ANNUAL PROGRESS REPORT 2015-16

MAIZE AND MILLETS RESEARCH INSTITUTE, YUSAFWALA, SAHIWAL

CONTENTS

INTRODUCTION

The Maize and Millets Research Institute, Yusafwala, District Sahiwal is located at a distance of 11 kilometers from Sahiwal city towards East on Lahore-Multan Motorway. Yusafwala is situated at latitude of 30^{O} 41 N, longitude of 73^{O} 12 E and the elevation of 175 meters from sea level. The land of Yusafwala and Chak number 86/9-L Seed Farms, Tehsil & District Sahiwal along with Iqbalnagar Seed Farm (Chak No. 11/14-L), Tehsil Chichawatni, District Sahiwal was converted into Government Seed Farms in the year 1925 and was handed over to the Agriculture Department (Ext. Wing) for multiplication of quality seed of wheat and cotton etc. mostly cultivated by Pattadars on 50:50 basis. Research work on maize was started in the 1940's and was abandoned in its infancy with the partition of sub-continent. A regular research work on maize was restarted in the year 1953-54 at Faisalabad. The research and seed production work of maize was transferred to Yusafwala in the year 1958-59. In 1968-69 the status of this farm was raised to a research Institute, named as Maize & Millets Research Institute, Yusafwala.

The main objective of this institute is to conduct research work on Maize and Millets crops to develop new varieties/ hybrids and their seed production on large scale. Maize crop has a significant role in economy due to its diversified industrial consumption. Per hectare yield of Maize has been increased from 2003 kg / ha (2003-4) to 4301 kg/ha (2015-16) in Punjab due to adoption of hybrids. In maize twelve OPV's, fourteen hybrids, three varieties of sorghum and two varieties of pearl millet have been released so far. In Kharif 2015 promising pipeline hybrids of maize FH-976 (10607 Kg/ha), FH-929 (10560 Kg/ha), YH-5389 (10440 Kg/ha), YH-5371 (10147 Kg/ha), YH-5370 (9973 Kg/ha), YH-5427 (9507 Kg/ha), FH-1036 (9687 Kg/ha) and YH-5421 (8020 Kg/ha) were competitor in yield with the commercial hybrids 6654 (10993 Kg/ha), 30Y87 (9187) and NT-6654 (7932 Kg/ha). Also promising/pipeline hybrid of sorghumYSH-95 showed competitive yield 2667 kg/ha at Yusafwala and 4267 Kg/ha at Sorghum Substation DG Khan in comparison to commercial hybrid Lasani (4140 Kg/ha at Yusafwala & 4800 Kg/ha at Sorghum Sub-Station DG Khan). In spring 2016, Promising / pipe line hybrids i.e. YH-5421 (14440 Kg/ha), YH-5440 (12427 Kg/ha), YH-5474 (11960 Kg/ha), YH-5473 (11880 Kg/ha), YH-5213 (11827) and FH-929 (10505 Kg/ha) and FH-1042 (9975 Kg/ha)were higher yielder than commercial hybrids P-1543 (11493), YH-1898 (11800 Kg/ha) and NK-8711(8734 Kg/ha). Now, with three recently approved hybrids (YH-1898, FH-949 & FH-1046) it is hoped that hybrid program is on the way towards self-sufficiency in maize hybrid development.

HISTORY

Research and seed production of maize and millet crops plus seed production of other major crops continued, normally, on directly cultivated area and Pattadar cultivated area, till 1972. Afterwards, a dispute regarding sharing was started during1973 on the basis/ provisions in Bhutto's Land Reform 1972. Sharing of produce between Pattadars and the Government @ 60% and 40% started implementation on Stay Order, issued on initial hearing of Writ Petition No. 1075/73 by the Lahore High Court, Lahore in the year 1973. During course of hearing, the Maize Botanist changed the Pattanama, unilaterally, and enforced the Pattadars to be agreed on the ratio of 50:50, against which, the Pattadars again filed a writ petition in the Lahore High Court, Lahore that was dismissed, accordingly, on 03-05-1981. Against the decision of Lahore High Court, the Pattadars filed an appeal (CPLA NO. 813/1981) in the Honorable Supreme Court of Pakistan. The Supreme Court of Pakistan disposed of the above petition on 17-07-1988 that the petitioners are allowed to settle the matter with the Govt. out of court. In the light of above CPLA, the Government of Punjab, Agriculture Department agreed on sharing ratios of 60:40 on 25-10-1989.

The Government of Punjab, Agriculture Department, Lahore, again wrongly, enhanced the share to 50:50 on 28-02-1993. Against which the Pattadars again filed a writ petition in Lahore High Court Lahore, vide No. 5967/93 which was decided in favor of Pattadars by the Lahore High Court Lahore, on 24-11-1994. Against the above decision, the Govt. of Punjab, Agriculture Department filed a Civil Appeal in the Supreme Court of Pakistan vide No. 221/1995 which was dismissed on 03-05-2002.On the dismissal of above appeal, Govt. of the Punjab, Agriculture Department, filed a Civil Review Petition No. 84/2002 that was also dismissed on 26-05-2004 that the Government is not competent to change the share from 60:40 to 50:50 unilaterally.

Govt. of the Punjab, Agriculture Department, Lahore, accepted the above decision of the Supreme Court of Pakistan and offered the Pattadars to get renew the Pattanamas verbally as well as through newspaper but almost all of them refused to do so and went on deadlock/non-sharing since Kharif 2000. Since then, the Ex-Pattadars are indulging the administration of the Institute in numerous false, baseless & frivolous cases which is a big hurdle in smooth running the research at Yusafwala, result being, less comparatively varietal development and production technology.

SEASON AND ITS EFFECTS

Meteorological data of Yusafwala for the financial years 2014-15 and 2015-16 is given below. During the year 2014-2016, total 534.27 mm rainfall was received in comparison to previous 2012-2014 433.88 mm rainfall, out of which 244.7 mm was received only in June to August, 2015 that delayed sowing/ and affected germination , however, favorably affected the timely sown crop. The seed production of sorghum crop was severely affected. During fiscal year 2014-15, total 185.37 mm rainfall was received. While in during fiscal year 2015-16 348.9 mm rainfall was received. Sowing of Kharif crop in August 2015 affected badly due to continuous monsoon rains and stagnant water in the fields caused suffocation to the plants due to which plant growth of maize and millets crops was affected. Neither nitrogenous fertilizers could be applied nor weeds could be eradicated which caused significant decrease in grain yield. In Kharif-2014 two windstorms were received first on 06-07-2014 damaged to the late sown maize crop at seedling stage and second on 17-07-2014 which caused countless losses to the maize crop by shattering the leaves at grand growth stage due to which 15 to 25% losses occurred in grain yield.

Sr. No.	**Month**	**Average temperature ^{O}C**				**Rainfall (mm)**	
		Maximum		**Minimum**			
		(2014-15)	**(2015-16)**	**(2014-15)**	**(2015-16)**	**(2014-15)**	**(2015-16)**
1	July	38.58	29.77	28.87	27.55	55.71	108.5
2	August	39.76	39.56	27.32	27.95	-	111.2
3	September	37.77	40.06	24.33	23.09	30.05	50
4	October	36.00	36.55	18.32	18.93	2.24	4.8
5	November	32.00	28.87	11.43	13.50	-	-
6	December	19.03	24.80	7.29	7.52	-	-
7	January	17.77	16.84	6.77	7.81	7.08	5.4
8	February	23.96	25.48	10.18	8.55	17.31	-
9	March	27.47	32.35	13.48	15.40	24.58	25.6
10	April	37.16	38.53	20.81	19.33	22	10.4
11	May	43.29	43.13	22.53	25.00	1.4	3.00
12	June	42.47	43.90	25.73	28.63	25	30
Total Rainfall =534.27						**185.37**	**348.9**

YUSAFWALA - SAHIWAL (HEADQUARTER)

MAIZE (*Zea mays* L) KHARIF 2015

HYBRID MAIZE (YELLOW)

1. Germplasm Maintenance

i. Maintenance of Inbred Lines

One hundred and sixty-five (165) inbred lines were sown ear to row for maintenance during Kharif 2015**.** The material was sown in such a way that after every two lines, one line was kept fallow to reduce the chance of foreign pollen contamination during hand pollination and to facilitate the breeding work. All these lines were maintained by self-pollination and harvested for next cycle of maintenance and purification considering their true to type behavior and other desirable parameters. Data regarding root anthocyanin, leaf sheath anthocyanin, margin serration, leaf margin wave, sheath hairs, leaf senescence, fertility of anthers, pollen shedding, anther color, pollen color, glumes color and silk color were also recorded for all the lines separately. Out of one hundred and sixty-five, seventy eight inbred lines were harvested for next cycle of maintenance and purification in Spring 2016.

2. Germplasm Development

i. Derivation of Inbred Families

Two hundred and seventy-two (272) derivative families were sown ear to row during Kharif 2015 for inbreeding through hand pollination. Plants selected on the basis of desirable traits like erect to semi erect leaves, medium to heavy tassel, cob length, low cob placement, strong root anchor and disease tolerance were self-pollinated in all the families. At harvesting two hundred and sixty (260) derivatives were selected for next cycle of inbreeding / selection in Spring 2016.

3. Germplasm Enhancement

i. Screening of Maize Germplasm Tolerant to Stalk Rot

One hundred and sixty five (165) lines were planted under this project. True to type plants were selected for self pollination. All the selfed plants were inoculated for stalk rot by pathogen carrier toothpicks at second node from the base. At harvesting, stems of the selfed plants were torn apart with the help of scalpel to see the penetration of pathogen below or above the point of insertion of tooth picks. The scoring for tolerant to susceptible was made on the basis of Hooker's Scale. The plants showing no infection and infection within node was selected as tolerant and moderate tolerant lines, respectively. In case of infection reached to the second internode, the plant was declared susceptible and rejected from the line in the field.

ii. Development of Inbred Lines Tolerant to Stalk Rot

Two hundred and seventy-two (272) segregating lines/families were sown ear to row for development of lines tolerant to stalk rot. Plants selected on the basis of desirable traits were self-pollinated in all the families. The selfed families were inoculated for stalk rot by pathogen carrier toothpicks at second node from the base. At harvest, stems of the selfed plants were torn apart with the help of scalpel to see the penetration of pathogen below or above the point of insertion of pathogen carrier tooth picks. The scoring for tolerant to susceptible was made on the basis of Hooker's Scale. The plants showing no infection and infection within node was selected as tolerant and moderate tolerant families, respectively. In case of infection reached to the second inter node, the plant was declared susceptible and thus rejected.

4. Hybrid Constitution through Open Pollination

i. Isolation No 1

Seventy inbred lines were sown with one male in isolation for developing new single crosses on an area of one Kanal. At harvesting twenty-four inbred lines set seed. These single crosses will be evaluated in Spring 2016 in replicated yield trials. The best performing single crosses will be selected for further testing in macro yield trials.

ii. Isolation No 2

Two elite maize inbred lines were sown with one common male on an area of 1.5 kanals to develop two single crosses for testing in National Uniform Maize Yield Trials.

iii. Isolation No 3

Twenty-seven elite Maize inbred lines were sown for seed increase through hand pollination on an area of 2.5 marlas. Twenty-two inbred lines set seed. The seed of these inbred lines will be utilized in the hybrid constitution through isolations in Spring 2016.

5. Hybrid Evaluation

Replicated Yield Trials

i. Preliminary Maize Hybrid Yield Trial No. 1. Kharif 2015

This trial was comprised of thirty two (32) entries including Standard hybrids of different maturity groups and ratios of temperate to tropical genetic material. The trial was sown in randomized complete block design with two replications. Plot size was kept 5m x 0.75m. The data regarding various parameters are presented in the following Table 1.

Table 1: Results of Preliminary Maize Hybrid Yield Trial No. 1

Rank No.	Hybrid code	Grain Yield (Kg/ha)	Plant Hrv.	Cob Hrv.	Days to tassel	Days to silk	Plant Ht. (cm)	Cob Ht. (cm)	Stand count
32	Check 6654	10667	22	20	53	57	188	95	15
28	YH-5389	10440	21	21	52	55	160	81	16
10	YH-5371	10147	19	20	49	52	158	75	14
9	YH-5370	9973	14	14	51	54	148	70	12
1	YH-5362	9733	15	16	47	50	158	70	13
19	YH-5380	9547	13	3	52	54	153	63	13
16	YH-5377	9267	20	20	49	52	148	59	15
22	YH-5383	9253	20	20	49	52	163	76	15
31	30Y-87	9187	17	17	54	57	190	88	12
7	YH-5368	7987	16	16	49	52	158	76	11
3	YH-5364	7787	18	19	52	55	145	68	15
29	YH-1898	7693	7	7	55	58	175	78	12
27	YH-5388	7640	21	20	52	55	155	73	17
17	YH-5378	7547	14	14	54	57	161	78	11
11	YH-5372	7173	7	7	52	54	150	77	13
14	YH-5375	6760	3	3	54	57	139	62	13
4	YH-5365	6653	17	16	51	54	138	68	13
12	YH-5373	6613	15	15	50	53	160	73	13
25	YH-5386	6507	19	19	51	54	170	77	15
15	YH-5376	6467	17	17	53	57	178	66	14

13	YH-5374	6333	16	16	48	51	161	75	10
2	YH-5363	6293	9	9	54	57	135	63	12
23	YH-5384	6213	14	14	53	56	159	72	11
24	YH-5385	6053	7	7	54	57	154	73	13
18	YH-5379	6027	14	14	52	54	150	85	12
5	YH-5366	5840	15	15	53	56	145	63	10
8	YH-5369	5840	15	14	52	54	168	66	11
20	YH-5381	5747	9	9	51	53	153	66	10
6	YH-5367	5440	11	10	49	52	175	88	11
21	YH-5382	4680	14	16	49	52	165	68	14
30	Yusafwala Hybrid	4560	10	10	54	57	159	63	11
26	YH-5387	3813	13	11	52	55	170	73	10
CV %		18.47	24.9	22.9	3.5	3.12	5.41	14.1	20.8
LSD @ 5%		2752	7.09	6.4	3.66	3.45	17.51	20.84	4.6

It is evident from the results presented in the Table 1 that YH-5389 and YH-5371 remained at 2nd and 3rd positions by giving 10440 and 10147 kg/ha grain yield respectively. YH-5374 seemed to be early maturing by taking 51 days to complete its fifty percent silks while local hybrid YH-1898 was late maturing taking 58 days to silks. Commercial hybrid 30Y87showed maximum plant height (190 cm) while YH-5363 showed minimum plant height (135 cm). Local hybrid YH-5375 showed low cob bearing (62 cm) while check 6654 showed high cob bearing (95 cm).

ii. Preliminary Maize Hybrid Yield Trial No. 2. Kharif 2015

This trial was comprised of fifty-four (54) entries including Standard hybrids of different maturity groups and ratios of temperate to tropical genetic material. The trial was sown in randomized complete block design with two replications. Plot size was kept 5m x 0.75m. The data regarding various parameters are presented in the following Table 2.

Table 2: Results of Preliminary Maize Hybrid Yield Trial No. 2

Rank No.	Hybrid code	Grain Yield (Kg/ha)	Plant Hrv.	Cob Hrv.	Days to tassel	Days to silk	Plant Ht. (cm)	Cob Ht. (cm)	Stand count
54	6654	10993	43	41	53	57	193	95	39
38	YH-5427	9507	40	39	51	54	170	90	32
14	YH-5403	9393	42	42	50	53	183	95	33
17	YH-5406	9340	43	45	48	51	185	94	38
4	YH-5393	9207	39	39	51	54	195	93	30
12	YH-5401	8907	39	38	51	54	158	80	32
26	YH-5415	8807	38	36	53	56	183	104	31
50	YH-5439	8600	42	39	47	51	179	84	35
33	YH-5422	8520	35	34	51	54	156	71	32
28	YH-5417	8513	40	38	50	53	158	76	35
37	YH-5426	8480	41	40	51	54	173	80	31
35	YH-5424	8413	44	42	48	51	172	88	35
1	YH-5390	8233	44	41	48	51	178	96	36
34	YH-5423	8107	36	34	51	54	163	87	28
32	YH-5421	8020	43	42	49	52	161	79	36

6	YH-5395	8013	37	36	49	53	169	105	29
25	YH-5414	8007	36	34	51	54	170	93	29
15	YH-5404	7967	41	38	49	52	179	101	39
11	YH-5400	7833	45	44	49	52	168	89	34
13	YH-5402	7800	38	39	51	54	170	85	33
27	YH-5416	7700	37	37	53	55	169	90	27
42	YH-5431	7660	44	42	48	51	161	77	36
39	YH-5428	7600	33	33	49	52	160	68	24
9	YH-5398	7593	30	30	53	56	170	86	26
40	YH-5429	7580	30	28	50	53	169	84	25
3	YH-5392	7493	45	40	49	51	163	90	33
53	30Y-87	7380	36	33	53	56	213	107	29
36	YH-5425	7287	35	34	51	54	150	74	27
22	YH-5383	7187	28	27	51	54	173	82	22
29	YH-5418	7173	39	38	51	54	168	79	29
5	YH-5394	7153	37	38	52	55	175	98	30
45	YH-5434	7147	36	35	50	52	177	80	30
7	YH-5396	7133	31	31	51	54	163	79	25
21	YH-5410	7020	33	31	47	51	168	94	28
23	YH-5412	6953	37	36	48	51	153	79	28
30	YH-5419	6740	36	35	49	52	168	79	27
41	YH-5430	6640	29	29	54	57	171	77	25
46	YH-5435	6593	34	34	48	52	157	73	30
44	YH-5433	6593	37	37	48	50	173	89	31
18	YH-5407	6513	29	30	49	52	173	89	28
48	YH-5437	6433	30	30	51	54	155	83	26
24	YH-5413	6333	39	38	49	52	165	88	33
49	YH-5438	6327	34	33	49	52	153	78	25
52	Yusafwala Hybrid	6267	23	26	53	56	173	88	21
20	YH-5409	6087	33	33	51	54	165	87	27
10	YH-5399	6007	33	33	49	52	158	80	29
8	YH-5397	5953	37	37	51	53	155	73	30
51	YH-1898	5807	19	19	53	56	164	77	16
31	YH-5420	4687	33	32	50	52	146	75	28
19	YH-5408	4547	29	27	53	55	165	65	27
47	YH-5436	4507	14	14	51	53	154	74	14
43	YH-5432	4460	19	21	54	57	173	85	16
2	YH-5392	4393	33	30	52	56	155	79	29
16	YH-5405	3727	34	34	54	57	155	88	33
CV %		15.78	11.5	12.4	1.75	1.82	4.86	14.24	10.34
LSD @ 5%		2291.0	8.1	8.5	1.76	1.93	16.4	NS	6.02

It is evident from the results presented in the Table 3 that YH-5427 and YH-5403 remained at 2nd and 3rd positions by giving 9507 and 9393 kg/ha grain yield respectively. YH 5433 seemed to be early maturing by taking 50 days to complete its fifty percent silks while commercial hybrid 6654 was late maturing taking 57 days to silks. Commercial hybrid

30Y87 showed maximum plant height (213 cm) and cob height (107 cm). Local hybrid YH-5408 showed low cob bearing (65 cm).

iii. Micro Plot Maize Hybrid Yield Trial. Kharif 2015

This trial was comprised of thirty-two (32) entries including Standard hybrids of different maturity groups and ratios of temperate to tropical genetic material. The trial was sown in randomized complete block design with two replications. Plot size was kept 5m x 1.5m. The data regarding various parameters are presented in the following Table 3.

Table 3: Micro Plot Maize Hybrid Yield Trial. Kharif 2015

Rank No.	Hybrid code	Grain Yield (Kg/ha)	Plant Hrv.	Cob Hrv.	Days to tassel	Days to silk	Plant Ht. (cm)	Cob Ht. (cm)	Stand count
15	YH-5344	10667	6	6	54	57	155	70	7
29	YH-1898	10107	12	12	53	56	163	68	12
24	YH-5354	10040	16	16	54	57	200	108	14
8	YH-5337	9813	20	20	52	55	170	75	15
16	YH-5345	9413	9	9	55	58	160	65	9
6	YH-5334	9080	14	14	54	55	158	65	12
31	30Y-87	8893	21	21	51	54	175	80	13
1	YH-5327	8880	20	19	54	57	168	83	13
18	YH-5348	8827	12	12	51	54	155	80	11
28	YH-5360	8693	21	20	52	55	160	78	15
21	YH-5351	8600	8	8	52	55	168	70	7
2	YH-5328	8520	15	14	54	56	158	73	14
27	YH-5359	8267	17	17	51	55	158	73	12
26	YH-5357	8213	14	13	52	55	145	70	11
4	YH-5331	8133	16	16	49	52	154	68	15
17	YH-5347	8120	20	19	53	56	145	68	14
12	YH-5341	7827	19	19	50	53	162	80	17
32	6654	7813	19	19	52	55	163	80	15
23	YH-5353	7800	19	19	51	53	153	68	17
25	YH-5355	7773	16	16	53	56	165	88	13
7	YH-5335	7693	19	17	53	56	153	75	14
20	YH-5350	7680	20	18	53	56	155	73	13
10	YH-5339	7600	14	13	54	57	163	68	14
22	YH-5352	7440	16	16	50	52	148	68	14
9	YH-5338	7413	18	17	52	55	164	84	16
13	YH-5342	7373	13	13	53	56	163	78	12
11	YH-5340	7107	17	17	51	53	148	80	13
19	YH-5349	7093	12	12	53	56	148	75	11
30	Yusawala Hybrid	6533	16	16	52	55	163	80	14
5	YH-5333	6307	16	15	53	56	155	70	13
14	YH-5343	6293	19	18	52	55	153	80	15
3	YH-5330	5973	14	13	53	56	155	63	12
CV %		13.06	24.2	24.5	2.8	3.7	9.0	11.6	20.2
LSD @ 5%		2164.8	7.8	7.58	4.1	4.1	29.2	17.7	5.3

It is evident from the results presented in the Table 3 that YH-5344, YH-1898 and YH-5354 out yielded all prominent commercial hybrids i.e. 6654, 30Y-87 used as check giving 10667 kg/ha, 10107 kg/ha &10040 kg/ha grain yield respectively. YH-5352 and YH-5331 seemed to be early maturing by taking 52 days to complete their fifty percent silks while YH-5345 was late maturing taking 58 days to silks. Local hybrid YH-5354 showed maximum plant height (200 cm) and cob height (108cm), while local hybrid YH-5347 showed minimum. Local hybrid YH-5330 showed low cob bearing (63 cm).

iv. Demonstration Yield Trial. Kharif 2015

This trial was comprised of nineteen (19) entries including Standard hybrids of different maturity groups and ratios of temperate to tropical genetic material. The trial was sown in strip. Plot size was kept 7m x 4.5m. The data regarding various parameters are presented in the following Table 4.

Table 4: Results of Demonstration Yield Trial

Rank No.	Hybrid code	Grain Yield (Kg/ha)	Plant Hrv.	Cob Hrv.	Days to tassel	Days to silk	Plant Ht. (cm)	Cob Ht. (cm)	Stand Count
12	DK 6714	8225	148	153	56	58	203	93	148
6	FH-922	8146	176	175	52	55	183	104	177
13	DK-6789	8016	171	181	54	56	199	87	172
7	FH-1012	7997	155	156	56	58	184	89	156
8	6654	7375	152	152	54	56	190	79	153
4	FH-1231	7273	157	163	53	55	208	104	159
11	9633	7156	144	150	55	57	176	68	144
2	FH-1036	7136	150	157	56	57	198	98	151
3	FH-1046	6909	140	143	53	55	179	97	140
10	20R-52	6806	148	153	54	56	198	100	149
1	FH-1137	6605	140	143	55	57	184	85	140
15	Hycorn 339	5985	128	133	56	58	175	70	128
9	30Y-87	5685	130	137	56	58	195	84	130
14	Hycorn 999	5671	160	163	56	58	188	87	161
17	**Yusafwala Hybrid.**	5413	121	124	54	56	173	85	121
19	MMRI Yellow	4672	113	115	54	56	198	93	114
5	FH-949	4484	111	110	56	58	138	79	111
18	Pearl	4333	108	113	53	55	205	88	109
16	YH-1898	4324	94	102	56	58	183	83	96
CV %		7.92	9.9	9.83	0.66	0.96	7.4	5.43	10.2
LSD @ 5%		1070.7	28.8	29.5	0.75	1.14	NS	10.0	29.9

It is evident from the results presented in the Table 4 that DK 6714, FH 922 and DK-6789 out yielded all prominent commercial hybrids by giving i.e. 8225kg/ha, 8146kg/ha and 8016kg/ha respectively. FH-922 seemed to be early maturing by taking 55 days to complete its fifty percent silks while DK 6714 was late maturing taking 58 days to silks. Local hybrid FH-1231 showed maximum plant height (208 cm) and cob height (104cm), while local hybrid FH-949 showed minimum (138cm) Local hybrid 9633 showed low cob bearing (68 cm).

v. National Uniform Maize (China Hybrid) Yield Trial. Kharif 2015

This trial was planted with 15 entries having plot size of 5mx1.5m with three replications. The data regarding various parameters are presented in the following Table 5.

Table 5: Results of National Uniform Maize Yield Trial. Kharif 2015

Rank No.	Hybrid code	Grain Yield (Kg/ha)	Plant Hrv.	Cob Hrv.	Days to tassel	Days to silk	Plant Ht. (cm)	Cob Ht. (cm)	Stand count
15	DT-2271	12693	38	39	55	56	195	93	38
11	PM13-012-15/16	12110	40	41	54	56	207	90	40
2	HSM-23	11763	35	37	53	54	187	93	37
1	HSM-13	11723	36	36	55	56	224	103	36
14	CS-2Y-10	11263	41	41	51	52	190	93	41
5	HSM-31	11242	40	42	52	53	216	112	41
13	HSM-70	11184	36	36	49	50	202	94	36
10	HSM-16	11153	36	37	53	54	175	78	37
12	DT2468	11010	41	41	53	55	207	96	42
7	HSM-33	10903	35	37	52	54	205	99	39
3	PM13B-012-25/26	10793	40	41	53	54	201	96	40
6	PM13B-012-3/4	10402	34	37	55	56	205	102	35
9	HSM-32	10182	32	33	54	56	205	98	32
8	NARC-009	6758	35	33	51	52	176	87	35
4	HSM-30	5666	38	38	46	47	160	70	38
CV %		9.20	8.45	7.92	1.23	1.23	4.39	6.27	7.47
LSD @ 5%		1625.8	5.26	5.04	1.07	1.10	14.47	9.82	4.72

It is evident from the results presented in the Table 5 that DT2207, PM13-012-15/16 and HSM-23out yielded all prominent commercial hybrids by giving i.e. 12693 kg/ha, 12110 kg/ha and 11763 kg/ha grain yield respectively. HSM-30 seemed to be early maturing by taking 47 days to complete its fifty percent silks while PM13-012-15/16 was late maturing taking 56 days to silks. Local hybrid HSM-13 showed maximum plant height (224 cm) while local hybrid HSM-30 showed minimum (160 cm) plant height and cob height (70 cm).

vi. National Uniform Maize Hybrid Yield Trial. Kharif 2015

This trial was planted with 26 entries having plot size of 5mx1.5m with three replications. The data regarding various parameters are presented in the following Table 6.

Table 6: Results of National Uniform Maize Yield Trial. Kharif 2015

Rank No.	Hybrid code	Grain Yield (Kg/ha)	Plant Hrv.	Cob Hrv.	Days to tassel	Days to silk	Plant Ht. (cm)	Cob Ht. (cm)	Stand count
8	KXB-2572	12864	40	41	52	54	205	91	41
10	Tara-G-866	12342	43	42	52	54	192	96	43
6	Kolosseus	12093	39	42	54	56	225	97	40
26	PN-9208-S	11962	38	39	54	56	202	90	38
5	ST-6293	11887	44	43	53	55	199	100	44
7	BP-3	11417	39	39	54	56	211	105	39
23	1616	11398	40	40	54	56	192	81	40
15	Mex-YLHY3	11357	41	41	55	57	182	80	42

2	6619	11341	44	43	54	56	188	89	44
4	ST-6253	11187	36	35	54	56	200	104	36
25	FH-1036	11146	37	35	56	58	190	91	38
18	MSM-1	10954	42	42	55	57	207	92	42
9	HSM-34	10927	41	39	52	54	201	89	41
14	Mex-YLHY2	10900	41	40	55	57	201	98	41
17	Mex-YLHY-5	10812	41	44	56	58	203	87	42
16	Mex-YLHY-4	10725	40	39	53	55	202	95	41
12	20-R-52	10654	38	36	53	55	205	86	39
11	Tara-LP-1243	10511	38	37	55	57	211	105	39
3	6655	10399	37	37	54	56	190	84	38
21	1515	10218	36	35	54	56	210	98	36
22	1516	10081	37	37	55	57	181	78	37
24	FH-1046	9926	35	35	54	56	159	68	35
20	Y.W-1898	9808	36	36	53	55	174	77	36
1	FB-1142	9569	35	35	55	57	175	73	36
13	Mex-YLHY-1	9543	38	35	53	55	208	108	39
19	Y.W.Hybrid	9495	38	36	52	54	183	91	39
CV %		12.36	9.06	11.4	0.74	0.84	3.82	8.14	9.08
LSD @ 5%		2209.7	5.78	7.20	0.65	0.76	12.26	12.08	5.86

It is evident from the results presented in the Table 6 that KXB-2572, Tara-G-866 and Kolosseus out yielded all prominent commercial hybrids by giving i.e. 12864 kg/ha, 12342 kg/ha and 12093 kg/ha respectively. KXB-2572seemed to be early maturing by taking 54 days to complete its fifty percent silks while FH-1036was late maturing taking 58 days to silks. Kolosseus showed maximum plant height (225 cm), while local hybrid FH-1046 showed minimum (159 cm) Local hybrid FH-1046 showed low cob bearing (68 cm).

SPRING 2016

1. Germplasm Maintenance

i. Maintenance of Inbred Lines

Two hundred and eighty five inbred lines (285) were sown ear to row for maintenance during Spring 2016**.** The material was sown in such a way that after every two lines, one line was kept fallow to reduce the chance of foreign pollen contamination during hand pollination and to facilitate the breeding work. All these lines were maintained by self-pollination and harvested for next cycle of maintenance and purification considering their true to type behavior and other desirable parameters. Data regarding root anthocyanin, leaf sheath anthocyanin, margin serration, leaf margin wave, sheath hairs, leaf senescence, fertility of anthers, pollen shedding, anther color, pollen color, glumes color and silk color were also recorded for all the lines separately. Whole inbred lines were harvested for next cycle of maintenance and purification.

2. Germplasm Development

i. Derivation of Inbred Families

Two hundred and eighty four (284) derivative families were sown ear to row during Spring 2016 for inbreeding through hand pollination. Plants selected on the basis of desirable traits like erect to semi erect leaves, medium to heavy tassel, cob length, low cob placement, strong root anchor and disease tolerance were self-pollinated in all the families. At harvesting

two hundred and thirteen (213) derivatives were selected for next cycle of inbreeding / selection in Kharif 2016.

3. Germplasm Enhancement

i. Screening of Maize Germplasm Tolerant to Stalk Rot

Two hundred and eighty five (285) lines were planted under this project. True to type plants were selected for self pollination. All the selfed plants were inoculated for stalk rot by pathogen carrier toothpicks at second node from the base. At harvesting stems of the selfed plants were torn apart with the help of scalpel to see the penetration of pathogen below or above the point of insertion of tooth picks. The scoring for tolerant to susceptible was made on the basis of Hooker's Scale. The plants showing no infection and infection within node was selected as tolerant and moderate tolerant lines, respectively. In case of infection reached to the second internode, the plant was declared susceptible and rejected from the line in the field.

ii. Development of Inbred Lines Tolerant to Stalk Rot

Two hundred and eighty four (284) derivatives families were sown ear to row for development of lines tolerant to stalk rot. Plants selected on the basis of desirable traits were self-pollinated in all the families. The selfed families were inoculated for stalk rot by pathogen carrier toothpicks at second node from the base. At harvest, stems of the selfed plants were torn apart with the help of scalpel to see the penetration of pathogen below or above the point of insertion of pathogen carrier tooth picks. The scoring for tolerant to susceptible was made on the basis of Hooker's Scale. The plants showing no infection and infection within node was selected as tolerant and moderate tolerant families, respectively. In case of infection reached to the second inter node, the plant was declared susceptible and thus rejected.

iii. Development of Heat Resilient Maize Inbred Lines under Natural Conditions

During spring 2016 fifty lines were sown for screening of inbred lines for high temperature. At flowering the temperatures remained above 40^{o}C. At harvesting thirty-six lines set seed. The seed was kept for next cycle of selection under high temperature.

4. Hybrid Constitution/Development of New Single Crosses in Isolation Blocks

i. Hybrid Constitution in Isolation

Sixty-six inbred lines were sown on 04-03-2016 with one male in isolation for developing new single crosses on an area of one kanal. Out of sixty-six female lines, fifty-four females set seed. These crosses will be evaluated in Kharif 2016. The best performing single crosses will be selected.

ii. Hybrid Constitution through Hand Pollination

Eighty crosses were developed in elite, pre elite and in derivations through hand pollination. Due to high temperature only four females could set few seeds.

5. Hybrid Evaluation under Normal Season

Replicated Yield Trials

i. Preliminary Maize Hybrid Yield Trial No. 1. Spring 2016

This trial was comprised of sixteen (16) entries including Standard hybrids of different maturity groups and ratios of temperate to tropical genetic material. The trial was

sown in randomized complete block design with two replications. Plot size was kept 5m x 0.75m. The data regarding various parameters are presented in the following Table 7.

Table 7: Results of Preliminary Maize Hybrid Yield Trial No. 1

Rank No.	Hybrid code	Grain Yield (Kg/ha)	Plant Hrv.	Cob Hrv.	Days to tassel	Days to silk	Plant Ht. (cm)	Cob Ht. (cm)	Stand count
10	YH-5440	12427	28	28	78	80	215	163	29
3	YH-5474	11960	21	20	77	81	183	103	26
2	YH-5473	11880	26	24	78	82	189	98	26
8	YH-5213	11827	25	24	79	82	168	83	28
16	P1543 (C)	11493	30	29	78	81	210	123	30
11	YH-5140	11453	23	23	79	83	163	92	27
13	Y. Hybrid (C)	11187	27	27	81	84	188	105	30
15	NK8711 (C)	11053	26	26	80	82	203	108	30
4	YH-5475	10693	28	29	77	81	175	98	30
14	FH-949 (C)	10520	27	26	78	80	199	100	30
12	YH-1898 (C)	10200	23	23	81	84	195	115	26
1	YH-5472	9680	31	29	77	80	218	89	31
7	YH-5478	9400	27	27	79	81	188	103	29
5	YH-5476	9187	31	31	80	83	170	93	31
9	YH-5133	9160	27	27	79	82	188	103	28
6	YH-5477	8773	27	28	79	81	177	95	28
CV%		8.75	9.54	11.5	1.13	1.5	12.10	21.92	7.41
LSD @ 5%		1992.1	5.38	6.4	1.9	2.5	48.7	48.6	4.5

It is evident from the results presented in the Table 7 that YH-5440 out yielded (12427 kg/ha) all prominent commercial hybrids i.e. P-1543, Y. Hybrid, NK-8711, FH-949 and YH-1898, used as check giving 11493 kg/ha, 11187 kg/ha, 11053 kg/ha, 10520 kg/ha & 10200 kg/ha respectively. YH 5440, FH-949 &YH-5472 seemed to be early maturing by taking 80 days to complete its fifty percent silks while Y. Hybrid and YH-1898 were late maturing taking 84 days to silks. Local hybrid YH-5472showed maximum plant height (218 cm) while local hybrid YH-5140 showed minimum plant height (163 cm). Local hybrid YH-5213 showed low cob bearing (83 cm) while YH-5440 showed high cob bearing (163 cm).

ii. Micro Plot Hybrid Maize Yield Trial. Spring 2016

This trial was comprised of fifty-four (54) entries including Standard hybrids of different maturity groups and ratios of temperate to tropical genetic material. The trial was sown in randomized complete block design with two replications. Plot size was kept 5m x 0.75m. The data regarding various parameters are presented in the following Table 8.

Table 8: Results of Micro Plot Hybrid Maize Yield Trial

Rank No.	Hybrid code	Grain Yield (Kg/ha)	Plant Hrv.	Cob Hrv.	Days to tassel	Days to silk	Plant Ht. (cm)	Cob Ht. (cm)	Stand count
32	YH-5421	14440.0	30.0	28.5	79.5	81.5	175.0	95.0	30.0
54	P1543 (C)	13040.0	29.0	28.5	79.0	81.5	207.5	97.5	30.0
52	FH 949 (C)	12906.7	28.5	28.5	80.5	83.5	207.5	105.5	30.0
34	YH-5423	12320.0	26.0	26.0	84.5	87.5	182.5	89.0	28.0
27	YH-5416	12306.7	23.5	23.0	83.0	86.0	182.5	104.0	28.5

15	YH-5404	12186.7	24.5	23.0	81.0	84.5	185.0	102.5	27.0
53	NK8711 (C)	12133.3	24.5	23.5	79.0	81.0	195.0	87.5	28.5
11	YH-5400	12053.3	29.0	28.0	81.5	83.5	186.0	102.5	29.5
21	YH-5410	11946.7	23.5	24.5	75.0	79.0	185.0	97.5	27.5
20	YH-5409	11866.7	20.5	21.0	82.0	85.0	180.0	87.5	25.5
51	YH-1898 (C)	11800.0	23.0	23.0	82.0	84.0	210.0	112.5	27.0
37	YH-5426	11773.3	20.5	21.5	83.5	86.0	186.0	95.5	22.5
25	YH-5414	11480.0	23.0	21.5	84.0	87.0	180.0	90.0	25.0
12	YH-5401	11253.3	27.5	26.5	78.0	80.5	183.5	100.0	24.5
41	YH-5430	11253.3	18.0	18.0	84.0	86.5	195.0	110.0	25.0
4	YH-5393	11186.7	22.0	22.5	78.5	81.0	198.0	90.5	29.0
30	YH-5419	11013.3	25.0	24.0	81.5	84.0	175.0	82.5	28.0
33	YH-5422	10973.3	23.0	23.0	85.5	87.5	192.5	100.0	25.0
44	YH-5433	10880.0	24.5	22.5	78.0	81.5	192.5	102.5	28.0
42	YH-5431	10840.0	24.0	22.5	81.0	83.5	187.5	95.0	26.5
29	YH-5418	10813.3	25.5	25.5	80.5	84.0	182.5	86.5	27.5
26	YH-5415	10786.7	21.5	20.5	84.0	86.5	178.5	85.0	24.5
40	YH-5429	10680.0	16.5	16.0	83.5	85.5	190.0	87.5	21.0
45	YH-5434	10373.3	25.5	25.0	78.5	81.5	209.0	111.0	30.0
50	YH-5439	10133.3	19.0	17.5	78.5	81.0	181.0	90.0	24.0
22	YH-5411	10093.3	17.0	15.5	81.5	84.0	187.5	88.5	20.0
14	YH-5403	10080.0	22.0	19.0	81.0	83.5	200.0	103.5	23.5
35	YH-5424	10066.7	22.0	21.5	76.5	79.0	186.5	96.5	26.5
5	YH-5394	10040.0	24.0	22.5	82.0	84.0	191.0	97.5	26.5
17	YH-5406	9986.7	26.5	25.5	80.5	83.0	182.5	95.0	27.5
1	YH-5390	9920.0	25.0	23.0	77.5	80.0	187.5	101.5	28.0
3	YH-5392	9893.3	27.0	24.5	78.0	80.5	175.0	87.5	30.0
38	YH-5427	9640.0	21.5	21.5	82.0	84.5	187.0	99.0	25.0
9	YH-5398	9613.3	21.0	19.5	83.0	84.5	202.5	104.0	25.0
19	YH-5408	9493.3	17.0	16.5	85.0	87.0	188.5	87.5	22.5
10	YH-5399	9453.3	22.0	21.0	81.0	84.0	169.5	85.0	25.0
6	YH-5395	9440.0	21.5	22.5	79.5	81.5	185.0	80.0	26.0
18	YH-5407	9186.7	23.0	22.0	78.5	80.5	178.5	87.5	26.5
36	YH-5425	9133.3	23.0	20.0	83.0	84.5	180.0	85.0	24.0
39	YH-5428	9026.7	16.5	15.0	81.0	84.0	180.0	84.0	19.0
2	YH-5391	8840.0	25.0	24.5	80.0	83.0	176.5	90.0	28.0
28	YH-5417	8760.0	23.5	20.5	81.5	83.0	189.0	92.5	26.0
49	YH-5438	8653.3	18.5	19.0	81.0	84.0	175.0	90.0	25.5
8	YH-5397	8600.0	24.5	22.5	78.5	80.5	167.5	76.5	28.5
13	YH-5402	8200.0	27.0	26.0	79.5	83.0	181.5	87.5	29.5
24	YH-5413	7493.3	18.5	18.0	85.5	87.5	180.0	85.0	21.0
23	YH-5412	6466.7	14.0	13.5	78.0	80.0	154.0	72.5	19.0
48	YH-5437	6093.3	15.5	14.5	81.0	83.0	167.5	87.5	23.0
31	YH-5420	5613.3	18.0	16.5	81.0	83.0	150.0	72.5	27.5
43	YH-5432	5546.7	10.0	10.5	80.5	83.0	192.5	100.0	21.5
7	YH-5396	5466.7	13.0	12.5	83.5	85.5	182.5	88.5	22.5
46	YH-5435	5466.7	11.5	11.5	79.0	81.5	187.5	90.0	19.0

16	YH-5405	4533.3	18.5	17.5	84.5	86.5	175.5	98.5	26.0
47	YH-5436	4360.0	9.5	9.0	82.5	85.5	175.5	91.5	20.5
CV %		15.85	15.7	10.3	1.07	1.16	4.7	15.9	12.3
LSD @ 5%		3118.6	6.9	6.7	1.73	1.9	17.2	19.1	6.3

It is evident from the results presented in the Table 8 that YH-5421 out yielded all prominent commercial hybrids i.e. P-1542, FH-949, NK-8711 and YH-1898, used as check giving 13040 Kg/ha, 12906.7 kg/ha, 12133 kg/ha &11800 kg/ha respectively. YH-5410 & YH-5424 seemed to be early maturing by taking 79 days to complete its fifty percent silks while local hybridsYH-5422 & YH-5423were late maturing taking 87.5 days to silks. Commercial hybrid YH-1898showed maximum plant height (210 cm) while YH-5420showed minimum plant height (150 cm). Local hybrid YH-5412 & YH-5420 showed low cob bearing (72.5 cm) while YH-1898 showed high cob bearing (112.5 cm).

iii. Demonstration of Local Maize Hybrids in Comparison to Commercial Hybrids under Normal Conditions. Spring 2016

This trial was comprised of fourteen (14) entries including Standard hybrids of different maturity groups and ratios of temperate to tropical genetic material. The trial was sown in strip. Plot size was kept 5m x 4.5 m. The data regarding various parameters are presented in the following Table 9.

Table 9: Results of Demonstration of Local Maize Hybrids in Comparison to Commercial Hybrids. Spring 2016

Rank No.	Hybrid code	Grain Yield (Kg/ha)	Plant Hrv.	Cob Hrv.	Days to tassel	Days to silk	Plant Ht. (cm)	Cob Ht. (cm)	Stand count
4	FH-988	12369	143	147	78	80	237	135	147
3	FH-922	12304	145	148	78	81	211	119	150
6	YH-1898	12027	140	145	71	74	205	105	140
1	FH-1046	12024	150	155	72	75	208	113	161
5	JPL-2066	10589	136	132	70	73	208	108	150
11	NK-8711	10478	142	146	75	78	209	103	164
9	YH-5133	10307	160	162	71	74	210	98	162
2	FH-949	10164	138	139	79	82	213	111	157
12	P1543	10027	160	163	70	72	228	108	162
10	YH-5440	9833	155	158	75	77	200	93	163
8	YH-5140	9384	156	160	77	79	205	118	153
7	YH-5213	9360	152	155	73	76	188	93	146
14	MV-531	8751	157	160	71	74	214	94	158
13	MAXIMA	7775	148	150	72	76	203	108	151
CV%		5.33	5.29	5.4	0.46	0.59	1.31	1.89	3.75
LSD @ 5%		1195	16.9	17.7	0.72	0.97	5.95	4.38	12.5

It is evident from the results presented in the Table 9 that FH-988 out yielded all prominent commercial hybrids i.e. YH-1898, FH-1046 and Nk-8711used as check giving 12027 kg/ha, 12024 kg/ha &10478 kg/ha respectively. P1543 seemed to be early maturing by taking 72 days to complete its fifty percent silks while commercial hybrid FH-949 was late maturing taking 82 days to silks. Local hybrid FH-988 showed maximum plant height (237 cm) while YH-5213showed minimum plant height (188 cm). Local hybrid YH-5440 & YH-5213 showed low cob bearing (93 cm) while FH-988 showed high cob bearing (135 cm).

iv. National Uniform Maize Yield Trial. Spring 2016

This trial was planted with 52 entries having plot size of 5mx1.5m with three replications. The data regarding various parameters are presented in the following Table 10.

Table 10: Results of National Uniform Maize Yield Trial. Spring 2016

Rank No.	Hybrid code	Grain Yield (Kg/ha)	Plant Hrv.	Cob Hrv.	Days to tassel	Days to silk	Plant Ht. (cm)	Cob Ht. (cm)	Stand count
10	E-10	13031	48	52	69	69	203	100	51
4	E-04	12796	54	55	65	68	206	104	57
25	E-25	12347	55	56	64	67	220	98	55
8	E-8	12173	56	54	62	65	207	92	53
9	E-9	12084	56	57	64	67	193	88	56
26	E-26	11880	53	55	63	65	205	115	54
5	E-5	11733	52	54	63	65	220	116	54
23	E-23	11724	54	55	66	69	215	105	56
35	E-35	11684	57	57	65	68	215	86	61
41	E-41	11600	57	58	62	65	201	76	58
7	E-07	11600	51	53	61	64	188	66	56
44	E-44	11520	52	53	63	65	186	83	54
1	E-01	11378	50	53	63	66	201	81	50
34	E-34	11369	50	49	66	68	258	102	56
13	E-13	11320	49	51	65	68	220	79	54
37	E-37	11258	49	50	74	77	250	118	55
3	E-3	11138	52	52	64	66	200	83	59
33	E-33	11138	52	54	66	68	217	94	55
28	E-28	11129	53	54	64	67	221	97	57
6	E-6	11129	49	51	69	72	215	113	51
18	E-18	11116	46	47	66	68	228	112	53
36	E-36	11044	50	49	68	71	225	115	55
11	E-11	10964	43	44	66	68	227	102	48
12	E-12	10911	48	50	64	66	187	90	50
24	E-24	10898	52	54	65	68	218	98	54
2	E-02	10796	53	55	63	66	205	88	56
19	E-19	10449	49	47	65	68	218	97	51
38	E-38	10338	48	47	64	67	226	120	51
48	E-48	10307	52	51	74	77	220	94	53
47	E-47	10218	46	47	72	74	238	123	54
21	E-21	10102	47	49	63	65	185	85	51
15	E-15	10027	50	53	67	70	218	97	57
40	E-40	9938	49	50	63	65	227	100	50
45	E-45	9911	51	51	66	68	182	95	54
17	E-17	9911	48	48	67	70	192	86	50
52	E-52	9858	49	49	65	67	187	87	51
16	E-16	9809	47	45	64	67	188	78	48
46	E-46	9422	45	46	65	68	214	96	50
20	E-20	9276	49	51	64	67	212	77	49
51	E-51	8831	40	44	62	65	175	85	44

14	E-14	8747	48	47	65	67	212	94	51
29	E-29	8418	51	52	63	65	201	90	53
32	E-32	8320	48	49	64	67	192	82	51
39	E-39	8284	48	49	62	64	200	82	50
42	E-42	7991	51	51	63	66	232	112	51
22	E-22	7658	47	48	63	66	221	86	50
43	E-43	7582	47	45	64	66	178	72	52
49	E-49	7369	45	47	63	66	185	83	48
27	E-27	7293	48	48	65	67	207	92	50
50	E-50	7227	52	53	59	62	173	62	56
31	E-31	7204	49	48	66	68	196	83	50
30	E-30	6591	48	48	62	65	202	92	53
CV%		8.04	9.62	9.71	3.87	3.88	2.31	2.83	9.17
LSD @ 5%		1329.9	7.70	7.90	4.05	4.23	7.80	5.79	7.80

It is evident from the results presented in the Table 10 that Entry 10 out yielded all hybrids giving 13031 kg/ha, followed by the E-04 and E-25 giving 12796 kg/ha & 12347 kg/ha respectively. Entry 50 seemed to be early maturing by taking 62 days to complete its fifty percent silks while hybrid E-37 and E-48 were late maturing taking 77 days to silks. Hybrid E-34 showed maximum plant height (258 cm) while Entry 50 showed minimum plant height (173 cm). Entry 50 showed low cob bearing (62 cm) while Entry 47 showed high cob bearing (123 cm).

v. CIMMYT-CRP Maize Yield Trial. Spring 2016

This trial comprised of 24 hybrids including two checks. The plot size was kept 5mx1.5 m in Randomized Complete Block Design. The data regarding various parameters are presented in the following Table 11.

Table 11: Results of CIMMYT-CRP Maize Yield Trial. Spring 2016

Rank No.	Hybrid code	Grain Yield (Kg/ha)	Plant Hrv.	Cob Hrv.	Days to tassel	Days to silk	Plant Ht. (cm)	Cob Ht. (cm)
23	CRP-23	8867	41.66	33.00	72	74	233.33	108.33
21	CRP-21	8866	41.33	40.33	65	67	192.00	78.33
19	CRP-19	8542	41.00	37.66	71	74	227.00	113.33
20	CRP-20	8275	44.66	35.33	63	66	180.00	73.33
3	CRP-3	7644	43.00	34.33	68	72	209.33	100.00
13	CRP-13	7591	44.66	34.00	75	78	220.00	121.67
9	CRP-9	7275	41.00	34.67	73	76	185.67	100.00
18	CRP-18	7271	43.66	38.00	65	68	216.67	78.33
2	CRP-2	7239	42.67	35.33	72	75	197.67	88.33
1	CRP-1	7013	43.00	37.00	69	72	214.33	106.67
4	CRP-4	6862	41.33	39.66	67	69	190	85.00
8	CRP-8	6853	43.66	30.33	66	68	203.33	95.00
6	CRP-6	6786	41.33	36.66	63	66	180.33	81.67
22	CRP-22	6564	40.00	30.00	67	69	196.67	100.00
11	CRP-11	6559	42.00	29.33	74	76	220.00	118.33
14	CRP-14	6484	40.33	30.33	74	77	213.33	101.67

7	CRP-7	6351	38.33	30.33	71	73	190.33	85.00
17	CRP-17	6142	42.00	36.33	62	65	183.33	96.67
10	CRP-10	6008	44.00	34.33	66	69	199.33	98.33
24	CRP-24	4924	39.66	26.33	71	73	216.67	103.33
5	CRP-5	4413	40.33	27.66	70	72	193.67	91.67
12	CRP-12	4311	31.33	28.66	64	67	196.67	106.67
15	CRP-15	4262	30.33	32.33	64	67	187.33	93.33
16	CRP-16	4088	31.33	23.33	64	66	177.33	88.33
CV%		6.95	3.86	5.26	3.47	3.39	6.17	10.84
LSD @ 5%		1453	4.9	5.5	7.6	7.5	32.9	39.1

It is evident from the results presented in the Table 11 that CRP-23 out yielded all other hybrids.CRP-17 seemed to be early maturing by taking 65 days to complete its fifty percent silks while CRP-13 was late maturing taking 78 days to silks. Hybrid CRP-23 Showed maximum plant height (233.3 cm) while CRP-16 showed minimum plant height (177.3 cm). Hybrid CRP-13 showed high cob bearing (121.67 cm) while CRP-20 low cob bearing (73.33 cm).

6. Hybrid Evaluation under High Temperature

Replicated Yield Trials

i. Local Hybrid Trial No. 01. Spring 2016

This trial was comprised of twenty-eight (28) entries including Standard hybrids of different maturity groups and ratios of temperate to tropical genetic material. The trial was sown late on 17-03-2016 in randomized complete block design with two replications. Plot size was kept 5m x 0.75m. The data regarding various parameters are presented in the following Table 12.

Table 12: Results of Local hybrid Trial No. 1. Spring 2016

Rank No.	Hybrid code	Grain Yield (Kg/ha)	Plant Hrv.	Cob Hrv.	Days to tassel	Days to silk	Plant Ht. (cm)	Cob Ht. (cm)	Stand count
8	YH-5397	14473	20	21	59	62	193	108	17
21	YH-5410	12452	15	18	60	63	193	108	17
28	FH-949	12398	18	19	60	63	195	83	20
6	YH-5395	12235	17	20	61	64	193	113	18
26	YH-1898	11317	15	17	65	68	178	105	18
5	YH-5394	10710	18	21	64	67	190	108	14
1	YH-5390	10168	15	17	60	63	175	103	18
11	YH-5400	10150	16	18	60	63	195	118	18
3	YH- 5392	10017	15	16	59	62	193	113	17
17	YH-5406	9913	14	16	60	63	203	108	15
12	YH-5401	9767	17	19	63	66	173	108	17
4	YH-5393	9437	11	11	61	64	203	123	13
25	YH- 5414	9397	14	15	64	67	185	100	13
7	YH- 5396	9235	17	16	61	64	180	98	13
22	YH- 5411	9003	13	15	64	67	180	103	12
27	NK-8711	8980	15	17	58	61	205	85	20
9	YH-5398	8837	17	19	62	65	203	113	14
10	YH-5399	8657	15	14	59	62	175	98	17

23	YH-5412	8497	14	15	59	62	170	83	15
13	YH-5402	8447	17	18	62	65	193	108	15
15	YH-5404	8055	12	14	59	62	198	108	18
2	YH-5391	7927	19	20	64	67	180	98	16
20	YH-5409	7912	12	12	64	67	183	105	14
18	YH-5407	7395	12	15	60	63	198	123	13
14	YH-5403	7298	11	12	60	63	205	113	13
24	YH-5413	7208	11	11	60	63	183	93	11
19	YH-5408	6717	12	12	65	68	183	105	13
16	YH-5305	2530	9	7	65	68	190	103	10
CV%		4.96	9.5	4.88	1.53	1.42	2.42	2.55	12.67
LSD @ 5%		942.47	5.7	1.54	1.91	1.87	9.59	5.45	21.19

It is evident from the results presented in the Table 12 that YH-5397 out yielded (14473 kg/ha) all prominent commercial hybrids i.e. FH-949 and NK-8711, used as check giving 12398 kg/ha & 8980 kg/ha respectively. NK-8711 seemed to be early maturing by taking 61 days to complete its fifty percent silks while local hybrid YH-1898, YH-5408 and YH-5305 was late maturing taking 68 days to silks. Commercial hybrid NK-8711 and YH-5403showed maximum plant height (205 cm) while YH-5412 showed minimum plant height (170 cm). Local hybrid FH-949 and YH-5412 showed low cob bearing (83 cm) while local hybrid YH-5407 and YH-5393 showed high cob bearing (123 cm).

ii. Local Hybrid Trial No. 02 Spring 2016

This trial was comprised of twenty-eight (28) entries including Standard hybrids of different maturity groups and ratios of temperate to tropical genetic material. The trial was sown late on 17-03-2016 in randomized complete block design with two replications. Plot size was kept 5m x 0.75m. The data regarding various parameters are presented in the following Table 13.

Table 13: Results of Local hybrid Trial No. 2 Spring 2016

Rank No.	Hybrid code	Grain Yield Kg/ha	Plant Hrv.	Cob Hrv.	Days to tassel	Days to silk	Plant Ht. (cm)	Cob Ht. (cm)	Stand count
26	YH-1898	13877	20	21	64	67	205	113	14
1	YH-5415	12487	18	19	64	67	185	108	15
25	YH-5439	12405	19	20	62	65	210	118	17
7	YH-5421	12297	19	19	63	66	183	88	17
13	YH-5427	11567	16	17	65	68	180	83	17
20	YH-5434	11547	18	20	64	67	173	98	17
21	YH-5435	11283	16	18	64	67	190	98	18
3	YH-5417	11052	17	19	62	65	200	113	18
10	YH-5424	11018	18	19	63	66	180	98	19
27	NK-8711	10588	17	18	63	66	180	95	20
2	YH-5416	10055	18	17	63	66	178	98	15
18	YH-5432	9900	12	14	64	67	190	98	14
12	YH-5426	9817	15	15	64	68	190	108	10
11	YH-5425	9692	15	15	64	67	198	113	13
4	YH-5418	9657	15	17	62	65	185	98	18
14	YH-5428	9637	15	15	64	67	175	98	14

17	YH-5431	9353	13	17	63	66	195	90	14
5	YH-5419	8905	15	16	61	64	205	108	17
9	YH-5423	8592	15	16	64	67	180	103	15
28	FH-949	8587	16	15	64	67	195	105	18
15	YH-5429	8152	12	13	64	67	170	78	10
16	YH-5430	8137	12	14	64	67	208	110	15
24	YH-5438	8028	13	14	63	66	190	103	14
19	YH-5433	7978	12	13	63	66	200	103	12
8	YH-5422	5202	11	9	64	67	193	93	11
6	YH-5420	4905	16	15	61	64	175	103	13
23	YH-5437	3888	8	8	64	67	175	93	17
22	YH-5436	2863	7	7	63	67	193	100	16
CV%		7.05	9.9	7.05	1.04	1.07	3.36	5.27	16.48
Cd		1074.3	5.97	2.21	1.44	12.9	10.8	12.9	4.83

It is evident from the results presented in the Table 13 that YH-1898 out yielded (138773 kg/ha) all prominent commercial hybrids i.e. NK-8711 & FH-949 used as check giving 10588 kg/ha, and 8587 kg/ha, respectively. YH-5419 and YH-5420 seemed to be early maturing by taking 64 days to complete its fifty percent silks while local hybrid YH-5427 and YH-5426 were late maturing taking 68 days to silks. Local hybrid YH-5439 showed maximum plant height (210 cm) while YH-5429 showed minimum plant height (170 cm). Local hybrid YH-5429 showed low cob bearing (78 cm) while YH-5439 showed high cob bearing (118 cm).

iii. Evaluation of Local Hybrids in Comparison to Commercial Hybrids under High Temperature. Spring 2016

This trial was comprised of sixteen (16) entries including Standard hybrids of different maturity groups and ratios of temperate to tropical genetic material. The trial was sown late on 17-03-2016 in strip. Plot size was kept 246.91m^2. The data regarding various parameters are presented in the following Table 14.

Table 14: Results of Evaluation of Local Hybrids in Comparison to Commercial Hybrids under High Temperature

Rank No.	Hybrid code	Grain Yield (Kg/ha)	Cob Hrv.	Days to tassel	Days to silk	Plant Ht. (cm)	Cob Ht. (cm)	Stand count
4	FH-988	10829	255	60	63	215	125	306
10	DK-9108	10172	255	55	57	225	105	361
6	YH-1898	9975	270	62	65	185	110	346
7	YH-5213	9881	255	60	63	190	105	361
5	JPL-2066	9866	260	55	58	198	110	378
3	FH-922	9765	265	61	64	210	105	297
1	FH-1046	9760	265	62	65	200	120	263
14	MV-531	9571	258	60	63	210	105	355
8	YH-5140	9266	240	59	62	170	95	363
9	YH-5133	9088	244	58	61	195	110	357
2	FH-949	9084	260	60	63	215	130	302
15	Y. Hybrid	9022	241	60	63	195	110	382

11	NK-8711	8675	251	58	61	165	80	359
12	P-1543	8321	260	59	62	210	90	362
16	CIMMYT SC	8105	259	61	64	235	125	361
13	Maxima	6570	247	58	61	205	115	359

It is evident from the results presented in the Table 14 that FH-988 out yielded all prominent commercial hybrids i.e. DK-9108, JPL-2066 and NK-8711, used as check giving 10172 kg/ha, 9866 kg/ha &8675 kg/ha respectively. Dk-9108 seemed to be early maturing by taking 57 days to complete its fifty percent silks while commercial hybrid. FH-1046 and YH-1898 were late maturing taking 65 days to silks. Hybrid CIMMYT SC showed maximum plant height (235 cm) while YH-5140 showed minimum plant height (170 cm). Local hybrid FH-949 showed high cob bearing (130 cm) while NK-8711 showed low cob bearing (80 cm).

HYBRID MAIZE (WHITE)

1. Derivation of Inbred Families during Kharif 2015

During Kharif 2015, 92 derivative lines in different generations (S_0 =21, S_1=05, S_2 =09, S_3 =04, S_4 =07, S_5 =23, S_6 =12 and S_7 =11) were sown on 11-08-2015 for derivation of inbred lines. All undesirable plants in each family were roughed out and 3-6 similar/ desirable plants were selected in each family before tasseling and silking. Tassels and silks were covered with kraft paper bags and plastic bags respectively for self-pollination. Self-pollination was accomplished by hand. At maturity, selfed plants were harvested from each family, separately, and seed of 128 inbreeding families was collected for further derivation and selection cycles.

2. Derivation of Inbred Families during Spring 2016

During spring 2016, 128 families of different generations i.e. S_0 =32, S_1 = 20, S_2 =8, S_3 =6, S_4=10, S_5 = 19, S_6 =15, S_7 =14 & S_8 =4 were sown on 04-02-2016 for derivation of inbred lines. 3-6 similar / desirable plants in each family were selected and remaining off-type plants were removed before tassels emergence. Tassels and silks were covered with Kraft paper bags and plastic bags respectively for self-pollination which was performed manually. At maturity, selfed plants were harvested from each family, separately, and seed of 125 families was collected for further inbreeding program.

OPV MAIZE:

MAIZE (YELLOW)

KHARIF 2015

1. Improvement of Open Pollinated Variety YY-15

Fifty seven selected cobs from previous season crop were sown in ear to row in an isolation of 1 kanal during Kharif 2015. Open pollination was allowed. Selection was made on the basis of plant height, stem girth, cob length and cob placement at 8th node with medium tassel. Cobs were collected from the selected plants and seed was kept for next sowing season after Table selection.

2. Improvement and Maintenance of Yusafwala Pool-50

Seed received from spring 2015 was mixed and sown in isolation of 1 kanal during Kharif 2015. Open pollination was allowed and selected 200 cobs on the basis of

plant height, stem girth, light tassel, cob length and lodging resistance. 100 cobs were kept for sowing in next season after Table selection.

3. Adaptability / National Uniform Maize Varietal Yield Trial, Kharif 2015

The trial comprising of 24 entries received from National Coordinator (Cereal System), Pakistan Agriculture Research Council with the instructions and data sheet. Data regarding different traits were recorded at different growth stages / physiological maturity and analyzed statistically (Table 15).

Table 15: Results of National Uniform Maize Varietal Yield Trial Kharif-2015

Rank No.	Entry	Yield (Kg/ha)	Cobs Harvested	Days to 50% silk	Plant Height (cm)	Cob Ht. (cm)
1	WVAR-2	8013	43	50	195	92
2	LOCAL SWAAT	7702	36	53	192	107
3	AH-15	7604	39	52	190	117
4	EV-7004-4	7538	37	51	208	107
5	POP-CORN-14	7462	33	52	162	85
6	WVAR-4	7422	38	51	192	98
7	WVAR-9	7369	25	52	177	88
8	MMRI-YELLOW	7280	37	52	172	92
9	WVAR-6	7200	36	50	185	98
10	WVAR-12	6800	36	52	178	82
11	WVAR-1	6782	37	52	197	102
12	WVAR-7	6724	32	50	163	77
13	WVAR-5	6169	27	52	150	77
14	WVAR-10	6062	32	52	178	88
15	H.N. gold	6053	26	51	162	87
16	WVAR-3	6004	32	51	175	110
17	SWEET CORN-Y	5809	37	51	140	73
18	ISLAMABAD WHITE	5716	35	51	162	92
19	EV-7004-6	5676	36	52	170	97
20	WVAR-13	5653	40	51	183	105
21	SWEET CORN-W	5044	34	52	205	110
22	WVAR-11	4951	23	51	160	72
23	WVAR-8	4676	26	51	180	87
24	SWEET CORN	3867	22	51	178	83

The results revealed that entry WVAR-2 stood first by giving grain yield 8013 which is followed by local swat and AH-15 having respective grain yield of 7702 kg / ha and 7604 kg / ha.

A. SPRING 2016

1. Improvement of (OPV) YY-15

Seed received from selected cobs during Kharif-15 was sown in an isolation of 1.5 kanals during Spring-2016. Open pollination was allowed. Best plants were selected and

harvested on the basis of plant height, stem girth, cob length and cob placement at 8th node. More over stem lodging was also noted. Best cobs from best plants were selected and seed was kept after Table selection for next sowing season.

2. Improvement and Maintenance of Yusafwala Pool-50

Seed received from best selected cobs during Kharif-15 was sown in an isolation of 1.5 kanals during Spring-2016. Population was allowed to open pollinate. Best plants were selected on the basis of plant height, stem girth, cob length, cob placement at 8th node and lodging resistance. Seed was collected from selected cobs and bulked for next season crop.

3. Adaptability / National Uniform Maize Varietal Yield Trial, Spring 2016

The trial comprising of 16 entries received from National Coordinator (Cereal System), Pakistan Agriculture Research Council with the instructions and data sheet. Data regarding different traits were recorded at different growth stages / physiological and analyzed statistically (Table 16).

Table 16: Results of National Uniform Maize Varietal Yield Trial Spring-2016

Rank No.	Entry	Yield (Kg/ha)	Cobs Harvested	Days to 50% silk	Plant Height (cm)	Cob Ht. (cm)
1	NCEV-1530-2	9496	44	69	215	112
2	NCEV-1530-9	8957	44	68	195	102
3	HAQ NWAZ GOLD	7483	36	67	200	127
4	LOCAL SWAT SWEET CORN	7129	51	69	223	132
5	SCWNARC	6991	49	70	215	120
6	MMRI-YELLOW	6775	51	68	225	103
7	SCYNARC	6773	44	68	235	137
8	NCEV-1270-4	6692	46	68	205	100
9	YCS-15	6454	46	70	208	123
10	PEARL WHITE	5836	49	67	217	125
11	YY-15	5409	46	67	210	123
12	EV-7004Q	5280	37	68	253	117
13	YW-786	4900	42	66	227	132
14	LOCAL SWAT POP CORN	3971	51	68	210	123
15	YPC-14	3887	41	67	183	98
16	NCEV-1270-3	3635	28	66	220	142

The results revealed that NCEV-1530-2 stood 1st with grain yield of 9496 kg/ha. Second and third variety was NCEV-1530-9 and HAQ NWAZ GOLD by having grain yield of 8957 and 7483 kg/ha, respectively.

MAIZE (WHITE) OPV:

1. Micro Plot Maize Yield Trial (OPVs) Kharif 2015

The trial comprising of seven entries was sown on 11-08-2015 in RCB design with three replications. Data regarding different traits were recorded at different growth stages/physiological maturity and analyzed statistically. Results are summarized below in tabulated form on mean basis.

Table 17: Results of Micro Plot Maize Yield Trial (OPVs) Kharif, 2015

Rank No.	Entries	Grain Yield (Kg/ha)	Days to 50 % silk	Plant Height (cm)	Cob Height (cm)
1	AH-15	8400 a	56	213	93
2	Pak-I	7626 b	50	187	87
3	Pak-II	7415 b	50	198	93
4	EV-6486	7240 bc	54	177	101
5	MMRI Yellow	6902 cd	54	218	112
6	Pearl	6771 d	53	206	105
7	EV-6487	5860 e	53	196	96
CV %		3.18	1.79	4.45	9.26
LSD @ 5%		405	1.68	15.76	NS

The data presented in Table 17 revealed that promising line AH-15 was at 1st position by giving grain yield of 8400 kg/ha followed by Pak-I with grain yield of 7626 kg/ha while EV-6487 gave the minimum grain yield of 5860 Kg/ha. MMRI Yellow attained the maximum plant height of 218 cm whereas Pak-I attained the minimum plant height of 187 cm. Pak-I showed low level bearing with 87 cm cob height while MMRI Yellow showed the highest bearing of 112 cm.

2. Micro Plot Maize Yield Trial (OPVs) Spring, 2016

The trial comprising of eight entries was sown on 24-02-2016 in RCB design with three replications. Data regarding different traits were recorded at different growth stages/physiological maturity and analyzed statistically. Results are summarized below in tabulated form on mean basis.

Table 18: Results of Micro Plot Maize Yield Trial (OPVs) Spring, 2016

Rank No.	Entries	Grain Yield (Kg/ha)	Days to 50 % silk	Plant ht. (cm)	Cob ht. (cm)
1	YY-15	9766 a	67	259	115
2	MMRI Yellow	9200 ab	67	243	121
3	Malka 2016	8764 bc	68	246	120
4	YW-787	8359 cd	68	265	138
5	YW-786	8104 cd	46	252	127
6	Pearl	7739 de	66	250	121
7	Pak-1	6954 ef	61	213	88
8	CZP-132001	6726 f	65	233	107
CV %		5.64	19.58	4.26	7.47
LSD @ 5%		809.8	NS	18.29	15.3

The results (Table 18) revealed that promising line YY-15 was at 1st position by giving grain yield of 9766 kg/ha followed by MMRI Yellow with grain yield of 9200 kg/ha while CZP-132001 gave the minimum grain yield of 6726 kg/ha. YW-787 attained the maximum plant height of 265 cm whereas Pak-I attained the minimum plant height of 213 cm. Pak-I showed low level bearing with 88 cm cob height while YW-787 showed the highest bearing of 138 cm.

3. Popcorn and Sweet Corn

a. Micro Plot Maize Yield Trial (Pop & Sweet Corn) Kharif, 2015

The trial comprising of eight entries (Pop & Sweet Corn) was sown on 12-8-2015 in RCB design with three replications. Data regarding different traits were recorded at different growth stages / physiological maturity and analyzed statistically. Results are summarized below on mean basis.

Table 19: Results of Micro Plot Maize Yield Trial (Pop & Sweet Corn) Kharif, 2015

Rank No.	Entries	Plant Stand	Grain Yield (Kg/ha)	Days to 50 % silk	Plant ht. (cm)	Cob ht. (cm)
1	Popcorn-14	39	6846 a	57	181	82
2	Popcorn-12	37	6429 ab	56	198	93
3	Local Sahiwal	40	6220 bc	56	182	84
4	MMRI Sweet Corn	39	5862 c	51	192	87
5	White popcorn	37	4958 d	59	190	96
6	Local Sweet Corn	40	4061 e	51	180	72
7	Local Swat	37	4058 e	56	171	76
8	Local Dir	38	3349 f	56	159	69
CV %		3.24	6.2	1.67	3.31	3.34
LSD @5%		NS	567.25	1.62	10.53	NS

The results (Table 19) exhibited that candidate popcorn variety Pop Corn-14 stood 1st by giving grain yield of 6846 kg/ha and Pop Corn-12 ranked 2nd with grain yield of 6429, kg/ha while Local Dir (check) gave the minimum grain yield of 3349 kg/ha. Pop Corn-12 got the maximum plant height of 198 cm whereas Local Dir attained the minimum plant height of 159 cm. Local Dir showed low level bearing by attaining 69 cm cob height while White Popcorn showed the highest bearing of 96 cm.

b. Micro Plot Maize Yield Trial (Pop & Sweet Corn) Spring, 2016

The trial comprising of five Pop Corn entries was sown on 04-02-2016 in RCB design with three replications. Data regarding different traits were recorded at different growth stages / physiological maturity and analyzed statistically. Results are summarized below on mean basis.

Table 20: Results of Micro Plot Maize Yield Trial (Pop & Sweet Corn Spring, 2016

Rank. No.	Entries	Plant Stand	Grain Yield (Kg/ha)	Days to 50 % silk	Plant ht. (cm)	Cob ht. (cm)
1	YPC-14	74	6584 a	81	234	125
2	White Pop Corn	75	6158 a	74	206	107
3	YSC-15	74	5929 a	82	226	125
4	Local Swat sweet corn	74	5059 b	78	218	117
5	Local Swat Popcorn	71	3172 c	77	211	112
CV %		2.03	8.78	1.14	5.43	8.05
LSD @ 5%		2.30	727.76	1.37	18.30	NS

The results (Table 20) exhibited that candidate popcorn variety YPC-14 stood 1st by giving grain yield of 6584 kg/ha and White Pop Corn ranked 2nd with grain yield of 6158 kg/ha while Local Swat Pop Corn (check) gave the minimum grain yield of 3172 kg/ha. YPC-14 got the maximum plant height of 234 cm whereas White Pop Corn attained the minimum plant height of 206 cm. White Pop Corn showed low level bearing by attaining 107 cm cob height while YPC-14 and YSC-15 showed the highest bearing of 125 cm.

SORGHUM

KHARIF 2015

1. Maintenance of Breeding Material.

i. Gene Pool

Sorghum collections having diversified characteristics were planted in strips with 5 m x 1.5 m plot size. Five true to type plants were selected and covered their panicles before anthesis to avoid foreign pollen contamination so that true to type seed of all germplasm could be produced. All the selected / covered plants were harvested for further maintenance.

i. Cytoplasmic Male Sterile (A) Lines.

Eighteen cytoplasmic male sterile (A) lines and their counterpart (B) lines were planted for maintenance in strips having 5 m x 2.25 m plot size. Fourteen lines were maintained while two lines were rejected due to disease susceptibility, one line was out crossed during previous year and one is just repetition. Panicles of ten plants from each A and B line were covered before anthesis for the production of pure seed of lines. All the "A" lines were maintained with their counterpart "B" lines.

ii. Fertility Restorer Lines

Twenty six fertility restorer (R) lines were planted for maintenance in strips with 5m x 1.5m plot size. Five true to type plants were selected in each line and their panicles were covered before anthesis to avoid pollen contamination. At maturity, panicles of each line were harvested separately and enough seed was collected for further maintenance and utilization in hybrid programme.

2. Breeding

i. Hybrids Constitution: (CMS X Restorers)

Fifteen (CMS x R) crosses were constituted (Eight in isolation & seven by hand pollination) during Kharif 2015 for their evaluation to identify the best commercial hybrid. The panicles of CMS lines and restorers were covered with kraft paper bags before anthesis. After 5-6 days, collected the pollen from male restorers and hand pollination of cms lines were done. While in isolation block CMS & R lines were planted 3:1 as female: male and

allowed to open pollinate. Sufficient to small quantity of seed from crosses was produced for evaluation during next crop season.

ii. Filial Generation: (F_3)

Eight F_3 families were planted and phenotypically superior plants from four families were selected and harvested for raising their next filial generation.

i. Head to Row Families

Head to row selection blocks were sown for maintenance, purification and improvement of approved / promising varieties. True to type plants were selected from uniform and disease free rows. The number of heads selected from each variety is given below in Table 21:

Table 21: Number of Heads of Each Variety

Sr. No.	Variety	No. of Selected Heads	Status
1	YSS-98	150	Approved
2	YSS-9	200	Promising

Evaluation

Following yield trials were conducted during the period under report to evaluate the promising material.

i. Sorghum Hybrid Yield Trial, Kharif 2015.

Ten (CMS x R) hybrids were tested including two check YSS-98 (approved variety) and Lasani (Private company hybrid). The trial was laid out according to RCB design with three replications having plot size of 5m x 1.5m. Data regarding grain yield per plot and other important plant characteristics were recorded. The data are presented below in Table 22.

Table 22: Results of Sorghum Hybrid Yield Trial, Kharif 2015.

R. No.	Entry	Plant Stand	Grain Yield (Kg/ha)	Stalk Yield (Kg/ha)	Days to 50% Anth.	Plant ht. (cm.)
1	Lasani (C)	40	4140 a	31555	81	201
2	YSS-98 (C)	34	2911 b	24444	80	192
3	YSH-75	33	2776 bc	27778	83	216
4	YSH-95	35	2667 bc	28889	83	227
5	YSH-118	36	2609 bc	29778	81	237
6	YSH-120	34	2589 bc	28000	83	221
7	YSH-122-7	35	2364 d	22445	85	175
8	YS-16	34	2269 d	27111	82	250
9	YSH-121	33	1567 e	22222	84	205
10	YSH-61	35	1184 e	16444	85	175
	Range	33-40	1184-4140	16444-31555	80-85	175-250
	C.V.%	7.30	12.28	13.78	2.03	6.73
	LSD @ 5%	NS	528	6113	NS	24.64

It is evident from the above Table 22 that hybrid Lasani and YSS-98 exhibited the highest grain yield of 4140 kg/ha and 2911 kg/ha statistically. Maximum stalk yield of 31555 kg/ha was produced by Lasani followed by YSH-118 (29778 Kg/ha). Plant height

ranged from 175 to 250 cm and days to 50% anthesis from 80 to 85. The reason for low yield of YSH-95 from check is its less stand count.

ii. Sorghum Varietal Yield Trial, Kharif 2015.

Seven varieties were evaluated with one check YSS-98. The trial was laid out according to RCB design with three replications having plot size of 5m x 1.5m. Data regarding grain yield per plot and other important plant characteristics were recorded. The data are presented below in Table 23.

Table 23: Results of Sorghum Varietal Yield Trial, Kharif 2015

R. No.	Entry	Plant Stand	Grain Yield (Kg/ha)	Stalk Yield (Kg/ha)	Days to 50% Anth.	Plant ht. (cm.)
1	YSS-10	36	3822 a	28889	80	239
2	YSS-18	38	3816 a	27556	78	239
3	YSS-98 (C)	36	2918 b	25778	79	191
4	YSS-9	38	2647 bc	24000	80	227
5	YSS-25	35	2474 bc	25333	82	218
6	YSS-31	35	2456 c	28889	79	124
7	YSS-19	37	2404 c	18666	74	129
8	YSS-23	36	2167 d	35111	74	205
	Range	35-38	2167-3822	18666-35111	77-82	124-239
	C.V.%	5.71	11.76	15.69	3.73	9.46
	LSD @ 5%	NS	584	NS	NS	37.74

Statistical analysis of the data revealed that the Entry YSS-10 and YSS-18 out yielded all other entries included in the trial by giving grain yield 3822 kg/ha and 3816 kg/ha, respectively. Maximum stalk yield of 35111 kg/ha was produced by YSS-23 followed by YSS-10 & YSS-31(28889 Kg/ha). Plant height ranged from 124 cm to 239 cm and days to 50% anthesis from 77 to 82.

PEARL MILLET (*Pennisetum glaucum* (L.) R. Br.):

1. Breeding:

i. Maintenance of Gene Pool

Sixteen gene pool lines were planted on 16-07-2015. Each entry was sown in two row strips of 5 meter length. The row to row distance was 75 cm and plant to plant distance was 20 cm. At the time of flowering three plants were selected from each line and three to six heads were covered with butter paper bags before emergence of stigmas for self-pollination. After maturity the self-pollinated heads of each line were harvested separately, sundried, threshed and seed stored for future use.

ii. Maintenance of Cytoplasmic Male Sterile Lines

Nineteen cytoplasmic male sterile (A) lines along with their counterpart male fertile (B) lines in separate beds were planted on 16-07-2015 in two row strips of 5 meter length with row spacing 75 cm and plant spacing 20 cm. At the time of flowering 3 plants were selected from each A & B line and 3-6 heads were covered with butter paper bags before

emergence of stigmas for maintenance and self-pollination, respectively. After maturity the heads of each line were harvested separately, sundried and threshed. Reasonable seed was collected, which was stored.

iii. Maintenance of Fertility Restorer Lines

Twenty nine fertility restorer lines were planted on 16-07-2015 in two row strips of 5 meter length with row spacing 75 and plant spacing 20 cm. At the time of flowering three plants were selected from each line and three to six heads were covered with butter paper bags before emergence of stigmas for self-pollination. After maturity the self-pollinated heads of 29 lines were harvested separately, sundried and threshed. Reasonable seed was collected, which was stored.

iv. Derivation of Fertility Restorer Lines

Twenty nine S_4 fertility restorer derivative lines were sown in two row strips of 5 meter length for derivation on 16-07-2015. The row to row and plant to plant distances were 75 cm and 20 cm respectively. At the time of flowering three plants were selected from each line and three to six heads were covered with butter paper bags before emergence of stigmas for self-pollination. After maturity self-pollinated heads of each line were harvested separately, sundried and threshed. Five derivative lines were added to fertility restorer lines. Reasonable seed was produced and stored for future use.

2. Evaluation:

i. Pearl Millet Varietal Yield Trial, Kharif 2015

The trial was comprised of ten varieties including check verity (18-BY), sown on 16-07-2015 in randomized complete block design with three replications. Plot size was kept 1.5m x 5m. Row to row and plant to plant distances were kept 75 cm and 20 cm, respectively. Data were recorded for grain yield and various other agronomic traits some of which are presented in the following Table 24.

Table 24: Results of Pearl Millet Varietal Yield Trial. Kharif 2015

Sr. No.	Entries	Crop stand	Yield (kg/ha)		50% Anthesis (days)	Plant Height (cm)
			Grain	Stalk		
1	YBS-98	31	2747	35556	60	283
2	YBS-95	34	2102	39111	65	340
3	YBS-89	29	2082	35556	62	283
4	18-BY	32	2053	42222	62	290
5	YBS-93	30	1938	36889	60	268
6	YBS-94	28	1878	37111	65	315
7	YBS-92	28	1733	32445	62	265
8	YBS-83	29	1720	31556	62	263
9	YBS-70	28	1665	45333	62	270
10	YBR-5	29	1220	28444	65	337
	CV%	9.13	18.98	11.29	2.29	6.32
	LSD @ 5%	NS	616	7055	2.46	31.63

The results given in above Table 24 reveal that YBS-98 gained maximum grain yield of 2747 kg/ha followed by YBS-95, YBS-89 with grain yield of 2102 and 2082 kg/ha respectively while YBR-5 got last position with 1220 kg/ha. In case of stalk yield, variety

YBS-70 exhibited significantly the highest stalk yield of 45333 kg/ha fallowed by 18-BY with stalk yield of 42222 kg/ha.

ii. Adaptability/National Uniform Pearl Millet Hybrid Yield Trial Kharif-2015

The trial comprising of six entries was received from the National Coordinator of MSM, NARC, Islamabad, sown on 14-08-2015 in RCB design with three replications keeping plot size of 5m x 1.5 m. The row to row and plant to plant distances were 75 cm and 20 cm, respectively. Data regarding grain yield, stalk yield, plant height and days to 50% anthesis were recorded which are presented in the following Table 25.

Table 25: Results of Adaptability/National Uniform Pearl Millet Hybrid Yield Trial. Kharif 2015

Sr. No.	Entry	Crop Stand	Grain Yield (Kg/ha)	Stalk Yield (Kg/ha)	Plant height (cm)	Days to 50% Anthesis
1	86M88	37	3736	52222	208	58
2	86M84	37	3694	48333	227	56
3	9450	33	3361	52778	262	56
4	9444 GOLD	34	3325	36111	202	53
5	YBS-98	33	3008	52778	238	55
6	Tejas	36	2247	28333	193	48
CV%		8.84	14.68	10.36	1.98	1.05
LSD @ 5%		NS	862	8498	7.96	1.03

The results presented in above Table 25 indicate that 86M88 gave maximum grain yield of 3736 kg/ha followed by 86M84 (3694 kg/ha) while Tejas produced the lowest grain yield of 2247 kg/ha. YBS-98 and 9450 produced maximum stalk yield of 52778 kg/ha. Variety 9450 attained the maximum plant height of 262 cm.

SEED PRODUCTION

OPV'S MAIZE

Different seed categories of various maize varieties were produced for maintenance, experiments and sale purposes. The BNS seed was produced through half-sib method by hand pollination and Pre basic and basic in isolations as detailed below in Table 26:

Table 26: Seed Production of Maize OPVs

Sr. No.	Name of Crop Variety	BNS (kg)	Pre-basic (kg)	Basic (kg)	Certified (kg)
Maize Kharif, 2015					
1	Pearl	3.5	40	3370	-
2	Popcorn	-	-	267	-
3	Sweet Corn	-	-	170	-
4	YW-786	-	-	8.0	-
5	YSC-15	4	-	13	-
6	YPC-14	5	-	14	-
Maize Spring, 2015					
1	Pearl	3.0	100	2480	-
2	Sadaf	5.0	-	-	-

3	CZP-132001	-	-	18	-
4	YW-787	3.0	-	-	-
5	YW-786	-	-	15	-
6	YPC-14	3.0	-	6.0	290
7	YSC-15	3.0	-	6.0	250

HYBRID MAIZE

KHARIF 2015

1. Hybrid Maize Seed Production of YH-1898

Hybrid variety YH-1898 was sown on an area of 41.5 kanals with scheme of 4:1 ratio of female and male lines. At maturity, these lines were harvested separately and 1198 kg of F1 seed was obtained.

2. Seed Production of Y-22

Female parental line of hybrid YH-1898 was sown on an area of 6 kanal in isolation to maintain it. Total produce of Y-22 was 314 kg.

3. Seed Production of Y-27

Male parental line of hybrid YH-1898 was sown on an area of 2.5 kanal in isolation to maintain it. Total produce of Y-27 was 253 kg.

4. Basic Seed Production of MMRI Yellow

For basic seed production, seed of MMRI Yellow was sown on an area of 20 kanal and 1720 kg seed was produced during Kharif 2015.

SPRING 2016

1. Hybrid Maize Seed Production of YH-1898

Hybrid variety YH-1898 was sown on an area of 38 kanal with scheme of 4:1 ratio of female and male lines. At maturity, these lines were harvested separately and 2825 kg seed of F1 hybrid was obtained.

2. Seed Production of Y-22

Female parental line Y-22 was sown on an area of 4 kanal in isolation to maintain it. Total produce of Y-22 was 64 kg.

3. Seed Production of Y-27

Male parental line was sown and total produce of Y-27 was 60 kg.

4. Basic Seed Production of MMRI Yellow

For basic seed production, seed of MMRI Yellow was sown on an area of 20 kanal and total produce was 2000 kg during Spring 2016.

SORGHUM

The following quantity of breeder & basic seed of approved and promising varieties (YSS-98 and YSS-9) was produced (Table 27).

Table 27: Seed Production of Sorghum Varieties

Variety	Quantity (Kg)		
	Breeder	Pre-basic	Basic
YSS-9	12	-	2050
YSS-98	08	-	-

PEARL MILLET

The following quantity of breeder & basic seed of approved and promising varieties (YSS-98 and YSS-9) was produced (Table 28).

Table 28: Seed Production of Pearl Millet Varieties

Variety	Quantity (Kg)		
	Breeder	Pre-basic	Basic
YBS-98	10		525
18BY	10		198

AGRONOMY

KHARIF 2015:

During Kharif 2015, different agronomic trials were planted and harvested after recording the data of different traits to develop the package of production technology for Maize, Sorghum and Pearl millet crops. The detail of each trial is as under:-

i. Determination of Optimum Plant Spacing for Maize Hybrid

This trial was planted on 11-08-15 using RCBD with four replications keeping plot size of 5m x 3m to determine grain yield of maize hybrid FH-1046 as affected by different plant populations. Data concerning crop stand, days to 50% silking, plant height, cob height and grain yield were recorded and presented as under.

Table 29: Determination of Optimum Plant Spacing for Maize Hybrid (FH-1046).

Sr. No	Plant Densities (R-R=75cm)	Actual Plants/Required Plants	Grain Yield (kg/ha)	Day to 50% Silking	Plant Height (cm)	Cob Height (cm)
1	106666 (12.5cm)	70/80	10118 a	55	214	101
2	88888 (15cm)	61/66	10446 a	56	218	104
3	76190 (17.5)	52/56	9701 ab	55	218	101
4	66666 (20cm)	45/50	8989 bc	56	212	100
5	59276 (22.5cm)	41/44	8556 c	56	209	97
	CV%	4.85	5.54	0.93	1.62	1.89
	LSD @ 5%	3.99	816	NS	5.35	2.92

The above mentioned data showed that plant spacing significantly affected the grain yield, plant height and cob height of maize hybrid FH-1046. Maximum grain yield of 10446 kg/ha was obtained with T_2 (P-P = 15cm) however it was statistically at par with T_1 (P-P = 12.5 cm) and T_3 (P-P = 17.5cm) which yielded 10118 and 9701 kg/ha respectively. Days to 50 % silking remained non-significant.

ii. Effect of Different Planting Methods on Grain Yield of Maize Hybrid.

This trial was sown on 11-08-2015 according to RCB design with four replications keeping plot size 5m x 5.25m to evaluate the effect of different Planting methods on grain yield of maize hybrid FH-1046. Data regarding the plant stand, days to 50% silking, plant height, cob height and grain yield were recorded and analyzed statistically as presented in the following Table 30.

Table 30: Effect of Different Planting Methods on Grain Yield of Maize Hybrid

Sr. No	Planting method	Actual Plants/Required Plants	Grain Yield (kg/h)	Days to 50% Silking	Plant Height (cm)	Cob Height (cm)
1	Ridge Sowing R-R (30″) sowing on one side (P-P = 6″)	185/231	8521 a	56	215	104
2	Bed Sowing B-B (36″) sowing on both side (P-P = 10″)	188/231	8098 b	56	207	99
3	Bed Sowing B-B (42″) sowing on both side (P-P = 8.5″)	188/231	8081 b	57	205	98
4	Bed Sowing B-B (48″) sowing on both side (P-P = 7″)	187/231	7827 b	57	195	94
	CV%	2.51	2.61	1.33	1.22	1.70
	LSD @ 5%	NS	339	1.19	4.01	2.69

The results presented in the Table 30 showed that T_1 {Ridge sowing R-R (30″) one side} produced significantly highest grain yield (8521 kg/ha) of maize hybrid FH-1046, Whereas T4 {Bed Sowing B-B (48″) sowing on both side} produced minimum yield of 7827 kg/ha. Planting methods also effected days to 50 % silking, plant height and cob height significantly.

iii. Effect of Plant Spacing on Grain Yield of New Pearl Millet Variety

This trial was planted on 16-07-2015, in RCB design, in four replications, keeping plot size 5m x 3m; to determine grain yield of YBS-95 as affected by different plant spacing. Data regarding crop stand, days to 50% anthesis, plant height, number of tillers per plant, stover yield and grain yield were recorded which are presented in the following Table 31.

Table 31: **Results of Plant Spacing on Grain Yield of Pearl Millet Variety (YBS 95)**

Sr. No	Plant Densities/ha (R-R=75 cm)	Stand Count	Grain Yield (Kg/ha)	Days to 50% Anthesis	Plant Height (cm)	Stover yield (kg/ha)	No. of tillers / plant
1	66666 (20 cm)	49 a	2767	59	240	47667	4.90
2	59276 (22.5 cm)	43 b	2933	58	246	46367	5.00
3	53333 (25 cm)	39 c	3100	58	253	44500	5.15
4	48496 (27.5 cm)	35 d	2800	58	255	44667	4.10
5	44444 (30 cm)	31 e	2600	57	233	42300	5.30
	CV%	3.57	8.47	1.91	3.05	4.51	3.17
	LSD @ 5%	2.15	NS	NS	11.55	3126.7	0.23

Statistical analysis of the data disclosed that different plant densities under study significantly affected stover yield, plant height and number of tillers per plant of pearl millet variety YBS-95. Maximum grain yield of 3100 kg/ha was obtained with T_3 (P-P = 25cm) followed by 2933 kg/ha with T_2 (P-P = 22.5 cm), but the results are non-significant.

iv. Determination of Optimum Plant Spacing for Sorghum Hybrid.

This trial was planted on 16-07-15 using RCBD with four replications keeping plot size of 5m x 3m to determine gain yield of sorghum hybrid YSH-95 as affected by different plant spacing. Data concerning crop stand, days to 50% anthesis, plant height and grain yield were recorded and presented as under.

Table 32: Determination of Optimum Plant Spacing for Sorghum Hybrid (YSH-95)

Sr. No	Plant Densities (R-R=75cm)	Actual /required plants	Grain yield (kg/ha)	Day to 50% anthesis	Plant height (cm)
1	88888 (15 cm)	56/66	3757 a	88	233
2	76190 (17.5 cm)	45/56	3437 b	89	233
3	66666 (20 cm)	35/50	3270 b	90	233
4	59276 (22.5 cm)	30/44	3257 b	90	235
	CV%	5.54	4.74	0.66	1.43
	LSD @ 5%	3.65	260	0.93	NS

The above-mentioned data showed that plant spacing significantly affected the grain yield, days to 50 % anthesis of sorghum hybrid YSH-95. Maximum grain yield of 3757 kg/ha was obtained with T_1 (P-P = 15 cm), in contrary T_4 (P-P = 22.5 cm) yielded minimum (3257 kg/ha). Plant height remained non-significant.

SPRING 2016:

During Spring 2016 different agronomic trials were planted and harvested after recording the data of different traits to develop the package of production technology. The detail of each trial is as under:-

i. Determination of Optimum Plant Spacing for Maize Hybrid

This trial was planted on 25-02-16 using RCBD with four replications keeping plot size of 5m x 3m to determine gain yield of maize hybrid FH-1046 as affected by different plant populations. Data concerning crop stand, days to 50% silking, plant height, cob height and grain yield were recorded and presented as under.

Table 33: Determination of Optimum Plant Spacing for Maize Hybrid (FH-1046).

Sr. No	Plant Densities (R-R=75cm)	Actual Plants/Required Plants	Grain Yield (kg/ha)	Day to 50% Silking	Plant Height (cm)	Cob Height (cm)
1	106666 12.5cm)	79/80	16265 a	72	249	125
2	88888 (15.0cm)	66/66	16636 a	71	247	125
3	76190 (17.5)	56/56	15625 b	71	247	124
4	66666 (20.0cm)	50/50	15439 b	71	247	124
5	59276 (22.5cm)	44/44	14596 c	71	247	121
CV%		1.31	2.10	1.09	1.45	4.43
LSD @ 5%		1.19	509.25	NS	NS	NS

The above-mentioned data showed that plant spacing significantly affected the grain yield of maize hybrid FH-1046. Maximum grain yield of 16636 kg/ha was obtained with T_2 (P-P = 15cm), however it was statistically at par with T_1 (P-P = 12.5cm) by producing grain yield of 16265 kg/ha. However, days to 50% silking, plant and cob height remained non-significant.

ii. Effect of Different Planting Methods on Grain Yield of Maize.

This trial was sown on 24-02-2016 according to RCB design with four replications keeping plot size 5m x 5.25m to evaluate the effect of different Planting methods on grain yield of maize hybrid FH-1046. Data regarding the plant stand, days to 50% silking, plant height, cob height and grain yield were recorded and analyzed statistically as presented in the following Table No 34:

Table 34: Effect of Different Planting Methods on Grain Yield of Maize

Sr. No	Planting method	Actual Plants/Required Plants	Grain Yield (kg/ha)	Days to 50% Silking	Plant Height (cm)	Cob Height (cm)
1	Ridge Sowing R-R (30″) sowing on one side	232/231	16875 a	71	248	128
2	Bed Sowing B-B (36″) sowing on both side	233/231	14210 c	70	257	130
3	Bed Sowing B-B (42″) sowing on both side	235/231	16081 b	70	261	131
4	Bed Sowing B-B (48″) sowing on both side	231/231	14984 c	71	258	129
CV%		1.16	3.19	0.71	1.95	3.42
LSD @ 5%		NS	792.31	NS	8.0	NS

The above-mentioned data showed that planting methods significantly affected the grain yield and plant height of maize hybrid FH-1046. T_1 {Ridge sowing R-R (30″) one side produced significantly highest grain yield (16875 kg/ha) of maize hybrid FH-1046 followed by T3 {Bed sowing B-B (42″) sowing on both side} i.e. 16081 kg/ha. Whereas, T_2 {Bed sowing B-B (36″) sowing on both side} yielded minimum i.e. 14210 kg/ha. In contrary, days to 50% silking and cob height remained non-significant.

iii. Evaluation of Different Modes of Application of Primextra Gold 720 SC against Weeds in Maize Crop

This trial was sown on 25-02-2016 according to RCB design with four replications keeping plot size 5m x 6m to evaluate the effect of different modes of application of Primextra Gold 720 SC @ of 800 ml/acre as pre-emergence on grain yield of maize hybrid YH-1898. Data regarding the plant stand, weed control %age, days to 50% silking, plant height, cob height and grain yield were recorded and analyzed statistically as presented in the following Table 35:

Table 35: Effect of Different Modes of Application of Primextra Gold 720 SC against Weeds in Maize Crop

Sr. No.	Modes of application (as pre-emergence)	Actual Plants/ Required Plants	Grain Yield (kg/h)	Days to 50% Silking	Plant Ht. (cm)	Cob Ht. (cm)	Weed control %age		
							BLW	NLW	Sedges
1.	Application on dry ridges 2 days before maize sowing.	192/198	11767b	72	243	117	19.56 bc	34.60 b	33.81 b
2.	Application on dry ridges 1 day before maize sowing.	193/198	11755b	71	244	119	40.82a b	47.92 b	55.63a b
3.	Application on dry ridges on same day before maize sowing.	190/198	12942a	71	237	116	54.47a	88.50a	58.94a b
4.	Application within 24 hours of maize sowing (after irrigation).	191/198	13895a	71	235	119	61.79a	92.74a	65.96a
5.	Weedy Check	191/198	9197c	72	238	115	0.00c	0.00c	0.00c
CV%		2.30	5.29	0.65	3.14	3.8	46.48	25.53	45.70
LSD @ 5%		NS	970.68	NS	NS	NS	25.30	20.75	30.18

The above-mentioned data showed that modes of application of Primextra Gold 720 SC @ 800 ml/acre in 120 liter of water against weeds in maize crop significantly affected the grain yield and weeds control of maize hybrid YH-1898. Maximum grain yield of 13895 kg/ha was obtained with T_4 (Application within 24 hours of maize sowing after irrigation), however it was statistically at par with T_3 (Application on dry ridges on same day before maize sowing) by producing grain yield of 12942 kg/ha, due to their effective control over weeds. However, days to 50% silking, plant and cob height remained non-significant.

SOIL CHEMISTRY

KHARIF -2015

i. Effect of Different Fertilizer Doses on Grain Yield of New Maize Hybrid

This trail was laid out on 12-08-2015, in RCB design, with three replications, keeping plot size 5m x4m, to find out the most suitable level of NP fertilizer for getting maximum grain yield of Maize Hybrid i.e. YH-5407. The results are given as under:-

Table 36: Results for effect of fertilizer Doses on Grain Yield of Maize Hybrid, Kharif 2015.

Sr. No	Treatments (Kg/ha)			Grain Yield (Kg/ha)	Stand count	Days to 50% Silking	Cob. Height (cm)	Plant Height (cm)
	N	P	K					
1	0	0	0	3811	102	54	84	157
2	225	112	100	3922	100	54	88	167
3	250	125	100	4615	100	52	92	172
4	275	137	100	5510	100	52	94	173
5	300	150	100	6890	102	51	96	177
6	325	162	100	6961	101	51	100	181
CV%				17.89	1.88	1.08	1.08	1.88
LSD @ 5%				2.228	1.5468	0.4635	0.4635	1.5468

Statistical analyses of the data revealed that different fertilizer doses under study significantly affected cob height, plant height, 50% days to silk and grain yield of Maize. Maximum days to 50% silking were found in treatment T-1 & T-2 (54days) conversely these were minimum in case of T-5 & T-6 (51days). T-6 caused maximum cob height (100 cm) disparately T-1 turned out minimum cob height (84 cm). Maximum plant height was attained in T-6 (181 cm) whereas T-1 gave minimum plant height (157 cm). T-6 out yielded by producing 6961 grains kg/ha, nonetheless statistically it was at par with T-5 (6890 kg/ha). T-1 yielded minimum grains (3811kg/ha).

SPRING 2016

i. Effect of Different Fertilizer Doses on Grain Yield of New Maize Hybrid

The research trial was planted on 25-02-2016 in RCB design with three replications to assess the suiTable NPK combination to obtained maximum grain yield of promising maize hybrid (FH-1046). The results are presented in Table given below

Table 37: Results for Effect of Fertilizer Doses on Grain Yield of Maize Hybrid Spring 2016.

Sr. No	Treatments (Kg/ha)			Grain Yield (Kg/ha)	Stand count	Days to 50% Siliking	Cob. Height (c m)	Plant Height (cm)
	N	P	K					
1	0	0	0	6616	115	76	109	178
2	225	112	100	8704	116	75	112	187
3	250	125	100	9071	115	75	116	193
4	275	137	100	9347	117	75	120	195
5	300	150	100	10264	115	74	120	198
6	325	162	100	10347	118	74	122	201
CV%				7.42	0.89	1.06	3.34	3.63
LSD @ 5%				889.57	1.8789	1.4478	7.0902	9.1306

Data given in the Table 37 elucidate that there was significant effect of NPK doses. The maximum grain yield of 10347 kg/ha grains was at T-6 (325-162-100 NPK kg/ha) and minimum grain yield of 6616 kg/ha was obtained in case of T-1 (0-0-0 NPK kg/ha). Maximum No. of days to silk were rewarded in case of T-1 i.e. 76 days and minimum for T-5 i.e. 74 days. T-6 caused maximum cob height (122 cm) and T-1 turned out minimum cob

height i.e 109 cm. Maximum plant height was attained in T-6 (201 cm) whereas T1 gave minimum plant height 178 cm.

ii. Impact of Different Fertilizer Levels on Grain Yield of New Maize Hybrid (YH-1898) Seed Production.

This trial was laid out on 25-02-2016, in RCB design, with three replications, keeping plot size 5m x4m, to find out the most suiTable level of NP fertilizer for getting maximum grain yield of Maize Hybrid i.e. YH-1898 for seed production. The results are given as under:-

Table 38: Results for effect of fertilizer Doses on Grain Yield of Maize Hybrid (YH-1898) Seed Production.

Sr. No.	Treatments (Kg/ha)			Grain Yield (Kg/ha)	Stand count	Days to 50% Siliking	Cob. Height (c. m)	Plant Height (c.m)
	N	P	K					
1	0	0	0	2300	115	77	80	142
2	225	112	100	2600	116	76	84	145
3	250	125	100	2693	116	75	96	148
4	275	137	100	2826	114	75	88	149
5	300	150	100	3384	116	75	94	155
6	325	162	100	3440	114	74	95	155
CV%				5.16	1.34	1.14	2.87	2.64
LSD @ 5%				513.87	1.5468	0.6992	4.5904	1.5468

Statistical analyses of the data revealed that different fertilizer doses under study significantly affected cob height, plant height, 50% days to silk and seed yield of Maize. Maximum days to 50% silking were found in treatment T-1 (77 days) conversely these were minimum in case of T-6 (74 days). T-6 caused maximum cob height (95 cm) disparately T-1 turned out minimum cob height (80 cm). Maximum plant height was attained in T-5 (155 cm) where as T-1 gave minimum plant height (142 cm). T-6 out yielded by producing 3440 seed grains kg/ha, nonetheless statistically it was at par with T-5 (3384 kg/ha). T-1 yielded minimum seed grains (2300 kg/ha).

PLANT PATHOLOGY

KHARIF -2015

i. Testing of Seed Dressing Fungicides against Seedling Diseases in Maize during Kharif-2015 (Hybrid= YH-1898)

The trial was comprised of five (5) treatments i.e Argyl Super 62.5 % WS, Hombre 186.25 % FS, Topsin-M 70 WP, Protocol 50 % WP and Control. It was conducted according to RCBD with plot size 5mx 2.25m in four replications. It was sown on 11-08-2015. Data regarding crop stand, grain yield and seedling diseases were recorded which are presented in the Table 39.

Table 39: Results of Testing of Seed Dressing Fungicides against Seedling Diseases in Maize.

Sr.No.	Treatments	Crop Stand	Grain Yield(Kg/ha)	Seedling diseases attack % age
1	Argyl Super 62.5 % WS	199	5553	3.01

2	Hombre 186.25 % FS	194	5489	3.10
3	Topsin-M 70 WP	194	5471	3.11
4	Protocol 50 % WP	196	5180	6.12
5	Control	202	4989	15.34
	C.V % age	2.99	4.46	17.32
	LSD @ 5%	NS	366	1.63

The above given data data revealed that Argyl Super 62.5 % WS gave the best control against seedling diseases showing minimum seedling diseses attack % age (3.01%) with grain yield 5553 Kg/ ha followed by Hombre 186.25 % FS showing seedling diseases attack % age (3.10 %) with grain yield 5489 Kg/ha.

SPRING -2016

ii. Testing of Stalk Rot Intensity in Maize Hybrids by Artificial Inoculation during Spring -2016.

The trial was comprised of five (5) maize hybrids i.e FH-922, FH-988, FH-1012, FH-1036 and FH-1046. It was conducted according to RCBD with plot size 5mx 2.25m in four replications. It was sown on 24-02-2016. At silking stage, 5 plants / plot were inoculated with infected tooth picks. After one month of inoculation, each inoculated plant was torn apart by a scalpel and disease reaction was recorded with the help of Hooker's disease rating scale. The data revealed that maize hybrids FH-988, FH-1012 are resistant against stalk rot while maize hybrids FH-922, FH-1036, FH-1046 are moderately resistant against stalk rot.

iii. Testing of Seed Dressing Fungicides against Seedling Diseases in Maize during Spring -2016 (Hybrid= YH-1898)

The trial was comprised of five (5) treatments i.e Argyl Super 62.5 % WS, Hombre 186.25 % FS, Topsin-M 70 WP, Protocol 50 % WP and Control. It was conducted according to RCBD with plot size 5mx 2.25m in four replications. It was sown on 24-02-2016. Data regarding crop stand, grain yield and seedling diseases were recorded which are presented in the Table 40.

Table 40: Results of testing of seed dressing fungicides against seedling diseases in maize.

Sr.No.	Treatments	Crop Stand	Grain Yield (Kg/ha)	Seedling diseases attack % age
1	Argyl Super 62.5 % WS	358	15129	1.39
2	Topsin-M 70 WP	356	13664	1.69
3	Hombre 186.25 % FS	356	13333	1.68
4	Protocol 50 % WP	360	12900	3.33
5	Control	353	11244	6.69
	C.V % age	0.92	3.81	30.15
	LSD @ 5%	NS	777	1.37

The data revealed that Argyl Super 62.5 % WS gave the best control against seedling diseases showing minimum seedling disease attack % age (1.39%) with grain yield 15129 Kg/ ha followed by Hombre 186.25 % FS showing seedling diseases attack % age (1.68 %) with grain yield 13333 Kg/ha

ENTOMOLOGY

KHARIF -2015

iii. Testing of Different Granular Insecticides against Maize Borer during Kharif-2015 (Hybrid= YH-1898).

The trial was comprised of five (5) treatments i.e Furadan 3G, Ferterra 0.4 % G, Oncol 3% G, karbosol 3 % G and Control. It was conducted according to RCBD with plot size 5mx 2.25m in four replications. It was sown on 11-08-2015. The data regarding crop stand, maize borer infestation % age and grain yield were recorded which are presented in the Table 41.

Table 41: Results of Testing of Granular Insecticides against Maize Borer.

Sr. No.	Treatments	Crop Stand	Borer Infestation % age before application of Insecticide	Borer Infestation % age after application of Insecticide	Grain Yield (Kg/ha)
1	Furadan 3G	199	16.18	3.54	5831
2	karbosol 3 % G	203	20.22	4.42	5757
3	Oncol 3% G	203	19.01	4.39	5700
4	Ferterra 0.4 % G	191	16.72	4.18	5145
5	Control	210	22.12	20.72	4966
C.V %		3.71	27.91	52.17	4.61
LSD @ 5%		2.87	NS	5.98	389

The data regarding maize borer infestation were recorded before and one week after application of insecticides. The data revealed that Furadan 3 G gave the best control against maize borer showing maize borer infestation % age (3.54 %) with grain yield 5831 Kg/ ha followed by Fertera 0.4 % G showing maize borer infestation % age (4.18 %) with grain yield 5145 Kg/ ha.

Spring -2016

i. Testing of Different Seed Dressing Insecticides against Shoot Fly during Spring-2016 (Hybrid = YH-1898)

The trial was comprised of five (5) treatments i.e Confidor 70% WS, Coniflex 70% WS, Actara ST 70 WS, Hombre 186.25% FS and Control. It was conducted according to RCBD with plot size 5mx 2.25m in four replications. It was sown on 24-02-2016. Data regarding crop stand, grain yield and shoot fly infestation % age were recorded which are presented in the Table 42.

Table 42: Results of Testing of Different Seed Dressing Insecticides against Shoot Fly.

Sr. No.	Treatments	Crop Stand	Grain Yield (Kg/ha)	Shoot fly infestation % age
1	Hombre 186.25 % FS	355	14631	1.12
2	Confidor 70% WS	360	14067	0.56
3	Coniflex 70% WS	360	13213	0.83
4	Actara ST 70WS	356	12838	1.11
5	Control	357	10922	80.7
	C.V % age	1.11	4.68	14.53
	LSD @ 5%	NS	946	3.77

The data revealed that Confidor 70% WS gave the best control against shoot fly showing minimum shoot fly infestation %age (0.56%) with grain yield 14067 Kg/ ha followed by Coniflex 70% WS showing shoot fly infestation %age (0.83%) with grain yield 13213 Kg/ ha.

ii. Testing of Different Granular Insecticides against Maize Borer during Spring- 2016 (Hybrid= YH-1898).

The trial was comprised of five (5) treatments i.e Furadan 3 G, Brifur 3% G, Oncol 3% G, karbosol 3 % G and Control. It was conducted according to RCBD with plot size 5mx 2.25m in four replications. It was sown on 24-02-2016. The data regarding crop stand, maize borer infestation % age and grain yield were recorded which are presented in the Table 43.

Table 43: Results of Testing of Granular Insecticides against Maize Borer.

Sr. No.	Treatments	Crop Stand	Borer Infestation % age before application of Insecticide	Borer Infestation % age after application of Insecticide	Grain Yield (Kg/ha)
1	Furadan 3 G	357	9.55	0.84	14842
2	Oncol 3% G	357	10.09	1.12	13944
3	Brifur 3% G	354	9.86	1.71	13480
4	karbosol 3 % G	352	11.64	1.98	12787
5	Control	354	10.02	9.18	11407
	C.V % age	1.30	51.43	107	4.29
	LSD @ 5%	NS	NS	4.88	878

The data regarding maize borer infestation were recorded before and one week after application of insecticides. The data revealed that Furadan 3 G gave the best control against maize borer showing maize borer infestation % age (0.84 %) with grain yield 14842 kg/ ha followed by Oncol 3% G showing maize borer infestation % age (1.12 %) with grain yield 13944 kg/ ha.

STATIONS AND SUB-STATIONS

MAIZE RESEARCH STATION, FAISALABAD

SEASON AND ITS EFFECTS:

During the year of 2015-16, 394.7 mm rainfall was received. High rainfall received in the month of August, 2015. Dry weather during October & November, 2015 affected the crop yield slightly. The detail of average maximum and minimum temperature and rainfall received during July 2015 to June 2016 is as follows:-

Sr. No.	Month/Year	Average Temperature (c°)		Rainfall (mm)
		Maximum	Minimum	
1	July, 2015	40	26.0	32.0
2	August, 2015	37.0	23.0	83.7
3	September, 2015	37.5	26.8	64.4
4	October, 2015	34.0	14.0	13.0
5	November, 2015	31.0	17.3	Traces
6	December, 2015	26.0	13.0	Traces

7	January, 2016	23.6	3.0	Traces
8	February, 2016	29.0	6.0	35.0
9	March, 2016	35.0	19.0	78.0
10	April, 2016	42.5	25.5	6.1
11	May 2016	44.5	29.5	41.0
12	June, 2016	46.0	31.5	41.5

RESEARCH WORK DONE:

1. Detail of gene pool maintained during this season is given as below:

Table 44: Detail of Gene Pool

Sr. No	**Entries**	**Planted**	**Harvested**
1	Inbred lines	176	171
2	Inbreeding generations.		
	S_1	31	30
	S_2	34	32
	S_3	18	18
	S_4	25	25
	S_5	38	35
	S_6	33	31
	S_7	21	15
	Total	**200**	**186**

Crossing Block:

Seventy five (75) single crosses were developed by hand pollination/ isolation blocks. Seventy (70) new crosses were attempted and 60 were successfully harvested.

Yield Trials:
Kharif 2015:

Twelve different yield trials were sown for the evaluation of hybrids.

1. **Hybrid Maize Macro Yield Trial No. 1: (Kharif 2015)**

This trial comprised of nine single cross hybrids including three commercial hybrids as check was sown on 16-08-2015. The trial was laid out in RCB design with three replications. The plot size was kept 5m x 3m. Standard agronomic and plant protection measures were carried out in the crop. The harvesting was done on 30-11-2015. Data regarding different agronomic traits were recorded and hybrids with good performance were selected for on farm testing. The data are given in Table 45.

Table 45: Results of Hybrid Maize Macro Yield Trial No. 1 (Kharif 2015), Faisalabad

Rank No.	Entry	Grain yield (kg/ha)	Days to 50% tassel.	Days to 50% silk	Plant Ht. (cm)	Cob Ht. (cm)	No. of plants harv.	No. of cobs harv.
1	FH-1036	9687	55	57	180	113	86	87
2	FH-810 (C)	9493	54	56	187	109	89	92
3	NT-6654(C)	8722	52	54	190	114	85	86
4	FH-988	8596	57	58	210	114	72	74
5	FH-793	8458	52	55	186	97	78	80
6	FH-949	8398	55	58	203	108	86	86
7	FH-1046	8376	49	52	198	103	85	86
8	30Y87 (C)	7991	52	54	177	118	89	88
9	FH-985	7918	55	57	193	95	76	77
	CV%	6.36	1.46	1.57	3.49	5.80	4.49	4.09
	LSD @ 5%	949.7	1.35	1.50	11.57	10.84	6.40	5.95

Data presented in the Table 45 reveals that local hybrid FH-1036 gave maximum grain yield 9687 Kg/ha followed by local check FH-810 (9493 kg/ha). Local hybrid FH-988 (8596 kg/ha) was statistically at par with commercial check NT-6654 with grain yield 8722 kg/ha. Statistically significant differences were observed for days to 50% tasseling and silking, plant and cob height, no. of plants and cobs harvested. Local hybrid FH-988 took maximum days (57) and (58) days to complete 50% tasseling and silking respectively.

2. Hybrid Maize Macro Yield Trial No. 2: (Kharif 2015)

Twelve entries including two hybrids as check were included in this trial. The trial was sown on 16-08-2015 in RCB design with three replications. The plot size was kept 5m x 2.25m. Standard agronomic and plant protection measures were carried out in the experiment. The harvesting was done on 30-11-2015. Data regarding different characters were recorded and results are presented in Table 46.

Table 46: Results of Hybrid Maize Macro Yield Trial No. 2 (Kharif 2014), Faisalabad

Rank No.	Entry	Grain yield (kg/ha)	Days to 50% tassel.	Days to 50% silk	Plant Ht. (cm)	Cob Ht. (cm)	No. of plants harv.	No. of cobs harv.
1	FH-976	10607	51	53	181	111	71	71
2	FH-929	10560	49	51	208	107	64	66
3	FH-928	10391	48	50	178	87	65	65
4	FH-932	10178	48	50	191	93	69	70
5	FH-1137	10166	51	53	192	89	67	68
6	FH-950	10012	52	54	195	103	64	69
7	FH-922	9819	50	52	200	109	64	65
8	FH-1012	9224	52	54	199	109	63	64
9	FH-1042	7944	52	54	198	107	65	66
10	NT-6654 (C)	7932	51	53	181	110	60	58
11	FH-1025	7890	53	55	193	100	64	65

12	HI-339 (C)	7698	53	55	192	91	56	57
	CV%	4.01	0.66	0.85	2.31	2.39	6.17	4.69
	LSD @ 5%	636.6	0.56	0.77	7.52	4.09	6.72	5.19

The results presented in the Table 46 showed that local hybrid FH-976 gave maximum grain yield i.e. 10607 kg/ha followed by FH-929 (10560 kg/ha). Other local hybrids FH-928, FH-932, FH-1137 and FH-950 also gave significantly higher grain yield than both the checks NT-6654 (7932 kg/ha) and Hi-339 (7698 kg/ha). The results showed significant differences for days to 50% tasseling and silking. Local hybrids and FH-928 and FH-932 were earlier taking minimum days to complete 50% tasseling (48) and 50% silking (50). Statistically significant differences were observed for plant height and cob height. Local Hybrids FH-928, FH-932 and FH-1137 showed mid bearing of cob which is useful for lodging resistance. Results for no. of plants harvested and cobs harvested were also significant.

3. Hybrid Maize Micro Yield Trial No.1: (Kharif 2015)

Three sets of this trial were sown each with eighteen entries including two commercial hybrids as check on 16-08-2015. The trial was laid out in RCB design with three replications. Two rows of five meters length for each entry were planted. Standard agronomic and plant protection measures were carried out in the experiment. The harvesting was done on 31-11-2015. Data regarding different traits were recorded and are given in Table 47.

Table 47: Results of Hybrid Maize Micro Yield Trial-1 (Kharif 2015), Faisalabad

Rank No.	Entry	Grain yield (kg/ha)	Days to 50% tassel	Days to 50% silk	Plant Ht. (cm)	Cob Ht. (cm)	No. of plants harv.	No. of cobs harv.
1	FH-1127	10171	45	47	150	75	44	46
2	FH-1166	9507	54	57	153	82	43	46
3	FH-1117	9489	50	53	119	79	43	45
4	FH-1169	9338	51	53	196	98	43	44
5	FH-1143	9316	46	48	166	83	45	46
6	FH-1125	9276	49	51	161	82	44	44
7	FH-1162	9244	48	51	170	85	42	44
`8	FH-1163	9209	54	56	171	86	45	46
9	FH-1146	9093	48	50	162	81	41	42
10	FH-1124	9076	46	48	156	78	42	44
11	FH-1167	9049	47	49	168	84	41	43
12	FH-1172	9022	49	51	173	88	42	42
13	FH-1168	9009	48	50	184	93	43	44
14	FH-1114	8360	50	52	155	78	44	46
15	HI-339 (C)	7862	51	52	129	71	39	39
16	FH-1158	7787	49	50	147	74	42	44
17	FH-1119	7516	46	48	115	68	39	39
18	NT-6654 (C)	7347	54	55	128	75	34	35
	C. V.%	6.96	1.95	1.87	3.79	6.03	4.89	4.75
	LSD @ 5%	1024	1.59	1.59	9.89	8.132	3.41	3.41

The result presented in table No, 47 revealed that statistically significant differences due to hybrids were observed for grain yield in this trial . Local hybrid FH-1127 gave maximum grain yield of 10171 kg/ha followed by local hybrid FH-1166 (9507 kg/ha) and also statistically significantly higher grain yield than the commercial checks HI-339 (7862 kg/ha) and NT-6654 (7347 kg/ha). Also significant differences were shown for other traits. Local hybrid FH-1127 was early maturing taking minimum no. of days to 50% tasseling (45) and silking (47). Mid to low cob bearing trend was observed in most of the local hybrids included in this trial. Results for No. of plants harvested and cobs harvested were showing differences statistically.

4. Hybrid Maize Micro Yield Trial No.2: (Kharif 2015)

Table 48: Results of Hybrid Maize Micro Yield Trial-2 (Kharif 2015), Faisalabad

Rank No.	Entry	Grain yield (kg/ha)	Days to 50% tassel	Days to 50% silk	Plant Ht. (cm)	Cob Ht. (cm)	No. of plants harv.	No. of cobs harv.
1	FH-1205	11533	50	52	222	101	49	49
2	FH-1184	10627	51	53	192	102	47	48
3	FH-1203	10600	51	53	200	102	44	46
4	FH-1206	10529	51	53	212	99	48	49
5	FH-1178	10404	51	53	206	112	47	48
6	FH-1173	9631	50	52	183	90	46	48
7	NT- 6654 (C)	9436	52	54	219	109	42	44
8	FH-1187	9400	48	50	207	105	47	48
9	FH-1201	9098	51	54	215	109	43	44
10	FH-1181	9049	51	53	207	110	46	48
11	FH-1208	8836	52	54	219	95	41	42
12	FH-1186	8804	52	54	191	104	45	46
13	HI-339 (C)	8524	53	55	215	111	35	35
14	FH-1190	8484	51	53	212	100	36	38
15	FH-1183	8276	51	53	186	94	45	46
16	FH-1200	6271	52	54	214	107	28	28
17	FH-1180	6084	52	54	176	107	22	23
18	FH-1202	5978	51	53	203	100	24	25
	C. V.%	10.15	1.28	1.16	6.92	2.81	7.36	6.50
	LSD @ 5%	1512	1.08	0.86	3.46	4.80	4.98	4.53

The result presented in table No, 48 revealed that statistically significant differences due to hybrids were observed for grain yield in this trial. Local hybrid FH-1205 gave maximum grain yield of 11533 kg/ha followed by local hybrid FH-1184 (10627 kg/ha) which is statistically significantly higher grain yield than the commercial checks HI-339 (8524 kg/ha). Significant differences were shown for other traits also. Local hybrid FH-1187 was early maturing taking minimum no. of days to 50% tasseling (48) and silking (50). Mid to low cob bearing trend was observed in most of the local hybrids included in this trial.

Results for No. of plants harvested and cobs harvested were showing differences statistically.

5. Hybrid Maize Micro Yield Trial No.3: (Kharif 2015)

TABLE 49: Results of Hybrid Maize Micro Yield Trial-3 (Kharif 2015), Faisalabad

Rank No.	Entry	Grain yield (kg/ha)	Days to 50% tassel	Days to 50% silk	Plant Ht. (cm)	Cob Ht. (cm)	No. of plants harv.	No. of cobs harv.
1	FH-1233	11747	54	55	202	106	43	42
2	FH-1230	10858	52	54	193	98	43	45
3	FH-1210	9960	49	51	191	93	46	47
4	FH-1225	9929	53	55	218	120	49	52
5	FH-1229	9631	50	53	200	105	44	47
6	FH-1222	9436	52	54	208	106	41	42
7	FH-1224	9156	53	56	217	114	43	44
8	FH-1231	9129	50	53	210	107	44	46
9	FH-1219	9053	53	55	233	117	42	44
10	FH-1227	9027	48	51	216	119	44	46
11	FH-1220	8982	51	53	212	108	44	46
12	FH-1212	8644	51	53	194	94	44	46
13	FH-1218	7930	52	54	209	108	44	45
14	FH-1241	7724	53	56	203	97	41	42
15	30Y87 (C)	7622	51	54	231	135	37	39
16	HI-339 (C)	7587	53	55	206	98	34	36
17	FH-1217	7573	53	55	217	113	44	44
18	FH-1221	7480	52	54	223	105	42	43
	C. V.%	6.47	1.90	2.27	1.09	2.35	5.20	4.88
	LSD @ 5%	963	1.63	2.03	3.79	4.21	3.69	3.58

The result presented in table No, 49 revealed that Statistically significant differences due to hybrids were observed for grain yield in this trial. Local hybrid FH-1233 gave maximum grain yield of 11747 kg/ha followed by local hybrid FH-1230 (10858 kg/ha). Other local hybrids FH-1210, FH-1225 and FH-1229 with grain yield 9960, 9929 and 9631 kg/ha also statistically significantly higher yielder than the commercial checks 30Y87 (7622 kg/ha) and HI-339 (7587 kg/ha). Significant differences were shown for other traits also. Local hybrid FH-1227 was early maturing taking minimum no. of days to 50% tasseling (48) and silking (51). Mid to low cob bearing trend was observed in most of the local hybrids included in this trial. Results for number of plants harvested and cobs harvested were showing differences statistically.

6. Hybrid Maize Preliminary Yield Trial No. 1 (Kharif 2015)

Two sets of this trial were sown on 17-08-2015 with twenty seven entries each including two commercial hybrids as check. The trial was laid out in RCB design with three replications. Two rows of five meters length for each entry were planted. Standard

agronomic and plant protection measures were carried out in the crop. The harvesting was done on 01-12-2015. Data regarding different traits was recorded and elite hybrids were selected for further evaluation. The data are given in Table 50.

Table 50: Results of Hybrid Maize Preliminary Yield Trial-1 (Kharif 2015), Faisalabad

Rank No.	Entry	Grain yield (kg/ha)	Days to 50% tassel	Days to 50% silk	Plant Ht. cm	Cob Ht. cm	No. of plants harv.	No. of cobs harv.
1	FH-1256	13492	56	55	209	103	31	29
2	FH-1258	12529	54	55	203	102	27	28
3	FH-1246	12300	51	53	208	107	29	32
4	FH-1266	12223	51	53	196	98	28	27
5	FH-1260	12081	54	55	202	106	30	29
6	FH-1243	11752	53	54	202	110	29	30
7	FH-1263	11315	51	53	203	101	27	31
8	FH-1247	10544	54	57	203	94	29	28
9	FH-1251	10529	51	53	195	88	25	29
10	FH-1254	10487	54	56	212	111	30	29
11	FH-1265	10444	46	48	192	86	26	29
12	FH-1249	10408	56	58	205	103	30	31
13	FH-1255	10101	50	52	197	95	28	29
14	NT-6654(C)	9814	56	58	204	100	27	33
15	FH-1264	9754	54	55	207	112	29	29
16	FH-1253	9621	48	50	204	99	27	29
17	30Y87(C)	9514	54	55	207	106	26	30
18	FH-1257	9125	54	57	195	101	23	29
19	FH-1245	8913	53	55	195	102	25	26
20	FH-1262	8912	54	57	202	103	27	29
21	FH-1261	8868	53	55	190	104	25	28
22	FH-1244	8787	54	55	197	101	32	28
23	FH-1250	8164	54	55	180	96	24	31
24	FH-1252	7583	56	58	197	104	27	32
25	FH-1259	7219	52	54	207	89	24	27
26	FH-1248	6684	56	67	206	96	17	25
27	FH-1267	5957	56	58	191	101	22	27
	CV%	4.44	1.62	3.77	4.44	6.65	6.59	3.98
	LSD @ 5%	2258	1.42	3.41	14.58	10.97	3.14	6.14

Data presented in Table 50 reveals statistically significant differences due to hybrids in grain yield among entries included in this trial. Local hybrid FH-1256 gave maximum grain yield 13492 kg/ha followed by FH-1258 (12529 kg/ha). Other local hybrids FH-1246, FH-1266 and FH-1260 with grain yield 12300, 12223 and 12081 kg/ha were statistically significantly higher yielder than both the check hybrids NT-6654 (9814 kg/ha) and 30Y87 (9514 kg/ha). Results for no. of days to 50% tasseling and silking also showed statistically significant differences. Local hybrid FH-1265 was earlier in maturity taking 46 and 48 days to complete 50% tasseling and silking respectively. Statistically significant differences were observed for plant height and cob height. A mid to low bearing trend was observed in most

of the local hybrids which was a good sign for selection of low cob bearing hybrids. Results for number of plants harvested and cobs harvested were also showing significant differences.

7. Hybrid Maize Preliminary Yield Trial No. 2 (Kharif 2015)

TABLE 51: Results of Hybrid Maize Preliminary Yield Trial-2 (Kharif 2015), Faisalabad.

Rank No.	Entry	Grain yield (kg/ha)	Days to 50% tassel	Days to 50% silk	Plant Ht. cm	Cob Ht. cm	No. of plants harv.	No. of cobs/ plot harv.
1	FH-1269	13595	53	54	213	109	28	28
2	FH-1276	12827	52	54	202	107	29	30
3	FH-1292	12522	54	55	205	114	30	30
4	FH-1280	11962	53	56	211	109	27	28
5	FH-1279	11946	52	54	210	110	30	30
6	FH-1287	11772	53	55	210	108	30	31
7	FH-1289	11689	53	56	214	97	29	30
8	FH-1290	11654	53	55	210	100	27	27
9	FH-1282	11456	54	56	201	96	29	29
10	FH-1274	11421	52	54	198	108	27	28
11	FH-1281	11007	54	56	195	98	26	27
12	FH-1275	10941	53	55	207	105	30	30
13	FH-1271	10756	53	55	190	104	30	31
14	FH-1273	10497	54	56	186	103	29	29
15	NT-6654 (C)	9469	55	57	211	107	25	26
16	FH-1268	9045	52	54	186	87	25	24
17	FH-1285	9001	53	54	214	105	22	23
18	FH-1284	8764	54	55	197	97	26	26
19	FH-1272	8714	54	55	184	104	26	26
20	FH-1288	8695	53	56	202	97	26	26
21	FH-1270	8130	54	57	190	97	26	26
22	FH-1277	7686	55	57	198	104	28	28
23	30Y87(C)	7100	54	55	214	112	20	21
24	FH-1283	7071	53	54	194	97	18	19
25	FH-1278	6990	54	56	202	107	27	27
26	FH-1286	6988	53	55	179	80	26	27
27	FH-1291	2599	59	60	143	67	15	15
	CV%	17.27	1.40	1.15	1.52	4.45	3.91	3.52
	LSD @ 5%	1574	0.71	0.61	1.98	4.24	2.92	3.05

Statistical analysis of data presented in above Table 51 reveals that local hybrid FH-1269 out yielded all the hybrids with yield 13595 kg/ha followed FH-1276 (12827 kg/ha). Local hybrids FH-1992, FH-1280, FH-1279 and FH-1287 were also statistically higher yielder than the commercial check hybrid NT-6654 and 30Y87 (9469 and 7100 kg/ha respectively). Results for days to 50% tasseling and silking are also showing significant differences. Most of the hybrids were medium in flowering however FH-1291 was later taking 59 days to complete 50% tasseling 60 days for silking as well as lowest yielder also (2599 kg/ha). Data analysis also revealed statistically significant differences for plant height

and cob height. Mid to low cob bearing trend was observed in some local hybrids which will be useful selection of lodging resistant hybrids in future. The results for number of plants harvested and cobs harvested were statistically significant also.

8. National Uniform Hybrid Maize Yield Trial (Kharif 2015)

This trial was sown with twenty six entries on 18-08-2015 laid out in RCB design with three replications. Two rows of five meters length for each entry were planted. Standard agronomic and plant protection measures were carried out in the experiment. Harvesting was done on 02-12-2015. Data regarding different traits were recorded and elite hybrids were selected for further evaluation. The data are given in following Table 52.

Table 52: Results of National Uniform Hybrid Maize (Yellow) Yield (Kharif 2015), Faisalabad.

Rank No.	Entry	Grain yield kg/ha.	Days to 50% tassel.	Days to 50% silk	Plant Ht. Cm.	Cob Ht. Cm.	No. of plants harv.	No. of cobs harv.
1	Y	10896	47	49	219	123	37	37
2	X	9750	46	48	211	117	36	36
3	E	9748	44	46	230	117	39	39
4	K	9134	46	48	234	112	35	35
5	F	8808	44	46	240	124	37	37
6	W	8797	45	47	207	111	33	33
7	B	8794	44	46	220	120	35	36
8	J	8721	49	51	217	120	33	34
9	U	8318	48	50	206	107	29	30
10	V	8156	45	47	211	106	32	32
11	M	8039	46	48	222	130	27	27
12	P	8000	44	46	239	110	34	34
13	R	7999	47	49	212	112	31	31
14	L	7994	45	47	218	112	32	33
15	C	7926	45	47	212	123	33	33
16	S	7805	48	50	206	106	27	27
17	Q	7787	45	47	226	111	35	35
18	T	7699	49	51	157	98	26	26
19	O	7693	47	49	207	106	34	34
20	G	7580	47	49	216	106	31	31
21	Z	7558	49	51	212	112	31	31
22	D	7149	46	48	212	110	31	31
23	I	6910	45	47	210	106	31	31
24	H	6831	48	50	208	102	32	32
25	A	6471	45	47	208	110	25	26
26	N	5727	45	47	225	115	30	30
	CV%	17.23	1.05	1.16	2.81	3.77	9.79	10.45
	LSD @ 5%	2283	0.79	0.91	9.89	6.95	5.15	5.52

The result presented in table No, 52 revealed that Analysis of data revealed that statistically significant differences exist for grain yield kg/ha among entries included in this trial. The hybrid Y with grain yield 10896 kg/ha out yielded all other entries included. While N was lower yielder giving 5727 kg/ha were at this location. Statistically significant

differences were also observed for traits days to 50% tasseling and days to 50% silking, plant height and cob height, number of plants and cobs harvested.

9. National Uniform Hybrid Maize (White) Yield Trial (Kharif 2015)

This trial was sown with thirty six entries on 18-08-2015. The trial was laid out in RCB design with three replications. Two rows of five meters length for each entry were planted. Standard agronomic and plant protection measures were carried out in the experiment. Harvesting was done on 02-12-2015. Data regarding different traits were recorded and elite hybrids were selected for further evaluation. The data are given in following Table 53.

Table 53: Results of National Uniform Hybrid Maize Yield Trial (White) (Kharif 2015), Faisalabad.

Rank No.	Entry	Grain yield (kg/ha)	Days to 50% tassel.	Days to 50% silk	Plant Ht. cm	Cob Ht. Cm	No. of plants harv.	No. of cobs harv.
1	O	7679	48	49	227	126	37	37
2	Q	7347	45	47	205	105	36	36
3	U	7345	43	45	173	110	37	37
4	AB	7251	44	45	230	124	33	33
5	R	7190	44	46	210	105	34	34
6	AH	7183	43	45	195	94	33	33
7	AD	7094	46	49	202	106	35	35
8	AE	7008	47	48	213	108	39	39
9	B	6947	46	48	227	109	35	35
10	AA	6940	46	48	181	94	36	36
11	C	6925	46	48	218	105	35	35
12	M	6880	47	49	215	110	32	32
13	Y	6830	45	47	201	97	34	34
14	AF	6727	43	45	213	97	36	36
15	P	6688	47	48	188	103	34	34
16	H	6612	47	49	190	87	32	32
17	J	6502	43	44	208	106	31	31
18	AI	6434	46	48	211	109	31	31
19	L	6396	43	45	202	103	32	32
20	S	6287	45	47	204	98	33	33
21	G	6257	45	47	223	107	33	33
22	D	5710	45	47	211	107	32	32
23	W	5687	45	47	230	105	29	29
24	T	5668	43	45	203	109	25	25
25	Z	5647	47	48	206	103	27	27
26	N	5569	43	45	220	110	32	32
27	AC	5493	44	46	225	112	34	34
28	K	5416	43	45	222	115	36	36
29	AG	5289	47	49	202	98	31	31
30	E	5177	43	46	197	97	32	32
31	V	5096	46	48	205	103	30	30
32	A	4872	44	46	224	130	30	30

33	X	4813	43	45	210	103	25	25
34	I	4715	45	47	225	105	29	29
35	AJ	4498	45	47	200	103	24	24
36	F	3755	45	47	221	104	21	21
	CV%	12.78	2.00	2.11	3.10	4.08	8.09	8.09
	LSD @ 5%	1280	1.46	1.61	10.56	7.03	4.23	4.23

Analysis of data revealed that statistically significant differences exist for grain yield kg/ha among entries included in this trial. The hybrids O with grain yield 7679 kg/ha out yielded all other entries included. While F was lower yielder giving 3755 kg/ha at this location. Statistically significant differences were also observed for traits days to 50% tasseling and days to 50% silking, plant height and cob height, No. of plants and cobs harvested.

10. National Uniform Hybrid Maize (China) Yield Trial (Kharif 2015)

This trial was sown with fifteen entries on 18-08-2015. The trial was laid out in RCB design with three replications.Two rows of five meters length for each entry were planted. Standard agronomic and plant protection measures were carried out in the experiment. Harvesting was done on 02-12-2015. Data regarding different traits were recorded and elite hybrids were selected for further evaluation. The data are given in following Table 54.

Table 54: Results of National Uniform Hybrid Maize (China) Yield Trial (Kharif 2015), Faisalabad.

Rank No.	Entry	Grain yield kg/ha.	Days to 50% tassel.	Days to 50% silk	Plant Ht. Cm.	Cob Ht. Cm.	No. of plants harv.	No. of cobs harv.
1	N	9027	44	46	208	104	37	37
2	J	9000	46	49	185	103	33	33
3	O	8350	45	47	186	105	33	33
4	M	8088	46	48	201	97	26	26
5	F	8032	47	49	227	121	26	26
6	L	7985	45	47	195	105	31	32
7	I	7794	45	47	227	104	32	32
8	A	7377	44	46	224	129	32	32
9	B	7275	44	46	230	108	30	31
10	K	7222	44	46	210	110	29	29
11	G	6533	46	47	200	112	25	25
12	E	6503	46	49	206	107	26	26
13	H	6133	44	46	202	108	27	27
14	C	5766	45	47	225	107	37	37
15	D	4177	45	47	210	102	14	15
	CV%	21.57	2.49	2.33	2.49	8.02	10.76	10.47
	LSD @ 5%	**2617**	**1.86**	**1.83**	**1.86**	**14.49**	**4.97**	**5.14**

Analysis of data revealed that statistically significant differences exist for grain yield kg/ha among entries included in this trial. The hybrid N with grain yield 9027 kg/ha out yielded all other entries included. While D was lower yielder giving 4177 kg/ha at this location. Statistically significant differences were also observed for traits days to 50%

tasseling and days to 50% silking, plant height and cob height, no. of plants and cobs harvested.

11. National Uniform Varietal Maize Yield Trial (Kharif 2015)

This trial was sown with twenty four entries on 18-08-2015. The trial was laid out in RCB design with three replications. Two rows of five meters length for each entry were planted. Standard agronomic and plant protection measures were carried out in the experiment. Harvesting was done on 02-12-2015. Data regarding different traits were recorded and elite hybrids were selected for further evaluation. The data are given in following Table 55.

Table 55: Results of National Uniform Varietal Maize Yield (Kharif 2015), Faisalabad.

Rank No.	Entry	Grain yield (kg/ha)	Days to 50% tassel.	Days to 50% silk	Plant Ht. cm	Cob Ht. cm	No. of plants harv.	No. of cobs harv.
1	C	8039	45	51	211	111	27	27
2	B	7749	44	48	202	105	32	32
3	H	6917	41	51	383	98	32	32
4	A	6772	44	47	215	123	32	32
5	T	6683	46	52	226	124	34	34
6	S	6406	45	47	211	108	31	32
7	Q	6406	46	51	233	130	31	31
8	N	6239	44	50	246	123	25	25
9	X	5953	46	45	202	104	34	34
10	R	5927	45	45	213	114	30	31
11	W	5323	44	46	225	111	29	29
12	P	5283	46	48	245	124	28	28
13	G	5250	42	48	205	105	31	31
14	V	5009	47	45	205	101	31	31
15	U	4722	42	50	210	99	21	21
16	O	4333	46	45	220	110	25	25
17	M	4263	45	48	233	114	16	16
18	D	4183	40	51	231	104	21	21
19	F	3994	46	48	221	108	24	24
20	E	3722	45	50	211	103	22	22
21	J	2811	44	45	212	105	20	20
22	I	2763	45	46	233	114	25	26
23	L	2102	46	48	186	114	8	8
24	K	1458	44	51	235	125	16	17
	CV%	19.41	2.37	1.52	3.49	3.39	14.09	14.70
	LSD @ 5%	1667	1.72	1.21	16.75	6.21	6.06	6.35

Analysis of data showed that statistically significant differences exist for grain yield kg/ha among entries included in this trial. The entry C at this station was top yielder with grain yield 8039 kg/ha while entry K was lower yielder giving 1458 kg/ha. Statistically significant differences were also observed for traits days to 50% tasseling and days to 50% silking, plant height and cob height, No. of plants and cobs harvested.

12. DEMONSTRATION YIELD TRIALS:

Table 56: Demonstration Yield Trial Results (Kharif 2015)

Grain Yield (Kg/ ha)

R. No.	Entry	Saeedabad Jhang	362JB	Chiniot	Khiddarwala	Avg.
1	30Y87	10616	10370	11066	10563	10654
2	FH-793	11030	10543	11283	9748	10651
3	FH-810	9792	11082	11264	10237	10594
4	NT-6654	9613	10235	10450	9219	9879
5	YH-1898	8088	10658	10833	9184	9691
6	FH-963	8525	9613	10457	8717	9328
7	Y. Hybrid	8676	9223	9540	8019	8865

SEED PRODUCTION:

Table 57: Seed Production (Kharif 2015), Faisalabad.

	Inbred lines/ Hybrids/OPV	Quantity (kg)
Single Crosses	FH-793	05
	FH-922	05
	FH-949	90
	FH-985	05
	FH-988	05
	FH-1012	10
	FH-1046	30
	Total	**150**
Double Top Cross	DTC-1	1000
OPV	Malka-2016	1100

SPRING 2016:

Ten different yield trials of hybrids were sown for evaluation.

1. Hybrid Maize Macro Yield Trial No. 1 (SPRING 2016)

A trial comprised of nine single cross hybrids including one hybrid as check was sown on 13-02-2016 according to RCB design with three replications. The plot size was kept 5m x 3m. The harvesting was done on 20-06-2016. Data regarding different agronomic traits were recorded and hybrids showed good performances were selected for on farm testing. The data are given in Table 58.

Table 58: Results of Hybrid Maize Macro Yield Trial No. 1 (Spring 2016), Faisalabad

Sr. No.	Entry	Grain yield (kg/ha)	Days to 50% tassel.	Days to 50% silk	Plant Ht. (cm).	Cob Ht. (cm).	No. of plants harv.	No. of cobs harv.
1	FH-1046	11943	77	79	193	109	100	102
2	FH-949	11297	79	80	171	83	95	96
3	FH-1012	11276	79	75	182	104	96	99
4	FH-793	11020	79	78	182	101	101	100
5	FH-810	10809	80	73	192	102	93	95
6	FH-922	10279	75	79	193	112	97	99
7	FH-1036	10118	82	79	192	103	92	94
8	FH-988	9883	78	82	217	115	94	96

9	31-P41	8721	73	77	205	93	89	92
	CV%	5.72	0.67	0.93	0.68	1.83	3.29	4.40
	LSD @ 5%	2370	0.88	1.25	2.26	3.24	5.42	7.36

Data presented in the Table 58 reveals statistically significant differences in grain yield due to hybrids. The hybrid FH-1046 gave maximum grain yield of 11943 Kg/ha. Other local hybrids FH-949, FH-1012 & FH-793 were at par with local hybrid FH-1046 but statistically higher yielder than commercial check 31-P41 (8721 Kg/ha).Significant differences were observed for days to 50% tasseling and silking also. Local hybrid FH-1036 took the maximum days for 50% tasseling (79) and silking (82).Local hybrid FH-988 attained the maximum plant height of 217 cm whileFH-949 attained the minimum (171cm).Local hybrid FH-988 showed maximum cob height of 115 cm while local hybridFH-949 showed minimum cob height of 83 cm. Number of plants per plot and cobs harvested were also statistically significant different.

2. Hybrid Maize Macro Yield Trial No. 2 (Spring 2016)

This trial comprised of twelve single cross hybrids including two commercial hybrids as check was sown on 13-02-2016. The trial was laid out according to RCB design with three replications. The plot size was kept 5m x 2.25m. The harvesting was done on 20-06-2016. Data regarding different agronomic traits were recorded and hybrids with good performance were selected for on farm testing. The data are presented in Table 59.

Table 59: Results of Hybrid Maize Macro Yield Trial No. 2 (Spring 2016), Faisalabad

Sr. No.	Entry	Grain yield (kg/ha)	Days to 50% tassel	Days to 50% silk	Plant Height (cm)	Cob Height (cm)	No. of plants harv.	No. of cobs harv.
1	FH-929	10505	77	79	203	111	69	71
2	FH-1042	9975	78	80	192	114	71	73
3	FH-928	9292	76	78	189	106	66	68
4	FH-1231	9278	78	81	201	122	62	62
5	FH-1117	8849	78	80	189	109	69	69
6	FH-1219	8826	78	81	199	113	67	67
7	FH-1137	8769	80	82	206	124	75	75
8	NK-8711(C)	8734	73	74	184	80	66	64
9	31P41 (C)	8708	73	74	207	82	72	73
10	FH-950	8601	77	79	198	111	69	72
11	FH-1119	8419	73	75	174	92	63	61
12	FH-1124	8129	74	76	161	80	70	69
	CV%	8.22	1.07	1.09	3.39	4.22	9.32	7.31
	LSD @ 5%	1049.5	1.38	1.44	11.01	7.39	10.77	8.50

Data presented in above Table 59 reveals that differences in mean grain yields due to hybrid varieties were significant at 5% level of significance. The local hybrid FH-929 gave significantly the highest grain yield of 10505kg/ha followed by the local hybrids FH-1042, FH-928 and FH-1231which were at par with top yielding local hybrid with respective yields of 9975, 9292 and9278kg/ha. Differences in days to 50% tasseling and silking were also significant. Commercial hybrid FH-1137 took the maximum (80) days to 50% tasseling and silking (82).Results for plant height and cob height were also showing statistically

significant differences. Commercial hybrid 31P41 attained maximum plant height of 207cm. Number of plants per plot and cobs harvested were also showing statistically significant differences.

3. **Hybrid Maize Micro Yield Trials (Spring 2016)**

This trial comprised of three sets each containing eighteen single cross hybrids including two commercial hybrids as check in Micro-II & III while only one commercial check in Micro yield trial-I sown on 14-02-2016, laid out according to RCB design with three replications. The plot size was kept 5m x 1.5m.The harvesting was done on 21-06-2016. Data regarding different agronomic traits were recorded and hybrids with good performance were selected for on farm testing. The data are given in the following Tables:

Table 60: Results of Hybrid Maize Micro Yield Trial-1 (Spring 2016), Faisalabad

Sr. No.	Entry	Grain yield (kg/ha)	Days to 50% tassel	Days to 50% silk	Plant Ht. (cm)	Cob Ht. (cm)	No. of plants harv.	No. of cobs harv.
1	FH-1166	9733	80	82	172	96	51	52
2	FH-1163	9584	80	82	170	102	51	50
3	FH-1214	9313	78	82	176	106	51	44
4	FH-1210	9037	81	82	170	111	50	50
5	FH-1125	9035	74	76	170	105	50	51
6	FH-1172	8932	80	82	173	101	51	48
7	FH-1224	8506	79	81	181	112	51	51
8	FH-1204	8456	74	76	168	117	51	52
9	31-P-41 (C)	8304	74	76	165	96	51	45
10	FH-1203	8168	81	82	187	109	52	48
11	FH-1217	8076	77	80	177	108	50	47
12	FH-1227	8060	78	80	213	125	51	48
13	FH-1146	7993	78	80	153	82	50	52
14	FH-1034	7946	80	82	181	110	51	49
15	FH-1025	7935	80	82	156	85	51	47
16	FH-1220	7921	79	81	186	104	42	46
17	FH-1205	7208	78	80	168	104	51	45
18	FH-1212	6132	81	83	171	104	49	42
	CV%	9.10	0.92	0.87	2.12	1.64	2.12	8.26
	LSD @ 5%	1260.8	1.19	1.15	1.76	2.83	1.76	6.58

Data presented in above Table 60 reveals that differences in mean grain yields due to hybrid varieties were statistically significant. Local hybrid FH-1166 gave the maximum grain yield of 9733 kg/ha followed by local hybrids FH-1163 (9584 kg/ha). FH-1214 (9313 kg/ha), FH-1210 (9037 kg/ha) and FH-1125 (9035 kg/ha) local hybrids were statistically at par with top yielding local hybrid. Significant differences were also observed for days to 50% tasseling and silking. The minimum no. of days to 50% tasseling (74) was observed for local hybrids FH-1204, FH-1125 and commercial check hybrids. Differences in plant height and cob height were also significant. The maximum plant height (213 cm) was shown by FH-1227 while the minimum plant height (153 cm) was observed for FH-1146. Number of plants per plot and cobs harvested were also statistically showing significant differences.

4. **Hybrid Maize Micro Yields Trials (Spring 2016).**

Table 61: Results of Hybrid Maize Micro Yield Trial-2 (Spring 2016), Faisalabad

Sr. No.	Entry	Grain yield (kg/ha)	Days to 50% tassel	Days to 50% silk	Plant Ht. (cm)	Cob Ht. (cm)	No. of plants harv.	No. of cobs harv.
1	FH-1255	10062	79	80	163	88	51	52
2	FH-1243	9284	75	77	169	109	50	51
3	FH-1252	9236	77	79	202	109	53	52
4	NK-8711 (C)	9100	75	77	181	90	46	46
5	FH-1257	8951	76	78	173	94	50	49
6	FH-1233	8815	79	80	179	108	51	51
7	FH-1229	8712	76	78	166	94	50	51
8	FH-1241	7822	76	78	170	99	49	49
9	FH-1250	7688	74	76	180	96	48	49
10	FH-1245	7355	74	77	168	99	45	45
11	FH-1262	7238	73	75	177	96	49	47
12	FH-1230	7236	79	81	179	107	51	51
13	FH-1246	7139	79	81	174	110	43	45
14	FH-1259	6917	75	77	186	91	47	49
15	FH-1254	6824	78	79	185	91	46	44
16	FH-1263	6467	76	78	193	94	44	45
17	Maxima (C)	6012	73	75	167	79	46	45
18	FH-1249	5245	72	74	178	74	41	43
	CV%	11.8	1.30	1.21	1.06	2.34	6.74	8.75
	LSD @ 5%	1523.5	1.63	1.56	3.11	3.73	5.33	6.97

Data presented in above Table 61 reveals that differences in mean grain yields due to hybrid varieties were statistically significant. Local hybrid FH-1255 gave the maximum grain yield of 10062 kg/ha. Other local hybrids FH-1243 (9284 kg/ha), FH-1252 (9236 kg/ha) were at par with commercial hybrid NK-8711 and top yielding hybrid. Significant differences were also observed for days to 50% tasseling and silking. The minimum no. of days to 50% tasseling (72) and silking (74) was observed for local hybrid FH-1249.Differences in plant height and cob height were also significant. The maximum plant height (202 cm) was shown by FH-1252.Statistically significant differences were also observed for number of plants per plot and cobs harvested.

5. **Hybrid Maize Micro Yields Trials (Spring 2016).**

Table 62: Results of Hybrid Maize Micro Yield Trial-3 (Spring 2016), Faisalabad

Sr. No.	Entry	Grain yield (kg/ha)	Days to 50% tassel	Days to 50% silk	Plant Ht. (cm)	Cob Ht. (cm)	No. of plants harv.	No. of cobs harv.
1	FH-1269	10432	72	74	161	105	50	51
2	FH-1275	10165	71	74	172	90	48	48
3	FH-1270	9240	72	74	185	106	47	48
4	FH-949	9162	72	74	172	103	44	44
5	FH-1284	8984	72	74	163	86	50	50
6	FH-1266	8827	71	73	148	83	49	49
7	FH-1287	8475	72	74	183	94	51	51
8	NK-8711 (C)	8325	68	69	165	70	43	44
9	FH-1289	8041	74	76	186	89	51	52
10	FH-1292	7784	73	75	174	98	46	47
11	FH-1286	7784	69	71	149	74	50	51
12	FH-1276	7363	72	75	186	91	56	58
13	FH-1285	7232	71	73	184	89	45	45

14	FH-1282	6857	73	75	175	89	36	38
15	FH-1281	5889	75	78	173	76	50	51
16	FH-1280	5779	75	78	157	88	48	49
17	MV-531 (C)	5501	66	68	173	75	45	46
18	FH-1291	1919	78	84	118	62	31	32
	CV%	15.43	0.87	1.01	1.34	2.33	9.29	8.89
	LSD @ 5%	1960	1.03	1.25	3.73	3.36	7.16	6.99

Data presented in above Table 62 reveals that differences in mean grain yields due to hybrid varieties were statistically significant. Local hybrid FH-1269 gave the maximum grain yield of 10432 kg/ha followed by local hybrids FH-1275 (10165 kg/ha).Other Local hybrids FH-1270 (9240 kg/ha), FH-949 (9162 kg/ha), FH-1284 (8984 kg/ha), FH-1266 (8827 kg/ha) and FH-1287 (8475 kg/ha) were also good yielder and at par with top yielding hybrid. These hybrids were also showing statically significantly higher grain yield than the commercial check NK-8711 (8325 kg/ha). Significant differences were also observed for days to 50% tasseling and silking. The minimum no. of days to 50% tasseling (66) and silking (68) was observed for commercial hybrid MV-531.Differences in plant height and cob height were also significant. The maximum plant height (186 cm) was shown by local hybrids FH-1289 and FH-1276 having cob height of 89cm and 91cm showing mid bearing characteristic. Statistically significant differences were also observed for number of plants per plot and cobs harvested.

6. **Hybrid Maize Preliminary Yield Trial No. 1 (Spring 2016)**

This trial comprised of two sets each consisting of twenty-eight single cross hybrids including two commercial hybrids as check were sown on 15-02-2016. The trials were laid out in R. C. B. design with three replications. The plot size was kept 5m x 0.75m. The harvesting was done on 22-06-2016. Data regarding different agronomic traits were recorded and hybrids with good performance were selected for on farm testing. The data are given in Tables given below:

Table 63: Results of Hybrid Maize Preliminary Yield Trial-1 (Spring 2016), Faisalabad.

Sr. No.	Entry	Grain yield kg/ha	Days to 50% tassel.	Days to 50% silk	Plant Ht. cm.	Cob Ht. cm.	No. of plants harv.	No. of cobs harv.
1	FH-1315	11000	75	77	180	91	28	26
2	FH-1310	10995	71	73	182	100	25	27
3	FH-1296	10987	66	68	249	78	27	25
4	FH-1294	10960	70	72	169	81	28	24
5	FH-1293	10664	71	73	160	74	27	23
6	FH-1313	10536	71	71	177	100	26	25
7	FH-1301	10400	77	79	130	68	24	23
8	31P41 (C)	9744	69	71	182	84	27	25
9	FH-1307	9744	71	73	172	93	27	25
10	FH-1311	9496	71	72	183	101	27	25
11	FH-1300	9493	75	77	123	66	24	24
12	FH-1316	9389	74	76	176	92	26	23
13	FH-1297	9387	71	73	171	88	26	23

14	FH-1299	9387	77	77	130	75	25	22
15	FH-949	8717	72	74	181	93	29	25
16	FH-1306	8688	74	76	174	107	23	26
17	FH-1314	8576	74	75	182	98	25	25
18	FH-1309	8573	74	76	168	93	26	25
19	FH-1304	8560	76	78	155	88	24	24
20	FH-1312	8560	70	73	172	94	28	27
21	FH-1302	8421	73	75	152	89	29	27
22	FH-1303	8333	72	74	138	73	27	23
23	FH-1298	8320	72	75	164	81	25	27
24	FH-1308	8299	73	75	157	83	25	26
25	FH-1305	7869	73	75	161	94	26	24
26	FH-1295	6720	68	70	151	72	25	23
27	Maxima (C)	5656	67	70	162	70	25	24
28	FH-1317	5656	72	74	162	73	19	19
	CV%	15.20	1.42	1.56	20.14	4.58	8.69	10.63
	LSD @ 5%	2056.8	1.67	1.89	54.91	6.41	3.68	4.25

The data given in Table 63 showed statistically significant differences in grain yield kg/ha for hybrids included in this trial. Local hybrid FH-1315 gave significantly higher grain yield (11000 kg/ha). Local hybrids FH-1310, FH-1296, FH-1294, FH-1293, FH-1313 and FH-1301 and commercial hybrid 31P41were statistically at par with the top yielding hybrid. Results for No. of days to 50% tasseling and 50% silking also showed statistically significant differences. Local hybrid FH-1296showed earliness taking minimum days to complete 50% tasseling (66) and 50% silking (68)while local hybrid FH-1301 took maximum days to complete 50% tasseling (77) and 50% silking (79). Significant differences were observed for plant height and cob height.Local hybrid FH-1296 attained maximum plant height (249 cm).Mid to low cob bearing was observed in most of the local hybrids which will be helpful developing lodging resistant hybrids. Results for No. of plants harvested and No. of cobs harvested were also showing significant differences.

7. **Hybrid Maize Preliminary Yield Trial No. 2 (Spring 2016)**

Table 64: Results of Hybrid Maize Preliminary Yield Trial-2 (Spring 2016), Faisalabad.

Sr. No.	Entry	Grain yield (kg/ha)	Days to 50% tassel	Days to 50% silk	Plant Ht. (cm)	Cob Ht. (cm)	No. of plants harv.	No. of cobs/ plot harv.
1	FH-1323	10444	76	77	199	109	28	29
2	FH-1333	10396	78	81	184	85	24	26
3	FH-1334	10164	76	78	199	90	25	26
4	FH-1338	10159	78	79	197	91	27	28
5	FH-1332	9970	78	80	210	102	26	28
6	FH-1327	9925	76	78	200	90	25	27
7	FH-1320	9872	77	79	196	97	27	29
8	FH-949 (C)	9796	78	80	188	83	25	27
9	FH-1319	9766	78	80	180	94	26	26

10	FH-1328	9420	77	79	187	90	25	26
11	FH-1329	9181	76	78	194	99	26	28
12	FH-1339	8887	78	80	206	107	22	24
13	FH-1342	8731	81	82	199	98	26	28
14	FH-1336	8602	79	80	193	90	21	23
15	FH-1335	8468	77	78	201	103	23	22
16	FH-1337	8456	77	80	196	100	23	25
17	NK-8711(C)	8249	77	80	207	100	24	26
18	FH-1330	8228	77	79	211	108	26	27
19	FH-1322	7744	76	78	195	104	24	24
20	FH-1341	7651	75	78	192	113	24	25
21	FH-1331	7530	76	78	212	104	24	26
22	FH-1324	7285	74	76	195	93	27	28
23	FH-1326	7284	75	77	205	102	23	23
24	FH-1340	7044	78	80	120	57	22	22
25	FH-1325	6937	76	77	185	80	24	23
26	FH-1318	6357	76	79	173	78	18	19
27	FH-1321	6324	78	79	200	107	26	28
28	MV-531 (C)	5681	78	80	215	110	22	24
	CV (%)	17.00	0.72	1.03	1.44	3.95	8.58	9.87
	LSD @ 5%	2370	0.91	1.32	4.57	6.19	3.41	4.14

The data presented in the Table 64 shows significant differences in grain yield statistically. Local hybrid FH-1323 gave the highest grain yield of 10444 kg/ha followed by FH-1333 (10396 kg/ha).Days to 50% tasseling and 50% silking were also showing statistically significant differences. FH-1342 took the maximum days to complete 50% tasseling (81) and 50% silking (82) respectively, while FH-1326 took the minimum days (75) to complete 50% tasseling and 77 & 78 days respectively to complete 50% silking. Significant differences were observed for plant height and cob height. Maximum plant height was attained by MV-531 (215cm) while FH-1318 attained minimum plant height (173cm). Mid to low cob bearing Number of plants and cobs harvested per plot were also showing statistically significant differences.

8. **National Uniform Hybrid Maize Yield Trial No. 1 (Spring 2016)**

This trial comprised of 52 entries was sown on 16-02-2016. The trial was laid out in RCB design with three replications. The plot size of 5m x 1.5m was kept. Standard agronomic and plant protection measures were carried out in the crop. Harvesting was done on 23-06-16. Data regarding different traits were given in the following Table 65.

Table 65: Results of National Uniform Hybrid Maize Yield Trial (Spring 2016), Faisalabad.

Sr. No.	Entry	Grain yield (kg/ha)	Days to 50% tassel	Days to 50% silk	Plant Ht. cm	Cob Ht. cm	No. of plants harv.	No. of cobs harv.
1	AF	9311	72	74	136	65	33	37
2	W	9213	72	74	144	72	40	42
3	E	9040	72	74	135	42	44	45

4	H	8895	72	74	121	58	49	51
5	O	8827	72	74	116	42	43	43
6	Y	8733	72	73	150	63	43	43
7	D	8720	72	74	130	56	41	40
8	AI	8378	72	74	131	79	45	48
9	I	8280	73	74	141	68	44	45
10	X	8244	72	74	129	57	42	41
11	J	8098	72	74	144	65	39	40
12	G	7844	71	73	146	71	40	40
13	AG	7831	72	74	147	68	47	47
14	AV	7684	71	73	127	57	37	38
15	V	7555	72	74	149	71	46	48
16	C	7284	71	73	135	65	36	39
17	M	7070	72	74	126	61	39	39
18	Z	6978	74	75	170	78	22	23
19	AR	6640	72	74	148	66	43	44
20	AK	6636	71	73	139	58	34	34
21	AS	6618	72	74	138	60	41	42
22	A	6599	71	73	135	65	35	34
23	R	6493	70	72	144	71	41	42
24	AT	6458	75	76	125	65	43	43
25	B	6280	72	74	126	55	39	40
26	AM	6196	72	73	134	57	38	38
27	AL	6182	73	74	126	74	40	40
28	AJ	6160	73	76	125	57	38	39
29	T	6111	73	75	159	68	42	42
30	AA	6067	73	75	143	58	33	33
31	AN	6049	72	74	164	69	43	44
32	F	5871	72	74	132	56	36	37
33	AY	5773	72	73	135	68	30	31
34	L	5769	73	75	133	72	43	46
35	AX	5529	72	74	134	65	31	32
36	AB	5507	71	72	134	66	43	43
37	AQ	5400	72	73	125	44	40	41
38	AO	5209	72	74	149	66	39	41
39	AP	5191	72	74	140	81	34	34
40	AU	4973	71	73	144	63	36	35
41	AZ	4880	72	74	119	66	35	36
42	U	4689	75	77	133	53	36	37
43	AE	4622	71	73	124	65	33	33
44	S	4518	71	73	128	55	34	35
45	K	4467	72	74	123	56	34	34
46	Q	4436	72	73	135	48	30	31
47	AH	4413	71	73	140	55	42	43
48	N	4258	72	73	133	65	32	32
49	AD	4160	73	75	125	54	35	36
50	AC	3840	73	74	124	51	33	31

51	AW	3547	74	75	146	68	33	33
52	P	2328	73	75	126	55	31	30
	CV%	13.47	1.18	1.29	4.54	5.14	12.23	12.13
	LSD @ 5%	1384.2	1.38	1.54	9.98	5.17	7.54	15.19

Data presented in Table 65 revealed that statistically significant differences exist for grain yield kg/ha among entries included in this trial. Entry AF gave maximum grain yield of 9311 kg/ha followed by entry W (9213kg/ha). Entry P was lower yielder with grain yield 2328 kg/ha at this station. Statistically significant differences were also observed for days to 50% tasseling, 50% silking, plant height, cob height, No. of plants and cobs harvested.

9. National Uniform Varietal Maize Yield Trial (Spring 2016)

This trial was sown on 16-02-16 with sixteen entries. The trial was laid out in RCB design with two replications. The plot size was kept 5m x 1.5m. Standard agronomic and plant protection measures were carried out in the crop. Harvesting of trial was done on 23-06-16. Data regarding different traits were recorded and elite hybrids were selected for further evaluation. The data are given in Table 66.

TABLE 66: Results of National Uniform Maize Varietal Yield Trial (Spring 2016), Faisalabad.

Rank. No.	Entry	Grain yield (kg/ha)	Days to 50% tassel	Days to 50% silk	Plant Ht. (cm)	Cob Ht. (cm)	No. of plants harv.	No. of cobs harv.
1	O	4733	68	70	129	82	36	36
2	K	4498	67	68	149	67	34	35
3	H	4422	63	65	148	89	29	28
4	G	4267	64	69	173	87	26	28
5	E	4004	69	70	162	83	30	31
6	M	3711	66	68	155	81	30	36
7	F	2938	70	72	167	87	20	22
8	L	2676	67	69	144	68	19	20
9	I	2627	66	67	148	78	31	31
10	D	2604	69	71	140	87	29	30
11	A	2542	66	68	155	83	31	33
12	J	2378	69	71	166	82	19	19
13	B	1364	66	68	160	77	23	23
14	P	1262	68	70	129	89	11	13
15	N	1080	67	69	135	77	7	7
16	C	796	68	69	163	75	10	11
	CV%	20.72	2.15	1.00	8.49	5.70	17.02	15.65
	LSD @ 5%	991.44	2.40	1.14	21.45	7.66	6.80	6.56

Data presented in Table 66 showed significant differences for grain yield kg/ha due to varieties. The Entry coded as O out yielded with grain yield 4733 kg/ha followed by K

(4498 kg/ha). Entry C was lower yielder with grain yield 796 kg/ha. Statistically significant differences were also observed for days to complete 50% tasseling and 50% silking. The traits plant height, cob height, number of plants per plot and cobs harvested were also showing significant differences in this trial.

10. ADP Project "PROVISION OF ADDITIONAL RESEARCH FACILITIES FOR DEVELOPMENT OF HEAT RESILIENT MAIZE HYBRIDS AT MAIZE AND MILLETS RESEARCH INSTITUTE"

I. Screening of Heat Resilient Maize Inbred Lines

Two sets (optimal and delayed) of maize inbred lines each consisting of 108 lines were sown at MRS, Faisalabad. Temperature range during flowering and grain filling period was:

Optimal sowing **07-05-2016 to 22-05-2016**
40.5 ^{0}c - 45.6 ^{0}c

Delayed sowing **10-06-2016 to 25-06-2016**
41.5 ^{0}c - 46.0 ^{0}c

At this high temperature stress during flowering and grain filling period sixty four (64) local inbred lines of maize were found heat stress tolerant in both trials i.e optimal sowing and delayed sowing.

II. **On-Farm Testing**

Table 67: On Farm Hybrids Evaluation Trial Spring 2016 for Heat Stress Tolerance under ADP Project.

Grain Yield (Kg/ ha)

R. No.	Entries	Ck. 437 G.B N.pur	Ck. 385 G.B Samundri	Ck. 452 G.B T. wala	Ck. 473 G.B Samundri	Ck. 191 G.B M. wala	Ck. 615 G.B T. wala	Avg.
1	FH-1046	10731	11471	10037	10388	11014	9979	10603
2	FH-949	10933	10848	9440	9621	10508	10191	10257
3	FH-922	9282	10267	9680	8491	9317	8835	9312
4	YH-1898	9970	9104	9664	8737	9234	9082	9299
5	FH-988	9744	9331	9827	8926	8277	9283	9231
6	Y. Hybrid	9305	8876	8703	8071	8321	8143	8570
7	P15M43	9447	9017	8651	7896	8166	8219	8566

Local hybrids FH-1046, FH-949, FH-922, FH-988, YH-1898 and Yusafwala hybrid showed heat stress tolerance and gave good yield kg/ha on average basis comparable to commercial hybrid P15M43.

Seed Production:

In two different isolated blocks composite variety were planted for double top cross seed production. Double top cross seed was collected from female line and composite variety seed from male line.

Table 68: SEED PRODUCTION, (Spring-2016), Faisalabad

Sr. No.	Entry	Seed production kgs
1	DTC	560
2	EV-77	960

MILLETS RESEARCH STATION, RAWALPINDI

1. SEASON AND ITS EFFECT

Meteorological data of Millets Research Station, Rawalpindi for the financial year 2014-2015 and 2015-2016 are given below. During the year 2015-2016, 1400.00 mm rain was received compared with 2014-2015 (1412.0 mm). Heavy rains during the 1st week of July facilitated seed bed preparation and sowing of pearl millet yield trials, adaptability national uniform maize yield trial and crossing block i.e. on 16-07-2015. Afterwards continuous rains delayed the sowing of Pearl millet breeding material till 1st week of August. Rains during the month of August and September created hindrance in cultural operations and created conducive environment for weeds, insects and pests. A dry spell during the month of November 2015 favored the harvesting of Kharif trials 2015 at the station. Rain received during the months from January 2016 to June 2016 facilitated the sowing of oat for green fodder on an area of nine Kanal at the station which was auctioned and amount deposited in the national treasury.

Meteorological data for the financial year 2014-15 and 2015-16

Sr. No.	Month	Average Temperature ^{o}C				Rainfall (mm)	
		Maximum		Minimum			
		(2014-15)	(2015-16)	(2014-15)	(2015-16)	(2014-15)	(2015-16)
1	July	42.0	40.5	28.5	21.0	105.6	432.2
2	August	39.0	37.0	18.0	21.5	129.4	180.3
3	September	35.0	37.0	15.0	18.0	461.7	79.9
4	October	34.0	34.2	11.6	10.5	26.3	193.0
5	November	27.5	27.5	3.0	6.5	6.80	15.2
6	December	26.5	24.0	1.0	2.0	0.0	20.0
7	January	21.0	21.5	2.5	2.0	33.5	55.7
8	February	26.0	31.5	4.5	4.5	98.9	129.4
9	March	31.0	32.2	6.5	9.5	308.0	180.1
10	April	35.0	38.0	11.0	14.5	168.3	14.3
11	May	39.0	42.5	16.5	19.4	31.0	26.0
12	June	43.0	42.0	19.0	21.0	42.5	73.6
Total						**1412.0**	**1399.7**

2. RESEARCH WORK DONE

Following research work on pearl millet and maize crops was conducted during the year 2015-16 at Millets Research Station, Rawalpindi.

I. PEARL MILLET

i. Crossing Block of Pearl Millet

Fifty pearl millet germplasm lines were sown on 04-08-2015 using strip design. Each genotype comprised of two rows of five meter length. Inter row and inter plant distances were kept as 20 cm and 60 cm, respectively. Gape filling and thinning was done on 18-08-2015 to 22-08-2015. Forty five lines were maintained through hand pollination while five lines were discarded due to very late maturity. Seed was harvested on 12-11-2015 and

retained for future utilization in the breeding programme for the development of dual purpose variety.
Twenty successful fresh crosses were made, harvested and seed was retained for further evaluation during Kharif- 2016.

ii. Development of Dual Purpose Pearl Millet Variety

Three filial populations (F_2, F_3 and F_4) were sown on 16-07-2015 and 31-07-2015, using strips design and F_1 population was sown on 04-08-2015. Plant to plant and row to row distances were kept as 20 cm and 60 cm respectively. Phenotypically vigorous plants from F_1 population were self fertilized, harvested and seed was retained to raise F_2 population during kharif 2016. Superior heads were selected from all other populations considering the characters like days to 50% flowering, plant height, number of tillers/plant, panicle length, panicle girth, seed size and number of grains per panicle, to develop next population for further evaluation. Selected heads were harvested and seed was retained to grow and study next population during kharif 2016. The detail is given in Table 69.

Table 69: Pearl Millet Populations Studied during Kharif- 2015

S. No.	Population	Studied	Selected
1	F_1	20	20 crosses
2	F_2	38	20 plants
3	F_3	20	16 plants
4	F_4	30	15 plants

Eight superior lines, considering the characters under study, were selected from F_3 and F_4 populations for further evaluation in micro yield trial during kharif 2016.

iii. Pearl Millet Micro Yield Trial

The trial, comprising of eight pearl millet genotypes was sown on 16-07-2015 using Randomized Complete Block Design with three replications. Each plot consisted of four rows of 5 meter length with row to row spacing of 60 cm and plant to plant spacing of 20 cm. Gape filling/ thinning was done on 29-07 2015 to ensure required plant population. Harvesting was completed on 15-10-2015. The observations recorded on different plant parameters are summarized in Table 70.

Table 70: Results of Pearl Millet Micro Yield Trial -2015.

R. No.	Varieties	Plants Harvested	Grain Yield (kg/ha)	Days to 50%Flowering	Plant Height (cm)
1.	13RBS-11	85	2970a	49	229
2.	14RBS-05	88	2595ab	53	242
3.	14RBS-03	85	2491abc	50	245
4.	14RBS-01	86	2355bcd	49	248
5.	YBS-98(Check)	80	2016cd	52	226
6.	14RBS-02	86	1910de	50	244
7.	14RBS-06	86	1483e	53	268
8.	14RBS-04	90	1460e	54	281
	CV %	3.52	9.29	1.87	2.64
	LSD 1%	7.34	487.97	2.34	15.92

The results revealed that highly significant genetic differences were observed for parameters like plant harvested, grain yield, days to 50% flowering and plant height. The genotype 13RBS-11 gave maximum grain yield (2970 kg/ha) followed by 14RBS-05 (2595 kg/ha). While check variety YBS-98 gave 2016kg/ha grain yield.

The top yielding genotype 13RBS-11 took minimum number of days (49days) to complete 50% flowering while maximum numbers of days (54days) were taken by the genotype 14RBS-04 which gave the lowest yield (1460 kg/ha). However it attained maximum height of 281 cm while minimum height (226cm) was recorded for the check variety (YBS-98). The results clearly indicate that the top yielding genotype (13RBS-11) is medium statured and early maturing, hence best suits for Barani areas.

iv. Pearl Millet Varietal Yield Trial

Ten pearl millet genotypes received from Maize and Millets Research Institute, Yusafwala were tested under rain fed conditions for grain yield and other attributes at Millets Research Station Rawalpindi. The experiment was sown on 16-07-2015 according to Randomized Complete Block Design with three replications. The plot size was kept 5m x 2.4m by planting three rows of 5 meter length of each genotype. Row to row and plant to plant distances were kept as 60 cm and 20 cm, respectively. Thinning/gape filling through transplanting was done from 27-07-2015 to 29-07-2015 which produced good effect on plant growth. The harvesting was completed on 12-10-2015. The data of various plant parameters were recorded and the summary of the results is presented in Table 71.

Table 71: Results of Pearl Millet Varietal Yield Trial, Kharif 2015

R. No.	Entries	Plants Harvested	Grain Yield (kg/ha)	Days to 50% Flowering	Plant Height (cm)
1.	YBS-98	92	2261a	52	226
2.	YBS-95	91	1963b	53	247
3.	YBS-92	85	1550c	50	244
4.	YBS-94	92	1530c	54	253
5.	YBR-5	87	1358cd	58	254
6.	YBS-70	92	1263d	55	282
7.	18-BY	89	1262d	56	275
8.	YBS-89	90	1257d	53	254
9	YBS-93	92	1166d	53	257
10.	YBS-83	91	1148d	55	253
	CV %	2.18	7.52	1.63	1.23
	LSD 1%	4.62	260.86	2.03	7.34

Analysis of variance showed highly significant differences among genotypes for plant harvested, grain yield, days to 50% flowering and plant height characters. Table 71 revealed that genotype YBS-98 gave maximum grain yield of 2261 Kg/ha followed by YBS-95 (1963Kg/ha) whereas, minimum grain yield of 1148 Kg/ha was produced by YBS-83. Genotype YBS-92 took minimum number of days (50days) to complete 50% flowering while genotype YBS-5 took maximum numbers of days i.e. 58 days to complete 50% flowering. Regarding plant height, maximum plant height of 282 cm was recorded for genotype YBS-70 followed by 18 BY (275cm) while genotype YBS-98 exhibited minimum plant height (226cm).

v. Adaptability/National Uniform Millet Hybrid Yield Trial

The experiment comprised of six pearl millet genotypes, received from National Agricultural Research Centre, Islamabad was sown on 16-07-2015 at Millets Research Station, Rawalpindi, during Kharif 2015. Randomized Complete Block Design with three replications was used to lay out the experiment. Each plot consisted of four rows of 5 meter length spaced at 60 cm. Plant to plant distance was kept as 20 cm. Thinning was done on 29-07-2015 which produced good effect on overall plant growth. The experiment was harvested on 07-10-2015 and the data recorded on different plant parameters summarized in Table 72.

Table 72: Results of Adaptability /National Uniform Millet Hybrid Yield Trial Kharif - 2015

R. No.	Varieties	Plants Harvested	Grain Yield (kg/ha)	Days to 50% Flowering	Plant Height (cm)
1.	86M88	89	4064a	48	221
2.	86M84	91	3708ab	52	218
3.	Pearl millet 9444 Gold	90	3478ab	46	192
4.	9450	91	3097bc	48	221
5.	Tejas	90	2708cd	37	185
6.	YBS-98	89	2139d	48	220
	CV %	1.36	8.51	1.69	1.44
	LSD 1%	2.90	704.09	2.39	1.87

Analysis of variance showed highly significant differences among all the genotypes for grain yield, days to 50% flowering and plant height characters except plants harvested. The results presented in Table 72 revealed that genotype 86M88 gave maximum grain yield of 4064 kg/ha followed by the genotype 86M84 (3708Kg/ha).Whereas, genotype YBS-98 produced minimum grain yield (2139 Kg/ha) and 86M84 took maximum number of days i.e. 52 days to complete 50% flowering. Minimum number of days (37days) were taken by the genotype Tejas to complete 50% flowering and also produced minimum plant height of 185 cm. Maximum plant height of 221 cm was recorded for genotypes 86M88 and 9450.

Pearl Millet on Farm Trials

Table 73: Results of Pearl Millet on Farm Trials Kharif -2015

S. No.	Location	(Grain yield kg/ ha)
		YBS-98
1.	Chakri, Rawalpindi	1720
2	Sohawa, Jhelum	1880
3	Dena, Jhelum	2250

II. MAIZE

Adaptability /National Uniform Maize Varietal Yield Trial

The experimental material was comprised of twenty four maize genotypes received from National Agricultural Research Centre, Islamabad. The experiment was sown on 16-07-

2015 in the research area of Millets Research Station, Rawalpindi. Lay out was done according to Randomized Complete Block Design with three replications. Each plot consisted of two five meter long and 75cm spaced rows. Plant to plant distance was kept 25cm in each genotype. Thinning and gape filling was done on 05-08-2015. The experiment was harvested on 26-10-2015. Data recorded on different plant characters are summarized in Table 74.

Table 74: Results of Adaptability/National Uniform Maize Variety (OPV) Yield Trial Kharif 2015.

R. No.	Entries	Plant harvested	Grain Yield (Kg/ha)	Days to 50% Tasseling	Days to 50% Silking	Plant Height (cm)	Cob Height (cm)
1.	WVAR-7	38	4440a	55	56	223	127
2.	WVAR-3	38	2805b	53	58	216	121
3.	WVAR-12	36	2528bc	53	57	221	126
4.	WVAR-13	37	2483bc	55	60	223	119
5.	Islamabad gold	36	2096cd	53	55	206	108
6.	WVAR-4	38	1982de	51	54	226	120
7.	WVAR-5	36	1956de	55	61	223	120
8.	WVAR-9	37	1885de	58	65	244	139
9.	WVAR-10	35	1791de	57	61	223	123
10.	WVAR-8	35	1726de	56	61	216	167
11.	AH-15	34	1710de	59	65	224	125
12.	WVAR-6	38	1694de	61	71	229	143
13.	WVAR-1	36	1600ef	58	64	234	134
14.	WVAR-2	38	1600ef	58	64	227	134
15.	WVAR-11	36	1202fg	53	59	218	116
16.	Pop Corn -14	36	1116gh	60	69	223	126
17.	MMRI Yellow	36	952ghi	59	66	211	117
18	Sweet Corn	36	920ghi	53	56	221	115
19	EV-7004-6	37	901ghi	56	60	187	97
20.	Local Swat	37	863ghij	51	55	218	122
21.	Islamabad White	34	768ghij	59	66	217	121
22.	Sweet Corn -W	36	733hij	56	61	142	70
23.	EV-7004-4	36	643ij	58	65	219	123
24.	Sweet Corn-Y	37	430j	50	57	161	100
	CV %	4.32	9.78	1.90	1.29	1.18	13.13
	LSD 1%	3.23	439.64	2.95	2.21	7.12	44.56

Analysis of variance showed highly significant differences for all the parameters under study except for number of plant harvested. Data presented in Table-7 showed that the genotype WVAR-7 out yielded (4440 kg/ha.) all the genotypes included in the trial. Lowest grain yield 430 kg/ha was recorded for genotype Sweet Corn-Y. Minimum number of days to tasseling and silking were recorded for Sweet Corn-Y (50 & 57) and WVAR- 4 (51 & 54) respectively. Maximum plant height was attained by WVAR-9 (244 cm) while minimum height of 142cm was recorded for Sweet Corn -W. Placement of cobs in all the genotype was observed almost at desired level with the exception of few genotypes i.e. WVAR-5, WVAR-8 and WVAR-6. Their cobs placement was above the desired level.

MAIZE BREEDING SUB STATION, CHHARRAPANI (MURREE)

i. RESEARCH WORK DONE:

During the crop season 2015, seed of thirty (30) advance maize derivatives for generation advancement was received from the office of Director, Maize and Millets Research Institute, Yusafwala (Sahiwal). Sowing of Ist replication was done on 13-04-2015, while 2nd replication was sown on 24-04-2015 in the research area of Maize Breeding Sub-Station, Chharrapani (Murree).

Sowing of maize inbred lines were done with the help of dibbler keeping plant to plant and row to row distance of 23cm and 75cm respectively. Fertilizer was applied @ 142 – 75 N : P, Kg/ha. Primextra Gold (Pre emergence weedicide) was sprayed after sowing. Furadan granules @ 08 Kg / acre against stem borer and liquid insecticide (Confidor SL-200) @ 250 ml / acre against while fly was also applied.

During the cropping season selfing of the inbred lines was done through hand pollination along with proper rogueing to maintain purity of the inbred lines. A total number of 305 selfed cobs were harvested during the first week of August -2015 and shifted to the Director, Maize and Millets Research Institute, Yusafwala (Sahiwal). Total germplasm weight (12.4 Kg) of the cobs after drying, shelling and grading was entered in the store book for further use.

SORGHUM RESEARCH SUB-STATION, DERA GHAZI KHAN

SEASON AND ITS EFFECTS

During the year 2015-16, 194.50 mm rainfall was received as compared to the year 2014-15, 153.50 mm. Continuous rains during the month of july-2015, delayed the sowing of the trials till the first week of August. Rains during the month of August created hindrance in cultural operations and also promoted the favorable environment for weeds, insects and pests. A dry spell during November to December-15, helped in harvesting and threshing of Kharif trials-15 at this sub-station.

Sr. No.	Month	Average Temperature ^{0}C				Rainfall (mm)	
		Maximum		Minimum			
		2014-15	2015-16	2014-15	2015-16	2014-15	2015-16
1	July	38.88	35.77	29.29	28.19	08.00	77.00
2	August	38.81	36.03	28.39	27.45	03.00	59.00
3	September	34.67	36.20	25.80	25.63	---	---
4	October	32.55	34.16	21.58	21.55	---	03.00
5	November	25.77	27.33	12.80	14.16	07.00	---
6	December	19.90	22.74	07.03	08.29	---	---
7	January	18.25	20.00	06.41	07.61	08.50	---
8	February	23.57	25.48	10.64	08.86	07.50	---
9	March	26.06	28.25	14.19	16.55	75.00	33.00
10	April	35.30	34.30	22.63	21.33	15.50	15.00
11	May	40.83	41.87	26.41	27.61	---	05.50
12	June	39.56	42.50	28.22	30.93	29.00	02.00
Total rainfall						153.50	194.50

Sorghum Hybrid Yield Trial

Seven crosses and three check varieties of sorghum were planted on 08.08.2015 to evaluate the best hybrids for grain yield. The layout was done according to Randomized Complete Block Design with three replications in a plot size 5m x 1.5m. Plant to plant and row to row distances were kept 15cm and 75cm respectively. Standard agronomic and plant protection

measures were carried out in the experiment. The harvesting was done on 23.12.2015. The data recorded for different morphological traits are presented in Table 76.

Table 76: Results of Sorghum Hybrid Yield Trial at Dera Ghazi Khan during Kh-2015

S #	Entry Name	Crop Stand	Grain Yield (Kg/ha)	Stalk Yield (kg/ha)	Plant Height (cm)	Days to 50% anthesis
1	Lasani- hybrid (check)	38	4800a	29222	195	74
2	YSH-95	37	4267b	43667	225	79
3	YSH-120	36	4222b	45889	210	76
4	YS-15(C)	38	3733c	36667	270	77
5	YSH-75	37	3467cd	41222	225	76
6	YSH-61	37	3244de	29889	198	76
7	YSS-98 (C)	37	3111e	18667	195	74
8	YSH-121	27	2667f	35444	199	78
9	YSH-118	37	2445fg	28778	235	80
10	YSH-122	25	2311g	14000	175	73
	CV%	1.75	5.69	1.07	1.65	0.95
	LSD @ 5%	---	159.25	283.48	2.87	0.59

The above Table 76 reveals that differences of means due to genotypes were significant for all traits under study. The maximum grain yield of 4800 kg/ha was produced by check variety Lasani hybrid followed by YSH-95 with grain yield of 4267 kg/ha. Highest stalk yield was recorded for the hybrid YSH-120 (45889 kg/ha) which is followed by the hybrid YSH-95(43667) kg/ha while minimum stalk yield for the hybrid YSH-122 which exhibited only 14000 kg/ha. Maximum plant height was observed for check variety YS-15 (270 cm)) while minimum plant height of 175 cm was observed for the hybrid YSH-122. YSH-118 took maximum 80 days to 50% anthesis while YSH-122 took minimum 73 days also.

Sorghum Varietal Yield Trial

Eight entries of sorghum were planted on 08.08.2015 to evaluate the promising lines/varieties for grain yield. The layout was done according to Randomized Complete

Block Design with three replications in a plot size 5m x 1.5m. Plant to plant and row to row distances were kept 15cm and 75cm respectively. Standard agronomic and plant protection measures were carried out in the experiment. The harvesting was done on 21.12.2015. The data recorded for different morphological traits are presented in Table 77.

Table 77: Results of Sorghum Varietal Yield Trial at Dera Ghazi Khan during KH-2015

S #	Entry Name	Crop Stand	Grain Yield (kg/ha)	Stalk Yield (kg/ha)	Plant Height (cm)	Days to 50% anthesis
1	YS-15(Check)	39	3733a	38889	273	78
2	GP-16	39	3555ab	28444	245	75
3	GP-40	38	3467abc	22000	220	79
4	GP-01	39	3289bc	22711	154	71
5	GP-03	40	3244bc	30444	185	73
6	GP-34	40	3111c	20000	196	71
7	YSS-98(Check)	38	3111c	36000	246	76
8	GP-65	39	2489d	35111	378	78
	CV%	2.49	6.30	2.73	1.46	1.01
	LSD @ 5%	---	167.14	649.17	2.83	0.62

The results reveal that differences of means due to genotypes were significant for all traits under study. Maximum grain yield of 3733 kg/ha was recorded for the entry YS-15(check) followed by entry GP-16 with grain yield 3555 kg/ha while minimum grain yield (2489 kg/ha) was recorded for entry GP-65. Highest stalk yield was also recorded for the check variety YS-15 (38889 kg/ha) while minimum stalk yield 20000 kg/ha was observed for GP-34. Maximum plant height (378 cm) was observed for GP-65 while minimum plant height (154 cm) was observed for GP-01. The entry GP-40 took maximum 79 days to 50% anthesis while GP-34 & GP-01 took minimum 71 days.

Sorghum Gene Pool

Eighty one sorghum cultivars/lines comprising of local and exotic origin were sown on 08.08.2015 in strips having plot size 5m x 1.5m to maintain for breeding programme. All entries were maintained by open pollination and guarded plants of each cultivar were harvested on 30.12.2015 and threshed carefully that will be sown for maintenance during KH-16.

PEARL MILLET

1- Pearl Millet Varietal Yield Trial

Ten lines/varieties of pearl millet were planted on 08.08.2015 to evaluate the promising lines/varieties for grain yield. The layout was done according to Randomized Complete Block Design with three replications in a plot size 5m x 3m. Plant to plant and row to row distances were kept 20cm and 75cm, respectively. Standard agronomic and plant protection measures were carried out in the experiment. The harvesting was done on 12.11.2015. The data recorded for different morphological traits are presented in Table 78.

Table 78: Results of Pearl Millet Varietal Yield Trial at Dera Ghazi Khan during Kh-2015

S #	Entry Name	Crop Stand	Grain Yield (kg/ha)	Stalk Yield (kg/ha)	Plant Height (cm)	Days to 50% anthesis
1	YBS-94	43	1625	11667	263	62
2	YBS-89	41	1602	12778	284	62
3	YBS-98	42	1402	8722	258	62
4	YBS-95	42	1335	10667	275	62
5	YBS-93	41	1269	10944	286	65
6	YBS-83	42	1246	13111	273	65
7	YBS-92	40	1068	9167	264	61
8	18-BY (check)	43	1046	13667	331	70
9	YBS-70	40	1046	12556	295	67
10	YBR-5	41	913	8167	254	60
	CV%	2.14	7.38	4.24	1.1	2.15
	LSD @ 5%	---	75.66	386.14	2.48	1.12

The results reveal that differences of means due to genotypes were significant for all traits under study. Maximum grain yield of 1625 kg/ha was recorded for advance line YBS-94 while minimum grain yield of 913 kg/ha was recorded for YBR-5. Highest stalk yield of 13667 kg/ha was recorded for check variety 18-BY while minimum stalk yield of 8167kg/ha was recorded for YBR-5. Maximum plant height of 331 cm was observed also for standard variety 18-BY while minimum plant height of 254 cm was observed for YBR-5. YBR-5 took minimum 60 days to 50% anthesis as compared to standard variety 18-BY which took maximum 70 days.

2- National Uniform/Adaptability Pearl Millet Yield Trial

Six lines/varieties of pearl millet; received from Coordinator MSM, NARC, Islamabad were planted on 08.08.2015 to test the adaptability and performance of national varieties/material under local conditions. The layout was done according to Randomized Complete Block Design with three replications in a plot size 4m x 3m. Plant to plant and row to row distances were kept 20cm and 75cm respectively. Standard agronomic and plant protection measures were carried out in the experiment. The harvesting was done on 03.11.2015. The data recorded for different morphological traits are presented in Table 79.

Table 79: Results of National Uniform/Adaptability Pearl Millet Yield Trial at Dera Ghazi Khan during Kh-2015

S #	Entry Name	Crop Stand	Grain Yield (Kg/ha)	Stalk Yield (kg/ha)	Plant Height (cm)	Days to 50% anthesis
1	Pearlmillet-9444-Gold	43	2292	10833	219	58
2	9450	42	2083	12083	239	59
3	YBS-98	42	1972	17708	292	58
4	86M88	42	1917	12847	230	61
5	86M84	42	1833	16180	247	61
6	Tejas	44	1333	10000	212	50
	CV%	1.33	7.33	1.3	1.47	1.63
	LSD @ 5%	---	114.01	141.28	2.87	0.77

The results presented in table No.79 reveal that differences of means due to genotypes were significant for all traits under study. Maximum grain yield of 2292 kg/ha was recorded for line/variety Pearlmillet-9444-Gold while minimum grain yield of 1333 kg/ha was recorded for Tejas. Highest stalk yield was recorded for advance line YBS-98 i.e., 17708 kg/ha while minimum stalk yield was recorded also for entry Tejas (10000 kg/ha). Maximum plant height of 292 cm was also observed for YBS-98 while minimum plant height of 212 cm was also observed for Tejas. Entries 86M88 and 86M84 took maximum 61 days to 50% anthesis while Tejas also took minimum 50 days.

On-Farm Pearl Millet Yield Trial

Advance line YBS-98 of pearl millet was tested at four different locations in D.G. Khan division to evaluate the performance/adaptability of the material on farmer`s field in a plot size of one kanal. Plant to plant and row to row distances were kept 20 cm and 75cm respectively. The data recorded for grain yield is presented in Table 80.

Table 80: Results of On-Farm Pearl Millt Yield Trial at Dera Ghazi Khan during Kharif-2015

S.No.	Address of Location	YBS-98 Grain Yield (kg/ha)
1	Muhammad Rafiq S/O Taaj Muhammad R/O Mouza Mangrotha Tehsil Taunsa District D.G.Khan	1423
2	Sadiq Hussain S/O Manzoor Hussain R/O Chak Buzdar Tehsil Kot Chutta District D.G.Khan	1581
3	Muhammad Afzal R/O Mauza Bhakkar Wah District D.G.Khan	1383
4	Malik mumtaz R/O Chak Gamaan Tehsil Kot Chutta District D.G.Khan	1304
	Average	**1423**

This Table shows that the advance line YBS-98 gave maximum grain yield (1581 kg/ha) at the land of Sadiq Hussain S/O Manzoor Hussain R/O Chak Buzdar Tehsil Kot Chutta District D.G.Khan

ADMINISTRATION
STAFF POSITION

Sr. No.	Designation of the Post.	Staff in Position	Number of Vacant Post	Total Sanctioned Strength
1	Director	-	01	01
2	Maize Botanist	01	-	01
3	Sorghum Botanist	01	-	01
4	Associate Maize Botanist	01	-	01
5	Associate Millet Botanist	01	-	01
6	Agronomist	01	-	01
7	Assistant Botanist Maize	07	-	07
8	Assistant Botanist Millet	01	-	01
9	Assistant Botanist Sorghum	01	-	01
10	Assistant Agronomist	02	-	02
11	Assistant Entomologist	01	-	01
12	Assistant Agricultural. Chemist	-	01	01
13	Assistant Statistician	-	01	01
14	Assistant Research Officer	16	04	20
15	Superintendent	-	01	01
16	Field Assistant	17	10	27
17	Plant Observer	12	01	13
18	Ministerial Staff	15	-	15
19	Laboratory Assistant	02	01	03
20	Computer Operator	01	-	01
21	Stenographer	02	-	02
22	Foreman	01	-	01
23	Mechanic	01	-	01
24	Driver	05	-	05
25	Electrician	01	-	01
26	Naib Qasid	07	-	07
27	Tube well Operator	06	-	06
28	Beldar	41	05	46
29	Chowkidar	06	-	06
30	Mali	-	01	01
31	Sweeper	01	-	01
32	Cook	01	-	01
Total		**152**	**26**	**178**

LIST OF RESEARCH STAFF

Sr. No.	Name of Officer	Designation	Qualification
1	Dr. Muhammad Arshad	Maize Botanist	Ph.D.
2	Mr. Muhammad Rafique	Associate Maize Botanist	M. Sc. (Hons) Agri.
3	Dr. Irshad-ul-Haq	Associate Millets Botanist	Ph.D.
4	Mr. Dilbar Hussain	Sorghum Botanist	M. Sc. (Hons) Agri.
5	Malik Riaz Hussain	Assistant Botanist Maize	M. Sc. (Hons) Agri.
6	Mr. Muhammad Hussain Chaudhry	Assistant Botanist Maize	M. Sc. (Hons) Agri.
7	Mr. Muhammad Saeed	Assistant Botanist Maize	M. Sc. (Hons) Agri.
8	Rana Abdul Hamid Khan	Assistant Botanist Maize	M. Sc. (Hons) Agri.
9	Mr. Aamir Hussain	Assistant Botanist Maize	M. Sc. (Hons) Agri.
10	Mr. Ahsan Raza Mahli	Assistant Botanist Maize	M. Sc. (Hons) Agri.
11	Mr. Muhammad Siddique	Assistant Botanist Millets	M. Sc. (Hons) Agri.
12	Mr. Khadim Hussain	Assistant Botanist Maize	M. Sc. (Hons) Agri.
13	Mr. Ehsan-U-Allah	Assistant Botanist Sorghum	M. Sc. (Hons) Agri.
14	Mr. Javaid Iqbal	Assistant Agronomist	M. Sc. (Hons) Agri.
15	Mr. Asrar Mehboob	Assistant Agronomist	M. Sc. (Hons) Agri.
16	Mr. Abdul Razaq	Assistant Research Officer	M. Sc. (Hons) Agri.
17	Mr. Tanweer Mukhtar	Assistant Research Officer	M. Sc. (Hons) Agri.
18	Mr. Shahid Hussain	Assistant Research Officer	M. Sc. (Hons) Agri.
19	Mr. Aamir Ghani	Assistant Research Officer	M. Sc. (Hons) Agri.
20	Mr. Muhammad Shakeel	Assistant Research Officer	M. Sc. (Hons) Agri.
21	Mr. Muhammad Altaf	Assistant Research Officer	M. Sc. (Hons) Agri.
22	Miss. Saeeda Khanum	Assistant Research Officer	M. Sc. (Hons) Agri.
23	Mrs. Zaib-un-Nisa	Assistant Research Officer	M. Sc. (Hons) Agri.
24	Mr. Barkat Ali	Assistant Research Officer	M. Sc. (Hons) Agri.
25	Mr. Naveed Kamal	Assistant Research Officer	M. Sc. (Hons)Agri.

STATIONS AND SUB-STATIONS

Sr. No.	Name of Sub-Station	Total area (acres)	Remarks
1.	Maize & Millets Research Institute, Yusafwala-Sahiwal (Headquarter)	1671.0	Research and Maize Seed Production Farm.
2.	Maize Sub-Station, Chak 86/9-L, Sahiwal.	459.625	Research and Maize Seed Production Farm.
3.	Maize Seed Farm, Chak 1 1/14-L, Iqbalnagar District Sahiwal.	929.00	Research and Maize Seed Production Farm.
4.	Maize Research Station, Ayub Agricultural Research Institute, Faisalabad.	10.25	Research work on maize.
5.	Millets Research Station, Rawalpindi.	2.0	Research work on millets.
6.	Maize Breeding Sub-Station, Charrapani Murree.	1.0	Multiplication of parent lines of maize.
7.	Sorghum Research Sub-Station, Dera Ghazi Khan.	0.663	Research work on sorghum (Yield Trials).
8.	Maize Breeding Sub-Station Muree	0.813	Development work on maize.

FINANCIAL STATEMENT

Year	Allocation (Rs.)	Expenditure (Rs.)	Target (Rs.)	Income (Rs.)
2009-2010	33,321,000	32,674,726	3,220,000	2,772,758
2010-2011	45,117,000	44,657,876	4,250,000	2,591,967
2011-2012	53,819,000	52,830,336	2,700,000	2,968,174
2012-2013	64,957,300	65,194,794	2,900,000	5,085,828
2013-2014	72,818,600	70,717,588	6,180,000	5,490,731
2014-2015	71,407,800	69,997,676	6,688,000	7,589,931
2015-2016	78,050,000	77,147,941	5,680,000	8,997,133

Following heads are being operated.
Under Grant No PC-21018-Agriculture-50000 Economic Services
51000 Agriculture & Food
51300 Agriculture Services Extension Services Non-Development

PROBLEMS AND BOTTLENECKS

Budgetary allocation in almost all the operational codes from last two years is extremely less to perform various operation of research.

Dead lock and litigation with Pattadars is a major problem and affecting the efficiency of research workers.

At present, land (0.663 acre) of Sorghum Research Substation, D.G. Khan (production zone of sorghum and Bajra) is quite insufficient. More land should be provided for research and seed production.

Cold storage facility for breeding materials is poor and in-sufficient which should be provided to conserve the germination / viability of precious seeds.

Drying floors have become very old / broken at many places is needed for drying of valuable breeding materials.

Boundary wall around the research area is needed for protection of research material from nearby animals of Ex- Pattadars / illegal occupants.

Canal water supply at Maize Research Station, Faisalabad, usually insufficient to meet the requirements of the breeding material and experiments to be conducted.

Experimental area at Millets Research Station Rawalpindi (2.0 acre) is very less to meet the requirements of mandatory research work on respective crops.

Lack of training facilities for research scientists.

ABRIDGED REPORT 2015-16

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OVERVIEW

The Institute is located at a distance of 11 kilometers from Sahiwal city towards East on Lahore Multan G. T. road. It is situated at latitude of 30° 41 N, longitude of 73° 12 E and the elevation of 175 meters from sea level. The land of Yusafwala, District Sahiwal was converted into Government Seed Farm in the year 1925 and was handed over to the Agriculture Department (Ext. Wing) for multiplication of quality seed of wheat and cotton etc. Research work on maize was started in the 1940's and was abandoned in its infancy with the partition of sub-continent. A regular research work on maize was restarted in the year 1953-54 at Faisalabad. The research and seed production work of maize was transferred to Yusafwala in the year 1958-59. In 1968-69 the status of this farm was raised to a research institute, named as Maize and Millets Research Institute. The main objective of this institute is to conduct research work on maize and millets crops to develop new varieties/hybrids and their seed production on large scale. Maize crop has a significant role in economy due to its diversified industrial consumption. Per hectare yield of maize has been increased from 1890 kg/ha (2001-02) to 6132 kg/ha (2015-16) in Punjab due to adoption of hybrids. In maize 12 OPV's, 14 hybrids, four varieties of sorghum and two varieties of pearl millet have been released so far. Punjab Seed Council approved Maize hybrids; YH 1898, FH-949 & FH-1046 and Maize OPVs; Malka 2016, Sorghum OPV; YS-16 and Pearl Millet OPV; YBS-98 for general cultivation during the year 2015-16. Approval of these hybrids will be helpful in self-sufficiency in maize hybrid development and also curtail the import of multinational maize seed.

HYBRID MAIZE

Maintenance and Derivation of Yellow Maize Inbred Lines

At Maize & Millets Research Institute (MMRI), Yusafwala one hundred sixty five (165) and two hundred eighty five (285) inbred lines were sown in ear to row fashion for maintenance during kharif 2015 and spring 2016, respectively. All these lines were maintained by self-pollination and harvested for next cycle of maintenance and purification considering their true to type behavior and other desirable parameters. Data regarding root anthocyanin, leaf sheath anthocyanin, margin serration, leaf margin waves, sheath hairs, leaf senescence, fertility of anthers, pollen shedding, anther color, pollen color, glumes color and silk color were also recorded. Whole inbred lines were harvested for next cycle of maintenance and purification.

Two hundred seventy two (272) and Two hundred eighty four (284) derivative families were sown ear to row during kharif 2015 and spring 2016, respectively for inbreeding through hand pollination. Plants selected on the basis of desirable traits like erect to semi erect leaves, medium to heavy tassel, cob length, low cob placement, strong root anchor and disease tolerance were self-pollinated in all the families.

Fig. 1. Recently approved hybrid FH-1046

At MRS, Faisalabad, 166 inbreds & 197 derivatives were maintained in 2015-16. Thirteen (13) new inbred lines were included in gene pool.

Derivation of White Maize Inbred Lines

Ninety two (92) and one hundred twenty eight (128) derivative families of different generations were sown in ear to row fashion during kharif 2015 and spring 2016, respectively for derivation of inbred lines through hand pollination. At maturity, selfed plants were harvested in each family, separately, and seed of one hundred twenty eight

(128) and one hundred twenty five (125) families was collected for further derivation and selection cycles.

Hybrid Constitution

Development of high yielding maize hybrids, tolerant to diseases, insects and high temperature, is a continuous project. At MMRI, Yusafwala, forty eight (48) single crosses were constituted with two males in two isolated blocks in Kharif 2015 while in spring 2016 sixty six (66) single crosses were developed with one male in isolated block for evaluation in coming seasons. At MRS, Faisalabad, 135 new hybrids including 60 single cross hybrids were constituted during kharif 2015.

Hybrid Evaluation

Preliminary Yield Trials

Objective was to select high yielding newly constituted hybrids. At MMRI, Yusafwala one hundred two (102) single crosses along with three different commercial checks were evaluated in three preliminary yield trials. The trials were conducted under RCBD with two replications. The observation pertaining to germination %, days to 50% silking and tasseling, plant height, cob height and yield per plot were recorded. It was revealed that NT-6621 gave maximum grain yield ie.10993 kg /ha while following entries were local hybrids i.e. YH-5389 and YH-5427 giving 10440 and 9507 kg/ha, respectively during kharif 2015. Similarly a yield trial was conducted during spring 2016 and results exhibited that there were significant differences among hybrids for grain yield. YH-5440 and YH-5474 gave maximum grain yield i.e.12427 and 11960 kg /ha, respectively against multinational checks NK-8711 and P1543 with grain yield values of 11053 and 11049 kg/ha, respectively.

Fig. 2. Promising maize hybrid of MMRI "YH-5440"

Fifty four (54) single cross hybrids were evaluated in two trials during kharif 2015 at MRS, Faisalabad. Four hybrids i.e. FH-1269, FH-1258, FH-1256, and FH-810 with grain yield of 13920, 12800, 12667 and 12347 kg/ha, respectively were higher yielder than commercial hybrids NT-6654 (8987 kg/ha) and 30Y87 (7706 kg/ha). In spring 2016 maize hybrids FH-1313 (10164 kg/ha), FH-1323 (9372 kg/ha) and FH-1348 (9419 kg/ha) showed better grain yield than commercial hybrids 31P41 (9042 kg/ha) and Maxima (4404 kg/ha).

Micro Yield Trials

A trial was conducted to select high yielding single crosses with desirable characteristics at MMRI, Yusafwala. 28 single crosses were sown in RCBD with 2 replications. Statistically significant differences were observed among hybrids regarding grain yield. Local hybrids YH-5344, YH-1898 and YH-5354 with grain yield of 10667, 10107 & 10040 kg/ha, respectively were found higher yielders as compared with multinational checks 30Y-87(8893 kg/ha) and NT6654 (7813 kg/ha). While in spring 2016, YH-5421 gave maximum grain yield of 14440 kg/ha against commercial and local check hybrids P 1543 (13040 kg/ha) and FH 949 (12909 kg/ha).

Fig. 3. Recently approved hybrid FH-949

At MRS, Faisalabad local hybrids FH-1218, FH-1205, FH-1219 and FH-1184 with grain yield of 11727, 11333, 11227 and 10707 kg/ha, respectively were found higher yielder as compared with multinational checks NT-6654 (9400 kg/ha) and HI-339 (7613 kg/ha) during kharif 2015 while in spring 2016, FH-1269, FH-1284, FH-1275 and FH-1166 with grain yield of 10696, 9970, 9966 and 9761 kg/ha, respectively performed better as compared with multinational checks NK-8711 (8564 kg/ha) and 31P41 (7690 kg/ha).

Macro Yield Trials

In macro yield trial, FH-976, FH-929 and FH-928 with respective yield values of 10604, 10560 and 10391 kg/ha performed better than commercial hybrids NT-6654 (8987 kg/ha) and 30Y87 (7706 kg/ha) in kharif 2015. In spring 2016, FH-1012 and FH-929 with grain yield of 11056 and 10505 kg/ha, respectively performed better than multinational

checks NK-8711 (8734 kg/ha) and 31P41 (8721 kg/ha).

National Uniform Maize Hybrid Yield Trial

The objective was to check adaptability of different national and multinational maize hybrids in different agro-climatic zones across the country. A trial consisting of 40 hybrids in Kharif, 2015 received from the National Coordinator, PARC, Islamabad was laid out in Alpha Lattice design with three replications. Plot size was kept 4m x 2.25m. The results revealed that hybrids K x B2572 and TARA-G866 exhibited the highest grain yield of 12864 and 12342 kg/ha, respectively. At MRS, Faisalabad promising hybrid FH-1036 out yielded in national uniform yield trial during kharif 2015 showing potential yield 13810 kg/ha.

Seed Production of Maize Parental Inbred Lines & Hybrids

Y-22 & Y-27 were planted in isolation on an area of 6.0 and 2.5 kanals during kharif 2015. 314 kg and 253 kg, healthy, true to type and graded seed of Y-22 & Y-27 was produced, respectively. During spring 2016, Y-22 was planted on an area of 4 Kanal and 64 kg seed was obtained for use in hybrid seed production of Yusafwala Hybrid and YH-1898. 60 kg seed of Y-27 was produced in YH-1898 seed production block. For constitution of YH-1898, male & female lines were sown on an area of 41.5 Kanals in isolations during kharif 2015 and 1189 kg seed was produced while during spring 2016, 2825 kg seed of YH-1898 was harvested from an area of 38 kanals.

MAIZE OPVs

Improvement of Yy-15 (OPVs)

Fifty seven selected cobs from previous season crop were sown in ear to row in an isolation of 1 kanal during kharif 2015. Open pollination was allowed. Selection was made on the basis of plant height, stem girth, cob length and cob placement at 8th node with medium tassel. Cobs were collected from the selected plants and seed was kept for next sowing season after Table selection.

Seed shelled from selected cobs during kharif-15 was sown in an isolation of 1.5 kanals during spring 2016. Open pollination was allowed. Best plants were selected and harvested on the basis of plant height, stem girth, cob length and cob placement at 8th node. More over stem lodging was also noted. Best cobs from best plants were selected and seed was kept after Table selection for next sowing season.

Enrichment of Pool-50

Selected cobs of Yusafwala Pool-50 were planted in isolated plot of 1 kanal, during kharif 2015. Open pollination was allowed to enrich/widen the genetic base of population. One hundred plants were selected on the basis of plant height, stem girth, cob placement, cob size and light tassel. After harvesting, Table selection was made on the basis of number of rows per cob and grain size. Selected cobs were shelled and seed was kept for next sowing season. In spring 2016, it was planted on 1.5 kanals and two hundred best plants were selected at tasseling. Some selected plants were self-pollinated while others were open-pollinated. Both self-pollinated and open pollinated plants were harvested and seed was shelled and kept separately for future use.

National Uniform Maize Yield Trial (OPVs)

The trial comprising of 16 entries was received from National Coordinator (Cereal System), Pakistan Agriculture Research Council with the instructions and data sheet. Data regarding different traits were recorded at different growth stages / physiological maturity and analyzed statistically. The results revealed that Sweet Corn-Y stood 1st and EV-7004-4 was at 2nd position by giving grain yield 8406 & 7900 kg/ha, respectively followed by Local Swat with grain yield of 6963 kg/ha.

Micro Plot Maize Yield Trial (OPVs)

The trial comprising of seven maize OPVs was sown in RCB design with three replications during kharif 2015. Data of different traits were recorded at different growth stages / physiological maturity and analyzed statistically. The results revealed that promising line AH-15 stood 1st by giving grain yield of 8400 kg/ha followed by Pak-I with grain yield of 7626 kg/ha while EV-6486 gave the minimum grain yield of 5860 kg/ha. During spring 2016, the trial comprising of eight maize OPVs was sown following triplicated RCB design. The results exhibited that promising line YY-15 ranked first with grain yield of 9766 kg/ha and MMRI Yellow was at 2nd position (9200 kg/ha) whereas minimum grain yield (6726 kg/ha) was given by CZP-132001.

Micro Plot Maize Yield Trial (Pop & Sweet Corn)

Eight maize entries were sown following triplicated RCB design during kharif 2015. The results showed that maximum grain yield (6846 kg/ha) was produced by promising line Popcorn-14 followed by Popcorn-12 with grain yield of 6429 kg/ha while minimum grain yield of 3,349 kg/ha was recorded for variety "Local Dir".

The trial comprising of five maize entries was laid out in RCB design with three replications during spring 2016. Data recorded for various traits at different growth stages / physiological maturity were analyzed statistically. The results revealed that

promising line YPC-14 was at top with grain yield of 6584 kg/ha followed by White Popcorn with grain yield of 6158 kg/ha while Pop corn (Swat) gave the minimum grain yield of 3172 kg/ha.

Seed Production of Maize OPVs

During kharif 2015 & spring 2016, 1720 and 2000 kg seed of "MMRI yellow" was produced, respectively. For seed production, Pearl was planted in isolation and 3340 kg and 2480 kg was obtained during kharif 2015 and spring 2016, respectively.

SORGHUM

Germplasm Maintenance and Hybrids Constitution

Eighty gene pool entries were planted at Yusafwala & D.G. Khan and 5 plants in each entry were maintained by hand pollination. Ten sweet Sorghum lines were planted and maintained. Fourteen CMS (A) lines with their counterpart (B) lines and twenty six fertility restorer (R) lines were planted at MMRI, Yusafwala for maintenance and hybrid constitution. Twelve crosses (CMS x R) were constituted (9 in isolation and 3 by hand-pollination). Eight F_1 families were planted in kharif 2015 and harvested for next filial generation. Eight F_3 families were planted and phenotypically superior plants from four families were selected and harvested for raising their next filial generation.

Evaluation of Hybrids and OPVs

Twelve hybrids (CMS x R) were tested in a hybrid yield trial at MMRI, Yusafwala and SRSS, D. G. Khan. The results revealed that maximum grain yield of 4110 kg/ha was given by Lasani (Check) followed by YSH-95 with grain yield of 2776 kg/ha at MMRI while at SRSS, D. G. Khan, Lasani (check) gave maximum grain yield (4800 kg/ha) followed by YSH-95 (4267kg/ha). Eight entries were tested in a varietal yield trial at MMRI, Yusafwala and SRSS, D. G. Khan. The results revealed that YSS-10 gave maximum grain yield (3822 kg/ha) followed by YSS-18 (3816 kg/ha) in comparison to check "YS-16" (2647 kg/ha) at MMRI Yusafwala, while at SRSS, D. G. Khan, maximum grain yield (3722 kg/ha) was given by YS-16 (check) in comparison to YSS-18 (3555 kg/ha).

PEARL MILLET

Maintenance of Germplasm / Derivations / Constitutions

Sixteen germplasm entries, 9 CMS (A) lines with respective counterpart (B) lines, 29 R-lines, were maintained by hand pollination. Thirty three segregating families were sown. Three to four heads in each family were selfed and harvested for planting during next generation.

Fig. 4. A high yielding sorghum variety YS-16

At Millets Research Station (MRS), Rawalpindi, 50 germplasm lines were maintained through hand pollination and 20 crosses were constituted for evolution. Twenty plants from F2 and sixteen plants from F3 were selected and eight superior homogeneous lines from F_3 and F_4 were also selected for further evaluation and micro trial testing.

Fig. 5. Maintenance of Pearl millet germplasm

Yield Evaluation

In pearl millet varietal yield trial, ten varieties were evaluated for yield at Yusafwala and D. G. Khan. The results showed that YBS-98 ranked first by producing grain yield of 2747 kg/ha and 1625 kg/ha at MMRI, Yusafwala and SSR followed by YBS-89 with yield of 2102 kg/ha and 1602 at MMRI, Yusafwala and SRSS, D. G. Khan, respectively.

National Uniform Pearl Millet Hybrid Yield Trial

A trial comprising of six entries, received from the National Coordinator (Cereal System), PARC, Islamabad, was conducted at MMRI as well as SRSS, D. G. Khan. The results revealed that the entry "86M88" out yielded with 3736 kg/ha at MMRI

while Millet-9444 was ranked 1st with respect to grain yield (2292 kg/ha) at SRSS, D. G. Khan.

Pearl Millet Micro Yield Trial

A trial comprising of eight pearl millet entries was laid out following RCB design with three replications. Data of different traits were recorded at different growth stages/ physiological maturity and analyzed statistically. The results showed that 13RBS-11 gave maximum grain yield (2970 kg/ha) followed by 14RBS-05 with a grain yield of 2592 kg/ha while check variety YBS-98 yielded 2016 kg/ha.

Seed Production of Pearl Millet Varieties

During kharif 2015, YSB-98 and 18-BY were sown on an area of 7 kanals & 2 kanals, and 620 kg and 200 kg seed was obtained for mentioned varieties, respectively. YBS-89, YBS-92, YBS-93 and YBS-94 were grown on an area of 125, 250, 250 and 250 m^2 with a production of 59, 17, 27 and 20 kg seed, respectively.

AGRONOMIC STUDIES

Determination of Optimum Planting Geometry for Maize Hybrids

Trials were conducted during kharif 2015 and spring 2016 following RCB design with four replications to determine effect of plant spacing on grain yield of maize hybrid FH-1046. Plant spacing of 15 cm was found to be optimum for attaining maximum yield. Maximum grain yield of 10446 kg/ha and 16636 kg/ha was obtained with 15 cm plant spacing during kharif 2015 and spring 2016, respectively.

Effect of Different Planting Methods on Grain Yield of Maize

During kharif 2015 and spring 2016, trials were conducted following RCB design with four replications. The analyzed data showed that planting methods significantly affected the grain yield and plant height of maize hybrid FH-1046. Ridge sowing with row to row distance of 75 cm was proved to be best method for obtaining maximum yield in kharif 2015 and spring 2016 with mean yield values of 7827 kg/ha and 16875 kg/ha, respectively.

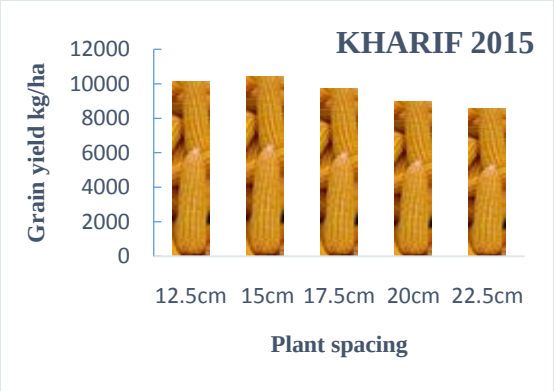


Fig. 6. Effect of plant spacing on grain yield of FH-1046.

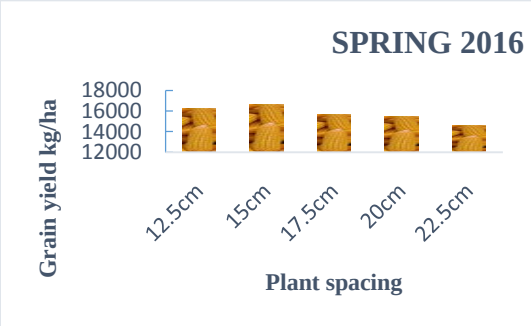


Fig. 7. Effect of plant spacing on grain yield of FH-1046.

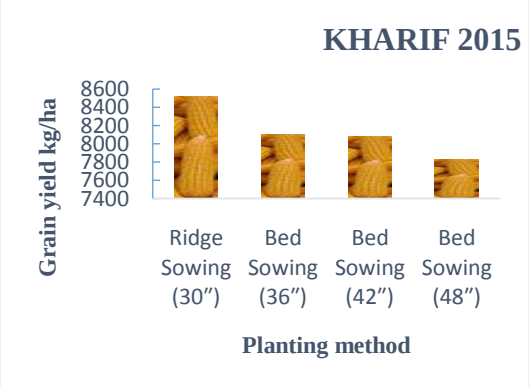


Fig. 8. Effect of planting methods on grain yield of FH-1046.

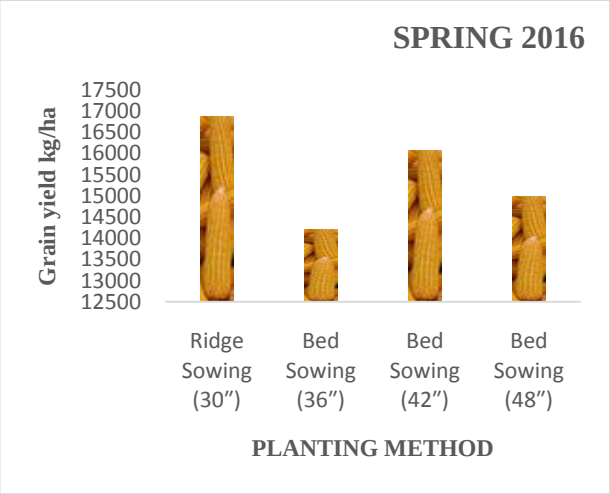


Fig. 9. Effect of planting methods on grain yield of FH-1046.

Effect of Plant Spacing on Grain Yield of New Pearl Millet Variety

In kharif 2015, trial was laid out in RCB design with four replications to determine grain yield of YBS-95 as affected by different plant spacings. The results revealed that different plant densities under study significantly affected stover yield, plant height and number of tillers per plant of pearl millet variety YBS-95. Plant spacing (25cm) gave maximum grain yield of 3100 kg/ha followed by 2933 kg/ha with plant to plant distance of 22.5 cm with non-significant differences.

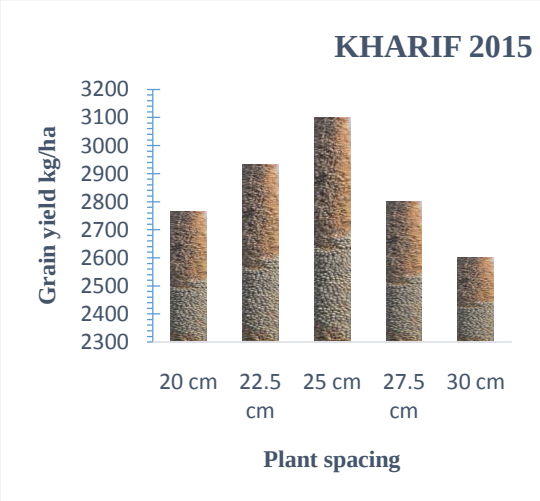


Fig. 10. Effect of plant spacing on grain yield of YBS-95.

Determination of Optimum Plant Spacing For Sorghum Hybrid

During kharif 2015 experiment was laid out under RCBD with four replications to conclude effect of plant spacing on grain yield of sorghum hybrid YSH-95. The results indicated that plant spacing significantly affected the grain yield and days to 50 % anthesis of sorghum hybrid YSH-95. Maximum grain yield of 3757 kg/ha was obtained with plant to plant distance of 15 cm while plant to plant distance of 22.5 cm produced minimum grain yield (3257 kg/ha).

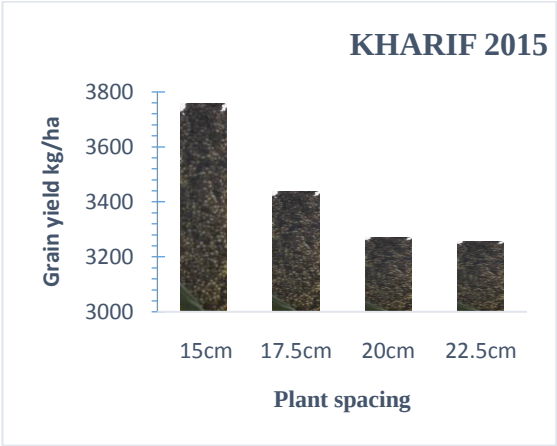


Fig. 11. Effect of plant spacing on grain yield of YSH-95.

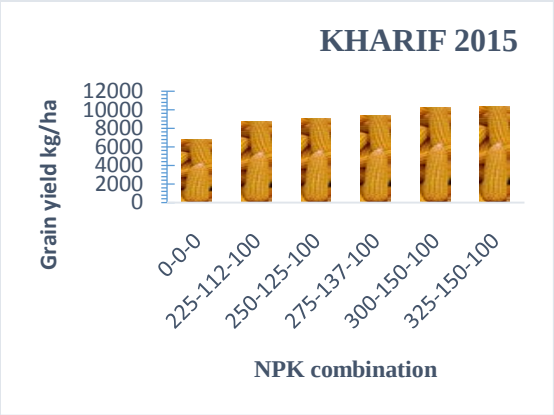
Evaluation of Different Modes of Application of Primextra Gold 720 SC against Weeds in Maize Crop

The trial was conducted following RCB design with four replications during spring 2016. The results revealed that mode of application of Primextra Gold 720 SC was significantly effective. Maximum grain yield of 13895 kg/ha was obtained when aforesaid weedicide was applied within 24 hours after sowing.

SOIL CHEMISTRY STUDIES

Effect of Fertilizer Doses on Grain Yield of New Maize Hybrids

During kharif 2015 and spring 2016, experiments were laid out under triplicated RCB design to assess the effect of various fertilizer doses on grain yield of promising maize hybrids YH-5407 and FH-1046, respectively. Six treatment combinations of NPK were evaluated. YH-5407 gave grain yield of 6961 kg/ha during kharif 2015 while FH-1049 yielded 10347 kg/ha during spring 2016 at fertilizer dose of 325-162-100 (NPK).



nt combinations on grain yield of YH-5407.

Impact of Fertilizer Level on Grain Yield of New Maize Hybrid Seed production (YH-1898)

The experiment was performed following triplicated RCB design during spring 2016 to probe out the impact of fertilizer levels on maize hybrid seed production (YH-1898). It was revealed that maximum seed yield (3440 kg/ha) was obtained at fertilizer dose of 325-150-100 (NPK) whereas minimum seed yield of 2300 kg/ha was recorded where no fertilizer was applied.

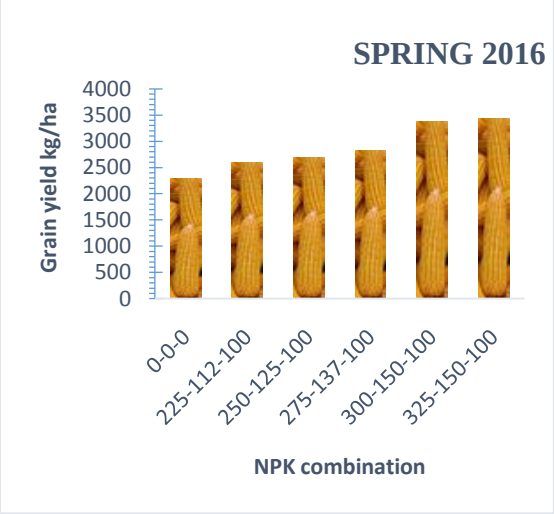


Fig. 13. Effect of various nutrient combinations on grain yield of FH-1046.

Effect of Fertilizer Doses on Grain Yield of New Sorghum Hybrid.

During kharif 2015, a trial comprising of six fertilizer treatments was conducted under triplicated RCB design to assess the effect of fertilizer doses on grain yield of promising sorghum hybrid (YSH-95). Maximum grain yield (3440 kg/ha) was obtained at fertilizer dose of 325-150-100 (NPK) whereas minimum grain yield of 2300 kg/ha was obtained with control.

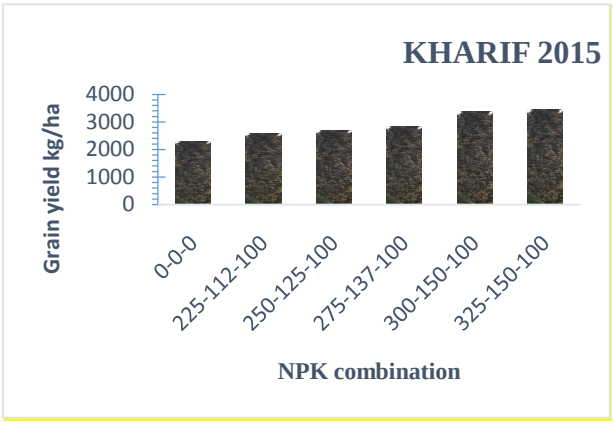


Fig. 14. Effect of various nutrient combinations on grain yield of YSH-95.

PLANT PATHOLOGY

Testing of Seed Dressing Fungicides against Seedling Diseases in Maize

The experiment comprising of four fungicides was laid out according to RCBD with four replications during kharif 2015 and spring 2016. Data regarding seedling diseases were recorded after 10 days of emergence while grain yield was recorded at the time of harvesting. The results showed that Argyl Super have the best control showing minimum seedling diseases attack 3.01% and 1.39% with grain yield of 5553 kg/ha and 15129 kg/ha during kharif 2015 and spring 2016, respectively. Whereas Hombre ranked 2nd during both of the seasons mentioned.

Testing of Stalk Rot Intensity in Maize Hybrids by Artificial Inoculation

A trial comprising of 5 maize hybrids i.e. FH-988, FH-1012, FH-922, FH-1036 & FH-1046 was conducted to screen above mentioned hybrids against stalk rot. The experiment was laid out according to RCBD with four replications in spring 2016. At silking stage, 5 plants per plot were inoculated with infected tooth picks. After one month of inoculation, each inoculated plant was torn apart by a scalpel and disease reaction was recorded with the help of Hooker's disease rating scale. The results showed that FH-988 and FH-1012 were resistant against stalk rot while FH-922, FH-1036 and FH-1046 were moderately resistant against stalk rot.

ENTOMOLOGY

Testing of Different Granular Insecticides against Maize Borer

A trial comprising of four insecticides namely Furadon 3G, Ferterra 0.4% G, Oncol 3% G and Karbosol 3% G was conducted to test mentioned insecticides against maize borer at recommended doses in kharif 2015. The experiment was laid out according to RCB design with four replications. The results showed that Furadon 3G gave the best control against maize borer with borer infestation % (3.5) and grain yield of 5831 kg/ha followed by Ferterra 0.4% G with borer infestation % (4.18) and grain yield of 5145 kg/ha.

During spring 2016 a trial comprising of four insecticides Furadan 3G, Brifur, Oncol 3% G and Karbsol 3% G was performed under RCB design with four replications. The results revealed that Furadan 3G gave the best control against borer with borer infestation % (0.84) and grain yield of 14842 kg/ha followed by Brifur 3G with borer infestation % (1.12) and grain yield of 13944 kg/ha.

Testing of Seed Dressing Insecticides against Shoot Fly in Maize

A trial comprising of four insecticides namely Confidor 70WS, Coniflex 70WS, Hombre186.25 FS and Actara 372.5 FS were tested against shoot fly at recommended doses in spring 2016. The experiment was laid out according to RCBD with four replications. Data regarding shoot fly infestation % were recorded 3 weeks after germination. The results showed that Confidor 70WP gave the best control against shoot fly with shoot fly infestation % (1.3) and grain yield of 14067 kg/ha followed by Coniflex 70WS with shoot fly infestation % (0.83) and grain yield of 13213 kg/ha.

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Metrological Data Recording at Maize & Millets Research Institute, Yusafwala during 2015-16

Sr. No.	Month	Average temperature ^{O}C				Rainfall (mm)	
		Maximum		Minimum			
		(2014-15)	(2015-16)	(2014-15)	(2015-16)	(2014-15)	(2015-16)
1	July	38.58	29.77	28.87	27.55	55.71	108.5
2	August	39.76	39.56	27.32	27.95	-	111.2
3	September	37.77	40.06	24.33	23.09	30.05	50
4	October	36.00	36.55	18.32	18.93	2.24	4.8
5	November	32.00	28.87	11.43	13.50	-	-
6	December	19.03	124.80	7.29	7.52	-	-
7	January	17.77	16.84	6.77	7.81	7.08	5.4
8	February	23.96	25.48	10.18	8.55	17.31	-
9	March	27.47	32.35	13.48	15.40	24.58	25.6
10	April	37.16	38.53	20.81	19.33	22	10.4
11	May	43.29	43.13	22.53	25.00	1.4	3.00
12	June	42.47	43.90	25.73	28.63	25	30
Total Rainfall =534.27						**185.37**	**348.9**