	Week
1.	Plenum	120g	16.21	2.43 c	1.93 d	89.62 a	95.19 a
2.	Fipryte	500ml	17.94	6.67 b	9.18 b	71.58 b	77.21 c
3.	Regent	30g	20.36	4.17 c	7.12 c	82.27 a	82.32 b
4.	Control	-	18.22	23.45 a	40.28 a	0 c	0 d
			NS	1.937	1.408	7.811	2.440

Table 5: **Impact of insecticides used against whitebacked planthopper on field population of beneficial fauna per 5 plants**

S. #	Treatment	Pre-treatment (number)	Post- treatment	
			Average number	Survival percentage
1.	Plenum	1.33	0.83 b	62.22 b
2.	Fipryte	1.25	0.75 b	60.00 b
3.	Regent	1.25	0.75 b	61.67 b
4.	Control	1.17	1.75 a	157.78 a
		NS	0.382	46.436

Table 6: Pre and post- treatment number of brown planthopper (adult/ nymph)/ plant

S. #	Treatment	Dose/ acre	Pre- treatment (number)	Post- treatment			
				Relative progression in number after		Percent mortality after	
				72 hours	Week	72 hours	Week
1.	Plenum	120g	17.05	3.23 d	2.00 e	87.34 a	92.32 a
2.	Fipryte	500ml	19.22	9.27 b	7.25 bc	63.41 d	71.06 c
3.	Regent	30g	20.72	4.95 cd	4.72 d	80.44 b	81.36 b
4.	Buffer	500g	16.22	6.58 c	9.00 b	73.69 c	63.82 d
5.	Sitara	300g	18.90	9.73 b	5.78 cd	61.20 d	76.80 bc
6.	Control	-	20.10	25.20 a	26.03 a	0.00 e	0.00 e
			NS	1.922	2.043	6.645	6.615

Table 7: Impact of insecticides used against brown planthopper on field population of beneficial fauna per 5 plants

S. #	Treatment	Pre-treatment (number)	Post- treatment	
			Average number	Survival percentage
1.	Plenum	1.25	0.83 b	66.67 b
2.	Fipryte	1.00	0.58 b	58.33 b
3.	Regent	1.25	0.75 b	60.00 b
4.	Buffer	1.08	0.58 b	55.56 b
5.	Sitara	1.33	0.75 b	55.56 b
6.	Control	1.25	1.75 a	141.11a
		NS	0.342	21.079

TITLE 4:	**SUPPRESSION OF PLANTHOPPERS IN ORGANIC RICE WITH BOTANICAL INSECTICIDE(S)**
OBJECTIVE	To study the effectiveness of botanical insecticides against target pest under in vitro. and field conditions
RESEARCH WORKERS	Mr. Muhammad Rizwan
	Mr. Bilal Atta
	Mr. Zafar Ullah Shah
PROJECT DURATION	2018- 19
LOCATION	Kala Shah Kaku

METHODOLOGY *In- vitro studies:*

Botanicals will be used against target pest in lab conditions to study their effectiveness.

In field application:

The Botanical insecticides applied at following ETL of planthoppers after pest scouting.

- 15-20 nymphs or adults/ plant (August)
- 20-25 nymphs or adults/ plant (September) OR
- 7-10 nymphs or adults per net sweep

The botanicals used against the target pest in field are as under:

Table 8:   Effectiveness of botanical insecticides against planthoppers

Date	Botanical insecticide	Dose/ acre	No. of planthoppers/ plant		
			Pre-treatment	Post-treatment	Percent Control
09.10.2017	Achta (Azadirachtin (1 % w/w) + Neem Oil (30% w/w)	400 ml	27.5	12.5	54.55
16.10.2017	Rotenone 5% ME (Plant extract- *Derris* roots)	100 ml	29	13.5	53.45
20.10.2017	Legend 0.5% (Plant extract: *Sophora flavescenss*)	300 ml	31	16	48.39
25.10.2017	Tobacco leaves extract	125 gm	25	13	48.00
30.10.2017	Tobacco leaves extract	125 gm	22.75	11.3	50.33
03.11.2017	Tobacco leaves extract	125 gm	24.35	12.6	48.25

TITLE 5:	**SCREENING OF DIFFERENT MICROBIAL INSECTICIDES AGAINST BPH**
OBJECTIVE	To study the utilization and effectiveness of different microbes to control BPH
RESEARCH WORKERS	Mr. Bilal Atta
	Mr. Zafar Ullah Shah
PROJECT DURATION	2018- 19
LOCATION	Kala Shah Kaku
METHODOLOGY	Different fungal microbials viz., *Aspergillus terreus*, *Fusarium oxysporum*, *Beauveria bassiana*, *Penicillium polonicum* and *Clonostachys rosae* will be screened against BPH.
PREVIOUS YEAR'S RESULTS	New Experiment

TITLE 6:	**SURVEYS OF RICE GROWING AREAS OF THE PUNJAB TO STUDY THE INCIDENCE OF BPH INFESTATION**
OBJECTIVE	❖ To study the extent of damage done by planthopper under field conditions
	❖ To collect the BPH from different locations for rearing and experimental purpose.
RESEARCH WORKERS	Mr. Bilal Atta
	Mr. Zafar Ullah Shah
	Dr. Arshed Makhdoom Sabir
	Mr. Muhammad Rizwan
PROJECT DURATION	2018- 19
LOCATION	Surveyed will be conducted at different rice growing areas on weekly basis (Oct.-Nov.) viz., Narowal, Sialkot, Lahore, Sheikhupura, Hafizabad, Kasur, Bahawalnager, Sadiqabad, Gujranwala, Gujrat, M.B. Din, Nankana Sahib, Faisalabad, Chiniot, Jhang, T.T. Singh, Okara, Pakpatan, Sargodha and Khushab to investigate occurrence of BPH.
METHODOLOGY	❖ Surveys of rice growing areas of the Punjab will be conducted in crop seasons to observe/ monitor the incidence of BPH infestation and their collection.
	❖ Collection of BPH will be made after every 4-5 kilometres or where the BPH infested spots will be seen in the rice crop to collect at least five infested samples from each site.

New Experiment

TITLE 7:   **CHARACTERIZATION OF BPH BIOTYPES**

OBJECTIVE   To study the biotypes of BPH in the Punjab

RESEARCH WORKERS

Mr. Bilal Atta

Mr. Zafar Ullah Shah

Dr. Ayesha Bibi

Mr. Zulqarnain Haider

Mr. Awais Riaz

PROJECT DURATION   2018- 19

LOCATION   Sixty (60) different rice growing areas in 19 Districts of the Punjab (Gujranawala, Hafizabad, Sialkot, Narowal, Gujrat, M.B. Din, Lahore, Sheikhupura, Nankana Sahib, Kasur, Faisalabad, Chinot, Jhang, T.T. Singh, Okara, Pakpatan, Bahawalnagar, Sargodha and Khushab) will be surveyed.

METHODOLOGY   BPH biotype will be identified by DNA extraction and DNA Barcoding analysis.

PREVIOUS YEAR'S RESULTS   New Experiment

TITLE 8:   **SCREENING OF BREEDING MATERIAL FOR RESISTANCE AGAINST RICE PLANTHOPPERS**

OBJECTIVE   To select breeding material/ lines resistant to rice planthoppers under field conditions.

RESEARCH WORKERS

Mr. Bilal Atta

Mr. Zafar Ullah Shah

PROJECT DURATION   2018- 19

LOCATION   Kala Shah Kaku

TREATMENT   Seed of fine and coarse grain advance lines will be collected from Plant Breeding Section.

PLAN OF WORK/   Lay out   Non replicated

METHODOLOGY

	Fertilizer application	Fine: 133-85-62 (NPK Kg/ ha)
		Coarse: 170-100-62 (NPK Kg/ ha)
	Insecticide application	No application
	Data recording	Test evaluation for resistance can be considered valid if hopper population is uniformly distributed at a high level across the field.
		For field screening, a minimum of 100 hoppers/ hill density on susceptible check is necessary. SES standard will be applied by considering following observations.

Brown planthopper	*Whitebacked planthopper*
0 No injury	0 No injury
1 Slight yellowing of a few plants	1 Very slight injury
3 Leaves partially yellow but with no hopperburn	3 First and 2nd leaves with orange tips; slight stunting
5 Leaves with pronounced yellowing and stunting or wilting and 10-25% of plants with hopperburn, remaining plants severely stunted	5 More than half the leaves with yellow-orange tips; pronounced stunting
7 More than half the plants wilting or with hopperburn, remaining plants severely stunted	7 More than half of plants dead; remaining plants severely stunted and wilted
9 All plants dead	9 All plants dead

PREVIOUS YEAR'S RESULTS

As 100 hoppers/ hill not attained in both coarse and fine grain lines, so protocol of **Standard Evaluation System** for rice not applied

TITLE 9: **SCREENING OF NEAR ISOGENIC LINES (NILs) FOR RESISTANCE AGAINST BPH**

OBJECTIVE To screen out near isogenic lines (NILs)for the development of resistant basmati varieties against BPH

RESEARCH WORKERS

Mr. Bilal Atta

Mr. Zafar Ullah Shah

Mr. Zulqarnain Haider

Mr. Awais Riaz

PROJECT DURATION 2018- 19

LOCATION Kala Shah Kaku

TREATMENT	❖ NILs will be acquired from IRRI, Philippines
	❖ Super Basmati, Basmati-515, PS-2, Chenab Basmati, Kissan Basmati and Punjab Basmati

PLAN OF WORK/ METHODOLOGY

i. Field Screening:

Different genotypes will be evaluated for resistance against BPH in field. All around test entries, two meters of susceptible variety TN1 will be transplanted. Number of BPH on 10 plants/entry will be recorded when TN1, susceptible check showed hopper burn symptoms. Each entry will be scored based on scoring system developed by the International Rice Research Institute (Harini et al., 2013).

ii. Standard Seed Box Screening Technique (SSBST):

The seeds will be pre-soaked and sown in rows in seed boxes along with resistant and susceptible checks. Seedlings will be infested with 1st instar nymphs. Approximately one week after infestation "hopperburn" symptom will be observed. The genotypes will be scored as scoring system developed by the International Rice Research Institute (Harini *et al.,* 2013).

iii. Honeydew Test:

The honeydew excretion is widely used to assess feeding activity and consequently a reliable index for resistance and susceptibility of a crop variety to homopteran pests. Many techniques have been developed to measure the feeding response of *Nilaparvata lugens* onresistant and susceptible rice plants, which are as follows:

a) Filter Paper Technique:

Filter paper will be dipped in a solution of bromocresol green and the test of a parafilm sachet following the procedure green. For each plant to be screened, calculated one day old adult females were kept starving for 2 h 30 min. Then, the female BPH will be released on to plants to feed for 24 h, after which the filter papers will be collected. Bromocresol green will be indicated phloem-based honeydew as blue spots indicates resistance and susceptibility according to the amount of honey dew appear on the filter paper. The area of each spot on the bromocresol green-filter paper will be measured using a digital scanner and "Image J" software.

b) Honeydew-Clock Technique:

The rate of honeydew drop production will be measured using the modified methods of Wilkinson and Douglas (1995) and Daniels *et al.,* (2009). Honeydew drops will be collected from individual BPH on filter paper treated with 0.1% bromophenol blue and 0.01 M HCl. This treatment will be generated a yellow paper that turns blue when in contact with aqueous solutions such as honeydew droplets. Treated filter paper will be placed on a plastic Petri dish circle plate attached to the h spigot of a clock such that it rotated 3600 over 12 h duration. A rice plant will be clamped horizontally over the disk. BPHs will be starved for one h before use and then introduced to the plant, positioned

so that the honeydew produced dropped directly onto the treated filter paper. The frequency of honeydew drop production will be calculated after a 12 h period. Data will be collected for analysis when BPH produced honey dew for more than 3 h after the start for the experiment.

iv) Nymphal Survival Method:

The nymphal survival test shows survival rate of the nymphs on different varieties of rice plants. For this, calculated 1st instar stage nymphs will be released on 40 days old rice plant. The number of surviving nymphs will be recorded for every two days until they became adults. The experiment will be carried in three replications along with the resistant and susceptible checks.

PREVIOUS YEAR'S RESULTS	New Experiments

TITLE 10:	**AWARENESS RAISING ABOUT RAVAGES OF BPH AND THEIR IPM STRATEGIES**
OBJECTIVE	To aware the rice stakeholders regarding BPH menace and IPM strategies to combat.
RESEARCH WORKERS	Mr. Bilal Atta Mr. Zafar Ullah Shah
PROJECT DURATION	2018- 19
LOCATION	Rice growing areas of the Punjab
METHODOLOGY	Awareness about BPH will be created among 500 master trainers and farmers though trainings, mobile messaging, print and electronic media.
PREVIOUS YEAR'S RESULTS	New Experiment

TITLE 11:	**SCREENING OF BREEDING MATERIAL FOR RESISTANCE AGAINST RICE LEAFFOLDER UNDER FIELD CONDITIONS**
OBJECTIVE	To select breeding material/ lines resistant to rice leaffolder
RESEARCH WORKERS	Dr. Arshed Makhdoom Sabir Mr. Zafar Ullah Shah
PROJECT DURATION	2018- 19
LOCATION	Kala Shah Kaku

TREATMENT	Seed of 35 fine and 18 coarse grain advance lines will be collected from Plant Breeding Section.	
PLAN OF WORK	Weedicide application rate	Acetachlor @ 100ml/ acre
	Fertilizer application rate	❖ Fine: 133-85-62 (NPK Kg/ ha)
		❖ Coarse: 170-100-62 (NPK Kg/ ha)
	Lay out	Non replicated (Two rows of each line/ variety with 45 plants in each row)
	Insecticide	No insecticide applied.
METHODOLOGY	Leaffolder damage recorded on the basis of percentage infested leaves/ larvae as per following formula:	

$$\frac{Infested\ leaves}{Total\ leaves} \times \frac{Infested\ hills}{Total\ hills} \times 100$$

Data regarding infestation recorded and compared with Standard Evaluation System for Rice, 2013 developed by the IRRI, Philippine as under:

0	No damage	Highly Resistant (HR)
1	1-10%	Resistant (R)
3	11-20%	Moderately Resistant (MR)
5	21-35%	Moderately Susceptible (MS)
7	36-50%	Susceptible (S)
9	51-100%	Highly Susceptible (HS)

Table 9: Percentage infestation record of rice leaffolder on fine lines/ varieties.

S.#	Line/ variety	Percent infestation	SES Score	Response
1.	PK 10306-15-5	13.57	3	MR
2.	PK 10306-15-5	13.57	3	MR
3.	PK10355-13-1-1	14.57	3	MR
4.	PK 10749-18-1-1	14.79	3	MR
5.	PK10350-7-2-1	15.20	3	MR
6.	PK10683-12-1	15.90	3	MR
7.	PK10348-7-1-3	16.56	3	MR
8.	PK PB-8	16.97	3	MR
9.	PK10395-8-1-1	19.20	3	MR
10.	PK 9444-8-1-2	26.30	5	MS
11.	PK 10967-30-1	30.27	5	MS
12.	PK9533-9-6-1-1	30.42	5	MS
13.	PK10495-7-3-1	31.11	5	MS
14.	PK10820-8-1	31.30	5	MS
15.	PK9748-16-2-1	32.32	5	MS
16.	PKBB 15-6	32.50	5	MS

S.#	Line/variety	Percent infestation	SES Score	Response
17.	PK10198-7-2	32.82	5	MS
18.	PK10473-3-1-1	32.96	5	MS
19.	PK9966-10-1	36.25	7	S
20.	PK 9194-54-1-2-2	36.42	7	S
21.	PK10434-6-2-1	36.75	7	S
22.	PK10161-1-5-1	38.10	7	S
23.	PK 10029-13-2-1	38.18	7	S
24.	PK 10324-1-1	38.67	7	S
25.	PK 10101	39.58	7	S
26.	PK10355-13-2-1	41.24	7	S
27.	PK10383-5-1-1	41.39	7	S
28.	PK10436-2-1-1	41.65	7	S
29.	PK 10969-39-1	42.01	7	S
30.	PK10344-12-1-1	44.45	7	S
31.	PK9699-6-2-1	44.72	7	S
32.	PK10356-10-1-1	44.81	7	S
33.	PKBB 15-1	45.39	7	S
34.	PK10395-1-1-1	46.23	7	S
35.	PK10419-2-1-1	47.67	7	S
36.	PK BB 15-8	50.10	7	S

Table 10: Percentage infestation record of rice leaffolder on coarse lines/ varieties.

S.#	Line/ variety	Percent infestation	SES Score	Response
1.	KSK 476	13.12	3	MR
2.	RC- 8	17.31	3	MR
3.	KSK 483	17.84	3	MR
4.	KSK 485	18.04	3	MR
5.	IR 73014-59	19.36	3	MR
6.	KSK 482	20.49	3	MR
7.	ZCHIF	20.55	5	MS
8.	RC- 7	21.21	5	MS
9.	KSK 484	25.63	5	MS
10.	KSK 434	25.91	5	MS
11.	KSK 487	26.07	5	MS
12.	KSK 486	26.97	5	MS
13.	RC- 5	28.08	5	MS
14.	RC- 6	29.55	5	MS
15.	PK 9259-4-1-1	32.16	5	MS
16.	KSK 133	32.94	5	MS
17.	KSK 488	32.95	5	MS
18.	PK 9832-45-1-4-1	40.06	7	S

Table 11: Resume of response of lines/ varieties against rice leaffolder

Lines/ Varieties	Total	Moderately Resistant	Moderately Susceptible	Susceptible
Fine	36	09	09	18
Coarse	18	06	11	01
Total	**54**	**15**	**20**	**19**

TITLE 12:	**SCREENING OF INSECTICIDES FOR THE EFFECTIVE CONTROL OF RICE LEAFFOLDER UNDER FIELD CONDITIONS**
OBJECTIVE	❖ To evaluate different insecticides for the effective control of rice leaffolder.
	❖ To study the bio-efficacy of different insecticides against beneficial fauna.
RESEARCH WORKERS	Mr. Muhammad Rizwan
	Mr. Zafar Ullah Shah
PROJECT DURATION	2018- 19
LOCATION	Kala Shah Kaku

	Variety	Basmati 515
	Weedicide application rate	Acetachlor @ 100ml/ acre
	Fertilizer application rate	133-85-62 (NPK Kg/ ha)
	Lay out	RCBD (replicated thrice)
	Plot size	12.66m^2
PLAN OF WORK	Time of insecticide application	At ETL
		August (02 folded leaves/ larvae per plant)
		September (03 folded leaves/ larvae per plant)
	Time of recording observations	Post- treatment data recorded after 72 hours and a week of treatment application.

METHODOLOGY The observations regarding rice leaffolder will be taken on the basis of folded leaves/ larvae per plant. Effect of insecticides on beneficial fauna recorded from five plants after one week of treatment application.

Statistical analysis will be done for all the parameters studied during the experimentation by using Statistix 8.1.

PREVIOUS YEAR'S RESULTS   Effectiveness of insecticides against leaffolder is given as under.

Table 12:   Insecticides used against rice leaffolder

Sr. #	Candidate insecticides	Common Name	Standard insecticides	Common Name
1.	Tri super 40EC JBL	triazophos	Trizone 40EC SUNCROP	Triazophos
2.	Belt 480SC BAYER	flubendiamide	Virtako 405WG SYNGENTA	thiamethoxam + chlorantraniliprole

Table 13:   Pre and post- treatment number of folded leaves or larvae of leaffolder per plant after 72 hours and a week

S. #	Treatment	Dose/ acre	Pre- treatment (number)	Post- treatment			
				Relative progression in average number after		Percent mortality after	
				72 hours	Week	72 hours	Week
1.	Tri zone	600ml	3.51	0.72 b	0.27 b	97.21 a	96.76 a
2.	Tri super	600ml	2.64	0.22 b	0.17 b	97.58 a	97.53 a
3.	Belt	20ml	4.87	0.87 b	0.46 b	96.00 a	95.60 a
4.	Virtako	40g	5.75	0.58 b	0.24 b	94.83 a	94.49 a
5.	Control	-	5.40	6.46 a	12.07 a	0.00 b	0.00 b
			LSD	2.279	3.127	3.156	3.134

Table 14:   Impact of insecticides used against brown planthopper on field population of beneficial fauna per 5 plants

S. #	Treatment	Pre-treatment (number)	Post- treatment	
			Average number	Survival percentage
1.	Tri zone	1.80	0.93 a	54.37
2.	Tri super	1.60	0.80 a	51.12
3.	Belt	1.73	1.00 a	64.85
4.	Virtako	2.00	1.07 a	100.00
5.	Control	2.07	2.47 b	111.11
	LSD	NS	0.569	50.135

TITLE 13:   **SUPPRESSION OF INSECT PESTS OF ORGANIC RICE WITH BOTANICAL INSECTICIDE(S)**

OBJECTIVE   To study the effectiveness of botanical insecticides against target pests under in vitro. and field conditions

RESEARCH WORKERS   Mr. Muhammad Rizwan

Mr. Zafar Ullah Shah

PROJECT DURATION	2018- 19
LOCATION	Kala Shah Kaku

METHODOLOGY	*In- vitro studies:*

Botanicals will be used against target pest in lab conditions to study their effectiveness.

In field application:

The Botanical insecticides applied at following ETL of respective pest insects after pest scouting.

Stem borers

➢ 05% deadheart OR
➢ 08-10 moths/ trap/ night

Leaffolder

▪ 02 folded leaves per plant (July- August) OR
▪ 03 folded leaves per plant (September- October)

The botanicals used against the target pests in field are as under:

Table 15: Effectiveness of botanical insecticides against leaffolder

Date	*Botanical insecticide*	*Dose/ acre*	*No. of folded leaves/ larvae*		
			Pre- treatment	*Post-treatment after 72hours*	*Percent Control*
13.09.2017	Neem extract	75g/l	2.26	1.30	42.48
18.09.2017	Tobacco leaves extract	125gm	2.15	1.15	46.51
25.09.2017	Tobacco leaves extract	125gm	2.30	1.25	45.65
02.10.2017	Bacterial formulation (*Empedobacter* spp.)	100ml	2.32	0.98	57.76
09.10.2017	Achta (Azadirachtin (1 % w/w) + Neem Oil (30% w/w)	400- 600ml	2.40	1.31	45.42

TITLE 14:	RICE LEAFFOLDER CONTROL BY USING ROPE DRAGGING
OBJECTIVE	To suppress leaffolder population by using rope dragging to dislodge the feeding larvae from leaves
RESEARCH WORKERS	Dr. Arshed Makhdoom Sabir Mr. Zafar Ullah Shah
PROJECT DURATION	2018- 19
LOCATION	Kala Shah Kaku
METHODOLOGY	Two rope draggings will be made at ETL (two folded leaves per plant) in two opposite directions, moistened with kerosene oil to dislodge the feeding caterpillars of leaffolder. The post- treatment data will be recorded after 72 hours and a week of treatment application.

Table 16: **Effectiveness of rope dragging against leaffolder**

Date	Number of leaffolder/ plant		Percent Control
	Pre- dragging	*Post- dragging (after 72 hours)*	
13.09.2017	2.45	1.23	49.80
18.09.2017	2.31	1.05	54.55

TITLE 15:	MONITORING OF RICE INSECT PESTS IN ORGANIC RICE BY USING PHEROMONE TRAPS
OBJECTIVE	To monitor the occurrence of rice stem borers and leaffolder for their temporal mapping and proper control
RESEARCH WORKERS	Dr. Arshed Makhdoom Sabir Mr. Zafar Ullah Shah
PROJECT DURATION	2018- 19
LOCATION	Kala Shah Kaku
METHODOLOGY	The delta trap one each for white stem borer, yellow stem borer and leaffolder will be used to monitor their population In the field for their timely control. The data will be collected by counting the trapped insects on weekly basis.
PREVIOUS YEAR'S RESULTS	Three delta traps were used to monitor borers and leaffolder.

TITLE 16:	COMPARATIVE POPULATION STUDIES OF DIFFERENT RICE PEST INSECTS ON LIGHT TRAP
OBJECTIVE	To study the population fluctuations of major rice pest Insects viz., rice stem borers and leaffolder
RESEARCH WORKERS	Mr. Zafar Ullah Shah
	Dr. Arshed Makhdoom Sabir
PROJECT DURATION	2018- 19
LOCATION	Kala Shah Kaku
TREATMENT	Natural conditions
METHODOLOGY	The pest insects attracted on the light trap will be collected/ monitored daily and identified in Entomology Laboratory. The weekly/ monthly record of following insects will be maintained for population studies.

A) **Stem borers**

i) White borer- *Scirpophaga innotata* (Wlk.)
ii) Yellow borer- *Scirpophaga incertulas* (Wlk.)
iii) Pink borer- *Sesamia inferens* (Wlk.)
B) **Rice leaffolder**
   Cnaphalocrocis medinalis (Gn.)

Table 17:   Trap catches of pest insects of rice

Month	White stem borer		Pink stem borer		Yellow stem borer		Rice Leaffolder	
Year	*2016*	*2017*	*2016*	*2017*	*2016*	*2017*	*2016*	*2017*
March	0	**0**	156	**56**	0	**0**	0	**0**
April	0	**2**	85	**25**	3	**1**	0	**0**
May	0	**5**	0	**0**	3	**0**	0	**0**
June	0	**0**	0	**0**	0	**0**	0	**0**
July	0	**0**	0	**0**	0	**0**	0	**0**
August	5	**13**	1	**0**	0	**3**	0	**6**
September	382	**219**	0	**7**	0	**18**	142	**200**
October	18	**3**	0	**64**	06	**0**	55	**47**
November	0	**0**	0	**23**	0	**0**	0	**0**
Total	405	**242**	242	**175**	12	**22**	197	**253**
Trend		⬇		⬇		⬆		⬆

TITLE 17:	SCREENING OF INSECTICIDES FOR THE EFFECTIVE CONTROL OF RICE STEM BORERS UNDER FIELD CONDITIONS
OBJECTIVE	❖ To evaluate different insecticides for the effective control of rice stem borers.

❖ To study the bio-efficacy of different insecticides against beneficial fauna.

RESEARCH WORKERS	Mr. Muhammad Rizwan Dr. Arshed Makhdoom Sabir
PROJECT DURATION	2018- 19
LOCATION	Kala Shah Kaku
TREATMENT	The number of treatments will depend upon the availability of insecticides samples provided by Entomological Research Institute, Faisalabad.

PLAN OF WORK

Variety	Basmati 515
Weedicide application rate	Acetachlor @ 100ml/ acre
Fertilizer application rate	133-85-62 (NPK Kg/ ha)
Lay out	RCBD (replicated thrice)
Plot size	12.66m^2
Time of insecticide application	at ETL (5% Deadheart)
Time of recording observations	Deadheart (7 days after insecticide application) Whitehead (10 days before crop harvest)
Data observations	Infestation was below ETL (5% infestation)

METHODOLOGY	The test insecticides will be applied at economic threshold level. The pre and post- treatment observations will be recorded in terms of deadheart and whitehead tillers in treated and untreated plots from central 100 hills. Effect of insecticides on beneficial fauna will be recorded from 05 plants after a week of treatment application. Statistical analysis will be done for all the parameters studied during the experimentation.
PREVIOUS YEAR'S RESULTS	As no ETL of stem borers (5% deadheatrs) attained in the experiment so no insecticides were tested for their effectiveness.

TITLE 18:	**SCREENING OF BREEDING MATERIAL FOR RESISTANCE AGAINST RICE STEM BORER UNDER FIELD CONDITIONS**
OBJECTIVE	To select breeding material/ lines resistant to rice stem borer.
RESEARCH WORKERS	Mr. Bilal Atta Mr. Zafar Ullah Shah

PROJECT DURATION	2018- 19
LOCATION	Kala Shah Kaku
TREATMENT	Seed of fine and coarse grain advance lines will be collected from Plant Breeding Section.

PLAN OF WORK	Weedicide application rate	Acetachlor @ 100ml/ acre
	Fertilizer application rate	❖ Fine: 133-85-62 (NPK Kg/ ha)
		❖ Coarse: 170-100-62 (NPK Kg/ ha)
	Lay out	Non replicated (Two rows of each line/ variety with 45 plants in each row)
	Insecticide	No insecticide will be applied.
	Recording of data	Borer attack will be recorded in terms of dead heart and whitehead tillers as under:

$$\frac{Infested\ tillers}{Total\ tillers} \times \frac{Infested\ hills}{Total\ hills} \times 100$$

METHODOLOGY	Data regarding borers' infestation will be recorded by counting the number of deadheart and whitehead tillers. The deadheartwill be recorded 45 days after transplanting while the white heads will be recorded 10 days before the crop harvest.Data regarding infestation will be compared with Standard Evaluation System for Rice, 2002 developed by the IRRI, Philippine.
PREVIOUS YEAR'S RESULTS	As neither the infestation of stem borers reached at least 20%deadheart, nor 10% whitehead in both coarse and fine grain lines, so protocol of **Standard Evaluation System** for rice was not applied.

RICE TECHNOLOGY

1.	**TITLE**	**STUDIES ON PHYSICOCHEMICAL CHARACTERISTICS OF COARSE GRAIN RICE YIELD TRIAL- A.**
	OBJECTIVE	To evaluate the rice lines planted in Coarse grain Yield Trials possessing desirable grain quality characteristics.
	RESEARCH WORKER	Mohsin Ali Raza
	PROJECT DURATION	2018-19 (continuous)
	LOCATION	Kala Shah Kaku
	PLAN OF WORK	Lines = 8 or more Check = KSK 133 Data to be recorded: average grain length, width, thickness cooked grain length, bursting upon cooking, elongation ratio.
	PREVIOUS YEAR'S RESULTS	The results are given in the following table.

Table 1: PHYSICOCHEMICAL CHARACTERISTICS OF COARSE GRAIN YIELD TRIAL- A (2017-18)

Sr. No	Line No.	Milling Recovery			Rice grain measurements (mm)			Cooking Quality		
		BR %	TMR %	HR %	Length	Width	Thick ness	CGL (mm)	Br (%)	E/R
1	KSK 512	80.0	70.0	46.0	7.06	1.88	1.56	10.3	3.0	1.46
2	KSK 513	81.0	71.0	54.0	6.84	1.96	1.66	10.4	2.0	1.52
3	KSK 514	80.0	70.0	51.0	7.28	1.92	1.64	11.2	4.0	1.54
4	KSK 515	81.0	71.0	40.0	7.10	1.38	1.76	11.5	9.0	1.62
5	KSK 516	80.0	70.0	39.0	7.70	1.78	1.86	11.4	3.0	1.48
6	KSK 517	80.0	70.0	44.0	7.40	1.92	1.67	12.0	4.0	1.62
7	KSK 518	80.0	71.0	47.0	6.72	1.85	1.80	10.8	11.0	1.61
8	KSK 519	80.0	70.0	25.0	6.44	1.36	1.62	10.7	5.0	1.66
9	KSK 520	80.0	67.0	34.0	8.06	1.74	1.58	12.1	2.0	1.51

10	KSK 521	80.0	70.0	52.0	6.92	2.04	1.66	10.4	7.0	1.51
11	KSK 522	80.0	70.0	57.0	7.14	1.84	1.68	11.7	30.0	1.64
12	KSK 523	81.0	69.0	45.0	7.82	1.62	1.54	11.9	9.0	1.52
13	KSK 133 (Ch)	80.0	69.0	47.0	7.18	2.04	1.66	12.3	12.0	1.73
14	KSK 434 (Ch)	80.0	68.0	46.0	7.42	1.92	1.66	11.4	2.0	1.54

CGL = Cooked Grain Length; Br = Bursting upon cooking E/R= elongation ratio

2.	TITLE	STUDIES ON PHYSICOCHEMICAL CHARACTERISTICS OF COARSE GRAIN RICE YIELD TRIAL- B.
	OBJECTIVE	To evaluate the rice lines planted in Coarse grain Yield Trials possessing desirable grain quality characteristics.
	RESEARCH WORKER	Farah Shamim
	PROJECT DURATION	2018-19 (continuous)
	LOCATION	Kala Shah Kaku
	PLAN OF WORK	Lines = 10 Checks = KSK 133 Data to be recorded: average grain length, width, thickness cooked grain length, bursting upon cooking, elongation ratio and alkali spreading value.
	PREVIOUS YEAR'S RESULTS	The results are given in the following table.

Table 2: PHYSICOCHEMICAL CHARACTERISTICS OF COARSE GRAIN YIELD TRIAL- B (2017-18)

Sr. No	Line No / variety.	Milling Recovery			Rice grain measurements (mm)			Cooking Quality		
		BR %	TMR %	HR %	Length	Width	Thickness	CGL (mm)	Br (%)	E/R
1	KSK 499	77.0	65.0	33.0	6.48	2.04	1.56	10.2	14.0	1.57
2	KSK 500	81.0	67.0	33.0	6.72	5.82	1.64	10.0	50.0	1.48
3	KSK 501	80.0	67.0	49.0	6.90	1.90	1.56	10.8	9.0	1.56
4	KSK 502	81.0	72.0	47.0	6.62	1.96	1.64	10.1	6.0	1.53

5	KSK 503	81.0	68.0	47.0	6.92	1.98	1.64	11.7	20.0	1.69
6	KSK 504	81.0	70.0	40.0	7.20	1.94	1.70	11.6	2.0	1.61
7	KSK 505	81.0	72.0	47.0	7.36	2.10	1.70	13.5	3.0	1.84
8	KSK 506	81.0	67.0	47.0	6.56	1.76	1.56	11.2	7.0	1.70
9	KSK 507	81.0	72.0	29.0	6.16	2.46	1.72	10.3	15.0	1.67
10	KSK 508	80.0	68.0	29.0	6.50	1.94	1.60	10.9	70.0	1.67
11	KSK 509	81.0	68.0	44.0	6.64	1.98	1.62	11.5	25.0	1.73
12	KSK 510	78.0	67.0	25.0	6.40	1.9	1.6	11.0	60.0	1.72
13	KSK 511	78.0	67.0	34.0	6.80	1.92	1.64	11.6	4.0	1.71
14	KSK 434 (Ch)	81.0	68.0	49.0	7.00	2.06	1.70	10.2	3.0	1.46

CGL = Cooked Grain Length; Br = Bursting upon cooking E/R= elongation ratio

3. **TITLE** **STUDIES ON PHYSICOCHEMICAL CHARACTERISTICS OF COARSE GRAIN RICE YIELD TRIAL - C**

OBJECTIVE To evaluate the rice lines planted in Coarse grain Yield Trials possessing desirable grain quality characteristics.

RESEARCH WORKER Farah Shamim

PROJECT DURATION 2018-19 (Continuous)

LOCATION Kala Shah Kaku

PLAN OF WORK
Entries   = 6 or more
Checks   = KSK 133
Data to be recorded: average grain length, width, thickness cooked grain length, bursting upon cooking, elongation ratio.

PREVIOUS YEAR'S RESULT For previous year, the lines of this trial were deleted by the breeding section.

Table 3: PHYSICOCHEMICAL CHARACTERISTICS OF COARSE GRAIN YIELD TRIAL- C (2017-18)

S. No	Line No / Variety.	Milling Recovery			Rice grain measurements (mm)			Cooking Quality		
		BR %	TMR %	HR %	Length	Width	Thick ness	CGL (mm)	Br (%)	E/R
1	KSK 489	81.0	70.0	51.0	6.90	1.94	1.74	11.0	6.0	1.594
2	KSK 490	80.0	68.0	49.0	7.06	2.12	1.76	11.1	2.0	1.572
3	KSK 491	80.0	69.0	52.0	6.90	2.06	1.62	11.6	3.0	1.681
4	KSK 492	80.0	69.0	49.0	6.94	2.00	1.72	12.2	5.0	1.758
5	KSK 493	79.0	68.0	47.0	6.92	2.20	1.68	10.1	16.0	1.460
6	KSK 494	80.0	70.0	36.0	6.88	2.02	1.70	10.4	60.0	1.512
7	KSK 495	79.0	68.0	48.0	7.02	1.98	1.69	12.3	8.0	1.752
8	KSK 496	78.0	67.0	40.0	7.18	1.98	1.66	12.2	2.0	1.699
9	KSK 497	80.0	68.0	46.0	6.74	2.00	1.64	11.4	1.0	1.691
10	KSK 498	80.0	71.0	37.0	6.92	2.10	1.70	13.0	9.0	1.879
11	KSK 434 (Ch)	80.0	69.0	44.0	7.24	1.92	1.70	12.0	7.0	1.657

CGL = Cooked Grain Length; Br = Bursting upon cooking E/R= elongation ratio

4	TITLE	STUDIES ON PHYSICOCHEMICAL CHARACTERISTICS OF COARSE GRAIN NATIONAL UNIFORM RICE YIELD TRIALS
	OBJECTIVE	To evaluate the rice breeding material (strains / lines) provided by PARC for desirable grain quality characteristics.
	RESEARCH WORKER	Farah Shamim
	PROJECT DURATION	2018-19 (Continuous)
	LOCATION	Kala Shah Kaku
	TREATMENT	The material will be received from the Pakistan Agricultural Research Council, Islamabad through Breeding Section of this Institute, under code numbers.
	PLAN OF	The Breeding Section will provide the samples and data for milling recovery,

| WORK | average grain length, width, thickness cooked grain length, bursting upon cooking and elongation ratio will be recorded. |

| PREVIOUS YEAR'S RESULTS | The results are given in the following table. |

Table 4: QUALITY CHARACTERISTICS OF COARSE GRAIN NATIONAL UNIFORM RICE YIELD TRIALS (2017-18)

S. No	PARC Code	Milling Recovery (%)			Rice grain measurements (mm)			Cooking Quality		
		BR	TMR	HR	Length	Width	Thickness	CGL (mm)	B (%)	E/R
1	CR-1	76.0	68.0	53.0	6.84	1.94	1.58	12.6	1.0	1.842
2	CR-2	77.0	67.0	44.0	6.44	2.12	1.56	12.1	3.0	1.879
3	CR-3	76.0	66.0	56.0	6.48	2.28	1.58	10.8	0.0	1.667
4	CR-4	77.0	68.0	54.0	6.90	2.08	1.56	10.7	2.0	1.551
5	CR-5	78.0	68.0	45.0	6.54	2.06	1.60	10.1	2.0	1.544
6	CR-6	78.0	69.0	41.0	6.60	2.26	1.64	11.4	9.0	1.727
7	CR-7	78.0	68.0	54.0	6.86	2.02	1.58	11.6	3.0	1.691
8	CR-8	77.0	66.0	53.0	7.14	2.08	1.64	12.0	5.0	1.681
9	CR-9	79.0	68.0	57.0	6.90	2.02	1.58	10.1	6.0	1.464
10	CR-10	80.0	70.0	61.0	6.78	2.02	1.64	11.5	4.0	1.696
11	CR-11	80.0	68.0	50.0	6.28	1.82	1.54	12.1	5.0	1.927
12	CR-12	78.0	66.0	53.0	7.16	2.00	1.60	12.0	10.0	1.676
13	CR-13	79.0	69.0	58.0	7.60	1.84	1.66	11.9	2.0	1.566
14	CR-14	79.0	68.0	57.0	7.04	2.06	1.68	12.5	8.0	1.776
15	CR-15	79.0	68.0	56.0	6.78	2.00	1.56	12.0	2.0	1.770

TMR = Total milled rice, HR = Head rice, CGL = Cooked Grain Length; B= Bursting upon cooking, E/R= elongation ratio;

| 5 | TITLE | **STUDIES ON PHYSICOCHEMICAL CHARACTERISTICS OF COARSE GRAIN RICE REGIONAL ADAPTABILITY YIELD TRIALS** |

OBJECTIVE	To evaluate the quality performance of the most promising rice strains at different locations of the Punjab province.
RESEARCH WORKER	Farah Shamim
PROJECT DURATION	2018-19 (Continuous)
LOCATIONS	Gujranwala, Farooqabad, Faisalabad, Sargodha and Kala Shah Kaku.
PLAN OF WORK	Strains/lines = 7, check = KSK 133

The Breeding Section will provide the samples and data for average grain length, width, thickness cooked grain length, bursting upon cooking, elongation value will be recorded |
| **PREVIOUS YEAR'S RESULTS** | The results are given in the following table. |

Table 5: Milling recovery of Coarse grain rice regional adaptability yield trials (2017-18)

Location	Farooqabad			Gujranwala			Faisalabad		
Line	BR (%)	TMR (%)	HR (%)	BR (%)	TMR (%)	HR (%)	BR (%)	TMR (%)	HR (%)
KSK 434 (Ch)	81.0	72.0	64.0	79.0	71.0	61.0	82.0	72.0	57.0
KSK 449	79.0	71.0	59.0	80.0	71.0	53.0	81.0	70.0	54.0
KSK 476	81.0	73.0	53.0	80.0	71.0	61.0	81.0	72.0	60.0
KSK 480	80.0	72.0	60.0	81.0	71.0	50.0	82.0	70.0	61.0
KSK 481	80.0	71.0	57.0	81.0	73.0	65.0	81.0	70.0	55.0
PK 7688	81.0	70.0	53.0	82.0	72.0	60.0	81.0	71.0	50.0
PK 9379	81.0	72.0	54.0	80.0	72.0	61.0	82.0	71.0	64.0
Average	**80.42**	**71.57**	**57.14**	**80.43**	**71.57**	**58.71**	**81.43**	**70.86**	**57.29**

BR = Brown Rice, TMR = Total milled rice, HR = Head rice

Table 6: Milling recovery of Coarse grain rice regional adaptability yield trials (2017-18)

Location	KSK			Sargodha		
Line	BR (%)	TMR (%)	HR (%)	BR (%)	TMR (%)	HR (%)
KSK 434 (Ch)	80.0	72.0	64.0	81.0	71.0	54.0
KSK 449	81.0	71.0	56.0	81.0	67.0	53.0
KSK 476	81.0	72.5	65.0	81.0	72.0	58.0
KSK 480	81.0	71.0	59.5	81.0	72.0	56.0
KSK 481	81.0	73.0	60.0	81.0	72.0	59.0
PK 7688	81.0	71.0	54.0	80.0	71.0	56.0
PK 9379	81.0	71.0	63.0	79.0	70.0	51.0
Average	**80.86**	**71.64**	**60.21**	**80.57**	**70.71**	**55.29**

BR = Brown Rice, TMR = Total milled rice, HR = Head rice

Table 7: Cooking quality of coarse grain rice regional adaptability yield trials (2017-18)

Location	Farooqabad			Gujranwala			Faisalabad		
Line	CGL (mm)	B (%)	E/R	CGL (mm)	B (%)	E/R	CGL (mm)	B (%)	E/R
KSK 434	11.0	3.0	1.467	12.0	4.0	1.615	11.6	4.0	1.652
KSK 449	10.7	4.0	1.583	11.5	3.0	1.684	10.5	0.0	1.606
KSK 476	10.5	7.0	1.544	10.7	3.0	1.466	10.7	0.0	1.583
KSK 480	10.8	0.0	1.598	11.0	6.0	1.692	11.0	6.0	1.724
KSK 481	10.0	0.0	1.563	10.8	4.0	1.636	10.2	3.0	1.579
PK 7688	11.0	4.0	1.480	13.0	7.0	1.654	12.2	5.0	1.837
PK 9379	12.0	3.0	1.724	13.2	5.0	1.859	13.0	4.0	2.012
Average	**10.86**	**3.00**	**1.565**	**11.74**	**4.57**	**1.656**	**11.31**	**3.14**	**1.711**

CGL = Cooked Grain Length; B= Bursting upon cooking; E/R = Elongation Ratio

Table 8: Cooking quality of coarse grain rice regional adaptability yield trials (2017-18)

Location	KSK			Sargodha		
Line	CGL (mm)	B (%)	E/R	CGL (mm)	B (%)	E/R
KSK 434 (Ch)	13.3	3.0	1.773	11.2	4.0	1.573
KSK 449	12.0	3.0	1.732	11.0	6.0	1.580
KSK 476	10.4	2.0	1.617	10.5	0.0	1.567
KSK 480	11.2	3.0	1.769	11.0	7.0	1.632
KSK 481	11.2	2.0	1.600	10.2	2.0	1.569
PK 7688	12.5	5.0	1.667	12.2	6.0	1.649
PK 9379	12.5	3.0	1.736	11.6	4.0	1.657
Average	**11.87**	**3.00**	**1.701**	**11.10**	**4.14**	**1.604**

CGL = Cooked Grain Length; B= Bursting upon cooking; E/R = Elongation Ratio

Table 9: Grain Dimension of Coarse Grain Regional Adaptability Trial (2017-18)

Location	Farooqabad			Gujranwala			Faisalabad		
Line	L	W	T	L	W	T	L	W	T
KSK 434	7.50	2.0	1.8	7.43	1.93	1.80	7.02	1.94	1.72
KSK 449	6.76	2.0	1.56	6.83	2.26	1.80	6.54	2.12	1.74
KSK 476	6.80	2.0	1.63	7.30	2.10	1.73	6.76	2.0	1.70
KSK 480	6.76	2.1	1.76	6.50	2.06	1.63	6.38	2.02	1.70
KSK 481	6.40	2.2	1.80	6.60	2.40	1.70	6.46	2.32	1.66
PK 7688	7.43	2.0	1.80	7.86	1.90	1.76	6.64	1.86	1.68
PK 9379	6.96	2.0	1.70	7.10	2.06	1.73	6.46	1.98	1.70
Average	**6.94**	**2.04**	**1.72**	**7.09**	**2.10**	**1.74**	**6.61**	**2.03**	**1.70**

L = Average Grain Length, W = Average Grain Width, T = Average Grain Thickness

Table 10: Grain Dimension of Coarse Grain Regional Adaptability Trial (2017-18)

Location	KSK			Sargodha		
Line	**L**	**W**	**T**	**L**	**W**	**T**
KSK 434 (Ch)	7.50	1.83	1.76	7.12	1.98	1.74
KSK 449	6.93	2.03	1.66	6.96	2.06	1.72
KSK 476	6.43	2.30	1.66	6.70	1.96	1.72
KSK 480	6.33	2.00	1.76	6.74	2.08	1.74
KSK 481	7.0	1.96	1.70	6.50	2.36	1.80
PK 7688	7.50	2.26	1.83	7.40	2.10	1.90
PK 9379	7.20	1.93	1.80	7.00	2.00	1.68
Average	**6.98**	**2.04**	**1.74**	**6.92**	**2.08**	**1.76**

L = Average Grain Length, W = Average Grain Width, T = Average Grain Thickness

6	TITLE	STUDIES ON PHYSICOCHEMICAL CHARACTERISTICS OF FINE GRAIN RICE REGIONAL ADAPTABILITY YIELD TRIALS
	OBJECTIVE	To evaluate the quality performance of the most promising rice strains at different locations of the Punjab province.
	RESEARCH WORKER	Mohsin Ali Raza
	PROJECT DURATION	2018-19 (Continuous)
	LOCATIONS	Gujranwala, Farooqabad, Faisalabad, Sargodha and Kala Shah Kaku.
	PLAN OF WORK	Strains/lines = 8, check = Basmati 515

The Breeding Section will provide the samples and data for average grain length, width, thickness cooked grain length, bursting upon cooking, elongation ratio and alkali spreading value will be recorded

PREVIOUS YEAR'S RESULTS

The results are given in the following table.

Table 11: Milling recovery of fine grain rice regional adaptability yield trials (2017-18)

Location	Farooqabad			Gujranwala			Faisalabad		
Line	BR (%)	TMR (%)	HR (%)	BR (%)	TMR (%)	HR (%)	BR (%)	TMR (%)	HR (%)
PK 8892-4-3-1-1	80.0	67.0	44.0	80.0	68.0	25.0	80.0	70.0	40.0
PK 9194	75.0	68.0	28.0	80.0	70.0	40.0	80.0	71.0	53.0
PK BB-15-1	78.0	66.0	38.0	80.0	68.0	46.0	80.0	70.0	35.0
PK BB-15-6	79.0	67.0	38.0	77.0	67.0	40.0	79.0	67.0	39.0
PK PB-8	78.0	67.0	18.0	79.0	68.0	35.0	80.0	68.0	28.0
PK 8892-4-2-1-1	78.0	67.0	52.0	79.0	68.0	51.0	81.0	70.0	56.0
RRI-3	78.0	66.0	25.0	80.0	68.0	28.0	81.0	68.0	37.0
Bas 515 (Ch)	79.0	68.0	51.0	80.0	70.0	55.0	78.0	66.0	50.0
Average	**78.1**	**67.0**	**36.8**	**79.4**	**68.4**	**40.0**	**79.9**	**68.8**	**42.3**

BR = Brown Rice, TMR = Total milled rice, HR = Head rice

Table 12: Milling recovery of fine grain rice regional adaptability yield trials (2017-18)

Location	KSK			Sargodha		
Line	BR (%)	TMR (%)	HR (%)	BR (%)	TMR (%)	HR (%)
PK 8892-4-3-1-1	76.0	66.0	48.0	80.0	68.0	53.0
PK 9194	76.0	63.0	44.0	80.0	71.0	50.0
PK BB-15-1	78.0	67.0	44.5	79.5	68.0	42.5
PK BB-15-6	81.0	70.0	44.0	79.0	68.0	48.0
PK PB-8	76.0	61.0	44.0	80.0	70.0	40.0
PK 8892-4-2-1-1	76.0	64.0	30.0	80.0	68.0	52.5
RRI-3	76.0	61.0	38.0	79.0	68.0	41.0
Bas 515 (Ch)	80.0	70.0	56.0	77.0	67.0	50.0

| Average | 77.4 | 65.3 | 43.6 | 79.3 | 68.5 | 47.1 |

BR = Brown Rice, TMR = Total milled rice, HR = Head rice

Table 13: Cooking quality of Fine grain rice regional adaptability yield trials (2017-18)

Location	Farooqabad			Gujranwala			Faisalabad		
Line	CGL (mm)	B (%)	E/R	CGL (mm)	B (%)	E/R	CGL (mm)	B (%)	E/R
PK 8892-4-3-1-1	12.7	6.0	1.764	13.3	3.0	1.790	14.0	3.0	1.931
PK 9194	13.3	7.0	1.663	13.8	3.0	1.833	12.0	7.0	1.683
PK BB-15-1	12.5	5.0	1.424	12.5	8.0	1.603	11.0	9.0	1.647
PK BB-15-6	13.0	9.0	1.733	13.5	4.0	1.800	12.0	5.0	1.660
PK PB-8	16.0	4.0	1.951	17.1	3.0	2.250	16.3	6.0	2.002
PK 8892-4-2-1-1	13.7	7.0	1.730	13.5	4.0	1.718	11.7	7.0	1.585
RRI-3	17.0	11.0	2.179	17.0	4.0	2.048	17.0	5.0	2.053
Bas 515 (Ch)	14.3	6.0	1.919	15.0	3.0	1.984	14.1	5.0	1.908
Average	**14.1**	**6.9**	**1.795**	**14.5**	**4.0**	**1.878**	**13.5**	**5.9**	**1.809**

CGL = Cooked Grain Length; B= Bursting upon cooking; E/R = Elongation Ratio

Table 14: Cooking quality of Fine grain rice regional adaptability yield trials (2017-18)

Location	KSK			Sargodha		
Line	CGL (mm)	B (%)	E/R	CGL (mm)	B (%)	E/R
PK 8892-4-3-1-1	15.0	3.0	1.995	12.0	5.0	1.695
PK 9194	11.7	3.0	1.577	13.2	4.0	1.784
PK BB-15-1	12.4	2.0	1.566	12.0	2.0	1.412
PK BB-15-6	14.5	5.0	1.954	14.2	2.0	1.911
PK PB-8	16.4	2.0	2.147	15.7	4.0	2.133
PK 8892-4-2-1-1	12.6	5.0	1.667	14.0	4.0	1.887

RRI-3	16.7	3.0	2.057	17.5	5.0	2.134
Bas 515 (Ch)	15.1	2.0	1.992	14.2	7.0	1.945
Average	**14.3**	**3.1**	**1.869**	**14.1**	**4.1**	**1.863**

CGL = Cooked Grain Length; B= Bursting upon cooking; E/R = Elongation Ratio

Table 15: Grain Dimension of Fine Grain Regional Adaptability Trial (2017-18)

Location	Farooqabad			Gujranwala			Faisalabad		
Line	**L**	**W**	**T**	**L**	**W**	**T**	**L**	**W**	**T**
PK 8892-4-3-1-1	7.20	1.64	1.50	7.43	1.83	1.70	7.25	1.68	1.47
PK 9194	8.00	1.80	1.42	7.53	2.06	1.80	7.13	1.70	1.56
PK BB-15-1	8.78	1.70	1.48	7.80	2.10	1.73	6.68	2.18	1.70
PK BB-15-6	7.50	1.70	1.50	7.50	2.06	1.63	7.23	1.70	1.53
PK PB-8	8.20	1.80	1.50	7.60	2.00	1.70	8.14	1.76	1.52
PK 8892-4-2-1-1	7.92	1.80	1.56	7.86	1.90	1.76	7.38	1.74	1.60
RRI-3	7.80	1.42	1.80	8.30	2.06	1.73	8.28	1.78	1.52
Bas 515 (Ch)	7.45	1.42	1.75	7.56	1.70	1.61	7.39	1.74	1.62
Average	**7.86**	**1.66**	**1.56**	**7.70**	**1.96**	**1.71**	**7.44**	**1.79**	**1.57**

L = Average Grain Length, W = Average Grain Width, T = Average Grain Thickness

Table 16: Grain Dimension of Fine Grain Regional Adaptability Trial (2017-18)

Location	KSK			Sargodha		
Line	**L**	**W**	**T**	**L**	**W**	**T**
PK 8892-4-3-1-1	7.52	1.68	1.48	7.08	1.70	1.48
PK 9194	7.42	1.64	1.50	7.40	1.70	1.50

PK BB-15-1	7.92	1.72	1.54	8.50	1.70	1.53
PK BB-15-6	7.42	1.68	1.50	7.43	1.76	1.53
PK PB-8	7.64	1.74	1.48	7.36	1.70	1.56
PK 8892-4-2-1-1	7.56	1.70	1.48	7.42	1.70	1.54
RRI-3	8.12	1.72	1.48	8.20	1.70	1.53
Bas 515 (Ch)	7.58	1.71	1.60	7.30	1.73	1.62
Average	**7.65**	**1.70**	**1.51**	**7.59**	**1.71**	**1.54**

L = Average Grain Length, W = Average Grain Width, T = Average Grain Thickness

7.	**TITLE**	**EFFECT OF TRANSPLANTING TIME ON GRAIN QUALITY CHARACTERISTICS OF DIFFERENT COARSE GRAIN RICE LINES.**
	OBJECTIVE	To ascertain the optimum time (date) of transplanting for obtaining higher milling recovery and best cooking quality in advanced Coarse grain rice lines.
	RESEARCH WORKER	Farah Shamim
	PROJECT DURATION	2018-19 (continuous)
	LOCATION	Rice Research Institute, Kala Shah Kaku
	TREATMENT	Seven advanced Coarse grain rice lines planted at four different transplanting dates will be tested: viz.,

Dates of transplanting   Line / Varieties

D_1: 05-05-2017 MV_1: Lines will be provided by the
D_2: 27-05-2017 MV_2: Breeding Section including
D_3: 18-06-2017 MV_3: Standard Check
D_4: 10-07-2017 MV_4:
                               MV_5:
                                   MV_6:
                                  MV_7:
                                  MV_8:

	PLAN OF WORK	The field experiment will be carried out in split plot design with three repeats by Agronomy Section of this Institute. Transplanting dates will be kept in the main plots while varieties / lines in sub plots. After harvesting from the field, paddy samples will be provided by Agronomy Section. These samples will be cleaned, dried to 10 % moisture content and milled in the Rice Technology Laboratory. The data on milling recovery and cooking quality will be recorded.

The results are given in the following table.

Table 17: Milling Recovery of Coarse Grain Lines (2017-18)

location Line / Variety	5TH May 2017			27th May 2017			18th June 2017			10th July 2017		
	BR (%)	TMR (%)	HR (%)	BR (%)	TMR (%)	HR (%)	BR (%)	TMR (%)	HR (%)	BR (%)	TMR (%)	HR (%)
KSK 133 (Ch)	79.0	69.0	61.0	79.0	70.0	60.0	81.0	73.0	58.5	81.0	72.0	64.5
KSK 434	81.0	72.0	60.0	80.0	71.0	62.0	81.0	73.5	61.0	78.0	70.0	58.5
KSK 476	81.0	73.0	66.0	80.0	70.0	64.0	82.0	73.5	60.0	81.0	73.0	57.0
KSK 480	80.0	71.0	62.0	79.0	72.0	61.0	81.0	73.0	66.0	81.0	72.0	51.0
KSK 481	78.0	72.0	62.5	79.0	71.0	62.0	81.0	73.0	62.0	80.0	71.0	57.0
PK 9259	69.0	68.0	41.0	70.0	70.0	45.0	82.0	73.0	54.0	80.0	71.0	55.0
PK 9379	80.0	70.0	60.0	81.0	69.0	60.0	82.0	73.0	61.0	78.0	70.0	59.5
PK 7688	80.0	70.0	60.0	80.0	68.0	61.0	81.0	74.0	49.0	81.0	70.0	52.0
Average	**78.5**	**70.6**	**59.0**	**78.5**	**70.1**	**59.3**	**81.3**	**73.2**	**58.9**	**80.0**	**71.1**	**56.8**

BR = Brown Rice, TMR = Total milled rice & HR = Head rice

Table 18: Cooking Quality of different coarse grain rice lines (2017-18)

Location Line / Variety	5TH May 2017			27th May 2017			18th June 2017			10th July 2017		
	CGL (mm)	B (%)	E/R	CGL (mm)	B (%)	E/R	CGL (mm)	B (%)	E/R	CGL (mm)	B (%)	E/R
KSK 133 (Ch)	13.1	5.0	1.795	13.2	5.0	1.806	13.2	3.0	1.961	13.3	5.0	1.814
KSK 434	11.9	4.0	1.560	12.0	3.0	1.569	12.0	5.0	1.600	12.6	6.0	1.743
KSK 476	11.4	3.0	1.629	11.5	4.0	1.620	12.0	6.0	1.875	13.3	4.0	1.939
KSK 480	11.3	7.0	1.704	11.4	8.0	1.707	12.0	5.0	1.791	12.1	3.0	1.833
KSK 481	10.1	5.0	1.417	10.2	6.0	1.417	11.6	4.0	1.706	11.3	5.0	1.679
PK 9259	11.7	2.0	1.688	11.9	3.0	1.705	12.8	15.0	1.855	13.3	50.0	1.797
PK 9379	11.4	4.0	1.570	11.6	2.0	1.596	13.0	2.0	1.781	13.9	2.0	2.006
PK 7688	13.2	7.0	1.811	13.3	5.0	1.822	12.7	8.0	1.680	13.0	4.0	1.750

| Average | 11.8 | 4.6 | 1.647 | 11.9 | 4.5 | 1.655 | 12.4 | 6.0 | 1.781 | 12.9 | 9.9 | 1.820 |

CGL = Cooked Grain Length; B % = Bursting upon cooking, E/R = Elongation Ratio

Table 19: Grain dimensions of different Coarse grain rice lines (2017-18)

Location Line / Variety	5TH May 2017			27th May 2017			18th June 2017			10th July 2017		
	L (mm)	W (mm)	T (mm)	L (mm)	W (mm)	T (mm)	L (mm)	W (mm)	T (mm)	L (mm)	W (mm)	T (mm)
KSK 133 (Ch)	7.30	2.20	1.73	7.31	2.20	1.72	6.73	1.96	1.73	7.33	2.13	1.86
KSK 434	7.63	1.96	1.73	7.65	1.95	1.70	7.50	1.90	1.76	7.23	2.00	1.70
KSK 476	7.00	2.00	1.73	7.10	2.02	1.71	6.40	2.00	1.66	6.86	2.06	1.73
KSK 480	6.63	2.00	1.66	6.68	2.05	1.65	6.70	2.03	1.73	6.60	2.20	1.76
KSK 481	7.13	2.06	1.76	7.20	2.02	1.75	6.80	2.03	1.73	6.73	2.30	1.86
PK 9259	6.93	1.90	1.66	6.98	1.91	1.65	6.90	1.90	1.66	7.40	1.96	1.83
PK 9379	7.26	1.83	1.66	7.27	1.80	1.70	7.30	1.96	1.76	6.93	2.00	1.76
PK 7688	7.29	1.80	1.65	7.30	1.78	1.68	7.56	1.86	1.76	7.43	1.96	1.80
Average	**7.15**	**1.97**	**1.70**	**7.19**	**1.97**	**1.70**	**6.99**	**1.96**	**1.72**	**7.06**	**2.08**	**1.79**

L = Average Grain Length, W = Average Grain Width, T = Average Grain Thickness

8.   TITLE   **EFFECT OF TRANSPLANTING TIME ON GRAIN QUALITY CHARACTERISTICS OF DIFFERENT FINE GRAIN RICE LINES.**

OBJECTIVE   To ascertain the optimum time (date) of transplanting for obtaining higher milling recovery and best cooking quality in advanced fine grain rice lines.

RESEARCH WORKERS   Mohsin Ali Raza

PROJECT DURATION   2018-19 (continuous)

LOCATION   Rice Research Institute, Kala Shah Kaku

TREATMENT   Seven advanced Coarse grain rice lines planted on four different transplanting

dates will be tested: viz.,

Dates of transplanting	Line / Varieties
D$_1$: 01-6-2017	FV$_1$: Lines will be provided by the
D$_2$: 23-6-2017	FV$_2$: Breeding Section including
D$_3$: 14-7-2017	FV$_3$: Standard Check
D$_4$: 05-8-2017	FV$_4$:
	:
	FV$_8$:

PLAN OF WORK

The field experiment will be carried out in split plot design with three repeats by Agronomy Section of this Institute. Transplanting dates will be kept in the main plots while varieties / lines in sub plots. After harvesting from the field, paddy samples will be cleaned, dried to 10 % moisture content and milled in the Rice Technology Laboratory. The data on milling recovery and cooking quality will be recorded.

PREVIOUS YEAR'S RESULTS

The results are given in the following table.

Table 20: Milling recovery of different fine grain rice lines (2017-18)

location Line / Variety	1st June 2017			23rd June 2017			14th July 2017			5th August 2017		
	BR (%)	TMR (%)	HR (%)	BR (%)	TMR (%)	HR (%)	BR (%)	TMR (%)	HR (%)	BR (%)	TMR (%)	HR (%)
PK 9194	78.0	68.0	54.0	76.0	68.0	45.0	81.0	73.0	65.0	79.0	71.0	61.0
PK BB-15-1	78.0	70.0	57.0	80.0	70.0	38.0	79.0	71.0	62.0	81.0	71.0	59.0
PK BB-15-6	80.0	66.0	44.0	80.5	67.0	42.5	81.0	68.0	40.0	79.0	69.0	51.0
PK PB-8	77.0	66.0	50.0	76.0	66.0	48.5	77.0	67.0	53.	79.0	71.0	61.0
PK 8892	78.0	68.0	29.	74.0	62.0	50.0	74.0	68.0	41.3	77.0	67.0	42.0
RRI-3	75.0	67.0	20.0	76.0	67.	22.0	79.0	70.0	50.0	78.0	69.0	44.0
Bas 515 (Ch)	81.0	73.0	60.0	81.0	73.0	47.0	79.0	70.0	61.0	81.0	73.0	64.0
PS-2 (Ch)	73.0	63.0	21.0	76.0	66.0	29.0	72.0	62.0	24.0	76.0	70.0	52.0
Average	**77.5**	**67.6**	**41.9**	**77.4**	**67.4**	**40.3**	**77.8**	**68.6**	**49.5**	**78.8**	**70.1**	**54.3**

BR = Brown Rice, TMR = Total milled rice & HR = Head rice

Table 21: Cooking Quality of different fine grain rice lines (2017-18)

Location Line / Variety	1st June 2017			23rd June 2017			14th July 2017			5th August 2017		
	CGL (mm)	B (%)	E/R	CGL (mm)	B (%)	E/R	CGL (mm)	B (%)	E/R	CGL (mm)	B (%)	E/R
PK 9194	13.1	7.0	1.770	13.2	6.0	1.784	12.0	2.0	1.617	14.0	2.0	1.910
PK BB-15-1	13.8	3.0	1.725	14.1	1.0	1.905	14.1	3.0	1.760	15.0	1.0	1.916
PK BB-15-6	11.8	3.0	1.475	12.0	2.0	1.515	12.4	4.0	1.501	14.3	3.0	1.759
PK PB-8	14.0	4.0	1.859	14.0	3.	1.867	14.5	3.0	1.893	14.6	2.0	1.872
PK 8892	17.0	9.0	2.109	17.4	8.0	2.122	16.5	2.0	1.957	16.6	2.0	2.213
RRI-3	17.2	6.0	1.955	16.6	8.0	1.930	15.6	6.0	1.767	15.2	4.0	1.825
Bas 515 (Ch)	14.5	4.0	1.970	15.0	4.0	1.948	15.2	3.0	1.851	15.0	2.0	1.958
PS-2 (Ch)	17.0	6.0	2.000	17.2	5.0	1.986	17.0	4.0	2.009	16.3	6.0	2.082
Average	14.8	5.3	1.858	14.9	4.6	1.882	14.7	3.4	1.794	15.1	2.8	1.942

CGL = Cooked Grain Length; B % = Bursting upon cooking, E/R = Elongation Ratio

Table 22: Grain dimensions of different fine grain rice lines (2017-18)

Location Line / Variety	1st June 2017			23rd June 2017			14th July 2017			5th August 2017		
	L (mm)	W (mm)	T (mm)	L (mm)	W (mm)	T (mm)	L (mm)	W (mm)	T (mm)	L (mm)	W (mm)	T (mm)
PK 9194	7.40	1.73	1.43	7.40	1.60	1.40	7.42	1.72	1.68	7.33	1.76	1.53
PK BB-15-1	8.00	1.80	1.63	7.40	1.70	1.60	8.01	1.50	1.42	7.83	1.76	1.56
PK BB-15-6	8.0	1.56	1.46	7.92	8.10	1.70	8.26	1.70	1.56	8.13	1.73	1.56
PK PB-8	7.53	1.66	1.50	7.50	1.65	1.45	7.66	1.76	1.53	7.80	1.70	1.53
PK 8892	8.06	1.83	1.56	8.20	1.70	1.40	8.43	1.93	1.60	7.50	1.73	1.53
RRI-3	8.8	1.90	1.50	8.6	1.80	1.55	8.83	1.93	1.56	8.33	1.73	1.50
Bas 515 (Ch)	7.36	1.70	1.60	7.70	1.75	1.66	8.21	1.84	1.43	7.66	1.70	1.56
PS-2 (Ch)	8.50	1.90	1.55	8.66	1.93	1.56	8.46	1.90	1.56	7.83	1.73	1.50
Average	7.96	1.76	1.53	7.92	2.53	1.54	8.16	1.79	1.54	7.80	1.73	1.53

CGL = Cooked Grain Length; B % = Bursting upon cooking, E/R = Elongation Ratio

AGRICULTURAL ENGINEERING

1.TITLE	**INFLUENCE OF THE SEED RATE OF PADDY IN DSR AT MILLING YIELD AND COOKING QUALITY OF RICE**
OBJECTIVE	To study the effect of seed rate at milling recovery and cooking quality of the rice grain
RESEARCH WORKER	Muddassir Ali
PROJECT DURATION	2018-19
LOCATION	Kala Shah Kaku
TREATMENT	DSR will be done with 04 different seed rates

Main plots : Seed rates (4)

SR_1	: 06 kg/acre
SR_2	: 08 kg/acre
SR_3	: 10 kg/acre
SR_4	: 12 kg/acre

PLAN OF WORK	Design =RCBD
	Rice crop will be sown with four different seed rates with the help of inclined plate seed drill. Land preparation and all other inputs will be the same. Rice plant populations will be determined by taking stand counts at the 3 to 4 leaf stage in three locations within each plot. Mill and cooking parameters will be checked in quality lab. of RRI KSK.
DATA TO BE RECORDED	Yield and yield components, Milling and cooking parameters, Harvesting index, Crop duration, Germination per m^2 , etc.
PREVIOUS YEAR'S RESULTS	1st year of experiment

2. TITLE	**QUANTIFICATION OF IRRIGATION WATER REQUIREMENT IN DIFFERENT RICE ESTABLISHMENT METHODS AND THEIR EFFECT ON WEEDS DYNAMICS**
OBJECTIVE	• To find out the economic rice productivity of different rice establishment methods without sacrificing the yield and quality • To study the impact of rice establishment methods on weeds flora
RESEARCH WORKER	Muddassir Ali Dr. Tahir Hussain Awan
PROJECT DURATION	2018-19
LOCATION	Kala Shah Kaku
TREATMENT	Factor 1, Main plots = 3 : Planting method (DSR on flat soil, and DSR on beds, Transplanting) Factor 2, Sub-plot = 3 : Irrigation Levels (Water depth 15, 20, and 25 cm in Tubes) Replications = 3 Design =Split Plot (RCBD)
PLAN OF WORK	DSR crop will be sown with DSR-drill on flat well prepared soil in the first week of June. Sowing of rice seed on raised beds will be done on the same day. Four rows will be sown on each bed along the length of the bed. Bed width will be 0.61 m (2ft) and R-R distance will be 0.15 m (6 inch). Same variety will be transplanted 20 DAS of DSR. DSR crop will be subjected to different irrigation regimes after 35 days of sowing and transplanted crop will be subjected to irrigation regimes 15 days after transplanting. The subsequent irrigations will be applied when the water level in perforated tubes (AWD Tubes) will be lowered to 15 cm, 20 cm, and 25 cm below the soil surface. All other agronomic practices will be kept standard for all treatments.
Data to be recorded	Leaf rolling scores, Yield and yield components, Milling and cooking parameters, Harvesting index, Crop duration, Weeds infestation,
PREVIOUS YEAR'S RESULTS	1st year experiment

RICE RESEARCH STATION, BAHAWALNAGAR

1.	TITLE	FRESH CROSSES

OBJECTIVE To induce genetic variability for selecting desirable recombinants possessing high yield potential, earliness, insect pests and disease resistance/tolerance, extra-long grain size and better grain quality for the development of new rice varieties.

RESEARCH WORKER
Muhammad Rizwan Anwar
Shahbaz Mustafa
Muhammad Aamer
Dr. Muhammad Ijaz

PROJECT DURATION 2018-19 (Continuous)

LOCATION Rice Research Station, Bahawalnagar

PLAN OF WORK 80 new target oriented crosses will be attempted.

PREVIOUS YEAR'S RESULTS

Objective	No. of Crosses
To increase yield, grain length and earliness.	18
To increase yield and earliness.	05
To increase yield.	05
To increase No. of tillers /plant.	02
To develop Extra-long grain size.	12
Total	**42**

2	TITLE	EVALUATION OF FILIAL GENERATIONS OF RICE F1 TO F6

OBJECTIVE To evaluate lines of F1 to F6 generations for the evolution of improved rice varieties.

RESEARCH WORKER
Muhammad Rizwan Anwar
Dr. Muhammad Ijaz

PROJECT DURATION 2018-19 (Continuous)

LOCATION Rice Research Station, Bahawalnagar

PLAN OF WORK
Entries: F1 = 09 crosses.
      F2 = 14 crosses.
      F3 = 43 progenies.
      F4 = 43 progenies.

F5 = 27 progenies.

F6 = 26 progenies.

Fertilizer = 133-85-62 NPK Kg/ha.

Data to be recorded:

Days to 50% flowering, maturity days, panicle length, Plant height, No. of productive tillers / plant, No. of grains / panicle, and paddy yield.

PREVIOUS YEAR'S RESULTS	F0 = 09 successful crosses
	F1 = 14 crosses were studied and all harvested.
	F2 = 09 crosses were studied and 43 panicles were selected.
	F3 = 106 lines were studied and 43 panicles were selected.
	F4 = 255 lines were studied and 27 panicles were selected.
	F5 = 65 lines were studied and 26 panicles were selected.

3	**TITLE**	**COARSE GRAIN RICE YIELD TRIAL**
	OBJECTIVE	To evaluate high yielding, early maturing and insect-pests and disease resistant coarse grain lines in Bahawalnagar conditions.
	RESEARCH WORKER	Muhammad Rizwan Anwar
	PROJECT DURATION	2018 -19
	LOCATION	Rice Research Station, Bahawalnagar

PLAN OF WORK

Varieties = 08
Check = 02 (KSK133, KSK 434)
Design = RCBD
Replications = 03
Plot size = 1.8 m x 5.85 m
Fertilizer = 170-100-62 NPK kg/ha

Data of days to 50% flowering, maturity days, panicle length, plant height, number of productive tillers per plant, No. of grains per panicle, thousands grain weight and paddy yield will be recorded.

PREVIOUS YEAR'S RESULTS	06 lines were tested in this trial. Yield performance of the lines is as under:

S.No.	Strain/ variety	Yield (t/ha)
1	KSK-462	7.80
2	KSK-434	7.50
3	KSK-464	7.20
4	KSK-133	6.90
5	IRRI-9	6.80
6	KSK-463	6.70

LSD 0.05 = 0.19   CV= 1.47

The strain KSK-462 out yielded all the varieties in the trial by giving 7.80 t/ha.

4	TITLE	**EXTRA LONG GRAIN YIELD TRIAL.**

OBJECTIVE To evaluate high yielding, early maturing, lodging resistant with better grain quality and insect-pests and disease tolerant extra long grain strains suitable for parboiling.

RESEARCH WORKER Muhammad Rizwan Anwar

PROJECT DURATION 2018 -19

LOCATION Rice Research Station, Bahawalnagar

PLAN OF WORK
Strain/Variety   = 08
Check   = 02 (PS 2, Kissan Basmati)
Design   =   RCBD
Replications   =   03
Plot size   =   1.8 m x 5.85 m
Fertilizer   =   170-100-62 NPK kg/ha
        Data of days to 50% flowering, maturity days, panicle length, plant height, number of productive tillers per plant, No. of grains per panicle, thousands grain weight and paddy yield will be recorded.

PREVIOUS YEAR'S RESULTS 06 lines were tested in this trial. Yield performance of the lines is as under:

S.No.	Strain/ variety	Yield t/ha
1	PK 8677 x PK 8971	6.5
2	PS 2	5.7
3	PK 8660 x PK 9301	5.5
4	Kissan Basmati	5.3
5	Super Basmati x PK 7857	4.5
6	PK 9650 x PS 2	4.3

LSD 0.05 = 0.16   CV= 1.69

The strain (PK 8677 x PK 8971) out yielded all the varieties in the trial by giving 6.5 t/ha.

5	**TITLE**	**FINE GRAIN YIELD TRIAL**

OBJECTIVE — To evaluate high yielding, early maturing, lodging resistant with better grain quality and insect-pests and disease tolerant fine grain strains.

RESEARCH WORKER — Muhammad Rizwan Anwar
Dr. Muhammad Ijaz

PROJECT DURATION — 2018 -19

LOCATION — Rice Research Station, Bahawalnagar

PLAN OF WORK
Lines   = 06
Check   = 01 (Basmati 515)
Design   =   RCBD
Replications   = 03
Plot size   = 1.8m x 5.85 m
Fertilizer   =   170-100-62NPK kg/ha

Data of days to 50% flowering, maturity days, panicle length, plant height, number of productive tillers per plant, No. of grains per panicle, thousands grain weight and paddy yield will be recorded.

PREVIOUS YEAR'S RESULTS — 6 strains were tested in this trial. Yield performance of the lines is as under:

S.No.	Strain/ variety	Yield (t/ha)
1	PK8662-15-4	5.9
2	PK8749-2-4-4-1	5.8
3	PK-8431-6-1-1-1-1	5.7
4	PK-10052-1	5.6
5	SR-12	5.2
6	BAS-515	4.8

LSD 0.05 = 0.15   CV = 1.48

The strain PK-8662-15-4 out yielded all the varieties in the trial by giving 5.9 t/ha.

6	TITLE	SEED MULTIPLICATION

OBJECTIVE To produce seed of the approved rice varieties for multiplication at Rice Research Station, Bahawalnagar.

RESEARCH WORKER
Shahbaz Mustafa
Dr. Muhammad Ijaz

PROJECT DURATION 2018-19 (Continuous)

LOCATION Rice Research Station, Bahawalnagar

TREATMENT Varieties: Kissan Basmati, Chenab Basmati, Kissan Basmati, PS 2, Super Basmati, Basmati 2000, Basmati 515, Shaheen Basmati, IRRI 9, KSK 133, and KSK 434

PLAN OF WORK The seed of each variety will be sown according to the availability of seed, area and irrigation water.

PREVIOUS YEAR'S RESULTS

Variety	Seed Produced (Kg)
Basmati 2000	345
Chenab Basmati	2333
PS 2	4873

7	TITLE	**EFFICACY OF PRE & POST-EMERGENCE HERBECIDES FOR WEED CONTROL IN TRANSPLANTED RICE**
	OBJECTIVE	To select suitable pre & post-emergence herbicide for effective weed control in transplanted rice.
	RESEARCH WORKER	Shahbaz Mustafa
	PROJECT DURATION	2018-19
	LOCATION	Rice Research Station, Bahawalnagar
	PLAN OF WORK	

Varieties :	02 (PS 2, Kissan Basmati)
Treatments :	Testing herbicides will be purchased from the market.
Design :	RCBD
Repeat :	03
Plot size :	8m x 5m
Fertilizer :	133-85-62 NPK Kg/ha
Methodology :	Pre emergence herbicides will be applied 3-5 days after transplanting while post emergence herbicides at 15-18 days after transplanting. Data of No. of weeds per sq m, days to 50% flowering, maturity days, panicle length, plant height, number of productive tillers per plant, No. of grains per panicle, thousands grain weight and paddy yield will be recorded.

PREVIOUS YEAR'S RESULTS

S.No	TREATMENTS	YIELD (t/ha)
1	BUTACHLOR 800 ml per acre +WINSTA 65 gm per acre	5.7
2	BUTACHLOR 800ml per acre+CLOVER 80gm per acre	5.6
3	WINSTA 65 gm per acre	5.4
4	CLOVER 80gm per acre	5.3
5	BUTACHLOR 800ml per acre	5.1
6	CONTROL	4.8

LSD 0.05 = 0.07   CV = 0.77

The treatment Butachlor + winsta produced the highest paddy yield 5.7 t/ha as compared to control with 4.8 t/ha.

8	TITLE	**DEMONSTRATION OF DIRECT SEEDING RICE TECHNOLOGY**

OBJECTIVE	To test the direct seeding technology.	
RESEARCH WORKER	Muhammad Aamer. Dr. Muhammad Ijaz	
PROJECT DURATION	2018-19	
LOCATION	Rice Research Station, Bahawalnagar	

PLAN OF WORK

No of Entries :   06

Treatments :   Demonstration plots of direct rice seeding will be planted at the station.

Layout   :   Non replicated

Plot size   :   04 Kanal

Fertilizer   :   Medium grain varieties : 170-100-62 NPK Kg/ha
                        Fine grain varieties   : 133-85-62 NPK Kg/ha

Methodology :   The demonstration plots will be conducted in the end of May to 15th June. All other agronomic and crop management practices will be kept normal. Data of days to 50% flowering, maturity days, panicle length, plant height, number of productive tillers per plant, No. of grains per panicle, thousands grain weight and paddy yield will be recorded.

PREVIOUS YEAR'S RESULTS

S.No	Varieties	Yield (t/ha)
1	Chenab Basmati	5.1
2	PS 2	4.9
3	Punjab Basmati	4.7
4	Super Basmati	3.9
5	IRRI-9	3.8
6	Basmati 2000	3.7

The rice variety Chenab Basmati produced highest yield 5.1 t/ha.

9   TITLE   **EFFICACY OF DIFFERENT SPRAY FUNGICIDES FOR THE CONTROL OF RICE BLAST (*Pyricularia oryzae*) DISEASE**

OBJECTIVE	To find effective control of the disease through spray fungicides.	
RESEARCH WORKER	Shahbaz Mustafa Dr. Muhammad Ijaz	
PROJECT DURATION	2018-2019	
LOCATION	Bahawalnagar	
PLAN OF WORK	**Variety**	Kissan Basmati
	Treatments	**Active Ingredient**

T-Zole	Tebuconazol @ 200 ml/acre
Contaf plus	Hexaconazole @ 400 ml/acre
Cardate	Kasugamycine @ 500 gm/acre
Evito	Fluoxystrobin @ 100 ml/acre
Cabriotop	Pyraclostrobin @ 300 gm/acre
Stuff	Myclobutanil @ 500 ml/acre
Score	Difenconazole @ 125 ml/acre
Control	(Tap Water)
Design	RCBD
Replications	03
Plot Size	2m x 6m
Fertilizer	150:85:00 NPK (Kg/ha)
Inoculation	*Pyricularia oryzae*
Observations	1. Leaf Blast incidence
	2. Paddy Yield

Methodology

The crop will be inoculated with leaves infected with the disease containing sporulating lesions. Heavy dose of N-fertilizer @150 kg/ha will be given to encourage disease infection. Test fungicides will be sprayed at late booting stage and 4-5 days after panicle emergence. Data regarding blast incidence and paddy yield will be recorded following the scale and formula devised by IRRI.

PREVIOUS YEAR'S RESULTS

Evito and Contaf Plus were proved to be better against control of rice blast disease.

S.No.	TREATMENT	Yield t/ha
1	EVITO	5.7
2	CONTAF PLUS	5.5
3	CABRIOTOP	5.4
4	T ZOLE	4.9
5	AMISTAR TOP	4.7
6	CARDATE	4.6
7	SCORE	4.4
8	CONTROL	4.1

LSD 0.05 = 0.55   CV= 6.54

Evito produced the highest paddy yield of 5.7 t/ha as compared to control with 4.1 t/ha.

10	TITLE	**EFFICACY OF DIFFERENT CHEMICALS FOR THE CONTROL OF BACTERIAL LEAF BLIGHT(*Xanthomonas oryzae pv oryzae*) DISEASE**

OBJECTIVE   To find effective control of the BLB disease through different chemicals sprays.

RESEARCH WORKER   Shahbaz Mustafa.

PROJECT DURATION   2018-2019

LOCATION   Bahawalnagar

PLAN OF WORK

Variety	**Kissan Basmati**
Treatments	**Active Ingredient**
Cupride	Copper Oxychloride @ 500 gm/acre
Flare	Streptomycine @ 100 gm/acre
Kasumin	Kasugamycine @ 600 ml/acre
Thiovet	Sulphur @ 800 gm/acre
Thrill	Bismerithiazole @ 150 gm/acre
Control	Tab Water
Design	RCBD
Replications	03
Plot Size	2m x 6m
Fertilizer	150:85:00 NPK (Kg/ha)
Inoculation	*Xanthomonas oryzae*
Observations	1. BLB incidence
	2. Paddy Yield

Methodology

The crop will be inoculated with inoculation of Xanthomonas oryzae pv oryzae. Heavy dose of N-fertilizer @150 kg/ha will be given to encourage disease infection. Test bactericides will be sprayed at late booting stage and 4-5 days after panicle emergence. Data regarding blight incidence and paddy yield will be recorded following the scale and formula devised by IRRI.

PREVIOUS YEAR'S RESULTS   Flare and Cupride were proved to be better against control of rice BLB disease.

S.No.	TREATMENT	Yield t/ha
1	Flare	4.6
2	Cupride	4.2
3	Kasumin	4.0
4	Thiovet	3.8

| 5 | Thrill | 3.7 |
| 6 | Control | 3.4 |

LSD 0.05 = 0.18   CV= 2.52

Flare produced the highest paddy yield of 4.6 t/ha as compared to control with 3.4 t/ha.

11	TITLE	**EFFICACY OF DIFFERENT INSECTICIDES FOR THE CONTROL OF STEM BORER UNDER FIELD CONDITIONS.**
	OBJECTIVE	To evaluate different insecticides for the effective control of the rice stem borer.
	RESEARCH WORKER	Shahbaz Mustafa
	PROJECT DURATION	2018-2019.
	LOCATION	Bahawalnagar

PLAN OF WORK	**Variety**	**Kissan Basmati**
	Treatments	**Active Ingredient**
	Padan	Cartephydrochloride @ 9 kg/acre
	Jumbo	Phorate + Carbofuron @ 10 kg/acre
	Refree	Fipronil @ 6 kg/acre
	Virtako	Chlorantraniliprole + Thiomethoxam @ 4 kg /acre
	Belt	Flubindamide 20 ml /acre
	Control	Tab water
	Design	RCBD
	Replications	03
	Plot Size	2m x 6m
	Fertilizer	150:85:00 NPK (Kg/ha)
	Time of insecticide application	*At ETL (5% Dead heart)*
	Observations	1. Borer incidence 2. Paddy Yield

Methodology

The test insecticides will be applied at economic threshold level. The pre and post treatment observations will be recorded in terms of dead heart and whitehead in treated and untreated plots.

The observations on dead heart will be taken seven days after insecticides application while white head data will be recorded ten days before crop maturity.

Padan and Virtako were proved to be better against control of rice stem borer.

S.No.	TREATMENT	Yield t/ha
1	Padan	5.7
2	Virtako	5.6
3	Refree	5.3
4	Jumbo	5.2
5	Belt	5.1
6	Control	4.8

LSD 0.05 = 0.09   CV= 1.04

Padan produced the highest paddy yield of 5.7 t/ha as compared to control with 4.8 t/ha.

12	**TITLE**	***EFFECT OF DIFFERENT POTASSIUM DOSES ON THE YIELD AND YIELD COMPONENTS OF PS 2 RICE VARIETY UNDER BAHAWALNAGAR CONDITIONS.***
	OBJECTIVE	To test the effect of different potassium doses on the yield and yield components of PS 2 under Bahawalnagar conditions.
	RESEARCH WORKER	Muhammad Aamer Dr. Muhammad Ijaz
	PROJECT DURATION	2018-2019
	LOCATION	Bahawalnagar

PLAN OF WORK

Variety		PS 2
Treatments		**T-1= 0 Kg potash/ha** **T-2=50 Kg potash/ha** **T-3=60 Kg potash/ha** **T-4=70 Kg potash/ha** **T-5=80 Kg potash/ha** **T-6=90 Kg potash/ha**
Design		RCBD
Replications		03
Plot Size		2m x 6m

Methodology: Thirty days old seedlings of PS 2 will be transplanted. Nitrogen @133Kg/ha, phosphorous @85 Kg/ha will be applied. Potash will be applied according to the above mentioned levels. All other agronomic practices will be kept normal. Data of days to 50% flowering, maturity days, panicle length, plant height, number of productive tillers per plant, No. of grains per panicle, thousands grain weight and paddy yield will be recorded.

PREVIOUS YEAR'S RESULTS	S.No.	TREATMENT	Yield t/ha
	1	Potash 90 Kg/ha	5.90
	2	Potash 80 Kg/ha	5.30
	3	Potash 70 Kg/ha	5.10
	4	Potash 60 Kg/ha	4.90
	5	Potash 50 Kg/ha	4.30
	6	Potash 0 Kg/ha	3.90

LSD 0.05 = 0.09   CV= 1.05

90 Kg Potash/ha produced the highest paddy yield of 5.9 t/ ha as compared to control with 3.9 t/ha.

13	TITLE	***EFFECT OF SILICON AND BORON FOLIAR APPLICATION ON YIELD AND YIELD COMPONENTS OF PS 2 RICE VARIETY UNDER BAHAWALNAGAR CONDITIONS.***
	OBJECTIVE	To test the effect of different silicon and boron levels on the yield and yield components of PS 2 under Bahawalnagar conditions.
	RESEARCH WORKER	Muhammad Aamer
	PROJECT DURATION	2018-2019
	LOCATION	Bahawalnagar
	PLAN OF WORK	**Variety** PS 2
		Treatments 04
		T-1=0% Boron and 0% Silicon
		T-2=0.5% Boron and 0.5% Silicon
		T-3=1% Boron and 1% Silicon
		T-4=1.5% Boron and 1.5% Silicon
		Design RCBD
		Replications 03
		Plot Size 2m x 6m

112

Methodology

Thirty days old seedlings of PS 2 will be transplanted. Boron and silicon will be applied according to the above mentioned levels. All other agronomic practices will be kept normal. Data of days to 50% flowering, maturity days, panicle length, plant height, number of productive tillers per plant, No. of grains per panicle, thousands grain weight and paddy yield will be recorded.

PREVIOUS YEAR'S RESULTS

This will be the first year of the experiment.