ANNUAL PROGRESS REPORT2018-19

MAIZE AND MILLETS RESEARCH INSTITUTE, YUSAFWALA, SAHIWAL

CONTENTS

INTRODUCTION

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 30^0 41 N, longitude of 73^0 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 Research Sub-Station, Faisalabad was established in 1978 and up graded as Research Station in 1990.Hybrid development program was started in 1994. Sorghum Research Sub-Station was established for development work of sorghum crop and an area of 5acres and one office room was allotted from Horticulture section during 2000. During 2008, 1.5 acres were again shifted to Horticulture section and 20 kanal 6 Marla were occupied by the divisional authorities for establishment of modal bazaar during 2012. Now 2 kanal 8 Marla have been occupied by the divisional authorities for establishment of Forensic Science Agency at D.G.Khan recently. Presently 5 kanal are in hand where maintenance and evaluation work of sorghum and pearl millet crops is being done successfully. The Millets Research Station Rawalpindi was established in 1976 to enhance the production of Pearl millet and maize crops through high yielding varieties and modern crop production technology in rain fed areas of Punjab. 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 4640 kg/ha (2017-18) 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. Presently nine (9) maize hybrids, two maize OPVs and one elite sorghum hybrid are in progress and most of them are in National Uniform Yield Trials and under DUS studies. Spot examination of two maize hybrids, four maize OPVs (including one pop-corn and one sweet corn variety) and a sorghum hybrid (YSH-95) has been done and these are recommended by Expert Sub-Committee for approval in Punjab Seed Council. Approval of some new hybrids and development of elite hybrids and OPVs will be helpful in self-sufficiency not only in maize hybrid development but best quality sorghum seed will also be available at cheaper rate and also curtail the import of multinational maize and sorghum seed.

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 deci-

sion 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 of 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 2017-18 and 2018-19 is given below. During the year 2017-2018, total 191.45`mm rainfall was received in comparison to previous 2016-2017 out of which 154.35 was received only in July 2017, September 2017 and June 2018.During fiscal year 2016-17 total 286.1 mm rainfall was received out of which only mm rainfall was received in July, August 2016 and June 2017. Smog prevalence was in November 2017, which badly affected maize and millets crops plant growth by causing suffocation. 247

Sr. No.	**Month**	**Average temperature ^{O}C**				**Rainfall (mm)**	
		Maximum		**Minimum**			
		(2017-18)	**(2018-19)**	**(2017-18)**	**(2018-19)**	**(2017-18)**	**(2018-19)**
1	July	40.58	40.29	28.45	27.87	25.70	58.70
2	August	39.67	40.38	27.93	27.26	09.00	16.00
3	September	38.43	38.80	23.76	25.13	74.00	14.00
4	October	37.52	34.42	19.77	20.58	-	-
5	November	27.51	27.90	12.88	13.80	02.20	-
6	December	27.45	22.48	07.21	07.26	07.60	04.50
7	January	24.16	19.50	05.42	05.70	-	24.00
8	February	26.48	14.11	08.89	08.17	-	41.30
9	March	34.54	28.03	16.29	13.45	10.80	02.50
10	April	40.26	36.60	20.56	20.40	03.50	31.70
11	May	42.00	40.64	23.45	22.09	-	28.7
12	June	40.63	44.03	26.60	25.76	64.1	01.00
Total Rainfall =						**205.90**	**222.4**

YUSAFWALA - SAHIWAL (HEADQUARTER)

MAIZE (*Zea mays* L)

HYBRID MAIZE (YELLOW)

KHARIF 2018:

Germplasm Maintenance:

1.1 Maintenance of Inbred Lines

Six hundred ninety-one (691) elite families of 70 inbred lines were sown on 15-08-2018 ear to row for maintenance during Kharif-2018. 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. Germination was not up to the mark due to rain just after the sowing. Gap filling was done. Data regarding root anthocyanin, leaf sheath anthocyanin, margin serration, leaf margin wave, sheath hairs, leaf senescence, days to 50% tasseling, days to 50% silking, fertility of anthers, pollen shedding, anther color, pollen color, glumes color and silk color were recorded of all the lines separately.

1.2 Maintenance of Pre-Elite inbred lines/families

One hundred forty-three (143) pre-elite families of 26 inbred lines, including dent derivatives and flint derivatives which have achieved the status of purity were merged into Pre-Elite inbred lines, were sown on 15-08-2018 ear to row for maintenance and purification through hand pollination. Harvesting of all the lines has been completed. Seed preparation of the inbred lines was completed for sowing in Spring-2019. Germination was not up to the mark due to rain just after the sowing; gap filling was done to achieve optimum plant density.

1.3 Derivation of Inbred Lines / Families

Sowing of two hundred fifty-six (256) derivatives including dent & flint derivative lines were completed on 15-08-2018 for maintenance and purification through hand pollination during Kharif-2018. The sowing was planned in such a way that after every two lines one line was kept blank to facilitate the breeding work and to avoid the foreign pollen contamination during self-pollination.

1.4 Stalk Rot Inoculation (*Fusarium verticilioides*) and Selection of Resistant Germplasm

All inbred lines (Elite and Pre-Elite) and hybrids were inoculated with stalk rot fungus (*Fusarium verticilioides,* formerly called *Fusarium moniliforme*) at the time of pollination stage to evaluate their resistance. Scoring points from 1-5 were given to each inoculated plant at the time of harvesting. Score (1-3) was given to a plant when spreading of disease was within inoculated internode and score 4 or 5, when disease infection was within 2nd or 3rd in-

ternode. Plant with 1-3 score (infection within inoculated internode) were selected and harvested to collect their seeds for next season sowing.

2 Hybrid Constitution through Open Pollination (Crossing Block)

2.1 Isolation No. 1

Sowing of twenty-seven (27) female inbred lines with one male Y-27 in isolation for new single cross constitution were completed in isolation in Sq. No 27 on 08-08-2018. Off-type plants were rogued out. Plants were harvested to collect crossed seed for sowing and evaluation in spring-2019.

2.2 Isolation No. 2

Sowing of 27 female inbred lines with one male Y-36 in isolation for new single cross constitution were completed in isolation in Colony area on 08-08-2018. Off-type plants were rogued out. Plants were harvested to collect crossed seed for sowing and evaluation in spring-2019.

2.3 Isolation No. 3

Sowing of 27 female inbred lines with one male SL-7 in isolation for new single cross constitution were completed in isolation in Seed house on 08-08-2018. Off-type plants were rogued out. Plants were harvested to collect crossed seed for sowing and evaluation in spring-2019.

2.4 Isolation No. 4

Sowing of 27 female inbred lines with one male P-222 in isolation for new single cross constitution were completed in isolation at office area on 17-08-2018. But due to rain just after the sowing germination of the block is below normal and re sowing of same crossing block with 24 female inbred lines has been completed on 29-08-2018. Off-type plants were rogued out. Plants were harvested to collect crossed seed for sowing and evaluation in spring-19. Off-type plants were rogued out. Plants were harvested to collect crossed seed for sowing and evaluation in spring-2019.

2.5 Isolation No. 5

Sowing of 8 early female inbred lines with one male DDR-P4 in isolation for developing new early maturing single crosses constitution were completed in isolation at Seed house near implement shed on 07-09-2018. Off-type plants were rogued out. Plants were harvested to collect crossed seed for sowing and evaluation in spring-2019. Off-type plants were rogued out.

3 Seed Increase

3.1 Isolation No.1

Sowing of promising female inbred line DDR-29 for maintenance / seed increase sown in Sq. No. 25 in isolation on 03-08-2018 was completed. Germination of the crop is normal. Off-type plants were rogued out. Plants were harvested to collect seed for sowing in spring-2019. Remaining seeds were preserved in seed house.

3.2 Isolation No.2

Sowing of promising female inbred line DR-135 for maintenance / seed increase sown in Sq. No. 24 in isolation on 03-08-2018 was completed. Germination of the crop was normal. Off-type plants were rogued out. Plants were harvested to collect seed for sowing in spring-2019. Remaining seeds were preserved in seed house.

3.3 Isolation No.3

Sowing of promising female inbred line DR-72 for maintenance / seed increase sown in Sq. No. 24 in isolation on 03-08-2018 was completed. Germination of the crop was normal. Off-type plants were rogued out. Plants were harvested to collect seed for sowing in spring-2019. Remaining seeds were preserved in seed house.

3.4 Isolation No.4

Sowing of promising female inbred line DRF-14 for maintenance / seed increase sown in colony area in isolation on 03-08-2018 was completed. Germination of the crop is normal. Off-type plants were rogued out. Plants were harvested to collect seed for sowing in spring-2019. Remaining seeds were preserved in seed house.

4. Spot Examination Trial

4.1 Trial No.1

Five promising hybrids (FH-1036, YH-5427, YH-5482; YH-5394 & YH-5554) along with two local approved checks (YH-1898 & FH-1046) and one commercial check (30Y87) were sown on an area of four Kanals for spot examination on dated 08-08-2018. Germination of the crop was normal. Plants were harvested to take required data for evaluation of hybrids.

4.2 Trial No.2

Five promising hybrids (FH-1036, YH-5427, YH-5482, YH-5394 and YH-5554) along with two local hybrids (YH-1898 & FH-1046) and one commercial check (DK-6789) were sown on an area of 6 Kanals for spot examination on 04-09-2018. Germination of the crop was normal. Harvesting of trial was done on 22-11-2018 and data were collected to evaluate the hybrids performance.

5. Hybrid Evaluation

Replicated Yield Trials

5.1 Preliminary Hybrid Maize Yield Trial No. 1. Kharif-2018.

This trial was comprised of sixty-two (62) 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 4 m x 0.75 m x 2. The data regarding various parameters are presented in the following table -1.

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

Sr. No.	Hybrid	Grain Yield kg/ha	Stand Count	50% Tass.	50% Silking	Plant Height	Ear Height	Plants Harv.	Ear Harv.
1	YH-5427	11841 a	37	50	52	180	90	37	39
2	YH-5404-3	11542 ab	39	49	52	215	110	39	41
3	YH-5417	11465 abc	38	49	52	175	90	38	41
4	YH-5427-2	11389 abc	38	51	54	178	83	38	40
5	YH-5556-3	11326 abc	38	53	55	193	103	38	40
6	YH-5421-6	11153 ab..d	37	51	54	200	113	36	39
7	YH-5559	11137 ab..e	38	54	57	180	90	37	40
8	YH-5404-2	11095 ab..f	39	48	51	185	103	39	41
9	YH-5535-1	11039 ab..f	37	48	51	193	103	37	39
10	YH-5556	11014 ab..f	36	51	54	168	83	36	38
11	YH-5423	10901 ab..g	37	51	54	178	83	37	39
12	YH-5404-1	10768 ab..h	38	50	53	185	105	37	40
13	YH-5421-1	10710 ab..i	37	48	51	183	98	37	39

14	YH-5421-3	10603 ab..j	37	49	52	185	98	37	39
15	YH-5417-2	10512 ab..k	38	53	55	188	98	38	40
16	YH-5535	10373 ab..k	37	50	52	180	100	36	39
17	YH-5558	10363 ab..k	36	51	53	173	93	36	38
18	YH-5395	10356 ab..k	36	52	55	168	80	36	38
19	YH-5411	10330 ab..k	35	52	54	155	78	35	37
20	DK-6789	10285 ab..l	40	53	55	210	108	40	42
21	YH-5539	10119ab..m	38	51	54	183	98	38	40
22	YH-5410	10031ab..m	36	50	53	178	80	36	38
23	YH-5545-1	9901ab..n	38	50	53	165	95	38	40
24	YH-5395-1	9851ab..n	36	49	52	178	98	36	38
25	YH-5583	9837ab..n	36	49	52	183	105	36	38
26	YH-5554	9810ab..n	36	48	51	160	95	36	38
27	YH-5421-2	9669ab..n	37	49	52	183	93	37	39
28	YH-5390	9559bc..o	39	52	54	193	105	39	41
29	YH-5439-1	9530bc..o	38	52	54	168	90	38	40
30	YH-5585	9507bc..o	39	54	57	215	120	39	41
31	YH-5423-1	9487bc..o	37	51	54	183	85	37	39
32	YH-5577	9435bc..p	37	52	54	190	95	37	39
33	YH-5545-3	9368bc..p	36	51	53	180	95	36	38
34	YH-5555	9311cd..p	36	55	57	175	100	36	38
35	YH-5397-2	9307cd..q	36	51	54	168	78	36	38
36	YH-5586	9282cd..q	40	54	56	240	120	40	42
37	YH-5533	9079 de..q	40	48	51	200	98	39	41
38	30Y87	9050 de..q	38	54	56	198	113	38	40
39	YH-5534	9028 de..q	38	52	54	170	95	38	40
40	YH-5576	8986 de..q	36	54	57	175	90	36	38
41	YH-5556-2	8919 ef..r	39	52	54	180	93	38	41
42	YH-5582	8888 fg..r	37	52	54	173	83	37	40
43	YH-5421-7	8765 gh..r	35	52	54	165	80	35	37
44	YH-5421-8	8763 gh..r	37	48	51	170	88	37	39
45	YH-5421-4	8721 gh..r	37	51	54	168	98	37	39
46	YH-5545-2	8608 hi..r	35	51	53	155	80	35	37
47	YH-5421	8514 ij..r	38	52	55	193	103	38	40
48	YH-5545	8424 jk..r	37	53	55	153	73	37	39
49	YH-5421-5	8388 jk..r	38	49	52	183	98	38	40
50	YH-5439	8375 kl..r	36	53	55	170	93	36	38
51	YH-5394	8319 kl..r	36	53	55	178	105	36	38
52	YH-5579	8091 lm..r	37	49	52	168	83	37	39
53	YH-5584	8080 lm..r	37	51	53	175	93	37	39
54	FH-1046	8079 lm..r	38	54	56	185	105	38	40
55	YH-5397-1	7992 mn..r	38	50	53	178	90	38	40
56	YH-1898	7925 mn..r	38	54	57	178	100	38	40
57	YH-5439-2	7805 no..r	38	52	55	153	75	37	40
58	YH-5556-1	7755 no..r	37	52	54	163	95	37	40
59	YH-5578	7416 op..r	36	53	55	148	73	35	38
60	YH-5581	7219 pqr	38	51	54	165	88	38	40
61	YH-5580	7087 qr	37	50	53	180	95	36	39

62	YH-5534-1	6754 r	35	55	58	160	83	35	37
CV %		11.73	3.93	3.29	3.13	8.27	11.76	4.03	3.71
LSD (5%)		2222.3	NS	3.35	3.36	29.57	22.06	2.97	2.90

It is evident from the results presented in the above Table-1 that significant differences were found among hybrids for all the traits studied except stand count. Local promising hybrid YH-5427 remained at the top position by giving 11841 kg/ha followed by local hybrid YH-5404-3 (11542 kg/ha) and YH-5417 (11465 kg/ha). Six hybrids including YH-5404-2, YH-5535-1, YH-5421-1, YH-5554, YH-5533 and YH-5421-8 seemed to be early maturing by taking 51 days to complete its fifty percent silking that portrayed the presence of early maturing characteristics in their inbred lines. Local hybrid YH-5586 showed maximum plant height (240 cm) while YH-5578 showed minimum plant height (148 cm). Local hybrid YH-5578 and YH-5545 showed lowest cob bearing (73 cm) while YH-5585 and YH-5586 showed highest cob bearing (120 cm). Non-significant results were found for stand count which depicted lack of sufficient variation for these characters.

5.2 Preliminary Hybrid Maize Yield Trial No. 2, Kharif -2018.

This trial was comprised of sixty-two (62) 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 4 m x 0.75 m x 2. The data regarding various parameters are presented in the following table-2.

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

Sr. No.	Hybrid	Grain Yield kg/ha	Stand Count	50% Tass.	50% Silking	Plant Height	Ear Height	Plants Harv.	Ear Harv.
1	YH-5521-1	11728 a	37	51	54	185	83	37	38
2	YH-5561-6	11361 ab	38	53	56	185	103	38	39
3	YH-5587	10833 abc	37	53	55	203	90	36	39
4	YH-5595-2	10705 ab..d	37	53	56	193	100	37	38
5	YH-5550-2	10584 ab..e	37	52	55	213	98	37	38
6	6789	10197 ab..f	38	53	55	203	93	38	39
7	YH-5482	10074 ab..g	38	53	56	185	78	38	39
8	YH-5591	10024 ab..g	37	55	58	178	78	37	38
9	YH-5539	9895 ab..h	36	52	54	193	95	36	37
10	YH-5540-3	9863 ab..h	34	53	55	178	80	34	35
11	YH-5521-5	9765 ab..h	36	55	58	170	80	36	37
12	YH-5596	9544 ab..i	37	52	54	160	80	37	38
13	YH-5490-4	9511 ab..i	38	52	54	193	85	37	39
14	YH-5550-1	9465 ab..i	37	51	54	175	90	37	38
15	YH-5600	9418 ab..i	36	54	57	185	95	36	38
16	YH-1898	9345 ab..j	35	52	54	188	93	35	36
17	YH-5521-4	9268 ab..j	37	55	59	183	78	37	38
18	YH-5543-2	9241 ab..j	36	53	55	163	78	36	37
19	YH-51333	9236 ab..j	39	52	55	185	83	38	40
20	YH-5560	9194 ab..j	37	53	55	175	75	37	38
21	YH-5561-7	9087 ab..j	39	52	54	173	88	39	40
22	YH-5489	9069 ab..j	38	54	56	143	73	37	39
23	YH-5547-2	9047 ab..j	37	52	55	208	90	37	38
24	YH-5543	9027 ab..j	38	52	55	185	90	38	39
25	30Y87	9025 ab..j	38	54	57	195	100	38	39

26	YH-5588	9024 ab..j	36	54	57	180	90	36	37
27	YH-5595-1	8992 ab..j	36	53	55	183	85	36	37
28	YH-5547	8968 ab..j	37	54	58	183	95	37	38
29	YH-5490-3	8952 ab..j	38	50	53	180	88	38	39
30	YH-5593	8920 ab..j	36	51	53	155	80	36	37
31	YH-5552-2	8910 ab..j	37	53	56	178	85	37	38
32	YH-5592	8910 ab..j	38	52	55	185	98	38	39
33	YH-5537	8583 bc..j	37	52	55	170	83	37	39
34	YH-5561	8476 cd..j	37	51	54	175	90	37	38
35	YH-5140	8473 cd..j	36	56	59	168	95	36	37
36	YH-5561-3	8444 cd..j	38	52	55	180	83	38	39
37	YH-5599	8436 cd..j	36	52	55	175	83	36	37
38	YH-5531	8402 cd..j	37	53	56	175	80	36	38
39	YH-5491	8352 cd..j	38	52	54	175	83	38	39
40	YH-5563-2	8283 cd..j	36	52	54	170	68	36	38
41	YH-5561-1	8268 cd..j	38	52	54	175	80	38	39
42	YH-5598	8240 cd..j	37	50	53	168	80	37	38
43	YH-5561-5	8153 cd..j	37	51	54	170	83	37	38
44	YH-5597	8115 cd..j	34	53	56	165	73	34	35
45	YH-5544	8070 cd..j	37	54	58	168	83	36	38
46	YH-5561-2	8062 cd..j	38	51	54	160	78	38	39
47	YH-5594	7953 de..j	36	54	57	175	73	36	38
48	YH-5590	7941 de..j	35	52	55	185	80	35	37
49	YH-5490-1	7872 de..j	36	52	54	175	90	36	37
50	YH-5550-3	7777 ef..j	37	55	58	185	88	37	38
51	YH-5561-4	7771 ef..j	37	51	54	170	93	37	38
52	YH-5540-1	7643 fg..j	35	53	56	163	80	35	36
53	YH-5133	7539 fg..j	36	52	55	178	93	36	37
54	YH-5521-3	7527 fg..j	38	53	56	165	88	38	39
55	YH-5543-1	7422 fg..j	37	57	59	155	60	37	39
56	YH-5540-2	7368 fg..j	36	52	55	203	85	36	37
57	YH-5589	7322 gh..j	35	55	58	185	80	35	36
58	YH-5490-2	7155 hij	37	52	55	193	98	36	38
59	YH-5552-1	7076 hij	37	54	57	148	63	37	38
60	YH-5521-2	6900 ij	36	53	56	178	80	36	38
61	YH-5540-4	6855 ij	36	53	55	165	83	36	37
62	YH-5563-1	6487 j	36	55	58	160	70	36	37
CV%(LSD)		16.37	3.41	3.17	2.96	9.72	14.99	3.08	3.44
LSD (5%)		2861.6	NS	NS	3.27	NS	NS	2.24	NS

It is evident from the results presented in the above Table-2 that significant differences were found only among sixty-two hybrids for yield, days to silking and plants harvest. Hybrid YH-5521-1 remained at top position by giving 11728 kg/ha followed by local hybrid YH-5561-6 (11361 kg/ha) and YH-5587 (10833 kg/ha). Three hybrids YH-5490-3, YH-5593 and YH-5598 seemed to be early maturing by taking 53 days to complete its fifty percent silking that comparatively portrayed as early maturing hybrid. Hybrid YH-5550-2 showed maximum plant height (213 cm) while YH-5489 showed minimum plant height (143 cm). Local hybrid YH-5543-1 showed lowest cob bearing (60 cm) while YH-5561-6 showed highest cob bearing (103 cm). Non-significant results were found for stand count, 50% tasseling,

plant height, eat height and ear harvest which depicted lack of sufficient variation among hybrids for these characters.

5.3 Preliminary Hybrid Maize Yield Trial No. 3, Kharif -2018.

This trial was comprised of thirty (30) 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 4 m x 0.75 m x 2. The data regarding various parameters are presented in the following table-3.

Table -3: Results of Preliminary Hybrid Maize Yield Trial No. 3

R. No.	Hybrid	Grain Yield kg/ha	Stand Count	50% Tass.	50% Silking	Plant Height	Ear Height	Plants Harv.	Ear Harv.
1	YH-5603	12858 a	35	53	52	195	83	35	36
2	YH-5615	12371 a	35	53	55	190	80	35	36
3	YH-5607	11945 ab	35	53	55	193	85	35	36
4	YH-5611-2	11939 ab	35	49	52	180	78	35	35
5	YH-5604	11065 abc	36	52	55	198	85	36	37
6	YH-5611-4	10966 ab..d	36	50	53	160	80	35	37
7	6789	10882 ab..d	39	53	55	198	90	38	40
8	YH-5610	10686 ab..d	36	48	51	170	83	35	37
9	YH-5623	10647 ab..d	36	47.5	51	213	95	36	37
10	YH-5611-1	10184 ab..e	35	49	52	188	83	35	36
11	YH-5609	10059 ab..f	35	52	55	183	88	35	36
12	YH-5602	9519 bc..g	34	49	55	175	75	34	35
13	YH-5608	9304 bc..g	35	53	56	175	95	35	35
14	YH-5611-5	9108 cd..h	36	48	51	160	78	36	36
15	YH-5614	9074 cd..h	35	48	51	173	80	35	35
16	YH-5616	8862 cd..i	38	52	54	160	70	38	39
17	YH-5619	8626 cd..j	36	49	52	168	73	36	37
18	YH-5620	8519 cd..j	36	50	53	170	90	36	37
19	YH-5611-3	8428 cd..j	36	53	55	150	68	36	37
20	YH-5621	8427 cd..j	35	50	53	145	60	35	36
21	YH-5617	8162 de..j	36	52	54	153	70	36	37
22	YH-5613	7754 ef..j	38	51	54	170	85	38	39
23	YH-5622	7657 ef..j	36	49	52	175	83	36	37
24	YH-5618	7295 fg..j	35	50	53	165	88	35	36
25	YH-5601	7090 gh..j	37	53	59	178	70	37	37
26	YH-5605	7033 gh..j	34	52	55	155	65	34	35

27	YH-5606	6725 gh..j	34	57	54	158	55	34	35
28	YH-5612	6461 hij	35	50	52	168	78	35	36
29	YH-1898	6064 ij	35	55	57	165	83	35	36
30	YH-5571	5837 j	34	52	55	168	78	34	35
CV%		**15.14**	**2.63**	**2.78**	**2.26**	**6.02**	**10.29**	**2.4**	**2.71**
LSD (5%)		**2822.7**	**1.9**	**2.89**	**2.47**	**21.32**	**16.61**	**1.73**	**2.01**

It is evident from the results presented in the above Table-3 that significant differences were found among thirty hybrids for all the characters under study. Hybrid YH-5603 remained at top position by giving 12858 kg/ha followed by local hybrid YH-5615 (12371 kg/ha) and YH-5607 (11945 kg/ha). Four hybrids YH-5610, YH-5623, YH-5611-5 and YH-5614 seemed to be early maturing by taking 51 days to complete its fifty percent silking that comparatively portrayed as early maturing hybrid. Hybrid YH-5623 showed maximum plant height (213 cm) while YH-5621 showed minimum plant height (145 cm). Local hybrid YH-5606 showed lowest cob bearing (55 cm) while YH-5623 showed highest cob bearing (95 cm). Non-significant results were not found for any characters which depicted presence of sufficient variation among hybrids for these characters.

5.4 Demonstration-1: Local Maize hybrid in comparison to commercial hybrids.

This trial was comprised of twenty five (25) entries including standard hybrids of different maturity groups and ratios of temperate to tropical genetic material. The trial was sown in strips. Plot size was kept 4mx0.75mx4. The data regarding various parameters are presented in the following table-4.

Table-4: Results of Demo-1, Local Maize Hybrid in Comparison to Commercial Hybrids

R. No.	Hybrid	Yield Kg/ha	Stand Count	50% Tasseling	50% Silking	Plant Height	Ear Height	Plants Harvest	Ear Harvest
1	YH-5552	11617	78	53	55	195	90	79	83
2	YH-5350	11288	78	53	56	185	80	77	81
3	YH-5561	10804	80	51	54	175	85	78	82
4	FH-949	10213	77	49	52	200	100	77	81
5	30Y87	9992	77	54	57	230	130	79	83
6	FH-1036	9871	77	53	56	210	100	76	80
7	YH-5133	9708	79	49	52	190	80	78	82
8	YH-5490	9506	79	52	55	185	90	78	82
9	YH-5560	9474	79	53	55	185	85	77	81
10	YH-5427	9465	78	55	58	175	75	78	82
11	6789	9330	78	53	56	210	100	78	82
12	YH-5404	9186	79	50	53	185	75	79	83
13	YH-5561-1	8909	80	53	55	170	80	77	81
14	YH-5398	8594	79	52	54	170	80	78	82
15	YH-5482	8571	78	55	58	175	80	79	83
16	YH-5547	8315	79	52	55	210	105	76	80
17	FH-1046	8283	78	52	55	175	95	78	82

18	YH-5390	8119	78	49	52	185	90	78	82
19	YH-5491	8118	78	53	56	185	85	79	83
20	YH-5533	7968	78	48	51	200	95	77	81
21	YH-5535	7903	77	56	59	155	85	79	83
22	YH-5554	7487	79	48	51	165	75	76	80
23	YH-5555	7358	78	53	55	170	80	77	81
24	YH-1898	7060	78	51	54	200	110	77	81
25	YH-5394	6599	79	50	53	170	95	78	82

The results presented in above Table-4 depicted the performance of twenty-five hybrids. Local hybrid YH-5552 remained at top position by giving 11617 kg/ha followed by local hybrid YH-5350 (11288 kg/ha). Two hybrids YH-5533 and YH-5554 seemed to be early maturing by taking 51 days to complete its fifty percent silking that comparatively portrayed as early maturing hybrid. Multinational hybrid 30Y87 showed maximum plant height (230 cm) while local hybrid YH-5535 showed minimum plant height (155 cm). Local hybrid YH-5554 showed lowest cob bearing (75 cm) while Multinational hybrid 30Y87 showed highest cob bearing (130 cm).

5.5 National Uniform Maize Hybrid Yield Trial, Kharif 2018

This trial was planted with one hundred (100) entries having plot size of 4mx0.75mx2 with two replications using Alpha Lattice design. The data regarding various parameters are presented in the following table-5.

Table-5: Results of National Uniform Maize Hybrid Yield Trial

R. No.	Hybrid	Yield	Stand Count	50% Tass.	50% Silking	Plant Height	Ear Height	Plants Harvest	Ear Harvest
1	P3582	13497 a	38	55	57	230	115	39	43
2	P3875	12140 ab	35	54	57	233	105	37	39
3	YH-5482	11788 ab..c	36	53	55	173	78	35	36
4	YH-5427	11652 ab..d	37	49	52	175	88	36	37
5	846	11501 ab..e	37	55	58	215	108	36	38
6	SD I7S22	11175 ab..f	34	54	57	210	98	32	40
7	DS 3377	10893 bc..g	40	56	59	195	98	37	39
8	C-915	10607 bc..h	35	55	57	205	120	35	36
9	SD 17S24	10360 bc..i	37	58	60	198	95	36	37
10	DS 2468	10129 bc..j	39	54	57	210	95	32	32
11	P3583	10126 bc..j	38	56	58	225	110	35	36
12	DS 2271	10059 bc..k	37	53	56	198	88	35	36
13	VH-5568	9990 bc..l	36	52	55	170	83	35	36
14	AAS 9435	9972 bc..l	28	53	56	200	103	36	35
15	C-905	9955 bc..l	38	55	57	213	113	34	36
16	5015	9895 bc..l	34	57	61	228	105	33	38
17	NK 7124	9804 bc..l	38	57	60	218	115	36	38
18	KWS T 744	9681 bc..l	40	57	60	205	95	37	38
19	30Y87[C1]	9681 bc..l	36	55	58	198	113	30	31

20	R 6180	9543 cd..m	33	54	56	220	103	30	30
21	2852	9504 cd..m	34	54	56	198	103	34	35
22	KWS 10	9479 cd..m	34	54	56	203	103	32	33
23	P4084	9477 cd..m	36	55	57	228	108	34	35
24	SD 17523	9444 cd..m	35	55	58	205	103	35	35
25	SD 32S33	9224 de..o	32	55	57	233	110	32	33
26	TG-Y NI-945	9081 ef..p	25	57	60	213	113	25	25
27	S 6293	8993 fg..q	34	58	60	220	108	33	36
28	KWS 8933	8908 fg..r	36	56	59	213	105	24	26
29	SG-7852	8883 fg..r	33	54	57	208	115	27	29
30	YAM-135C	8879 fg..r	39	52	55	203	90	36	38
31	848	8584 gh..s	34	55	58	198	105	29	30
32	HI 9788	8562 gh..s	38	55	57	208	115	33	35
33	BF-92	8476 gh..t	29	55	58	200	105	29	31
34	3399	8366 hi..u	31	55	59	193	110	30	31
35	AH-9272	8354 hi..u	40	53	56	198	108	35	37
36	WS-1315/33y	8337 hi..v	33	55	58	208	113	28	29
37	4050	8210 hi..w	31	54	57	198	108	27	29
38	Hi 9722	8152 hi..w	35	55	58	208	110	29	31
39	25W87	8139 hi..w	29	55	57	190	98	28	29
40	S 7750	8120 ij..w	39	53	56	218	115	34	35
41	R 6176	8030 ij..x	31	56	59	203	100	30	29
42	DS 3366	8022 ij..x	39	54	57	198	115	32	34
43	MS-449	7994 ij..x	29	55	57	208	115	27	28
44	9066	7985 ij..x	34	55	58	203	115	31	32
45	SB-9674	7975 ij..x	36	55	58	218	108	30	32
46	FS 131	7822 jh..y	26	53	56	200	103	25	29
47	WS-313	7760 jh..z	36	55	58	200	88	31	31
48	HP313	7749 jh..z	28	57	59	198	103	28	31
49	SS-777	7704 jh..z..a	30	56	59	193	105	26	27
50	9067	7631 kl..z..a	37	57	59	195	93	27	28
51	2141	7599 kl..z..a	31	55	58	220	128	27	29
52	AS-S266	7529 lm..z..a	28	54	57	188	95	23	23
53	SS-93	7164mn..z..b	31	55	58	198	110	30	31
54	AS-5277	7164mn..z..b	26	54	57	200	110	24	23
55	PSHY-0408	7113 mn..z.c	25	55	57	193	113	24	25
56	BF-99	7080 mn..z.c	36	55	59	178	88	30	32
57	CM-I07	7000 no..z..d	27	56	59	208	115	23	24
58	PSHY-0402	6976 no..z..e	20	53	56	185	83	20	22
59	ST-1387	6910 op..z..f	31	55	58	210	110	23	25
60	77M87	6877 op..z..f	28	56	58	190	90	26	26
61	AS-5178	6837 op..z..f	28	51	54	200	75	28	30

62	1'H-5569	6820 op..z..f	33	54	57	185	83	33	35
63	WS-93	6771 op..z..f	29	57	60	183	78	29	29
64	FS999	6743 pq..z..f	26	54	57	203	105	25	24
65	IS-5456	6703 pq..z..f	31	55	58	195	95	27	27
66	Ag-4040	6695 pq..z..f	29	55	58	190	95	24	24
67	Y H-5561	6684 pq..z..f	30	53	56	175	78	28	30
68	70M70	6637 pq..z..g	37	53	56	190	98	27	26
69	4070	6556 qr..z..h	23	57	60	208	118	22	22
70	4060	6467 rs..z..h	27	56	59	205	105	26	26
71	7786	6444 rs..z..i	25	54	57	203	118	22	22
72	SB-13	6205 st..z..j	24	53	56	175	85	20	21
73	Y H-5560	6023 tu..z..j	33	52	55	193	85	30	31
74	CS-2Y20	5966uv..z..k	27	53	56	203	95	23	24
75	JS-707	5877 vw..z..l	23	55	58	185	90	19	21
76	IS-5448	5877 vw..z..l	24	56	59	185	93	24	25
77	AAS 9633	5840 wx..z..l	23	56	59	185	100	20	21
78	77N186	5796wx..z.m	29	58	61	193	105	25	25
79	P888	5778wx..z.m	25	54	57	160	83	24	25
80	RS-6464	5574 xyz..n	25	56	58	193	78	20	22
81	EW13E33	5412 yz..n	23	57	59	193	100	21	20
82	MA-10I	5358 yz..n	29	57	60	195	88	21	23
83	SB-6082	5341 za..n	27	52	55	188	68	20	21
84	H-3	5243 zab..n	25	57	60	193	93	19	20
85	RS-7677	4976 z..bc..n	26	56	59	200	100	25	25
86	RS-936	4956 z..bc..n	23	58	61	195	108	23	23
87	SS-92	4695 z..bc..n	21	52	55	178	80	16	17
88	SD 3392	4643 z..cd..n	15	55	58	208	95	15	18
89	20 R 88	4526 z..de..n	20	55	58	190	95	19	19
90	3066	4520 z..ef..n	27	58	61	168	85	19	20
91	IS-7628	4436 z..fg..n	19	56	58	180	85	18	19
92	PSHY-0404	4177 z..gh..o	22	51	54	188	88	17	18
93	Y11-1292	4147 z..hi..o	24	52	55	190	95	18	19
94	NTH-6618	3985 z.. ij..o	20	58	61	180	90	19	20
95	2452Y	3836 z.. jh..o	16	55	58	183	98	14	13
96	MS-7411	3545 z..kl..o	22	56	60	190	100	19	19
97	YH-1898^{C2}	3425 z..lm..o	15	55	58	163	85	15	18
98	G-3	3332 z.. no	10	57	59	205	105	10	11
99	PSHY-7604	3235 z.. no	10	53	56	165	93	10	14
100	PSH1-7608	1925 z.. o	9	53	57	148	75	9	9
CD (LSD)		2475.6	7.919	3.429	3.495	28.213	22.072	9.176	9.805
CV%		16.64	13.58	3.17	3.07	7.21	11.21	17.1	17.74

It is evident from the results presented in the above Table-5 that significant differences were found among one hundred hybrids for all the characters studied. Multinational hybrid P3582 remained at top position by giving 13497 kg/ha followed by multinational hybrid P3875 (12140 kg/ha), local hybrid YH-5482 (11788 kg/ha) and local hybrid YH-5427 (11652 kg/ha) Local hybrid YH-5427 seemed to be early maturing by taking 52 days to complete its fifty percent silking that comparatively portrayed as early maturing hybrid. P3875 showed maximum plant height (233 cm) while PSH1-7608 showed minimum plant height (148 cm). SB-6082 showed lowest cob bearing (68 cm) while 2141 showed highest cob bearing (128 cm). Non-significant results were found not found for any trait which depicted presence of sufficient variation among hybrids for these characters.

SPRING 2019

Germplasm Maintenance

1 Maintenance of Inbred Lines

Eight hundred three (803) elite families of 78 inbred lines were sown ear to row for maintenance during spring-2019**.** 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 to retain their purification considering their true to type behavior and other desirable parameters. Numbers of 50% days to tasseling and silking were recorded to maintain inbred classes based on maturity. After gaining maturity, these self-pollinated lines were harvested and stored for using in next season.

2 Maintenance of Pre-Elite Inbred Lines/Families

One hundred twelve (112) pre-elite families of 19 inbred lines were sown ear to row during spring-2019 for maintenance and purification of inbred lines through hand pollination. After gaining maturity, these self-pollinated lines were harvested and stored for using in next season.

2 Germplasm Development

2.1 Derivation of Inbred Families

Four hundred six (406) elite families including dent and flint derivative lines were sown ear to row during spring-2019 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, lower cob placement, strong root anchor and disease tolerance were self-pollinated in all the families. After gaining maturity, these self-pollinated lines were harvested and stored for using in next season.

3 Germplasm Enhancement

3.1 Screening of Maize Germplasm and Hybrids Tolerant to Stalk Rot

Selfed-plants of eight hundred and three (803) elite families, one hundred twelve (112) pre-elite families and four hundred six (406) derivatives were inoculated with stalk rot fungus carrier toothpicks at second node from the base. At harvesting stems of 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.

All the hybrids sown in PYT, MPMYT, NUMYT and Demonstration plot were also inoculated with stalk rot fungus carrier toothpicks at second node from the base. The selection procedure was the same as described in above paragraph. Data were collected at the time of harvesting to know the susceptibility of hybrids against stalk rot.

4 Screening of Maize Inbred Lines and Hybrids under ADP Projects

4.1 Development of Heat Resilient Maize Inbred Lines under ADP Project.

During spring-2019 seventy-five (75) inbred lines were sown on 22-3-2019 for screening against high temperature. At flowering the temperatures remained above 40^{o}C. At harvesting sixty eight inbred lines were selected on the basis of seed set and performance under high temperature. The seed was kept for next cycle of planting and selection under high temperature.

4.2 Planting under Tunnel Condition

Thirty inbred lines (30) were also planted in tunnel during spring 2019 to provide high temperature regimes by covering the tunnels with plastic sheet at flowering under ADP project. At harvesting only two lines were found heat tolerant to heat conditions.

4.3 Development of Heat Resilient Maize Hybrids under ADP Project.

Three single crosses trials i. e Preliminary hybrid Maize yield trial No. 03, 04 and 08 were sown under ADP projects for evaluation of single crosses under high temperature. The material was sown late on 22-3-2019. The data of these trials is presented in the hybrid trials evaluation under ADP.

5 Hybrid Constitution/Development of New Single Crosses in Isolation Blocks

5.1 Isolation No.1

Fifty-eight (58) elite inbred lines were used as female with Y-27 as male were sown for production of new single crosses. The female lines were de-tasseled prior to the dehiscence of pollen. These crosses will be tested in preliminary yield trials, NUMYT and on farm trials in kharif-2019. The best performing single crosses will be selected. At harvesting, 13.5 kg seed of lines was harvested.

5.2 Isolation No.2

Fifty-nine (59) elite inbred lines were used as female with P-222 as male were sown for production of new single crosses. The female lines were de-tasseled prior to the dehiscence of pollen. These crosses will be tested in preliminary yield trials, NUMYT and on farm trials in kharif-2019. The best performing single crosses will be selected. At harvesting, 8.00 kg seed of lines was harvested.

5.3 Isolation No.3

Eleven (11) elite inbred lines were used as female with Y-36 as male were sown for production of new single crosses. The female lines were de-tasseled prior to the dehiscence of pollen. These crosses will be tested in preliminary yield trials, NUMYT and on farm trials in kharif-2019. The best performing single crosses will be selected. At harvesting, 4.00 kg seed of lines was harvested.

6 Hybrid Evaluation under Normal Season (Replicated Yield Trials)

6.1 Preliminary Maize Hybrid Yield Trial No. 1 Spring-2019

This trial was comprised of twenty-eight (28) entries including standard hybrids of different maturity groups and containing temperate to tropical genetic material. The trial was sown in randomized complete block design with two replications. Plot size was kept 4m x 1.5m. The data regarding various parameters are presented in the following table-6.

Table -6: Results of Preliminary Maize Hybrid Yield Trial No. 1

Sr. No	Hybrid	Grain Yield kg/ha	Stand Count	50% Tass.	50% Silking	Plant Height	Ear Height	Ear Harvest
1	YH-5482	9197a	37	73	76	223	105	38
2	P-1543	8829ab	36	78	80	195	121	40
3	YH-5556-3	8367abc	35	74	77	223	120	39
4	NK-8441	7459bcd	33	72	74	208	88	37
5	YH-5589	7041bc..e	35	72	75	200	115	33
6	YH-5556-2	6977bc..f	38	74	77	223	130	39
7	YH-5213	6901bc..g	32	73	76	198	108	33
8	YH-5555	6424bc..h	37	73	76	188	95	39
9	YH-5427	6163bc..h	33	72	75	190	95	33
10	YH-5417-1	6105bc..h	34	74	77	198	108	35
11	YH-5421	6043cd..h	31	73	76	215	113	33
12	YH-5398	6028cd..i	38	74	77	195	108	31
13	YH-5411	5961cd..j	33	71	74	195	100	29
14	YH-5404	5831cd..j	33	74	77	188	98	29
15	YH-5554	5830de..j	34	74	77	205	108	30
16	YH-5588	5610de..j	35	74	77	205	128	34
17	YH-5545	5197de..j	34	74	77	223	120	33
18	YH-5213	4971de..j	37	73	76	210	110	29
19	YH-5556-1	4937de..j	34	72	75	185	98	32
20	YH-5490	4904ef..j	35	76	79	218	108	32
21	YH-5533	4769fg..k	36	72	75	200	100	28
22	YH-5417-1	4747fg..k	36	74	77	208	123	41
23	YH-5390	3752gh..k	30	79	82	180	105	27
24	YH-5535	3017gh..k	38	76	79	160	78	31
25	YH-5587	2886hi..k	37	71	76	125	58	29
26	YH-5415	2794ijk	33	83	86	183	115	36
27	YH-5559	2784jk	31	75	78	118	60	34
28	YH-5423	2536k	31	74	77	160	80	27
CV%		**8.70**	**7.43**	**1.60**	**1.67**	**5.05**	**7.0**	**8.92**
LSD (5%)		**1880**	**NS**	**2.45**	**2.64**	**20.93**	**16.**	**NS**

The result given in Table-6 unveiled that significant differences were found among all hybrid for all characters in preliminary maize hybrid yield trial (PYT-01). It is evident from the results that YH-5482 gave maximum yield (9197 kg/ha) followed by check P-1543 (8829 kg/ha). NK-8441 and YH-5411 seemed to be early maturing by taking 74 days to complete its fifty percent silks while YH-5415 was late maturing taking 86 days to silks. YH-5482, YH-5556-3, YH-5556-2 and YH-5545 showed maximum plant height (223 cm) while YH-5559 showed minimum plant height (118 cm). Many local hybrids showed medium to low cob bearing characteristic which is desirable in developing lodging resistant hybrids. YH-5587 showed low cob bearing (58 cm) while YH-5556-2 showed high cob bearing (130 cm).

6.2 Preliminary Maize Hybrid Yield Trial No. 2 Spring-2019

This trial was comprised of thirty (30) entries including standard hybrids of different maturity groups and containing temperate to tropical genetic material. The trial was sown in randomized complete block design with two replications. Plot size was kept 4m x 1.5m. The data regarding various parameters are presented in the following table -7.

Table-7: Results of Preliminary Maize Hybrid Yield Trial No. 2

Sr. No	Hybrids	Grain Yield kg/ha	Stand Count	50% Tass.	50% Silking	Plant Height	Ear Height	Ear Harvest
1	YH-5550	11208a	39	75	77	233	125	36
2	P-1543	10506ab	36	72	74	213	93	37
3	YH-5597	10308abc	35	77	80	213	120	37
4	YH-5593	10292abc	37	77	80	205	110	33
5	YH-5439	9754ab..d	36	77	80	198	93	37
6	NK-8441	9742ab..d	35	73	76	208	98	34
7	YH-5482	9737ab..d	35	76	79	205	103	39
8	YH-5491	9721ab..d	35	73	76	198	98	34
9	YH-5594	9531ab..e	34	74	77	225	113	37
10	YH-5521	9486ab.e	37	77	80	213	105	37
11	YH-5599	9439bc..e	38	75	78	200	95	36
12	YH-5133	9294bc..e	35	76	79	223	120	35
13	YH-5602	9005bc..e	36	78	81	218	113	35
14	YH-1898	8981bc..e	36	77	80	190	118	35
15	YH-5522	8939b..e	38	74	77	203	103	36
16	YH-5596	8786b..e	33	77	80	203	108	33
17	YH-5590	8733cde	34	74	77	213	103	37
18	YH-5547	8708cde	37	74	77	203	105	34
19	YH-5595	8686cde	38	74	77	198	100	35
20	YH-5565	8638cde	36	74	77	215	108	34
21	YH-5545	8607cd..f	38	75	78	203	103	37
22	YH-5598	8468def	33	74	77	208	108	36
23	YH-5564	8439def	35	74	77	195	95	36
24	YH-5591	8348de..g	34	76	79	220	118	35
25	YH-5601	8209d..g	36	77	80	188	90	37
26	YH-5541	8041d..g	39	77	80	190	108	37
27	YH-5523	7950efg	35	77	80	215	125	35
28	YH-5600	7877efg	36	75	78	210	110	32
29	YH-5592	6903fg	35	77	80	208	105	35
30	YH-5543	6636g	35	74	77	188	105	36
CV%		**9.42**	**6.66**	**0.88**	**0.91**	**4.97**	**9.14**	**5.93**
LSD (5%)		**1726.8**	**NS**	**1.36**	**1.45**	**20.99**	**19.88**	**NS**

The results presented in the above Table-7 showed statistically significant differences in mean grain yield. It is evident that local hybrid YH-5550 (11208 kg/ha) out yielded all prominent commercial check hybrids i.e. P-1543© and NK-8441© and YH-1898© gave 10506 kg/ha, 9742 kg/ha & 8981 kg/ha, respectively. P-1543 seemed to be early maturing by taking 74 days to complete its fifty percent silks while YH-5602 was late maturing hybrid, who took 81 days to silks.YH-5550 showed maximum plant height (233 cm) while YH-5543 and YH-5601 showed minimum plant height (188 cm). Local hybrid YH-5601 showed low cob bearing (90 cm) while YH-5550 & YH-5521 showed highest cob bearing (125 cm). Stand count and cobs harvested showed non-significant results.

6.3 Preliminary Maize Hybrid Yield Trial No. 3 Spring-2019

This trial was comprised of thirty (30) entries including standard hybrids of different maturity groups and containing temperate to tropical genetic material. The trial was sown in randomized complete block design with two replications. Plot size was kept 4m x 1.5m. The data regarding various parameters are presented in the following table-8.

Table -8: Results of Preliminary Maize Hybrid Yield Trial No. 3

Sr. No	Hybrid	Grain Yield kg/ha	Stand Count	50% Tass.	50% Silking	Plant Height	Ear Height	Ear Harvest
1	FH-1046	8378a	31	78	80	210	125	34
2	YH-1898	8212ab	33	78	80	215	130	32
3	P-1543	8189ab	37	71	74	228	100	37
4	YH-5615	7795abc	31	75	79	220	98	35
5	YH-5624	7794abc	35	74	77	220	108	35
6	YH-5610	7750abc	38	74	77	203	108	35
7	YH-5427	7500abc	35	74	77	190	115	35
8	YH-5482	7475ab..d	35	76	79	200	110	36
9	YH-5605	7440ab..d	37	75	78	238	130	35
10	YH-5619	7195ab..e	33	73	76	230	115	31
11	NK8441	7190ab..e	33	72	75	205	105	33
12	YH-5612	6975ab..f	30	74	77	220	118	34
13	YH-5620	6973ab..f	35	73	76	228	128	34
14	YH-5611	6832ab..f	32	73	76	233	125	31
15	YH-5607	6690ab..f	31	74	77	228	118	34
16	YH-5622	6666ab..g	34	72	75	223	115	36
17	YH-5627	6665ab..g	35	75	78	238	130	35
18	YH-5615	6664ab..g	33	73	76	220	110	37
19	YH-5603	6599ab..g	29	76	79	228	123	32
20	YH-5621	6356bc..g	38	73	75	218	120	36
21	YH-5625	6350bc..g	35	74	77	223	108	36
22	YH-5626	6255cd..g	32	74	77	220	130	34
23	YH-5617	6224cd..g	36	74	77	220	118	37
24	YH-5613	6145cd..g	31	74	77	235	128	33
25	YH-5606	5883cd..g	32	74	77	208	113	32
26	YH-5609	5572de..g	32	75	78	210	110	34
27	YH-5623	5489efg	34	71	74	203	108	37
28	YH-5604	5235fg	30	75	78	218	115	32

29	YH-5614	4754gh	36	71	74	213	105	37
30	YH-5618	3281h	24	76	81	160	83	39
CV%		**14.03**	**11.35**	**1.67**	**1.44**	**5.80**	**9.07**	**7.10**
LSD (5%)		**1917.7**	**NS**	**2.52**	**2.26**	**25.69**	**21.29**	**4.99**

The results presented in the above Table-8 showed statistically significant differences in mean grain yield. It is evident that local hybrid FH-1046 (8378 kg/ha) out yielded all prominent commercial check hybrids i.e. YH-1898© and P-1543© gave 8212 kg/ha & 8189 kg/ha respectively. P-1543, YH-5614 and YH-5623seemed to be early maturing by taking 74 days to complete its fifty percent silks while hybrids YH-5618 was late maturing taking 81 days to silks. YH-5605 and YH-5627 showed maximum plant height (238 cm) while YH-5618 showed minimum plant height (160 cm). Local hybrid YH-5618 showed low cob bearing (83 cm) while YH-1898, YH-5605, YH-5627 and YH-5626 showed highest cob bearing (130 cm). All the characters excluding stand count showed significant results.

6.4 Preliminary Maize Hybrid Yield Trial No. 4 Spring-2019

This trial was comprised of thirty (30) entries including standard hybrids of different maturity groups and containing temperate to tropical genetic material. The trial was sown in randomized complete block design with two replications. Plot size was kept 4m x 1.5m. The data regarding various parameters are presented in the following table-9.

Table -9: Results of Preliminary Maize Hybrid Yield Trial No. 4

Sr. No	Hybrid	Grain Yield kg/ha	Stand Count	50% Tass.	50% Silking	Plant Height	Ear Height	Ear Harvest
1	P-1543	8985a	45	72	75	220	98	43
2	YH-5632	8933ab	39	76	78	225	105	35
3	YH-5647	8733ab	36	77	80	208	90	34
4	YH-5651	8048abc	36	77	80	195	103	35
5	YH-5427	7938abc	35	75	77	205	118	37
6	YH-5641	7883ab..d	40	77	80	223	123	39
7	YH-5636	7659ab..d	33	76	79	198	103	35
8	YH-5631	7612ab..d	38	76	78	205	110	40
9	YH-5629	7583ab..d	40	74	77	203	95	35
10	YH-1898	7527ab..d	34	78	80	193	110	40
11	NK-8441	7518ab..d	38	72	76	218	110	40
12	YH-5630	7492ab..d	38	74	77	203	115	31
13	YH-5482	7349ab..d	36	76	78	200	105	37
14	E-06	7345ab..d	35	76	79	228	125	36
15	YH-5642	7325ab..d	40	73	76	195	93	37
16	YH-5646	7284ab..d	40	73	76	195	95	37
17	YH-5639	7246ab..d	38	75	78	198	100	41
18	YH-5645	7162ab..d	35	74	77	198	108	34
19	YH-5637	7002ab..d	35	77	79	235	95	35
20	YH-5643	6907ab..d	40	74	77	188	100	39
21	FH-1046	6886ab..d	33	77	80	200	113	40
22	YH-5640	6725bcd	43	73	76	205	113	41
23	YH-5648	6396cde	33	74	77	195	90	39

24	YH-5644	6274cde	35	72	75	200	93	35
25	YH-5633	6045cde	33	77	80	200	105	36
26	YH-5649	5923cde	32	76	79	198	108	33
27	YH-5634	5849cde	33	77	77	220	110	37
28	YH-5650	5819cde	33	71	74	173	85	30
29	YH-5635	5649de	26	75	78	188	103	27
30	YH-5638	4367e	23	77	79	185	88	23
CV%		**15.37**	**11.11**	**1.57**	**1.52**	**7.85**	**8.09**	**9.90**
LSD (5%)		**NS**	**8.08**	**2.41**	**2.41**	**NS**	**17.11**	**7.22**

The results presented in the above Table-9 showed statistically significant differences in mean grain yield. It is evident that local hybrid P-1543 (8985 kg/ha) out yielded other elite maize hybrids i.e. YH-5632, YH-1898© and NK-8441© gave 8933 kg/ha, 7527 kg/ha & 7518 kg/ha respectively. YH-5650 seemed to be early maturing by taking 74 days to complete its fifty percent silks while hybrids YH-5647, YH-5651, YH-5641, YH-1898, FH-1046 and YH-5633 were late maturing taking 80 days to silks. YH-5637 showed maximum plant height (235 cm) while YH-5638 showed minimum plant height (185 cm). Local hybrid YH-5650 showed low cob bearing (85 cm) while Entry-6 of petal seeds showed high cob bearing (125 cm). All the characters excluding stand count showed significant results.

6.5 Preliminary Maize Hybrid Yield Trial No. 5 Spring-2019

This trial was comprised of thirty-four (34) entries including standard hybrids of different maturity groups and containing temperate to tropical genetic material. The trial was sown in randomized complete block design with two replications. Plot size was kept 4m x 1.5m. The data regarding various parameters are presented in the following table-10.

Table-10: Results of Preliminary Maize Hybrid Yield Trial No. 5

Sr. No	Hybrid	Grain Yield kg/ha	Stand Count	50% Tass.	50% Silking	Plant Height	Ear Height	Ear Harv.
1	YH-5684	8798a	31	83	86	243	138	30
2	YH-5683	8586a	26	80	83	250	138	32
3	P-1543	8484ab	38	71	74	228	100	36
4	NK-8441	8072abc	34	71	74	218	110	36
5	YH-5657	8028abc	39	77	80	265	158	38
6	YH-5681	7633ab.d	38	72	75	233	133	35
7	YH-5665	7569ab..d	35	74	76	228	113	34
8	YH-5676	7539ab..d	36	76	79	260	155	34
9	YH-5656	7464ab..d	37	74	77	200	110	42
10	YH-5682	7304ab..e	31	78	81	198	105	37
11	YH-5671	7255ab..e	37	72	75	243	130	36
12	YH-5685	7254ab..e	30	78	81	210	108	22
13	YH-5664	7172ab..e	34	72	75	210	100	40
14	YH-5655	7139ab..e	31	75	78	240	123	38
15	YH-5678	6998ab..e	33	78	80	240	133	33
16	YH-5658	6994ab..e	33	74	77	243	125	33
17	YH-5675	6993ab..e	29	77	79	190	105	37
18	YH-5672	6718bcde	31	73	76	163	103	34

19	YH-5670	6613cde	35	77	77	228	120	35
20	YH-5669	6584cde	37	73	75	195	100	35
21	YH-5661	6570cde	37	72	75	205	95	37
22	YH-5666	6548cde	31	75	78	235	118	35
23	YH-5679	6306cdef	35	75	78	253	143	34
24	YH-5668	6084def	36	74	77	210	115	39
25	YH-5662	6030def	34	71	74	193	105	33
26	YH-5680	5998def	28	73	76	248	140	33
27	YH-5654	5918def	37	74	77	225	138	30
28	YH-5667	5818defg	34	77	80	223	125	35
29	YH-5663	5790defg	28	74	77	185	103	37
30	YH-5660	5546efg	35	75	78	210	110	32
31	YH-5670	5507efg	33	72	75	193	95	37
32	YH-5674	4650fg	33	80	83	223	108	32
33	YH-5659	4062gh	35	71	74	195	93	21
34	YH-5673	2322h	34	86	89	163	78	37
CV%		**13.65**	**16.22**	**1.60**	**1.38**	**8.14**	**9.52**	**7.39**
LSD (5%)		**1848.7**	**NS**	**2.43**	**2.18**	**36.21**	**22.59**	**5.11**

The results presented in the above Table-10 showed statistically significant differences in mean grain yield. It is evident that local hybrid YH-5684 (8798 kg/ha) out yielded all prominent commercial check hybrids i.e. P-1543© and NK-8441© gave 8484 kg/ha & 8072 kg/ha respectively. P-1543, NK-8441, YH-5662 and YH-5659 seemed to be early maturing by taking 74 days to complete its fifty percent silks while hybrids YH-5673 was late maturing taking 89 days to silks. YH-5657 showed maximum plant height (265 cm) while YH-5672 and YH-5673 showed minimum plant height (163 cm). YH-5673 showed low cob bearing (78 cm) while YH-5657 showed high cob bearing (158 cm). All the characters excluding stand count showed significant results.

6.6 Preliminary Maize Hybrid Yield Trial No. 6 Spring-2019

This trial was comprised of twenty-six (26) entries including standard hybrids of different maturity groups and containing temperate to tropical genetic material. The trial was sown in randomized complete block design with two replications. Plot size was kept 4m x 1.5m. The data regarding various parameters are presented in the following table -11.

Table -11: Results of Preliminary Maize Hybrid Yield Trial No. 6

Sr. No	Hybrid	Grain Yield kg/ha	Stand Count	50% Tass.	50% Silking	Plant Height	Ear Height	Ear Harvest
1	YH-1898	9430a	37	77	80	208	120	35
2	P-1543	8562ab	38	71	74	225	100	37
3	NK-8441	8098bc	40	72	75	225	108	35
4	YH-5702	7162cd	34	73	76	210	98	36
5	YH-5697	6771de	31	72	75	200	93	37
6	YH-5696	6764de	36	74	77	205	93	35
7	YH-5706	6546def	34	75	77	223	108	32
8	YH-5700	6434def	29	74	77	208	103	33

9	YH-5699	6410def	35	71	74	190	90	37
10	YH-5687	6102def	33	72	75	198	100	34
11	YH-5690	6060de..g	31	74	77	213	120	35
12	YH-5703	5891ef..h	32	71	74	195	95	37
13	YH-5691	5767ef..h	32	73	76	200	83	33
14	YH-5695	5744ef..h	29	74	77	195	90	32
15	YH-5701	5682ef..h	28	75	78	225	120	29
16	YH-5707	5668ef..h	29	75	76	200	113	32
17	YH-5693	5635ef..h	36	75	78	183	103	34
18	YH-5688	5472fg..i	29	73	76	193	98	34
19	YH-5705	5403fg..i	31	77	77	203	100	32
20	YH-5686	5330fg..i	29	76	79	190	113	32
21	YH-5704	4864ghi	39	78	80	183	98	36
22	YH-5698	4736hi	35	75	78	183	98	37
23	YH-5692	4378ij	32	73	76	178	88	34
24	YH-5708	3189jk	33	80	83	200	103	35
25	YH-5689	2789k	23	83	86	163	78	30
26	YH-5694	2681k	23	76	79	183	88	20
CV%		**10.14**	**13.30**	**1.58**	**1.64**	**5.21**	**11.63**	**7.21**
LSD (5%)		**1217.5**	**8.76**	**2.42**	**2.60**	**21.36**	**NS**	**4.95**

The results presented in the above Table-11 showed statistically significant differences in mean grain yield. It is evident that local hybrid YH-1898 (9430 kg/ha) out yielded all prominent commercial check hybrids i.e. P-1543©, and NK-8441© gave 8562 Kg/ha & 8098 Kg/ha respectively. P-1543, YH-5699 and YH-5703 seemed to be early maturing by taking 74 days to complete its fifty percent silks while hybrids YH-5689 was late maturing taking 86 days to silks. P-1543, NK-8441 and YH-5701 showed maximum plant height (225 cm) while YH-5689 showed minimum plant height (163 cm). Local hybrid YH-5689 showed low cob bearing (78 cm) while local hybrids YH-1898, YH-5690 and YH-5701 showed highest cob bearing (120 cm). All the characters excluding cob height showed significant results.

6.7 Preliminary Maize Hybrid Yield Trial No. 7 Spring-2019

This trial was comprised of twenty-six (26) entries including standard hybrids of different maturity groups and containing temperate to tropical genetic material. The trial was sown in randomized complete block design with two replications. Plot size was kept 4m x 1.5m. The data regarding various parameters are presented in the following table 12.

Table-12: Results of Preliminary Maize Hybrid Yield Trial No. 7

Sr. No	Hybrid	Grain Yield kg/ha	Stand Count	50% Tass.	50% Silking	Plant Height	Ear Height	Ear Harvest
1	NK8441	9197a	38	73	76	223	105	37
2	YH-1898	8829ab	40	78	80	195	121	36
3	YH-5725	8367abc	39	74	77	223	120	35
4	P-1543	7459bcd	37	72	74	208	88	33
5	YH-5723	7041cde	33	72	75	200	115	35
6	YH-5719	6977cd..f	39	74	77	223	130	38

7	YH-5724	6901def	33	73	76	198	108	32
8	YH-5716	6424de..g	39	73	76	188	95	37
9	YH-5728	6163de..h	33	72	75	190	95	33
10	YH-5720	6105ef..i	35	74	77	198	108	34
11	YH-5721	6043ef..i	33	73	76	215	113	31
12	YH-5715	6028ef..i	31	74	77	195	108	38
13	YH-5713	5961ef..i	29	71	74	195	100	33
14	YH-5712	5831ef..i	29	74	77	188	98	33
15	YH-5710	5830ef..i	30	74	77	205	108	34
16	YH-5718	5610fg..i	34	74	77	205	128	35
17	YH-5726	5197ghi	33	74	77	223	120	34
18	YH-5714	4971hij	29	73	76	210	110	37
19	YH-5727	4937hij	32	72	75	185	98	34
20	YH-5730	4904hij	32	76	79	218	108	35
21	YH-5709	4769hij	28	72	75	200	100	36
22	YH-5722	4747ij	41	74	77	208	123	36
23	YH-5731	3752jk	27	79	82	180	105	30
24	YH-5711	3017k	31	76	79	160	78	38
25	YH-5717	2886k	29	71	76	125	58	37
26	YH-5732	2794k	36	83	86	183	115	33
CV%		**12.30**	**11.16**	**1.38**	**1.43**	**5.38**	**8.33**	**7.19**
LSD (5%)		**1408.1**	**7.56**	**2.09**	**2.27**	**21.361**	**17.67**	**NS**

The results presented in the above Table-12 showed statistically significant differences in mean grain yield. It is evident that local hybrid NK-8441 (9197 kg/ha) out yielded other hybrids i.e. YH-1898© and P-1543©gave 8829 kg/ha & 7459 kg/ha respectively. P-1543 and YH-5713 seemed to be early maturing by taking 74 days to complete its fifty percent silks while hybrids YH-5732 was late maturing taking 86 days to silks. Maximum plant height (223 cm) was exhibited by four hybrids i.e. NK-8441, YH-5725, YH-5719 and YH-5726 while YH-5717 showed minimum plant height (125 cm). Local hybrid YH-5717 showed low cob bearing behavior (58 cm) while YH-5719 showed highest cob bearing (130 cm). All the characters excluding cob height showed significant results.

6.8 Preliminary Maize Hybrid Yield Trial No. 8 Spring-2019

This trial was comprised of ten (10) entries including standard hybrids of different maturity groups and containing temperate to tropical genetic material. The trial was sown in randomized complete block design with two replications. Plot size was kept 4m x 1.5m. The data regarding various parameters are presented in the following table-13.

Table-13: Results of Preliminary Maize Hybrid Yield Trial No. 8

Sr. No	Hybrid	Grain Yield kg/ha	Stand Count	50% Tass.	50% Silking	Plant Height	Ear Height	Ear Harvest
1	P-1543	7377a	37	72	74	208	93	34
2	YH-1898	7347a	38	78	80	188	113	35
3	YH-5740	7325a	39	72	75	195	110	35
4	NK-8441	7038ab	38	72	75	213	105	36
5	YH-5736	6468abc	35	72	75	183	83	35

6	YH-5739	6090abc	35	73	76	203	103	36
7	YH-5734	5779bc	36	71	74	163	98	34
8	YH-5737	5440c	37	72	75	183	90	34
9	YH-5735	5279c	35	71	74	165	85	35
10	YH-5738	5178c	34	72	75	190	93	36
CV%		9.80	7.17	1.32	1.27	4.09	9.12	7.66
LSD (5%)		1403.8	5.863	2.159	2.159	17.46	20.02	6.032

The results given in the above Table-13 demonstrate statistically significant differences in mean grain yield. It is evident that local hybrid P-1543 (7377 kg/ha) out yielded all other hybrids i.e. YH-1898© and NK-8441© gave 7347 kg/ha & 7038 kg/ha respectively. P-1543, YH-5734 and YH-5735 seemed to be early maturing by taking 74 days to complete their fifty percent silks while hybrids YH-1898 was late maturing taking 80 days to silks. NK-8441 showed maximum plant height (213 cm) while YH-5734 showed minimum plant height (163 cm). Local hybrid YH-5736 showed low cob bearing (83 cm) while YH-1898 showed highest cob bearing (113 cm). All the characters showed significant results.

6.9 Micro Plot Hybrid Maize Yield Trial No.01 Spring 2019

This trial was comprised of sixty (60) 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 4m x1.5m. The data regarding various parameters are presented in the following table-14.

Table-14: Results of Micro Plot Hybrid Maize Yield Trial No.01

Sr. No	Hybrid	Grain Yield kg/ha	Stand count	50% Tass.	50% Silk.	Plant Height	Ear Height	Ear Harv
1	YH-5550-2	8721a	36	71	74	199	94	35
2	NK-8441	8515ab	37	74	77	212	97	38
3	YH-5133	8473ab	31	75	78	206	105	31
4	YH-5561-2	7974abc	36	71	73	183	98	36
5	YH-5560	7901ab..d	36	73	76	210	110	36
6	YH-5540-2	7836ab..e	30	73	76	197	108	32
7	YH-5547	7828ab..e	34	70	73	199	102	35
8	YH-5552-1	7802ab..e	38	72	74	189	95	39
9	YH-5491	7760ab..f	37	72	75	206	100	35
10	YH-1898	7753ab..f	40	76	78	193	110	33
11	YH-5490-3	7695ab..g	37	73	76	208	119	33
12	YH-5561-1	7471ab..h	35	72	75	194	100	34
13	YH-5550-3	7364ab..i	36	77	80	216	100	34
14	YH-5587	7275ab..j	36	71	74	200	93	31
15	YH-5592	7256ab..j	33	75	78	197	89	31
16	YH-5552-2	7229ab..j	36	69	72	200	103	34
17	YH-5595-2	7201ab..j	39	76	79	212	114	35
18	YH-5588	7188ab..k	30	76	79	189	98	30
19	YH-5561-6	7166ab..k	35	76	79	192	87	36
20	P-1543	7145ab..k	36	72	76	221	99	38
21	YH-5521-5	7124ab..k	31	76	80	217	112	31

22	YH-5561-3	7089ab..k	39	71	74	207	100	37
23	YH-5563-1	7032ab..k	31	73	76	191	92	33
24	YH-5547	7005ab..k	39	72	75	200	104	35
25	YH-5490-2	6940ab..k	36	72	74	212	113	40
26	YH-5537	6929ab..k	37	72	75	189	101	36
27	YH-5490-4	6828ab..k	36	74	77	240	136	37
28	YH-5543	6798ab..k	37	72	75	188	75	35
29	YH-5599	6725bc..k	32	73	77	189	98	27
30	YH-5598	6609bc..k	34	72	75	206	105	34
31	YH-5543	6451cd..k	38	69	73	190	88	32
32	YH-5550-1	6370cd..k	26	73	76	197	101	32
33	YH-5590	6366cd..k	40	75	78	206	109	33
34	YH-5539	6331cd..k	25	74	77	191	94	26
35	YH-5131	6323cd..k	37	73	77	194	82	33
36	YH-5521-3	6314cd..k	40	76	79	207	112	39
37	YH-5521	6298cd..k	31	72	74	193	89	28
38	YH-5561-5	6294cd..k	32	73	76	189	94	37
39	YH-5531	6258cd..k	36	76	79	203	105	37
40	YH-5600	6252cd..k	31	77	80	200	101	30
41	YH-5521	6221cd..k	37	74	77	186	100	33
42	YH-5595-1	6115cd..k	32	76	79	193	89	31
43	YH-5543	6056cd..l	32	71	74	198	96	30
44	YH-5563-2	6053cd..l	31	73	76	183	88	31
45	YH-5540-3	6019de..l	37	74	77	199	88	31
46	YH-5540	5966de..l	30	78	81	182	105	29
47	YH-5540-1	5932ef..l	16	77	80	188	93	18
48	YH-5490-1	5836fg..l	37	71	75	185	96	34
49	YH-5596	5788gh..l	34	70	73	175	85	32
50	YH-5489	5768gh..l	25	75	78	175	84	25
51	YH-5521-4	5702hi..l	32	77	80	213	94	32
52	YH-5594	5669hi..l	31	72	75	173	93	30
53	YH-5561-7	5548hi..l	30	74	77	189	94	25
54	YH-5561-4	5476ij..l	31	72	76	194	88	28
55	YH-5589	5418jkl	23	75	78	204	89	22
56	YH-5591	5394jkl	31	73	76	189	91	34
57	YH-5593	5377jkl	34	73	76	169	91	31
58	YH-5540-4	5367jkl	35	73	76	187	95	31
59	YH-5544	5261kl	24	75	78	202	103	29
60	YH-5561	4128l	32	73	74	187	92	31
CV%		**14.58**	**14.08**	**2.58**	**2.57**	**7.15**	**12.48**	**13.20**
LSD (5%)		**1939.5**	**9.38**	**3.78**	**3.92**	**28.12**	**NS**	**8.50**

It is evident from results presented in Table-14 that all the hybrids expressed statistically significant differences for grain yield, days to tasseling, silking, plant height and ear

height. It is obvious that YH 5550-2 (8721 kg/ha) out yielded all prominent commercial hybrids i.e. NK-8441 (8515 kg/ha), YH-1898 (7753 kg/ha) and P-1543 (7145 kg/ha). YH-5552-2 seemed to be early maturing by taking 72 days to complete its fifty percent silks while local hybrid YH 5540 taken 81 days to silks. Local hybrid YH 5490-4 showed maximum plant height (240 cm) while YH-5593 exhibited minimum plant height (169 cm). Local hybrid YH-5131 showed low cob bearing (82 cm) while YH 5490-4 showed high cob bearing (136 cm).

6.10 Micro Plot Hybrid Maize Yield Trial No.02 Spring 2019

This trial was comprised of sixty (60) 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 4m x1.5m. The data regarding various parameters are presented in the following table 15.

Table-15: Results of Micro Plot Hybrid Maize Yield Trial No.02

Sr. No	Hybrid	Grain Yield kg/ha	Stand Count	50% Tass.	50% Silking	Plant Height	Ear Height	Ear Harvest
1	NK-8441	9351a	37	71	74	220	103	41
2	Entry-7 Petal	8857ab	34	76	79	220	123	32
3	YH-5576	8396abc	32	72	75	214	100	38
4	P-1543	8374ab..d	36	72	75	204	85	37
5	FH-1046	7968ab..e	32	77	80	198	115	28
6	Entry-6 Petal	7732ab..f	39	74	77	230	123	35
7	YH-5555	7397ab..g	28	75	78	196	103	28
8	YH-5404-2	6952bc..h	26	72	75	193	91	26
9	YH-5439-2	6928bc..i	32	75	78	170	93	28
10	YH-5533	6919bc..i	28	73	76	194	97	27
11	YH-5556-1	6820bc..j	28	78	80	184	114	28
12	YH-5535	6785bc..j	24	72	75	189	108	23
13	YH-5423	6763bc..j	26	75	76	172	90	28
14	YH-1898	6702bc..j	36	75	78	194	110	30
15	YH-5545-2	6667bc..k	33	72	75	192	94	31
16	YH-5569	6593cd..l	29	71	74	197	102	32
17	YH-5421-4	6518cd..l	29	71	75	187	98	30
18	YH-5421-3	6391cd..m	26	71	74	205	113	29
19	YH-5410	6361cd..m	29	71	74	186	90	26
20	YH-5404-3	6332cd..m	24	74	77	195	105	27
21	YH-5581	6287cd..m	14	73	74	149	75	15
22	YH-5421-1	6266cd..m	25	76	79	138	110	29
23	YH-5556-3	6254cd..m	28	75	78	194	116	28
24	YH-5421-7	6184de..n	34	72	75	194	105	33
25	YH-5579	6132ef..o	23	73	76	176	88	25
26	YH-5397-1	5980ef..o	28	72	75	177	90	32
27	YH-5582	5972ef..o	26	74	76	168	83	25
28	YH-5394	5916ef..p	25	77	81	170	99	24
29	YH-5421-8	5906ef..p	27	73	76	173	89	29
30	YH-5404-1	5832ef..p	21	73	76	177	90	26

31	YH-5390	5832ef..p	20	73	76	202	90	21
32	YH-5439-1	5792ef..p	23	72	75	172	80	25
33	YH-5397-2	5701fg..p	32	73	75	175	100	31
34	YH-5534	5675fg..p	37	73	76	178	93	35
35	YH-5559	5526gh.q	17	77	80	189	98	20
36	YH-5423-2	5525gh..q	22	71	75	171	79	25
37	YH-5417-1	5206gh..r	20	72	75	169	95	21
38	YH-5395-1	5132hi..s	18	75	77	178	85	20
39	YH-5423-1	5124hi..s	25	72	75	177	80	25
40	YH-5395	5104hi..s	21	75	78	185	95	21
41	YH-5556-2	5037hi..s	16	77	80	193	101	20
42	YH-5545-3	4921hi..s	21	71	75	188	96	21
43	YH-5421-6	4849hi..s	29	71	74	164	93	26
44	YH-5421-5	4818hi..s	19	76	79	167	104	27
45	YH-5545	4733ij..s	34	77	80	155	82	30
46	YH-5421-2	4719jk..s	21	73	76	198	110	22
47	YH-5545-2	4707jk..s	20	73	77	190	98	25
48	YH-5558	4690jk..s	13	76	79	187	98	20
49	YH-5539	4500kl..s	17	73	75	179	98	19
50	YH-5577	4450lm..s	21	73	77	181	95	19
51	YH-5534-1	4439lm..s	22	75	78	157	80	23
52	YH-5583	4299mn..t	18	72	75	185	88	16
53	YH-5580	4031no..t	16	71	75	171	83	16
54	YH-5545-1	3953op..t	21	78	81	155	77	23
55	YH-5578	3738pq..t	16	76	79	166	85	17
56	YH-5554	3346qr..u	11	73	76	162	88	13
57	YH-5535	3047rs..u	18	73	76	199	110	19
58	YH-5411	2960stu	8	74	77	164	78	11
59	YH-5556	2191tu	9	72	75	164	70	9
60	YH-5439	1501u	10	74	77	154	73	7.5
CV%		**19.32**	**18.06**	**2.12**	**1.94**	**7.05**	**10.79**	**16.36**
LSD (5%)		**2197**	**8.65**	**3.12**	**2.96**	**25.63**	**20.48**	**8.09**

It is evident from the results given in Table-15 that all the hybrids expressed statistically significant differences in grain yield, days to tasseling, silking, plant height and ear height. It is obvious that NK-8441 (9351 kg/ha) out yielded all prominent commercial hybrids i.e. YH-5576 (8396 kg/ha), P 1543 (8374 kg/ha) and FH-1046 (7968 Kg/ha). NK-8441, YH-5569, YH-5421-3, YH-5410, YH-5581 and YH-5421-6 seemed to be early maturing by taking 74 days to complete its fifty percent silks while local hybrids i.e. YH-5394 and YH-5545-1 that taken 81 days to silks. Local hybrid Entry-06 showed maximum plant height (230 cm) while YH-5421-1 showed minimum plant height (138 cm). Local hybrid YH-5439 showed low cob bearing (73 cm) while Entry-07 and Entry-06 showed highest cob placement (123 cm).

6.11 Demonstration (Demo-01) of Local Maize Hybrids in Comparison to Commercial Hybrids under Normal Conditions, Spring-2019

This trial was comprised of twenty-four (24) entries including standard hybrids of different maturity groups and ratios of temperate to tropical genetic material. The trial was sown in Strip plot design. Plot size was kept 4m x1.5m. The data regarding various parameters are presented in the following table-16.

Table- 16: Results of Demo of Local Maize Hybrids in Comparison to Commercial Hybrids under Normal Conditions

Sr. No	Hybrid	Grain Yield kg/ha	Stand Count	50% Tass.	50% Silking	Plant Height	Ear Height	Ear Harvest
1	E-01 (petal seed)	9345	39	77	81	210	100	35
2	YH-1898	8743	37	75	78	200	110	38
3	SB-9618	8692	37	74	78	213	88	39
4	SB-1763	8554	34	76	79	213	100	32
5	SB-9663	8405	36	78	81	208	107	41
6	YH-5427	8324	34	74	77	200	110	37
7	CS-222	7528	35	73	76	220	95	36
8	E-7 (Petal seed)	7493	36	75	78	220	125	33
9	YH-1898 (PSC)	7474	33	76	79	205	122	34
10	FH-1046	7211	46	78	81	206	122	37
11	YH-5482	7156	38	75	78	210	105	33
12	SB-9635	6545	38	72	75	202	110	39
13	SB-1794	6534	41	77	81	225	123	31
14	FH-949	6530	37	75	78	205	113	26
15	SB-9617	6507	37	74	77	176	92	32
16	YH-5395	6494	27	70	74	191	97	30
17	NK-8441	6456	34	74	76	205	95	32
18	JPL-1908	6440	37	73	76	216	98	39
19	P-1543	6412	39	70	73	220	105	38
20	FH-1166	6339	32	75	78	232	115	27
21	E-06 (Petal seed)	6168	39	75	78	240	140	32
22	SB-6971	5974	39	77	81	218	117	29
23	FH-1210	5416	33	76	79	242	100	22
24	FS-131	2106	2	74	77	172	80	8

It is apparent from the results depicted in Table-16 that all the hybrids expressed statistically significant differences for days to tasseling, silking; ear height and ear harvest. It is obvious that E-01 of Petal seed out yielded all prominent commercial hybrids giving 9345 kg/ha, followed by the YH-1898 (8743 kg/ha).P-1543 seemed to be early maturing by taking 73 days to complete its fifty percent silks while local hybrids i.e. E-01 of Petal seed, SB-9663, FH-1046, SB-1794 and SB-6971 were late maturing by taking 81 days to silks. FH-1210 maize hybrid showed maximum plant height (242 cm) while FS-131 showed minimum plant height (172 cm).

6.12 Demonstration (Demo-02) of Local Maize Hybrids in Comparison to Commercial Hybrids under Normal Conditions Spring-2019.

This trial was comprised of fifteen (24) entries including standard hybrids of different maturity groups and ratios of temperate to tropical genetic material. The trial was sown in strip plot design. Plot size was kept 4m x1.5m. The data regarding various parameters are presented in the following table-17.

Table -17: Results of Demo of Local Maize Hybrids in Comparison to Commercial Hybrids under Normal Conditions

Sr. No	Hybrid	Grain Yield kg/ha	Stand Count	50% Tass.	50% Silking	Plant Height	Ear Height	Ear Harvest
1	YH-5404	7776	36	74	77	197	127	36
2	YH-5629	7223	34	70	73	211	93	38
3	YH-5390	7146	38	73	76	208	102	30
4	YH-5630	6999	34	70	72	197	110	36
5	YH-5556	6965	36	78	81	211	127	35
6	P-1543	6946	36	69	73	225	100	32
7	YH-5535	6872	41	74	77	211	129	31
8	YH-5645	6829	34	78	81	206	108	34
9	NK-8441	6600	36	70	73	215	95	35
10	YH-5545	6391	36	72	75	185	102	34
11	YH-5554	6289	37	71	75	175	90	36
12	YH-5616	6172	37	76	79	225	127	28
13	YH-5606	6103	39	70	73	198	105	28
14	YH-5605	5851	35	73	76	220	118	26
15	YH-5631	5822	34	78	81	202	110	30
16	YH-5619	5819	35	70	73	218	98	33
17	YH-5612	5737	35	73	76	216	130	26
18	YH-5632	5673	39	77	81	222	110	27
19	YH-5213	5651	36	72	75	211	117	30
20	YH-5634	5640	33	75	78	209	100	32
21	YH-5627	5013	37	71	74	210	113	27
22	YH-5609	4940	36	73	76	232	103	20
23	YH-5613	4932	36	71	74	230	122	23
24	YH-5635	4555	22	75	78	184	92	22

It is evident from Table-17 that all the hybrids expressed statistically significant differences for days to tasseling, silking; ear height and ear harvest. It is obvious that YH-5404 out yielded all prominent commercial hybrids giving 7776 kg/ha, followed by the YH-5629 (7223 kg/ha). YH-5630 seemed to be early maturing by taking 72 days to complete its fifty percent silks while local hybrids i.e. YH-5556, YH-5645, YH-5631 and YH-5632 were among the late maturing hybrids, taking 81 days to silks. YH-5609 showed maximum plant height (232 cm) while YH-5554 showed minimum plant height (175 cm).

6.15 National Uniform Maize Yield Trial-01 Spring-2019

This trial was planted with 110 entries having plot size of 4m x 0.75m x 2 with two replications. The data regarding various parameters are presented in the following table-18.

Table-18: Results of National Uniform Maize Yield Trial-01 Spring-2019

Hybrid	Vehari, Ali Akar	Arifwal, Jullunder	Dadu, Sindh	Manga Mandi, Monsento	Sher Garh, Petal Seed	Papattan, Pioneer	Yusaf-wala, MMRI	AARI, Faisala-bad	Pirsabak, CCRI	Khanewal, Data Agro	Okara, Syngeta	NARC	Mean
SS-7350	10992	4308	6514	10633	7721	10293	10637	7163	3258	7565	11920	6121	8094
SS-801	10506	5196	5980	9928	9516	12191	10479	7986	3764	8456	10788	6897	8474
K-2061	11512	5051	7367	8314	7500	9987	8668	9085	3235	7560	10823	6609	7976
WS-3570	11741	5497	6514	9115	12889	11661	10476	8955	2967	9673	9564	6195	8771
MAXIMA	12124	5271	6194	9103	12577	11620	9532	9229	3796	8770	9777	6220	8684
J-7330	11773	4444	6194	10113	8615	13044	9165	8519	3298	7275	10461	5776	8223
J-7440	10184	6188	7367	9298	9709	10010	8392	8089	2316	8001	9751	5209	7876
J-1908	10761	4481	5980	9847	12430	11755	8908	8270	3165	8588	11159	7493	8570
J-1431	10936	4162	7367	7839	11506	9311	10019	7829	3002	8127	9520	6297	7993
J-2020	10238	4202	6407	8863	7744	7664	8355	6406	3125	5915	7515	5444	6823
J-1671	9437	5501	7367	7995	8964	7978	10008	7755	2264	6946	8454	5947	7385
ZS-9091	9832	5359	6514	8967	8345	9278	8439	7542	2186	7154	9658	5606	7407
ZS-7799	10221	4545	6620	9593	9621	10000	8414	6610	4753	7589	10443	6193	7884
YG-777	10192	4472	7367	8712	9895	8845	10128	6827	2915	7762	10737	5098	7746
YG-676	10137	4404	6620	8641	9195	10466	9339	6516	4731	7729	8868	5716	7697
DIAMOND-2025	10115	3142	7367	8031	8442	9373	8349	5842	3267	6660	9086	5137	7068
DIAMOND-2026	8469	3187	6620	8382	9075	8066	8042	5570	2645	6580	11885	5845	7031
YHM-111A	12345	4820	7047	11022	13361	12315	8237	8110	3812	8526	10431	7381	8950
CS-5806	9146	4609	6727	8607	7771	8774	7281	6264	3328	7488	9508	7073	7215
CS-5808	9884	4137	6514	8397	7646	9384	7396	6284	2838	7471	8585	7207	7145
MASCP-8104	13311	4118	7154	10177	14295	11375	7452	7076	3942	7991	10790	6365	8671
GS-MALKA	11909	4369	6834	8457	11150	9361	8572	6761	2048	6887	11214	6668	7852
HP-252	12015	5219	6407	8838	10252	11287	7833	7732	4733	7045	10564	6526	8204
HP-4590	12180	3993	6834	9350	9541	10785	7377	7814	2571	8069	10606	6767	7991
FM-19B70	12150	4779	6514	7916	27870	11113	7416	9538	3348	8396	11316	6295	9721
FM-19B88	10808	4225	6834	9600	10335	8690	8512	7895	2446	5984	10240	5559	7594
T-1729	11756	5999	6407	9827	10571	11050	8145	7119	2811	7594	11728	7200	8351
F-10	11990	7229	6727	9157	12202	12157	8326	9767	3636	8192	12095	6999	9040
AG-2020	11553	5495	6471	8675	7202	9881	8708	6335	3453	7316	10624	5658	7614
YH-5427	10969	5889	7111	9089	11103	10200	11391	9116	2904	8141	11736	5604	8604
YH-5482	10522	7645	6311	8425	10499	11574	10579	9604	3333	8332	10709	6901	8703
YH-5554	10467	4276	7580	9264	10418	9062	9421	7559	3296	6458	9207	6000	7751
YH-5535	11190	5460	6471	8842	8764	9380	8733	8710	4314	4442	10973	8231	7959
YH-5404	10255	5838	7580	9054	9521	10009	10740	8943	3351	7885	11263	5942	8365
YH-5397	9680	3524	7367	8361	7594	8400	8270	7266	3079	7546	9315	6109	7209
FH-1166	11689	4502	7154	8884	8919	6708	8166	6915	3797	6940	9342	5197	7351
FH-1210	9943	4488	7580	7784	8030	5586	8618	8275	3134	6890	9136	6080	7129

E-777	11051	4600	6727	9500	9173	10073	8176	7005	3488	8071	10506	6315	7890
SWAN-9696	11190	5492	6300	8419	9248	7759	7658	7415	2839	6316	8177	6271	7257
PB-PROA-2017	8496	2692	7580	7892	4788	5169	7443	6902	2316	4267	8119	4827	5874
Kefrancos	11490	6616	7367	8808	11499	11610	8190	7575	2787	6765	9286	5701	8141
STAR-1	10225	6551	7367	10365	12824	10732	8784	7643	5214	8180	10078	7296	8772
STAR-2	10647	4689	7367	10718	12086	9830	8215	7295	3876	7831	10082	5988	8219
C-7075	8881	5157	7047	9036	10785	10285	8211	7714	2698	7993	8242	7538	7799
C-5357	11492	6913	7580	7292	11222	11807	8590	7038	3622	7746	8745	5563	8134
SC-1901	12150	5878	6727	9293	9027	8946	7595	6460	2406	8273	7455	5409	7468
MM-2296	10528	5370	7154	8280	13020	12047	7980	6203	2131	8394	8293	7768	8097
MM-2299	10930	5536	7367	9565	13137	11412	8955	7585	3220	7967	7189	7542	8367
HC-9091	9970	4013	7154	8036	10724	8193	7677	7994	2107	5694	7672	6814	7171
HC-2090	9918	5471	6940	9004	11191	11818	8359	7932	3123	6171	8348	6230	7875
HC-2050	11510	4938	6834	10403	11185	12553	9728	6829	2915	8040	8089	7521	8379
MS-7433	11347	5329	7367	10208	11956	11058	8832	6991	3424	6892	8315	6458	8181
MS-3203	10607	6141	7047	9811	10670	11318	7314	7878	2463	7539	8220	5148	7846
3280	8842	2830	6194	7523	9398	8758	7524	9059	2743	6286	8232	5341	6894
5101	9935	6151	6620	9949	10088	10101	9931	8837	4151	7023	7249	4971	7917
5190	10871	5929	7154	10717	11674	10626	9243	8350	4008	7933	7537	6525	8381
63P15	10124	5520	6727	8744	7692	10343	7704	7748	2962	6088	7493	6222	7281
SZ-676	9152	4012	6514	8591	10415	9002	7758	8277	3290	6690	7588	5629	7243
CKD-215	11002	6211	6514	9806	-14986	10624	11819	8797	3293	8088	7162	5386	6143
CKD-244	9780	4885	6727	8925	10652	9981	9509	6531	4076	6947	9204	7067	7857
CKD-245	9069	3999	7367	8058	8593	8717	8063	7171	3547	5766	8802	6706	7155
CKD-348	10919	7416	6471	9894	13686	12758	9434	7146	3669	9915	7624	6373	8775
AAS-9633	12676	7505	6151	8566	8362	10632	7567	7821	2791	7714	7850	9293	8077
AAS-9435	12148	4789	6514	8164	8780	9933	10347	8834	3876	8819	8609	7245	8171
AAS-1723	13139	5452	7111	9634	8518	11664	9117	8622	2190	8394	9113	8589	8462
SB-9608	11528	5458	6471	8811	11103	9823	8203	7090	3346	8236	8707	6494	7939
SB-8363	11495	4073	6151	9860	8149	11039	9267	7105	2445	10631	9665	6195	8006
TG-1801	9848	6705	7367	9065	11867	10550	8085	7816	4110	7261	8319	6618	8134
TG-1901	12329	6462	7154	8835	12674	10360	7881	6599	3485	8064	9820	6956	8385
TG-1902	11473	7283	7580	9527	13852	12833	9311	8600	2158	9178	10023	7737	9130
CM-1107	10818	5031	6727	8257	9977	10930	7512	7357	1920	7937	8253	5231	7496
CM-1177	10786	5644	6300	8690	11257	10964	7323	7003	3529	8406	9189	5925	7918
SS-7499	11157	6067	7580	9191	12055	11250	11072	9163	3528	7355	8756	6455	8636
SS-8399	11811	4376	7367	8774	11961	10536	11064	7194	3100	8992	8646	5564	8282
Nagina-3	7532	4620	7367	8537	7937	10606	7724	6456	3047	5752	6871	5732	6848
Nagina-4	7508	4180	7367	8921	9825	8905	7734	7430	3382	6404	7770	6790	7185
G-9	10383	4890	7047	9985	9063	10116	7993	7271	3822	6783	7877	5486	7560
DKC70-24	11479	5216	7580	10614	14617	13089	8139	9199	5681	7590	9959	6380	9129
DK6612	11576	5559	6727	10470	13319	11116	10111	8402	2543	8581	10473	6628	8792

DK6564	12172	4903	7154	9983	12654	11796	8172	10378	2574	8556	10444	6208	8749
HS-7894	11844	5807	7367	9131	11052	11783	8247	9677	5006	8405	10629	6805	8813
HS-7896	12001	6654	7154	9305	12333	12673	7331	9775	4326	9408	10334	8163	9121
C-3386	11701	6187	6940	9236	11789	11124	7413	6379	4797	7769	10358	5762	8288
P1443	11808	5328	6834	9492	13418	12014	9176	9195	5135	8186	11080	7442	9092
P1535	9606	5595	7367	9469	11626	12811	7976	9084	2809	7327	11867	6154	8474
P1570	11949	4870	7047	8544	12298	11101	9811	9334	3668	7599	11112	7553	8740
P1602	13082	4884	6194	10233	11902	11145	8055	9340	3896	8385	9849	7868	8736
P1690	11148	5705	6620	10156	11605	10818	10188	9233	4343	8007	10713	6652	8766
Surkhab	11576	5838	7154	9802	13313	12544	10693	9853	3705	8498	10791	8385	9346
Shahkar	11447	5175	6727	10607	13164	12163	8864	9204	3183	8394	8454	7004	8699
7838	11358	3040	6514	9179	11461	10721	10581	9892	3576	8443	9664	7312	8478
7868	11430	5015	6514	9282	11752	10510	10154	9927	3920	7370	10042	7962	8656
NK-8568	8687	4104	6727	9604	7918	9815	8902	8036	2909	6931	10747	6851	7603
S-7720	12016	6808	7367	9381	11474	11721	10069	9277	3188	6859	9320	7112	8716
NK-7372	10612	5012	6471	9288	10097	10066	9414	8344	2816	6564	10670	6215	7964
NK-7793	10035	4483	6151	10616	12148	9648	10502	7954	3741	7867	8537	6027	8142
NK-7113	11108	3775	6514	8066	10141	9158	9487	6352	3267	6726	10820	5320	7561
S-7750	9755	4896	7111	7720	8629	5985	10079	6037	2319	7192	9226	5096	7004
IS-8647	10197	4552	6471	8710	10443	10370	11009	10042	3456	7755	8162	6135	8108
IS-9771	12844	7000	6151	9599	13947	12514	10380	8386	3190	8342	8885	6545	8982
22W33	10669	5959	7367	8325	12171	9765	10210	7152	3785	7739	10145	7062	8362
FS171	10255	5868	7154	8586	10453	11036	8434	8316	3605	8682	10227	8007	8385
AH-9236	7525	2938	7580	9579	8617	8248	8816	7143	4883	7393	10321	5305	7362
27D65	9687	4291	6514	8475	7872	9124	9464	6856	2754	7636	9303	5946	7327
37D55	9378	4852	7154	9117	8905	8532	10401	8529	2886	7500	10246	5158	7721
SS -7007	8694	5665	7260	7976	8022	9461	8149	8062	2205	7705	10579	5557	7445
NARC-1	4712	1040	7580	6588	2636	3637	9215	5435	2327	2189	9550	5166	5006
YH-1898 (Check)	7933	6644	6407	8146	6782	9539	7627	8193	2670	8197	8538	5388	7172
CS-5800 (Check)	9951	3818	6407	9075	6045	8445	10043	5713	2315	6215	7191	5957	6765
P-1429 (Check)	8917	3484	6620	8755	10217	9269	10012	6693	2871	5964	7805	6548	7263
CV %	10.65	27.99	-	12.67	-	11.05	11.09	14.12	30.35	13.86	-	20.51	-
LSD	1831	-	-	-	1250.41	1820	2678	1784.1	-	-	-	-	-

It is evident from the results presented in the Table that Hybrid "FM-19-B-70" out yielded from all the hybrids by giving yield 9721 kg/ha at all the locations, followed by the Hybrid "Surkhab" and TG-1902 by giving yield 9346 kg/ha & 9130 kg/ha respectively. All the local candidates Hybrids of MMRI i.e YH-5482, YH-5427, YH-5404, YH-5535, YH-5554 and YH-5397 gave higher yield (8703 Kg/ha, 8604 Kg/ha, 8365 Kg/ha, 7959 Kg/ha, 7751 Kg/ha and 7209 Kg/ha) respectively over the local approved check hybrid YH-1898 (7172 Kg/ha).

7 Hybrid Evaluation at High Temperature under ADP project

7.1 Preliminary Maize Hybrid Yield Trial-03 under High Temperature Spring-2019

This trial was comprised of thirty (30) entries including standard hybrids of different maturity groups and ratios of temperate to tropical genetic material. The trial was

sown in RCBD with two replications on 22-3-2019. Plot size was kept 4m x 075 m x1. The data regarding various parameters are presented in the following table-19.

Table-19: Results of Preliminary Maize Hybrid Yield Trial-03 under High Temp.

Sr. No	Hybrid	Grain Yield kg/ha	Stand Count	50% Tass.	50% Silking	Plant Height	Ear Height	Ear Harvest
1	FH-1046	9085a	17	64	67	200	108	17
2	YH-5427	8501ab	14	65	68	183	95	18
3	YH-5482	7792abc	16	64	67	203	103	16
4	YH-5625	6607ab..d	14	64	67	215	98	15
5	NK8441	6575ab..d	13	64	67	205	98	17
6	YH-5612	6508ab..d	15	63	66	215	110	17
7	YH-5605	6440ab..d	13	62	65	220	123	17
8	YH-5615	6411ab..d	12	63	66	210	95	13
9	YH-5615	6195ab..d	14	63	66	223	133	17
10	YH-5621	6163ab..d	13	63	66	215	100	15
11	YH-5622	6078ab..d	14	64	67	210	103	16
12	YH-5626	5772bcd	13	64	67	203	110	17
13	YH-1898	5738bcd	12	64	67	205	120	16
14	YH-5610	5638bcd	13	64	67	198	95	15
15	YH-5613	5488bcd	13	63	66	210	108	13
16	YH-5611	5408bcd	14	64	67	215	115	15
17	YH-5620	5281cde	13	62	65	210	98	16
18	YH-5624	5278cde	15	64	67	210	110	18
19	YH-5607	5151cde	13	63	66	215	123	13
20	YH-5627	5098cde	13	64	67	210	100	13
21	P-1543	5055cde	13	62	65	218	93	17
22	YH-5617	4904cde	14	64	67	175	90	13
23	YH-5603	4846cde	12	64	67	203	113	13
24	YH-5614	4793cde	14	62	65	215	105	17
25	YH-5604	4606de	14	62	65	198	103	15
26	YH-5606	4403de	12	63	66	213	105	16
27	YH-5619	4254de	13	64	67	203	103	14
28	YH-5609	3857de	12	64	67	200	90	13
29	YH-5623	3643de	14	63	66	200	105	14
30	YH-5618	2175e	11	67	70	185	98	13
CV%		**27.22**	**14.79**	**1.33**	**1.27**	**8.37**	**9.94**	**20.55**
LSD (5%)		**NS**	**NS**	**1.72**	**1.72**	**NS**	**21.29**	**NS**

It is evident from Table-19 that all the hybrids expressed statistically significant differences for yield, days to tasseling, silking, plant height and ear height. FH-1046 produced maximum yield (9085 Kg/ha) followed by approved hybrid YH-5427 (8501 Kg/ha) and YH-5482 (7792 Kg/ha). These hybrids would be recommended as high yielder. Local maize hybrids i.e. YH-5605, YH-5620, P-1543, YH-5614 and YH-5604 showed minimum days to silking (65 days). For breeding short duration hybrids, these would prove good.YH-5615 showed maximum plant height (223 cm) while YH-5617 showed minimum plant height (175

cm). YH-5617 and YH-5609 showed minimum ear height (90 cm) followed by hybrid P-1543 (93 cm). Entries with lower ear height would be proved beneficial for breeding short duration hybrids. Non-significant results showed by stand count, grain yield, plant height and ear harvested.

7.2 Preliminary Maize Hybrid Yield Trial-04 under High Temperature Spring-2019

This trial was comprised of thirty (30) entries including standard hybrids of different maturity groups and ratios of temperate to tropical genetic material. The trial was sown in RCBD with two replications on 22-3-2019. Plot size was kept 4m x 075 m x1. The data regarding various parameters are presented in the following table-20.

Table-20: Results of Preliminary Maize Hybrid Yield Trial-04 under High Temp.

Sr. No	Hybrid	Grain Yield kg/ha	Stand Count	50% Tass.	50% Silking	Plant Height	Ear Height	Ear Harvest
1	E-06	8571a	13	65	68	225	133	17
2	YH-5630	8332ab	13	63	66	193	95	18
3	YH-5427	8280ab	13	64	67	195	108	16
4	FH-1046	7934abc	14	65	68	220	130	15
5	YH-5633	7913abc	12	65	68	208	98	17
6	YH-5482	6947ab..d	14	65	67	213	100	16
7	YH-5647	6778ab..d	12	65	68	213	93	15
8	YH-5642	6630ab..d	13	65	67	200	103	19
9	YH-5629	6564ab..d	17	64	67	210	93	19
10	YH-5639	6269ab..d	14	64	67	198	90	18
11	YH-5644	6186ab..d	14	65	68	198	85	17
12	YH-5645	6093ab..d	16	63	66	203	95	14
13	YH-5651	6078ab..d	13	65	67	200	98	16
14	YH-5637	6023ab..e	14	66	69	188	83	15
15	NK-8441	5806ab..e	13	64	66	203	88	15
16	YH-5640	5728ab..e	12	64	67	208	110	15
17	YH-5649	5709ab..e	10	65	68	203	90	13
18	YH-5648	5562ab..e	12	65	67	193	83	16
19	YH-5638	5497ab..e	11	65	68	188	83	10
20	YH-5641	5465ab..e	15	65	68	205	100	12
21	P-1543	5159bc..e	12	64	67	198	85	13
22	YH-5636	4993bc..e	14	64	67	195	83	12
23	YH-5646	4818cde	14	64	67	178	78	17
24	YH-5631	4808cde	11	64	67	190	100	14
25	YH-5650	4667cde	11	65	68	155	70	13
26	YH-5632	4649cde	13	65	68	213	93	11
27	YH-5643	4474de	12	64	67	180	85	11
28	YH-5634	4312de	12	65	68	188	88	15
29	YH-1898	4157de	13	66	68	205	125	16
30	YH-5635	2714e	10	64	67	178	80	11
CV%		**27.72**	**17.72**	**1.13**	**1.19**	**5.39**	**9.29**	**23.38**
LSD (5%)		**NS**	**NS**	**NS**	**NS**	**21.82**	**17.96**	**6.98**

It is evident from Table-20 that all the hybrids expressed statistically significant differences for yield, days to tasseling, silking, plant height and ear height. Entry-06 produced maximum yield (8571 kg/ha) followed by YH-5630 (8332 kg/ha), YH-5427 (8280 kg/ha) and FH-1046 (7934 kg/ha). These hybrids would be recommended as high yielder. Three maize hybrids namely YH-5630, YH-5645 and NK-8441 showed minimum days to 50% silking (66 days). For breeding short duration hybrids, these would prove good. Entry-06 of petal seeds showed maximum plant height (225 cm) while minimum plant height (155 cm) was given by YH-5650. YH-5650 also showed minimum ear height (70 cm) followed by hybrid YH-5646 (78 cm). Entries with lower ear height would be proved beneficial for breeding short duration hybrids. Non-significant results showed by stand count, grain yield, days to 50% tasseling and silking.

7.3 Preliminary Maize Hybrid Yield Trial-08 under High Temperature Spring-2019

This trial was comprised of ten (10) entries including standard hybrids of different maturity groups and ratios of temperate to tropical genetic material. The trial was sown in RCBD with two replications on 22-3-2019. Plot size was kept 4m x 0.75 m x1. The data regarding various parameters are presented in the following table-21.

Table-21: Results of Preliminary Maize Hybrid Yield Trial-08 under High Temp.

Sr. No	Hybrid	Grain Yield kg/ha	Stand Count	50% Tass.	50% Silking	Plant Height	Ear Height	Ear Harvest
1	YH-5739	6939a	12	63	66	185	100	19
2	Entry-01	6853a	12	64	67	193	93	16
3	YH-5734	6326ab	13	63	67	168	88	16
4	YH-5740	6293ab	13	64	67	190	108	15
5	Entry-02	5449ab	16	63	67	168	80	14
6	P-1543	5377ab	14	64	67	205	75	12
7	YH-1898	5012ab	10	64	67	200	108	18
8	NK-8441	4883ab	11	63	66	193	85	13
9	YH-5737	4640ab	15	64	67	188	88	13
10	YH-5736	4394b	12	64	67	190	95	13
CV%		**18.26**	**13.66**	**0.63**	**0.51**	**3.08**	**5.87**	**18.66**
LSD (5%)		**NS**	**NS**	**NS**	**NS**	**13.08**	**12.19**	**NS**

It is evident from Table-21 that all the hybrids expressed statistically significant differences for yield, days to tasseling, silking, plant height and ear height. YH-5739 produced maximum yield (6939 kg/ha) followed by hybrid Entry-01 (6853 kg/ha) and YH-5734 (6326 kg/ha). These hybrids would be recommended as high yielder. YH-5739 and NK-8441 showed minimum days to silking (66 days). For breeding short duration hybrids, these would prove good. Multinational maize hybrid P-1543 showed maximum plant height (205 cm) while YH-5734 and Entry-02 showed minimum plant height (168 cm). P-1543 showed minimum ear height (75 cm) followed by hybrid Entry-02 (80 cm). Entries with lower ear height would be proved beneficial for breeding short duration hybrids. Only plant height and cob height has significant differences.

8 Hybrid Evaluation under Combined Drought and Heat Stress

This trial was comprised of six (06) entries including standard hybrids of different maturity groups and ratios of temperate to tropical genetic material. The trial was sown in RCBD with three replications on 15-2-2019. Plot size was kept 4m x 075 m x4. At maturity, 2 lines per hybrid were harvested for data recording. The data regarding various parameters are presented in the following table-22.1.

Table-22.1: Results of Hybrid Yield Trial-01 under Drought (Drought-1)

Sr. No	Hybrid	Grain Yield kg/ha	Stand Count	50% Tass.	50% Silking	Plant Height	Ear Height
1	YH-5427	8058a	73	70	173	92	38
2	YH-5482	8016a	77	74	180	91	37
3	NK-8441	7773b	70	67	177	82	38
4	YH-5404	7416c	74	71	185	98	38
5	P-1543	6910d	71	68	186	72	38
6	YH-1898	6556e	75	72	170	95	38
CV%		**6.64**	**0.83**	**0.73**	**3.52**	**3.35**	**1.52**
LSD (5%)		**100.56**	**0.51**	**0.43**	**0.47**	18.0	**0.49**

It is evident from the results presented in the Table-22.1 that all the hybrids expressed statistically significant differences for yield, days to tasseling, silking, plant height and ear height under drought stress conditions. YH-5427 produced maximum yield (8058 kg/ha) followed by hybrid YH-5482 (8016 kg/ha) and NK-8441 (7773 kg/ha). These hybrids would be recommended as high yielder under drought stress conditions. NK-8441 showed minimum days to silking (67 days) followed by P-1543 (68 days). For breeding short duration hybrids, these would prove good. P-1543 showed maximum plant height (186 cm) while YH-1898 showed minimum plant height (170 cm). P-1543 showed minimum ear height (72 cm) followed by hybrid NK-8441 (82 cm). Entries with lower ear height would be proved beneficial for breeding short duration hybrids.

Table 8.2: Results of Hybrid Yield Trial-03 under Drought (Drought-3) Spring-2019

This trial was comprised of twelve (12) entries including Standard hybrids of different maturity groups and ratios of temperate to tropical genetic material. The trial was sown in RCBD with three replications on 4-3-2019. Plot size was kept 4m x 075 m x4. At maturity, 2 lines per hybrid were harvested for data recording. The data regarding various parameters are presented in the following table-22.2

Table-22.2: Results of Hybrid Yield Trial-01 under Drought (Drought-3)

Sr. No	Hybrid	Grain Yield kg/ha	Stand Count	50% Tass.	50% Silking	Plant Height	Ear Height	Ear Harvest
1	YH-5395	7605a	60	63	164	73	38.0	38.9
2	YH-5482	7529a	62	65	166	75	38.6	38.9
3	YH-5427	6732b	60	63	161	85	38.5	39.2
4	SB-9663	6624bc	61	65	176	91	38.2	38.7
5	YH-5404	6512c	61	64	171	93	39.0	39.3
6	JPL1908	6503c	59	62	181	79	38.7	39.4
7	YH-1898	6150d	63	66	159	94	38.2	38.9
8	FH-1046	6038d	62	65	178	101	38.3	38.9
9	NK-8441	6016d	59	63	178	80	38.5	38.9
10	FH-1166	5525e	62	65	202	114	38.4	39.2
11	P-1543	5507e	57	61	175	70	38.5	39.2
12	Y-26	2298f	59	63	114	52	38.5	38.8
CV%		**6.89**	**0.87**	**0.89**	**2.32**	**3.52**	**3.0**	**2.45**
LSD (5%)		**668.7**	**0.76**	**0.74**	**5.37**	**4.04**	**1.58**	**1.31**

It is evident from Table-22.2 that all the hybrids expressed statistically significant differences for yield, days to tasseling, silking, plant height and ear height. YH-5395 produced

maximum yield (7605 kg/ha) followed by hybrid YH-5482 (7529 kg/ha) and YH-5427 (6732 kg/ha). These hybrids would be recommended as high yielder. P-1543 showed minimum days to silking (61 days) followed by JPL-1908 (62 days).For breeding short duration hybrids, these would prove good.FH-1166 showed maximum plant height (202 cm) while inbred line Y-26 showed minimum plant height (114 cm). Y-26 inbred line showed minimum ear height (52 cm) followed by P-1543 (70 cm). Entries with lower ear height would be proved beneficial for breeding short duration hybrids.

On-Farm Yield Trial Spring-2019

Eight local and multinational hybrids were sown on seven different locations at farmer fields to evaluate their yield potential under ADP project in spring-2019.

Table-23.1: Yield Results of On-form Yield Trial Spring-2019

Locations/ Hybrids	Samundri	Mamu Kanjan	Arifwala	Harrapa	Sahiwal	Kameer	Khane wal	Yield kg/ha
D.O.S.	01-03-19	09-03-19	27-02-19	12-03-19	11-03-19	26-02-19	07-03-19	-
FH-1046	9745	9856	11010	10219	9715	9956	9700	10029
FH-1166	7415	6915	9012	8075	8512	7211	6889	7718
P-1543	9198	7812	11085	9515	8815	11112	8772	9472
YH-1898	9670	9627	8519	9700	9272	9687	9522	9428
JPL-1908	10391	9300	10112	11275	9615	10577	9492	10108
YH-5404	9550	8967	9092	9415	9712	9612	8581	9275
YH-5427	10410	10218	9662	11085	11217	10311	9800	10386
NK-8441	8800	9919	8841	9539	10012	9615	8846	9367

It is evident from above given Table-23.1 that hybrid YH-5427 produces highest grain yield (10386 kg/ha) followed by JPL-1908 (10108 kg/ha), FH-1046 (10029 kg/ha) and P-1543 (9472 kg/ha). The lowest yield was given by FH-1166 (7718 kg/ha), NK-8441 (9367 kg/ha) and YH-5404 (9272 kg/ha). So, these high yielder hybrids would be recommended to farmers for general cultivation.

AGRONOMIC TRIALS UNDER ADP:

Kharif 2018 (ADP Trials)

i) **Effect of Boron and Zinc Micronutrient Application on Grain Yield of Hybrid Seed Production of Maize Hybrid YH-1898.**

Trial was conducted during autumn 2018 following RCB design with four replications to determine effect of Boron and Zinc application on grain yield of YH-1898 seed production. Maize: inbred lines Y22 and Y27 were sown in 4:1 ratio; proper de tasseling of female was done. Data regarding stand count, plant height, cob height, fresh cob weight, and grain yield were recorded, compiled and analyzed statistically which are presented in table-24.

Table-24: Effect of Boron and Zinc Application on Grain Yield of YH-1898 Seed Production

Treatment Boron + Zinc kg ha^{-1}	Stand count/ plot	Plant Height (cm)	Cob Height (cm)	No. of cobs harvested /plot	Fresh cob wt. (kg/plot)	Actual cob wt. (kg/plot)	Grain Yield (kg/ha)
T4 = 7.5+7.5	82.75	132.00	69.75ab	83.00ab	7.14bc	4.84b	2670a
T3 = 0+7.5	84.50	132.00	7.001a	83.50ab	6.93bc	4.98b	2642a
T2 = 7.5+0	88.75	135.25	69.50ab	90.00ab	7.58bc	5.26b	2469ab

T5 = 11.25+0	84.25	132.00	66.60ab	82.75ab	6.73c	4.68b	2465ab
T6 = 0+11.25	94.00	132.00	65.25ab	95.75a	8.24ab	5.50b	2426ab
T7 = 11.25+11.25	83.25	123.50	62.00b	80.75ab	9.24a	6.38a	2217b
T1 = 0+0	78.75	128.25	61.75b	80.00b	4.50d	3.06c	2139b
CV%	11.77	12.85	12.19	15.31	12.36	8.85	9.80
LSD (5%)	NS	NS	4.165	7.43	0.620	0.41	354.02

The results presented in the above Table-24 show that different doses of boron and zinc significantly affected the cob height, number of harvested cobs, fresh cob weight, actual cob weight and grain yield. However, plant height and stand count were not affected by different concentrations of boron and zinc application. T_4 (7.5 + 7.5) produced significantly the highest grain yield (2670kg/ha) of maize hybrid seed YH-1898 which is statistically at par with T_3, T_4, T_5& T_6 by producing 2642, 2469, 2465 & 2426 kg/ha respectively.

ii) **Effect of Different Pre and Post Emergence Weedicides on Seed Production of Maize Hybrid YH1898.**

During Kharif 2018 trial was conducted following RCB design with four replications keeping plot size 5 × 5.25m. Data regarding the plant stand, plant height, cob height, harvested cobs, fresh cob weight, actual cob weight and grain yield were recorded and analyzed statistically, which are presented in table-25.

Table-25: Effect of Different Pre and Post Emergence Weedicides on Grain Yield of Maize Hybrid YH1898.

Treatment	**Stand count/ plot**	**Plant Height (cm)**	**Cob Height (cm)**	**No. of harvested cobs/plot**	**Fresh cob wt. (kg/plot)**	**Actual cob wt. (kg/plot)**	**Grain Yield (kg/ha)**
T1= Weedy check (control)	60abc	130 b	73.50 ab	62.75 ab	2.095 d	1.36 e	785 e
T2= Gangvi@500ml/ac (Post – em.)	52cd	132ab	72.25 ab	60.5 bc	3.60 bc	2.50cd	1549cd
T3= Primextra g old@ 800 ml/ac (post – em.)	70a	143a	78.25a	75.75a	4.63ab	3.55ab	2212ab
T4= Maxpro @500 g/ac (Post – em.)	33e	116c	61.50c	37.75d	2.0d	1.61de	1001de
T5= Dual gold @600 ml/ac (post – em.)	67ab	136ab	71.00abc	75.25a	5.56a	3.95a	2465a
T6= Flesto gold @1000 ml/ac (post – em.)	42de	126bc	65.50bc	47cd	2.57cd	2.0d	1248cde
T7= Atrazine @500ml/ac (Post – em.)	55bcd	132ab	71.50abc	63.75ab	3.625bc	2.64bc	1647bc
CV %	24.95	16.51	22.84	10.59	16.39	9.99	24.81
LSD (5%)	6.29	5.74	4.98	6.99	0.56	0.45	273.81

The results presented in the above Table-25 disclose that T_5 {Dual gold @600 ml/ac (post – emergence.)} Produced significantly the highest grain yield (2465.5kg/ha) of maize hybrid seed YH1898 which is statistically at par with T_3 {Primextra g old@ 800 ml/ac (post – emergence.)} by producing 2212.3 kg/ha. Whereas T_1 {weedy check control produced minimum yield of 785kg/ha. Greatest number of cobs was recorded from T5 &T3 while number of cobs from T1 control was lowest. Similarly plant height and cob height was also more in T5 &T3 while lowest in control. The stand count was statistically at par in T5, T3 and T1 control.

iii) **Effect of Plant Spacing on Grain Yield and Biomass Production of Promising Sorghum Line YSS-42**

In Kharif 2018, trial was laid out in RCB design with three replications keeping plot size 8 × 3 m to determine grain yield and biomass production of YSS-42 sorghum promising line as affected by different plant populations. Data regarding crop stand, plant height, number of fertile tillers per plant, number of leaves per plant, leaf area per plant, stem girth biomass production and grain yield were recorded, analyzed and presented in table-26

Table-26: Result of Effect of Plant Spacing on Grain Yield and Biomass Production of promising Sorghum Line (YSS-42)

Treatment	Stand count/ plot	Plant height (cm)	Av. leaves/ plant	Stem girth (mm)	Leaf area (mm)	Brix (%)	No. of Tillers/ plant	Biomass t/ha	Grain yield kg/ha
T1= 8′ PXP	71 a	183 a	12 a	17.6a	528a	4.36	69.7 a	7.55 b	1125a
T2= 7′ PXP	67.33 a	182 a	11.55a	20,04a	514a	8.80	66.7a	12.49a	1208 a
T3= 6′ PXP	69.67 a	184 a	11.7 a	21.25a	516a	6.63	69.0a	11.87ab	981.3b
T4 = 9′ PXP	46.33 b	174a	12.4 a	20.99a	486 a	7.40	44.3 b	9.86ab	1093ab
T5 =10′ PXP	39.0 c	186 a	12.5 a	21.52a	491a	5.73	38.3b	8.05ab	845c
CV%	5.83	4.36	1.09	13.86	7.17	10.5	6.5	25.76	6.5
LSD (5%)	6.4756	NS	NS	NS	NS	NS	7.05	4.834	128.5

The results depicted in Table-26 reveal that different plant spacing's of sorghum promising line under study significantly affected stand count, No. of tillers/plant biomass ton per hectare and grain yield however plant height, No. of leaves per plant; Stem girth and brix percentage remained non-significant. The maximum grain yield 1208 kg/ha achieved when crop sown 7′ apart plant to plant which was statistically at par with T1 8′ and T4 i.e. 9′ PXP. The grain yield remained lowest 845 kg/ha in 10 inches apart sown crop and 981 kg/ha where crop was sown 6 inches apart plant to plant. The overall biomass was higher in closely sown crop compared with widely sown crop.

SPRING 2019

i. **Effect of Sowing Dates on Grain Yield Of Maize Hybrid YH1898 Seed Production**

Seven sowing dates starting from 20th January with an interval of ten days upto21th March 2019 were sown using parent inbred lines Y-22 and Y-27 with 4:1 ratio as female and male. Plot size was 6X10 $m^2$with four replications using RCB design .Data on stand count, flowering, No. of cobs ,fresh cob weight , actual cob weight and grain yield will be recorded and presented in the below table- 27.

Table-27: Result of Effect of Sowing Dates on Grain Yield of Hybrid YH-1898 Seed Production

Treatment	Stand count per plot	Plant Height (cm)	Cob Height (cm)	No. of cobs/plot harvested	Fresh cob weight. (kg/plot)	Grain Yield (kg/ha)
D1= 20th January sowing	116 a	131 a	71.50 c	121.75 ab	13.7	2088 cd
D2= 30th January sowing	118.5 a	134.75 a	72.75abc	121.75 ab	13.45	2765 a
D3= 10th February sowing	112 a	138.25 a	73 abc	126.25 a	13.66	2548 ab
D4 = 20th February sowing	114 a	135.25 a	72 bc	116.5 ab	15.58	2380 bc
D5= 1st March sowing	109.5	134.5 a	79.25 ab	120.25 ab	14.54	2150 cd
D6= 10th March sowing	112.5 a	137 a	75.75 abc	127.75 a	15.8	2041 d
D7= 20ththt March sowing	101.75 b	132.5 a	79.75 a	102.24 b	12.64	1914 d

CV%	10.25	5.47	16.91	12.86	9.6	12.86
LSD (5%)	17.062	10.95	7.26	22.63	NS	323.75

The data presented in Table-27 revealed that sowing dates did not affected no. of plants per plot, plant height and fresh cob weight but significantly affected grain yield, maximum grain yield of 2765 kg per hectare was achieved when crop was planted on 30th January followed by 2548 kg per hectare when sown on 10th February. The minimum grain yield of 1914 was achieved in the month of March sowing perhaps due to high temperature prevailing at pollination.

ii. **Effect of Micronutrient Boron and Zinc Application on Grain Yield of Maize Hybrid YH-5427 Seed Production.**

The trial was laid out with four replications using RCB design having plot size 6X8 m^2. Trial was sown on 15-02-2019. Parent inbred lines Y222 and Y27 were sown in 4:1 ratio. Different levels of boron and zinc each alone and combination of both were compared with control zero application. Data on yield and its different components will be recorded, compiled and analyzed statistically and presented in the below table-28.

Table-28: Result of Effect of Micronutrient Boron and Zinc Application on Grain Yield of Maize Hybrid YH-5427 Seed Production

Treatment	**Stand count/plot**	**Plant Height (cm)**	**Cob Height (cm)**	**No. of Cobs/plot Harvested**	**Fresh cob weight. (kg/plot)**	**Grain Yield (Kg/ha)**
T1= B+ Zn (0+0) kg/ha	157.5ab	107 b	63,5 b	163.25 a	11 a	2188,5 b
T2= B+ Zn (0+7.5) kg/ha	162 a	115a	70,5 a.	174.00 a	11.8 a	2469 ab
T3= B+ Zn (7.5+0) kg/ha	160 ab	116a	66 ab	160.00 a	12.35 a	2642 a
T4= B+ Zn (7.5+7.5) kg/ha	155.5 ab	115.5 a	69.5 a	168.00 a	12,31 a	2669 a
T5= B+ Zn (0+11,25) kg/ha	153 ab	111 ab	66.25 ab	169,50 a	12,85 a	2465 ab
T6= B+ Zn (11.25+0) kg/ha	158 ab	109 ab	62.25 b	168.50 a	11.69 a	2426 ab
T7= B+ Zn (11.25+11.25 kg/ha	144 b	110 ab	66.25 ab	163,24 a	12.03 a	2217 b
CV%	**7.12**	**4.29**	**5.33**	**6.79**	**15.41**	**9.8**
LSD (5%)	**16.45**	**7.14**	**5.24**	**NS**	**NS**	**354.32**

The data presented in above mentioned Table-28 revealed that boron and zinc application enhanced grain yield maximum grain yield of 2669 kg per hectare was achieved where boron + zinc @ 7.5 kg/ha whereas minimum grain yield noticed where no such practice adopted. Hence it is concluded that micronutrient application enhances grain yield of hybrid seed production.

iii. **Effect of Plant Spacing on Grain Yield of Maize Hybrid YH-5427 Seed Production.**

The experiment was laid out in RCBD fashion having four replications with plot size 3X5 m^2,'seven plant spacing with the help of dibbler were maintained starting from $_{5^{\prime\prime}\ PXP\ to 11^{\prime\prime}\ PXP}$ parent inbred lines Y222 and Y27 were sown in 4:1 as female and male. The data recorded is presented below in table-29.

Table-29: Result of Effect of Plant Spacing on Grain Yield of Maize Hybrid YH-5427 Seed Production

Treatment	Stand count / plot	Plant Height (cm)	Cob Height (cm)	No. of harvested cobs/plot	Fresh cob weight. (kg/plot)	Grain Yield (kg/ha)
5 inches apart PxP	163a	122a	73a	146	10.8a	2484a
6 inches apart PxP	142ab	121ab	72a	142	9.6ab	2064ab
7 inches apart PxP	133bc	116abc	66c	134	10ab	2070ab
8 inches apart PxP	122bcd	117abc	68bc	126	9,9ab	2096ab
9 inches apart PxP	118cd	118ab	65c	129	9.89ab	1843bc
10 inches apart PxP	116cd	115bc	68bc	138	9.89ab	1967bc
11 inches apart PxP	119d	111c	70ab	125	9.23ab	1533c
CV%	**9.24**	**3.3**	**3.12**	**13.13**	**9.51**	**13**
LSD (5%)	**21.21**	**6.93**	**3.83**	**NS**	**1.652**	**464,61**

The data presented in above Table -29 illustrate that 5 inch plant spacing gave maximum grain yield i. e. 2484 kg/ha due to high plant stand, cob harvest and fresh cob weight followed by 6 inches apart spacing. Minimum grain yield (1533 kg/ha) was obtained by the 11 inches plant spacing. Almost a continuous drop in values of grain yield, fresh cob weight, cobs harvested and stand count was observed with the increase in plant spacing.

HYBRID MAIZE (WHITE)

1. Hybrid Maize (White)

1.1.1 Derivation of Inbred Families

One hundred & twenty-three (123) derivative families of different generations were sown in ear to row fashion during kharif, 2018 for derivation of inbred lines through hand pollination. At maturity, selfed plants were harvested in each family, separately, and seed of 164 families was collected / added for further derivation and selection cycles.

During Spring-2019, 164 derivative families were sown in ear to row fashion for derivation of inbred lines. Undesirable lines and plants were rejected at various stages and only desirable lines and plants were self-pollinated manually. At maturity, selfed plants were harvested in each family, separately, and seed of 141 derivative families was collected / added for further derivation and selection cycles.

1.2.1. Maintenance of Inbred Lines

During kharif 2018, 68 inbred lines were sown in ear to row fashion for maintenance through hand-pollination. Fifty One (51) inbred lines were finally selected and maintained while 5, newly derived inbred lines, were also added in maintenance which resulted in 56 inbred lines. During spring 2019, 56 inbred lines were sown for maintenance and undesirable lines and plants were rejected at various stages and only desirable lines and plants were self-pollinated manually. At maturity, selfed plants were harvested in each family, separately, and seed of 49 inbred lines was collected / added for further derivation and selection cycles.

OPV MAIZE:
MAIZE (YELLOW)

KHARIF 2018

1. Maintenance of Open Pollinated Variety YY-15 (Sahiwal Gold)

Seed from previous year's crop was sown in an isolation of 2 kanal during Kharif 2018. Detasselling was made with the ratio of 1:4. The weak plants were eliminated and remaining crop was harvested.

Improvement and Maintenance of Yusafwala Pool-50

Seed received from Spring-2017 was mixed and sown in isolation of 1 kanal during Kharif 2018. Open pollination was allowed and selection was made on the basis of plant height, stem girth, light tassel, cob length and lodging resistance. 200 cobs were selected. 100 cobs were kept for sowing in next season after table selection.

SPRING 2019:

1. Seed Production of Open Pollinated Variety Sahiwal Gold (YY-15)

Seed from previous year crop was sown in an isolation of 2kanal during spring 2019. Detasselling was made with the ratio of 1:4. The weak plants were eliminated and remaining crop was harvested.

2. Improvement and Maintenance of Yusafwala Pool-50

Seed received from Kharif 2018 was mixed and sown in isolation of 2kanal during spring 2019. One hundred and fifty (150) best plants were selected on the basis of plant height, stem girth, light tassel, cob length and lodging resistance and selfed. Out of 150 plants 55 best plants were further selected on the basis of above-mentioned characteristics. Cobs received from these plants were kept for sowing in next season-n ear to row method.

2. Adaptability / National Uniform Maize Varietal Yield Trial, Spring 2019

The trial comprising of 10 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/physiological stages analyzed statistically and presented in table-30.

Table-30: Means of Grain Yield (kg/ha) of Maize OPV Entries Evaluated in National Uniform Yield Trials

OPVs	MMRI	AARI	Vehari, Ali Akbar	Dadu Sindh	Pirsabak, CCRI	Shergarh, Petal Seed	Islamabad	Mean
YW-786	6376.5	6696	7534	4971	2394	5269	3472	5540
Pearl (Check)	5048.9	5188	7577	5596	3221	6292	4055	5487
CZP-132001	5928.6	5928	7181	5056	2439	5995	4692	5421
YSC-15	2986	3305	5051	4892	3069	5926	15261	4205
Local Swat sweet corn (Check)	3302.4	3559	6154	5476	2265	4176	4193	4155
YPC-14	2964.4	3336	5316	5959	2308	4003	3603	3981

CZP-132001	1192.2	1313	8010	5070	3209	3369	3912	3694
TP-1221	1054	1275	8382	5781	2636	2396	4010	3587
Local Swat Popcorn (Check)	1594.6	1933	3741	5877	2194	4020	4251	3227
TP-1217	632	877	3191	5106	3080	3774	3984	2776
CV%	32.78	23.14	4.69	6.99	18	81.28	_	_

The results presented in Table-30 revealed that the entry YW-786 stood first and entry Pearl (Check) was second by giving grain yield 5540 and 5487 kg/ha respectively followed by CZP-132001 which showed 5421 kg/ha.

POPCORN AND SWEET CORN:

1.1. Micro Plot Maize Yield Trial (Pop & Sweet Corn) Kharif, 2018

The trial comprising of five entries (Pop & Sweet Corn) was sown on 02-08-2018 in RCB design with three replications. Data regarding different traits were recorded at different growth stages / physiological maturity and analyzed statistically. Results are summarized on mean basis below in table-31.

Table-31: Results of Micro Plot Maize Yield Trial (Pop & Sweet Corn)

Rank No.	Entries	Grain Yield (Kg/ha)	Days to 50 % silk	Plant ht. (cm)	Cob ht. (cm)
1	YSC-15	3997a	51	210	95
2	Sweet Corn (Swat, check)	3758a	56	228	120
3	YPC-14	3235ab	55	225	110
4	White Popcorn	2478b	58	205	109
5	Pop Corn (Swat, check)	2104b	57	215	112
CV %		17.2	5.9	8.0	8.3
LSD (0.05)		1204	3.5	NS	NS

The Results presented in Table-31 showed that maximum grain yield (3997 kg/ha) was produced by promising line YSC-15 followed by Sweet Corn (Swat, check) with grain yield of 3758 Kg/ha while minimum grain yield of 2104 kg/ha was recorded for Pop Corn (Swat, check). Sweet Corn (Swat) attained the maximum plant height of 228 cm whereas White Popcorn attained the minimum plant height of 205 cm. YSC-15 showed low level bearing by attaining 95 cm cob height while YPC-14 showed the highest bearing of 120 cm.

1.2. Micro Plot Maize Yield Trial (Pop & Sweet Corn) Spring, 2019

The trial comprising of four Pop Corn entries was sown on **19-02-2019** 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 in table 32.

Table-32: Results of Micro Plot Maize Yield Trial (Pop & Sweet Corn)

Rank No.	Entries	Grain yield (kg/ha)	Days to 50 % silk	Plant height (cm)	Cob height (cm)
1	YSC-15	4346a	60	205	100
2	YPC-14	4325ab	65	215	115
3	POPOCORN (Swat, check)	3205b	67	218	120
4	SWEET CORN (Swat, check)	2869b	63	222	110
	CV %	10.5	3.77	2.64	7.96
	LSD (0.05)	817	2	12	3

The Results presented in Table-32 revealed that promising line YSC-15 was at top with grain yield of 4346 kg/ha followed by YPC-14 with grain yield of 4325kg/ha while Sweet Corn (Swat, check) gave the minimum grain yield of 2869kg/ha. Sweet Corn (Swat, check) got the maximum plant height of 222 cm whereas YSC-15 attained the minimum plant height of 205cm. YSC-15 showed low level bearing by attaining 100cm cob height while Popcorn (Swat) showed the highest bearing of 120cm.

WHITE MAIZE OPVS

1.1. Micro Plot Maize Yield Trial (OPVs) Kharif 2018

The trial comprising of seven entries was sown on 08-08-2018 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 table-33 on mean basis.

Table-33: Results of Micro Plot Maize Yield Trial (OPVs) Kharif, 2018

Rank No.	Entries	Grain Yield (Kg/ha)	Days to 50 % silk	Plant ht. (cm)	Cob ht. (cm)
1	Pearl	8490a	53	215	112
2	YW-2055	8454a	52	227	105
3	YY-15	7540b	57	235	115
4	CZP-132001	7514b	51	208	107
5	MMRI Yellow	7224b	54	210	126
6	YW-786	7105b	53	216	115
7	Agaiti-85	2271c	46	146	63
CV %		**11.2**	**1.7**	**7.0**	**10.4**
LSD (0.05)		**568**	**2.1**	**40**	**27.8**

The results depicted in Table-33 revealed that Pearl stood 1st position by giving grain yield of 8490 kg/ha followed by YW-2055 with grain yield of 8454 kg/ha, both are statistically at par while Agaiti-85 gave the minimum grain yield of 2271 kg/ha. YY-15 attained the maximum plant height of 235 cm whereas Agaiti-85 attained the minimum plant height of 146 cm. Agaiti-85 showed low level bearing with 63 cm cob height while YW-2055 showed the highest bearing of 105 cm.

1.2. Micro Plot Maize Yield Trial (OPVs) Spring, 2019

The trial comprising of eight entries was sown on 16-02-2018 in RCB design with three repeats. Data regarding different traits were recorded at different growth stages/ physiological maturity and analyzed statistically. Results are summarized on mean basis below in table-34.

Table-34: Results of Micro Plot Maize Yield Trial (OPVs)

Rank No.	Entries	Grain Yield (Kg/ha)	Days to 50 % silk	Plant ht. (cm)	Cob ht. (cm)
1	MMRI Yellow	5252a	60	214	123
2	CZP-132001	4950ab	58	207	107
3	YW-786	4896bc	59	222	116
4	Pearl	4357c	58	217	115
5	YW-2055	4152c	52	227	105
6	YY-15	4142c	61	232	118
7	YW-787	2450d	65	206	104
CV%		14.8	1.85	7.5	9.85
LSD(5%)		280.5	2.9	44.85	31.05

The results depicted in Table 34 revealed that promising line MMRI Yellow ranked first with grain yield of 5252 kg/ha and CZP-132001was at 2nd position (4950 kg/ha), both are statistically at par whereas minimum grain yield (2450kg/ha) was given by YW-787. YY-15 attained the maximum plant height of 232cm whereas YW-787 attained the minimum plant height of 206 cm. YW-787 showed low level bearing with 104cm cob height while YY-15 showed the highest bearing of 118cm.

PARB PROJECTS:

PARB PROJECT 900:

Kharif 2018:

The inducer lines of maize were imported from Mexico and planted in field for acclimatization in the second season on 02.08.2018 along with 25 F_1,50F_2 and three OPVs. The date of silking and tasseling were recorded for checking synchronization for the purpose of pollination of inducer lines with the source material. The data are presented as under in table-35.

Table-35: Data of Inducer lines and Source Population

Inducer Lines planting on 02-08-2018 (Imported from Mexico) Harvesting on 06-12-2018						
Plot No.	**Pedigree**	**Count Stand**	**Days to Silking**	**Days to Tasseling**	**Plant Ht.(cms)**	**Ear ht.(cms)**
1	CIM2GTAIL-P1	60	52	56	58	32
2	CIM2GTAIL-P2	100	56	60	60	36
Hybrids (PARB PROJECT 900) sown on 02-08-18 Harvesting on 06-12-2018						
Plot No.	**Pedigree**	**Count Stand**	**Days to Silking**	**Days to tasseling**	**Plant Ht.(cms)**	**Ear ht.(cms)**

1	YH4357	32	66	68	188	90
2	YH5553	47	65	68	198	110
3	YH5415	38	64	67	220	135
4	CS5808	34	65	64	210	100
5	YH5532	37	65	67	210	120
6	YH5482	44	66	65	185	85
7	YH5404	39	65	63	190	85
8	YH5566	45	65	62	175	85
9	NK8711	38	60	62	200	100
10	YH5423	42	65	67	223	105
11	YH5564	49	61	63	200	125
12	FH1098	50	63	64	177	103
13	YH5404	48	60	62	175	85
14	YH5567	45	61	63	170	90
15	YH5550	48	61	63	225	120
16	FH949	45	54	56	210	115
17	YH5547	46	66	68	185	85
18	DK9108	45	66	68	190	98
19	YH5555	39	65	67	160	85
20	YH5427	36	66	68	185	105
21	SB9617	45	61	63	195	95
22	FH743	44	61	63	235	150
23	FH1046	46	61	64	240	140
24	SB9663	42	54	57	220	115
25	YS1898	40	60	62	105	105
OPVs sowing on 02-08-18						
Plot No.	**pedigree**	**Count Stand**	**Days to Silking**	**Days to Tessling**	**Plant Ht.(cms)**	**Ear ht.(cms)**
1	MMRI YEL-LOW	70	63	67	250	110
2	YY 15	80	64	67	240	115
3	CZP13001	50	54	57	240	110
F2 (source population) sowing on 02-08-2018 Harvesting on 06-12-2018						
Plot No.	pedigree	Count Stand	Days to Silking	Days to tasseling	Plant Ht.(cms)	Ear ht.(cms)
1	YH5397	40	65	67	192	94
2	YH5482	40	64	67	202	114
3	YH5415	40	63	66	224	139
4	YH5534	40	64	63	214	104
5	YH5567	40	64	66	214	124
6	YH5398	40	65	64	189	89
7	YH5423	40	64	62	194	89
8	YH5390	40	64	61	179	89
9	YH5556	40	59	61	204	104
10	YH5555	40	64	66	227	109
11	YH5421	40	60	62	204	129
12	YH5558	40	62	63	181	107
13	YH5490	40	59	61	179	89

14	YH5554	40	60	62	174	94
15	YH5539	40	60	62	229	124
16	YH5553	40	53	55	214	119
17	YH5545	40	65	67	189	89
18	YH5411	40	65	67	194	102
19	YH5421-1	40	64	66	164	89
20	YH5394	40	65	67	189	109
21	YH5535	40	60	62	199	99
22	YH5550	40	60	62	239	154
23	YH5537	40	60	63	244	144
24	YH5562	40	53	56	224	119
25	YH5564	40	59	61	109	109
26	YH5565	40	63	65	180	90
27	YH5563	40	62	65	175	95
28	YH5543	40	61	64	230	125
29	YH5521	40	62	61	215	120
30	YH5491	40	62	64	190	90
31-32	YH5547	80	63	62	195	103
33-34	YH5541	80	62	60	165	90
35-36	YH5521	80	62	59	190	110
37-38	YH5552	80	57	59	200	100
39-40	YH5490	80	62	64	240	155
41-42	FH949	80	58	60	245	145
43-44	FH1046	80	60	61	225	120
45-46	FH793	80	57	59	110	110
47-48	YH1898	80	58	60	190	90
49-50	DK9108	80	58	60	195	103

SPRING 2019:

Two inducer lines, 25 hybrids (F_1) and 1250 F_2 and 3 OPVs were sown on 3rd January 2019 in tunnels. Inducer 1 was sown in Tunnel 1 with 25 F_1 (50 seeds each) and OPVs (200 seeds each) and Inducer 2 was sown in tunnel 2 with F_2 (50 seeds each) and OPVs (200 seeds each). The tunnel was covered with polythene sheets for creating warmness in the tunnel which is necessary for germination of maize seed. The polythene sheets were removed in last of February after normalization of outer Temperature. The growth of inducer 1 was slow as compared to inducer 2. Therefore inducer 2 was sown on two sowing dates (with remaining germplasm and after one week of sowing of remaining germplasm) while inducer 1 was sown in three sets (1st with remaining germplasm, 2nd after one week and 3rd after two weeks of sowing of remaining germplasm). De-tasseling was made in all germplasm expect inducer lines. And open germination was allowed within pollen of inducers and silks of F_1, F_2 and OPVs. The crossed germplasm and inducer lines were harvested on 11-06-2019. The haploids, diploids and contaminated seeds were sort out.

Table-36: Detail of Haploids Produced in Spring 2019

		F_1	F_2	OPVs	Total
Diploids		5798	11040	583	17421
Haploids		218	513	28	759
Total		**6016**	**11553**	**611**	**18180**
Induction%		**3.62**	**4.40**	**4.58**	**4.20**

PARB PROJECT NO. 904.

Twenty five (25) inbred lines were selected and sown in field during kharif 2018 to increase their seed in maintenance block and utilize them for constitution of single cross hybrids in next season. All the recommended agronomic practices (hoeing, weeding and irrigation and fertilizer application) were performed accordingly. Hand pollination was carried out carefully at the time of flowering and 80-120 g seed for each inbred line was harvested at the end.

In next season, Twelve (12) inbred lines were selected and sown in crossing block for constitution of single cross hybrids in square No. 24. Hand pollination was performed at the time of anthesis and silking. More than 100 crosses were constituted during this season and almost 20-30 g seed of each cross was harvested.

SORGHUM

KHARIF 2018:

1. MAINTENANCE OF BREEDING MATERIAL:

i. Gene Pool

One hundred and twenty two (122) pure lines from Yusafwala and 26 pure lines from ICRISAT, India were planted for maintenance 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. Forty eight entries from Yusafwala and 16 entries from ICRISAT, India were rejected due to disease susceptibility. All the remaining selected/covered plants were harvested for further maintenance.

ii. Cytoplasmic Male Sterile (A) Lines.

Forty four cytoplasmic male sterile (A) lines and their counterpart (B) lines (14 from Yusafwala and 31 from ICRISAT, India) were planted for maintenance in strips having 5 m x 2.25 m plot size. 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 except one line from ICRISAT, India which is rejected due to disease susceptibility.

iii. Fertility Restorer Lines

Forty four (44) restorer (R) lines (26 lines form Yusafwala and 18 from ICRISAT, India) 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. 13 lines from ICRISAT, India did not germinate.

2. BREEDING:

i. Hybrids Constitution: (CMS × Restorers)

Thirty Three (33) (CMS x R) crosses were constituted (23 in isolation and 10 by hand) during Kharif 2018 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 restorers and hand pollination of CMS lines were done. While in two isolation blocks CMS & R lines with different R line each i.e., R-25 and YSS-98 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. A separate isolation was planted for YSH-95 seed production and 12.5 kg seed of YSH-95 was produced.

ii. Sorghum × Sudan Grass Crosses

12 CMS (A) lines were planted with Sudan grass for sorghum × Sudan grass in isolation and eleven crosses (One by hand) were constituted for planting in spring 2018.

iii. Filial Generations:

Five F_4 families were selected from 10 F_3 in Kharif 2018. Three F_5 families were selected from eight F_4; phenotypically superior plants from families were selected. Eight F_6 generations were planted and six lines were selected for varietal trial based on their plant aspect, head length and brix value. Fifteen (15) F_2 families were selected form hybrid trials based on their head length and brix value.

iv. Mutated Lines

Fifty eight (58) Mutated selected lines from Kharif 2017 were planted and 11 entries were selected based on their head length and brix value for sowing in Kharif 2019.

v. Head to Row Families:

Head to row selection blocks were sown for maintenance, purification and improvement of approved varieties. True to type plants were selected from uniform and disease free rows. The number of heads selected from each variety is given in Table-37

Table-37: Number of Heads of Each Variety

Sr. No.	Variety	No. of Selected Heads	Status
1	YSS-98	80	Approved
2	YS-16	100	Approved

3. EVALUATION:

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

i. Sorghum Hybrid Yield Trial 1, Kharif 2018.

Eighteen (12) (CMS x R) hybrids were tested including two checks YS-16 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 and other important plant characteristics were recorded and presented below in table-38.

Table-38: Results of Sorghum Hybrid Yield Trial 1

Sr. No.	Entry	Plant Stand	Brix Value	Grain Yield (kg/ha)	Stalk Yield (kg/ha)	Flag Leaf Area (cm^2)	Days to 50% Anth.	Plant ht. (cm.)
1	YSH-130	24	3.6	3878a	22681	724.3	61	173
2	YSH-134	24	2.5	3520ab	29825	710.3	73	190
3	YSH-138	25	7.1	3507ab	26190	545.1	59	180
4	YSH-132	24	11.6	3443ab	35570	669.3	71	213
5	YSH-95©	24	11.1	3417ab	38563	222.0	73	214
6	YSH-131	24	2.6	3345ab	22270	561.7	67	173
7	YSH-137	24	2.7	3170ab	20963	609.4	66	175
8	YSH-129	24	15.0	3121bc	30447	657.2	67	190
9	YSH-128	25	12.5	2727bc	23323	716.6	49	187
10	YSH-136	23	4.4	2692bc	25489	681.5	71	187
11	Lasani ©	24	14.3	2242c	31027	572.8	71	198
12	YSH-154	24	13.4	1320d	42101	735.0	72	227
Range		23-25	2.5-15.0	1320-3878	20963-42101	222-735	49-73	173-227
CV%		**3.12**	**13.55**	**17.31**	**14.36**	**21.74**	**15.99**	**4.24**
LSD (5%)		**NS**	**1.9**	**889**	**7061**	**NS**	**NS**	**14**

It is evident from the above Table-38 that YSH-130 gave significantly higher yields (3878 kg/ha) followed by YSH-134, 3520 kg/ha in comparison to check Lasani© yield which was 2242 kg/ha at MMRI while YSH-134, YSH-138, YSH-132, YSH-95©, YSH-131 and YSH-137 were also at par. Maximum stalk yield of 42101 kg/ha was produced by YSH-154 followed by YSH-95 (38563 Kg/ha). Plant height ranged from 173 to 227 cm and days to 50% anthesis from 49 to 73.

ii. Sorghum Hybrid Yield Trial 2, Kharif 2018.

Fourteen (14) (CMS x R) hybrids were tested including one check 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 and other important plant characteristics were recorded and presented below in Table-39.

Table-39: Results of Sorghum Hybrid Yield Trial 2.

Sr. No.	Entry	Plant Stand	Brix Value	Grain Yield (kg/ha)	Stalk Yield (kg/ha)	Flag Leaf Area (cm^2)	Days to 50% Anth.	Plant ht. (cm.)
1	YSH-151	28	7.7	5068a	13334	583.9	68	148
2	YSH-143	28	4.6	4173ab	17500	607.7	68	160
3	YSH-147	27	6.6	3919ab	18846	763.3	74	188
4	YSH-138	26	17.3	3417bc	27083	669.6	61	175
5	YSH-156	27	5.6	3120bcd	16667	796.0	72	145
6	YSH-135	28	17.8	2715cde	16667	480.6	76	250
7	YSH-155	27	18.9	2582cde	28334	669.6	78	215
8	YSH-133	27	3.7	2422cde	21667	639.4	68	208
9	YSH-146	27	3.6	2340cde	8334	662.0	70	203
10	YSH-141	28	10.8	2159de	30000	774.7	63	193
11	YSH-150	27	11.5	2054de	12084	726.5	76	175
12	Lasani©	26	16.8	1970de	18334	626.4	77	190
13	YSH-139	28	8.5	1877e	20000	488.2	68	205
14	YSH-153	28	8.7	1632e	24167	611.6	74	203

Range	26-28	3.6-18.9	1632-5068	8334-30000	480.6-796.0	61-77	145.0-250.0
CV%	03.25	13.35	19.01	12.06	19.33	2.53	8.38
LSD (5%)	NS				NS		30.67

It is evident from the above Table-39 that YSH-151 gave significantly higher yields (5068 kg/ha) followed by YSH-143 yield 4173 kg/ha in comparison to check Lasani which yielded 1970 kg/ha. Maximum stalk yield of 30000 kg/ha was produced by YSH-141 followed by YSH-155 (28334 kg/ha). Plant height ranged from 145 to 250 cm and days to 50% anthesis from 61 to 77.

iii. Sorghum Hybrid Yield Trial 3, Kharif 2018.

Fourteen (12) (CMS x R) hybrids were tested including three checks Lasani (Private company hybrid), YS-16 and 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 and other important plant characteristics were recorded and presented below in table-40.

Table-40: Results of Sorghum Hybrid Yield Trial 3.

Sr. No.	Entry	Plant Stand	Brix Value	Grain Yield (kg/ha)	Stalk Yield (kg/ha)	Flag Leaf Area (cm^2)	Days to 50% Anth.	Plant height (cm.)
1	YSH-157	20	18.0	5203a	20000	181.44	68	148
2	YSS-98©	19	13.5	4456ab	26667	392.4	68	160
3	YSH-140	20	17.9	4048abc	24667	195.12	74	188
4	YSH-159	19	11.6	3995abc	26000	185.91	61	175
5	YS-16©	20	4.3	3704bcd	29334	207.82	72	145
6	YSH-144	20	13.2	3173cde	3334	242.64	76	183
7	YSH-149	19	13.8	3051cde	16000	245.49	78	230
8	Lassani ©	19	13.6	2706def	26000	148.54	75	190
9	YSH-145	19	9.1	2445ef	16667	248.22	75	218
10	YSH-160	19	11.5	1525fg	17334	249.12	69	213
11	YSH-148	20	11.8	1013g	7334	363.5	78	187
12	YSH-158	19	8.2	386g	22666	144.36	82	210
LSD (5%)		NS	2.3	1221	7956	81.67	4	NS
Range		**19-20**	**11.5-18.0**	**386-5203**	**3334-29334**	**144.36-392.40**	**62-82**	**158-230**
CV.%		**4.42**	**8.55**	**18.65**	**18.38**	**15.88**	**2.27**	**11.62**

It is evident from the above Table-40 that YSH-157 gave higher yield (5203 kg/ha) followed by check YSS-98 (4456 kg/ha), YSH-140 (4048 kg/ha) and YSH-159 (3995 kg/ha). These four are at par statistically. Maximum stalk yield of 29334 kg/ha was produced by check YS-16 followed by check YSS-98 (26667 kg/ha). Plant height ranged from 158 to 230 cm and days to 50% anthesis from 62 to 82.

iv. Sorghum Varietal Yield Trial, Kharif 2018.

Eight varieties were evaluated with two check YSS-98 and YS-16. 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-41.

Table-41: Results of Sorghum Varietal Yield Trial.

Sr. No.	Entry	Plant Stand	Brix Value	Grain Yield	Stalk Yield	Flag Leaf	Days to	Plant height

				(kg/ha)	(kg/ha)	**Area** (cm^2)	**50% Anth.**	(cm.)
1	YSS-31	23	8.7	2840a	36007	187	67	195
2	YSS-18	23	11.5	2815a	22130	184	75	145
3	YSS-17	23	4.5	2730ab	30889	144	67	238
4	YSS-42	24	9.9	2717ab	37963	245	77	227
5	YSS-10	23	9.8	2707ab	39778	171	75	240
6	YSS-41	23	11.5	2698ab	37654	115	75	225
7	YSS-23	23	11.6	2618ab	38487	126	78	315
8	YSS-25	23	11.4	2359abc	30352	148	76	227
9	YS-16c	23	7.9	2212bc	34444	184	77	255
10	YSS-38	23	10.6	1887c	33009	213	67	260
	Range	23-24	4.5-11.6	1887-2840	22130-39778-	115-245	67-78	145-315
CV.%		3.77	13.10	12.61	16.99	13.25	1.12	6.06
LSD (5%)		NS	2.2	553.4	9928	39.04	1.41	24.17

Statistical analysis of the data given in Table-41 revealed that the Entry YSS-31 gave significantly higher yields (2840 kg/ha) along with YSS-18 (2815 kg/ha), YSS-17 (2730 Kg/ha) and YSS-42 (2717 kg/ha) at MMRI in comparison to check YS-16, 2212 kg/ha. All the varieties were statistically at par except check YS-16 and YSS-38. Maximum stalk yield of 39778 kg/ha was produced by YSS-10. Plant height ranged from 145 cm to 315 cm and days to 50% anthesis from 67 to 78.

National Uniform Yield Trial Kharif 2018

Seven varieties/hybrids were tested in a trial. 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 and presented in Table-42.

Table-42: National Uniform Yield Trial.

Sr. No.	**Entry**	**Grain Yield** (kg/ha)	**Stalk Yield** (kg/ha)	**Days to 50% Anth.**	**Days to Maturity**	**Plant Height** (cm)
1	YSS-42	3467a	14332	78	122	213
2	YSH-95	3435ab	19522	81	120	220
3	YS-16©	2997abc	15938	84	130	228
4	W-3535	2641abc	22016	78	117	140
5	S,22, RARI	2455bc	20874	75	121	167
6	R-3636	2208c	20953	78	119	128
Range		3467-2208	14332-22016	75-84	117-130	128-228
CV.%		**19.33**	**21.20**	**1.20**	**0.69**	**3.92**
LSD (5%)		**1008**	**7303**	**1.73**	**1.5**	**13.0**

The results presented in Table-42 reveal that YSS-42 gave highest yield (3467 kg/ha) followed by YSH-95 (3435 kg/ha). Maximum stalk yield was obtained by W-3535 (22016 kg/ha) followed by R-3636(20953 kg/ha).

Seed Production of YS-16 and YSS-98

Variety	Quantity (Kg)	
	Breeder	Pre-basic
YS-16	24	2940
YSS-98	14	960

International Collaboration:

Two sweet sorghum lines imported by Sugarcane Board, AARI, Faisalabad were received by this institute in June 2019 and will be sown in Kharif 2019.

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

KHARIF 2018:

1. BREEDING:

1.1 Maintenance of Gene Pool

Sixteen (16) gene pool lines were planted on 02-08-2018. Each entry was sown in two row strip of 4 meter length. One row was kept vacant between two lines to facilitate the breeding work at flowering. 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 on 13-11-2018, sundried, threshed and seed was stored for future use.

1.2 Maintenance of Cytoplasmic Male Sterile Lines

Seventeen (17) cytoplasmic male sterile (A) lines and twenty two cytoplasmic male fertile (B) lines were planted on 02-8-2018 in two row strips of 4 meter length with row spacing 75 cm and plant spacing 20 cm. One row was kept vacant between two lines to facilitate the breeding work at flowering. 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 on 13-11-2018, sundried and threshed. Reasonable seed was collected and stored.

1.3 Maintenance of Fertility Restorer Lines

Twenty (20) fertility restorer lines were planted on 02-8-2018in two row strips of 4 meter length with row spacing 75 and plant spacing 20 cm. One row was kept vacant between two lines to facilitate breeding work at flowering. 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 on 14-11-2018, sundried and threshed. Reasonable seed was collected, which was stored.

1.4 Derivation of Fertility Restorer Lines

Five S_3, six S_4 and twenty one S_5 fertility restorer derivative lines were sown in two row strips of 4 meter length for derivation on 02-8-2018. The row to row and plant to plant distances were 75 cm and 20 cm respectively. One row was kept vacant between two lines to facilitate breeding work at flowering. 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 harvest-

ed separately on 14-11-2018, sundried and threshed. Four derivative lines were added to fertility restorer lines. Reasonable seed was produced and stored for future use.

1.5 Constitution of Pearl Millet Hybrids.

During kharif 2018, thirty two (32) new crosses were made by hand pollination with in germplasm lines. Crossed heads from female parents were harvested separately. The harvested heads were sundried, threshed and packed after cleaning for planting in next season.

2. EVALUATION:

2.1 Pearl Millet Varietal Yield Trial, Kharif-2018

The trial was comprised of ten varieties including check variety (YBS-98) sown in randomized complete block design with three replications on 02-08-2018. Plot size was kept 1.5m x 4m. Row to row and plant to plant distances were kept 75 cm and 20 cm respectively. Trial was harvested on 15-11-2018. Data were recorded for grain yield and various other agronomic traits some of which are presented in the following table-43.

Table-43: Results of Pearl Millet Varietal Yield Trial

Sr. No.	Varieties	Grain Yield kg/ha	Stalk Yield Tons/ha	Plant Height cm	Days to 50% Flowering	Head Weight kg/plot	Stand Count
1	YBS-89	4281 a	65.56	275	54	4.57	40
2	YBS-95	3983 ab	60.00	285	56	4.39	38
3	YBS-94	3918 b	68.33	278	56	4.30	40
4	YBS-83	3755 b	71.11	282	54	4.38	40
5	YBS-92	3706 bc	65.56	277	53	4.18	38
6	YBS-98 (C)	3689 bc	72.78	288	54	4.20	40
7	14RBS-02	3686 bc	64.44	292	55	4.31	40
8	14RBS-05	3403 cd	67.78	285	54	4.16	38
9	YBS-93	3342 d	65.00	292	55	4.10	40
10	14RBS-01	3186 d	62.78	284	55	4.57	41
CV%		5.34	4.99	3.79	0.88	6.83	3.08
LSD (5%)		339	5.673	18.45	0.83	0.51	2.08

The results presented in Table-43 reveal that YBS-89 produced maximum grain yield of 4281 kg/ha followed by YBS-95 with grain yield of 3983 and 3918 kg/ha respectively, both are statistically at par. YBS-98 (Check) gave 3639 kg/ha while 14RBS-01 remained at the bottom with grain yield of 3186 kg/ha.

2.3 Adaptability/National Uniform Pearl Millet Hybrid Yield Trial Kharif-2018

The trial comprising of ten entries was received from the National Coordinator of MSM, NARC, Islamabad, sown on 02-08-2018 in RCB design with three replications keeping plot size of 4m x 3 m. The row to row and plant to plant distances were 75 cm and 20 cm respectively. The trial was harvested on 15-11-2018 after maturity. Data regarding grain yield, stalk yield, plant height, days to 50% anthesis and disease score were recorded which are presented in the following table-44.

Table-44: Results of Adaptability/National Uniform Pearl Millet Hybrid Yield Trial

Sr. No.	Entries0	Grain Yield (kg/ha)	Stalk Yield (Tons/ha)	Plant Height (cm)	Days to 50% Flowering	Head Wt. (kg/plot)	Stand Count
1	86 M 90	3772 a	27.22	278	52	4.53	35
2	HM 535	3651 a	23.61	233	52	3.80	34
3	KOS HM 3	3621 a	23.06	275	52	3.91	34
4	55 S 85	3542 a	25.00	277	51	3.98	35
5	YBS-95	3074 ab	26.67	338	52	3.39	33
6	RARI-Composite 7	2641 bc	27.78	313	53	4.16	34
7	YBS-98 (C)	2439 bc	25.56	250	50	3.27	35
8	14 RBS-01	2338 bc	30.00	312	52	2.57	34
9	14 RBS-02	2270 c	26.40	317	51	3.09	34
10	14 RBS-05	2102 c	26.68	288	51	2.66	34
CV%		15.56	4.59	6.62	2.76	11.6	3.78
LSD (5%)		786	2.064	32.75	2.45	0.70	2.21

The results presented in the Table-44 indicate that 86-M-90 gave maximum grain yield of 3772 kg/ha followed by HM-535 (3651 kg/ha), KOS-HM-3 (3621 kg/ha) and 55-S-85 (3542 kg/ha). All the four entries are statistically at par.

2.4 Observation Nursery of Pearl Millet Crosses Kharif-2018

In this observation nursery 24 crosses and one check (27 B 93) were sown on 02-08-2018 in strips of plot size 1.5m x 4m. Row to row and plant to plant distances were kept 75 cm and 20 cm respectively. The plots were harvested on 15-11-2018. Data were recorded for grain yield and various other agronomic traits some of which are presented in the following table-45.

Table-45: Results of Observation Nursery of Pearl Millet Crosses

Sr. No.	Entries	Grain Yield (kg/ha)	Stalk Yield (Tons/ha)	Plant Height (cm)	Days to 50% Anthesis	Head Wt. (kg/plot)	Stand Count
1	YBH-278	4717	50.00	255	48	3.710	29
2	YBH-289	4717	33.33	255	49	2.735	25
3	YBH-286	3417	50.00	265	47	1.755	17
4	YBH-283	3192	46.67	260	48	3.200	28
5	YBH-300	2960	46.67	255	49	2.905	16
6	YBH-279	2950	45.00	210	49	4.650	27
7	27 B 93 (C)	2792	45.00	225	49	3.095	27
8	YBH-291	2758	43.33	260	49	4.110	16
9	YBH-285	2725	28.33	260	48	4.070	22
10	YBH-280	2650	50.00	270	51	4.100	30
11	YBH-281	2642	43.33	225	44	3	27
12	YBH-292	2450	53.33	290	48	6.135	33
13	YBH-295	2408	45.00	260	50	2.555	24
14	YBH-298	2392	36.67	290	49	3.025	24
15	YBH-296	2325	45.00	215	51	2.750	23

16	YBH-277	2300	46.67	250	49	2.570	28
17	YBH-284	2183	23.33	255	49	4.785	23
18	27 B 93 (C)	1942	36.67	270	47	3.280	25
19	YBH-276	1742	30.00	220	48	3.695	24
20	YBH-282	1550	36.67	235	48	4.250	29
21	YBH-287	1542	28.33	190	50	3.835	29
22	YBH-293	1525	50.00	275	50	3.000	25
23	YBH-294	1208	38.33	270	49	3.405	28
24	YBH-290	917	33.33	215	48	3.080	20
25	YBH-288	900	31.67	240	47	3.590	12
26	YBH-297	850	30.00	260	49	3.820	26

The results presented in the Table-45 indicate that cross YBH-278 and YBH-289 gave maximum grain yield of 4717 kg/ha followed by cross YBH-286 (3417 kg/ha) while check entry 27 B 93 gave grain yield of 2792 kg/ha.

3. Seed Production

Seed of following varieties / promising lines was multiplied in kharif-2018 for future use.

Table-46: Seed multiplied of varieties / promising lines of Pearl Millet

Sr. No.	Variety/Line	Category	Weight (Kg)
1	YBS-70	BNS	5
2	YBS-83	BNS	5
3	YBS-94	BNS	5
4	YBS-95	BNS	5
5	YBS-98	Basic	609
6	14 RBS-01	BNS	5
7	14 RBS-02	BNS	5
8	14 RBS-05	BNS	9
9	CMS- 72A	BNS	1.2
10	Line 72B	BNS	0.25
11	YCMP-R-35	BNS	6.5
12	CrossF1(YBH-308)	F1	5.8
13	Mixture		360

SPRING 2019:

Seed Multiplication

Seed of CMS lines 72 A and its counterpart B line was increased/ multiplied in tunnel in isolation. Three rows 25 meters long of 72 A-line were sown between two rows of B line. Female rows were allowed to receive pollen from male rows at flowering. Panicles/ Heads from female and male rows were harvested, dried, threshed and cleaned separately. The seed was entered in cold store. Quantity of seed produced was 13 kg and 23 kg of A and B lines respectively.

AGRONOMY:

KHARIF 2018:

A. Trials at MMRI, Yusafwala- Sahiwal

1. Determination of Optimum Plant Population for Hybrid Maize in Bed Sowing

A trial was conducted to find out the suitable plant spacing for higher grain yield of hybrid (YH-5427) maize sown on 3.5 feet wide beds during Kharif 2018. Layout plan was RCB design with three replications. Treatments comprised of 17.5 cm, 20 cm, 22.5 cm, 25 cm and 27.5 cm plant spacing on both sides of the bed.

Table-47: Impact of Different Plant Spacing on Yield of Maize Hybrid in Bed Sowing.

Plant Spacing (cm)	**Days to 50% tasseling**	**Days to 50% silking**	**Plant height** (cm)	**Cob height** (cm)	**No. of cobs/ha**	**Grain yield** (kg /ha)
17.5 (7")	52	54	205.4	81.9	54365	8729 c
20.0 (8")	48	52	218.3	90.4	60913	9901 ab
22.5 (9")	49	52	219.3	88.3	63294	10529 a
25.0 (10")	50	52	213.3	86.9	52976	9365 bc
27.5 (11")	51	54	213.9	87.8	45040	8687 c
LSD (5%)	2.54	2.32	11.79	NS	17687	1154

The results presented in Table-47 explain that the tallest maize plants were found at 22.5 cm spacing while the shortest were found at 17.5 cm plant spacing. Generally, days to tasseling and silking increased as plant spacing increased or decreased from 22.5 cm. However, cob height was not affected (P>0.05) by the treatments. Maximum grain yield (10529 kg/ha) was recorded at 22.5 cm plant spacing (82963 plants/ha) though statistically not different from sowing at 20 cm spacing (9901 kg/ha) while the lowest yield of 8687 kg/ha was recorded at 27.5 cm plant spacing.

2. Evaluation of Different Weedicides for Weed Control in Pearl Millet

During Kharif 2018, herbicides were evaluated for effective weed control in pearl millet. Treatments consisted of post emergence spray of Mesotrione + Atrazine (Flisto gold 550SC) @ 300, 350 and 400-ml acre^{-1} and Atrazine + S metolachlor (Primextra gold 720 SC) @ 250 and 300 ml acre^{-1}. Spray was done at 24 days after sowing.

Table-48: Impact of Weed Control in Pearl Millet through Post Emergence Herbicide Spray.

Treatments acre^{-1}	**Plant Stand ha^{-1}**	**Weed DM (14 days after spray)**	**Weed DM (6 weeks after spray)**	**Heading (days)**	**Plant height (cm)**	**Grain yield kg ha^{-1}**
Flisto Gold 250 ml	49722	121	94	53.6	276	3911 a
Flisto Gold 300 ml	51111	111	85	53.3	257	3492 ab
Flisto Gold 350 ml	53056	113	76	54.6	272	3428 ab
Primextra Gold 250 ml	46111	114	112	52.7	270	3072 ab
Primextra Gold 300 ml	48611	116	110	53.0	260	3139 ab
Control	44444	335	298	52.0	251	2606 b
LSD (5%)	**NS**	**58**	**128**	**2.05**	**15.75**	**1148.5**

The Results given in Table-48 illustrate that plant stand remained unaffected by the treatments. Weed DM after 14 days of spray was minimum for Flisto gold @ 300 ml/acre though it was not significantly different from all other herbicide treatment. While after 6

weeks of spray minimum DM was obtained by Flisto gold @ 350 ml/acre. Maximum grain yield of 3911 kg/ha, that was 50% higher than that of control, was obtained with Flisto gold @ 250 ml/acre/ which was followed by Flisto gold @ 300 ml/acre with a grain yield of 3492 kg ha^{-1}. While the control treatment 'no weedicides' produced the lowest grain yield of 2606 kg ha^{-1}. It is concluded that a better post emergence weed control in pearl millet can be obtained with Flisto gold @250 ml/acre.

3. Evaluation of Different Weedicides for Weed Control in Sorghum

Herbicides were evaluated for better weed control in sorghum. Treatments consisted of post emergence spray of Mesotrione + Atrazine (Flisto gold 550SC) @ 250, 300, 350 ml $acre^{-1}$ and Atrazine + S-metolachlor (Primextra gold 720 SC) @ 250 and 300 ml $acre^{-1}$. Control (no herbicide) treatment was maintained for comparison.

Table-49: Impact of weed control in sorghum through post emergence herbicide spray.

Treatments $acre^{-1}$	Plant Stand ha^{-1}	Weed DM (14 days of spray)	Weed DM (6 weeks of spray)	Heading (days)	Plant height (cm)	Grain yield kg/ha
Flisto Gold 250 ml	66667	191	102	74.7	183	4728 b
Flisto Gold 300 ml	62222	195	84	74.7	177	5306 a
FlistoGold 350 ml	63333	187	75	74.3	176	4222 cd
Primextra Gold 200 ml	62222	140	110	74.7	188	4356 c
Primextra Gold 250 ml	65556	137	123	74.3	187	3911 d
Control	62778	215	292	75.0	176	3039 e
LSD (5%)	**NS**	**25.39**	**38**	**NS**	**3.58**	**313**

Analysis of the data presented in Table-49 disclose that plant stand ha^{-1} was not affected by different treatments (P>0.05). After 14 days of the spray weed DM was minimum with Primextra gold @ 300 ml $acre^{-1}$ while after 6 weeks of spray minimum weed DM was recorded with Flisto gold @ 350 ml $acre^{-1}$. Maximum grain yield (5306 kg/acre was recorded at Flisto gold @ 350 ml/acre followed by Flisto gold @ 250 ml $acre^{-1}$with grain yield of 4728 kg/ha. Lowest yield was recorded in the control treatment gave 3039 kg/ha.

B. Agronomic Trials at Water Management Research Farm, Renala Khurd

1. Effect of Different Planting Geometries on Grain Yield of Maize Hybrid under Drip Irrigation

During Kharif 2018, four sowing geometries viz. (T1) sowing on one side of 75cm apart ridges with plant spacing of 16.25 cm, (T2) sowing on both sides of 90 cm wide beds with plant spacing of 26.25 cm, (T3) sowing on both sides of 105 cm wide beds with plant spacing of 22.5cm and (T4) sowing on both sides of 120 cm wide beds with plant spacing of 20 cm were evaluated under drip irrigation. The experiment was sown on 09-08-2018. Experiment was laid out in randomized complete block design with four replications having net plot size was of 5.25 m × 4 m for treatment 1 and 3 while 5.4m ×4 m for treatment 2 and 4.8m × 4m for treatment 4 for data collection.

Table-50: Yield and other Parameters of Maize Grown under Different Planting Geometries under Drip Irrigation.

Treatments	Stand count ha^{-1}	Days to 50% Silking	Plant height (cm)	Cob height (cm)	Cobs ha^{-1}	Fresh weight (kg ha^{-1})	Grain yield (kg ha^{-1})
75 cm wide Ridge	68194 b	52	262	130	65139	15327	9696 c
90 cm wide beds	81713 a	52.3	258	120	78241	20434	12838 a
105 cm wide beds	75198 a	53	240	116	75397	18734	11767 b

120 wide beds	77604 a	52	244	123	68750	15881	9955 c
LSD (5%)	**7023**	**0.399**	**NS**	**8.72**	**6639**	**1058**	**794**

Results presented in table-50 reveal that lowest stand count was found in 75 cm wide ridges. Sowing on 105 cm wide beds took maximum time to silking as compared to other treatments. Response of plant height remained non-significant to the different treatments. While maximum fresh cob and grain weight was obtained from sowing on 90 cm wide beds followed by sowing on 105 cm wide beds. Sowing on both sides of 90 cm spaced beds with 26.25 cm plant spacing produced maximum grain yield of 12838 kg/ha that was followed by sowing of maize on 105 cm wide beds with 22.5 cm spacing (11767 kg/ha). The sowing on ridges with 16.25 cm plant spacing gave statistically lowest grain yield of 9696 kg/ha.

2. Efficient Use of Fertilizers to Obtain Higher Grain Yield of Maize Hybrid under Drip Irrigation

Experiment was conducted in Kharif-2018. Treatments consisted of four different fertilizer level, viz. (1) 100% recommended, (2) 75% of recommendation, (3)50 % of recommendation and (4) 25% of the recommendation. Recommended dose of fertilizer was 83-33-83 NPK kg acre^{-1}. Crop was sown on 105 cm wide beds-furrow on both sides of the bed with plant spacing of 22.5. Experiment was laid out using randomized complete block design with four replications. Gross plot size of 14m × 4m was maintained, however net plot size of 3.15 m × 4 m was allotted for data collection.

Table-51: Effect of Different Fertilizer Rates on Hybrid Maize Yield under Drip Irrigation.

Treatments Recommendations	**Stand count ha^{-1}**	**Days to 50% silking**	**Plant height** (cm)	**Cob height** (cm)	**Cobs ha^{-1}**	**Fresh weight** (kg ha^{-1})	**Grain yield** (kg ha^{-1})
100	77579	55	254	114	73810	16428	10530 b
75	74008	53	259	120	73214	18066	11483 a
50	75198	53	264	118	72817	17950	11384 a
25	73413	53	252	101	70635	15187	9597 c
LSD (5%)	3605	0.65	Ns	8.8	2539	594	582

The results presented in Table-51 reveal that generally stand count decreased with decrease in fertilizer rate. Plants given 100 % fertilizer took maximum days to reach 50% silking. Plant height remained unaffected by the treatments. Minimum cob height was recorded at 25% fertilizer rate. Maximum fresh and grain weight was recorded from 75% fertilizer application though statistically not different from that obtained from 50% fertilizer application. Treatments with 75% of recommended fertilizer produced the highest grain yield of 11483kg/ha and the lowest grain yield of 9597 kg/ha was recorded by 25% fertilizer rate.

3. Estimation of Optimum Management Allowed Deficit (Mad) under Drip Irrigation for Hybrid Maize

This Experiment was conducted during autumn 2018. Treatments consisted of four MAD levels viz. (1) 15% MAD, (2) 30% MAD, (3) 45% MAD and (4) 60% MAD. Crop was sown on one side 75 cm wide ridges with plant spacing of 20 cm. Treatments were laid in randomized complete block design with four replications. Gross plot size of 14m × 4m was maintained, however net plot size of 5.25 m × 4 m was allotted for data collection.

Table-52: Estimation of Optimum Management Allowed Deficit (Mad) under Drip Irrigation for Hybrid Maize

Treatment (MAD level)	Stand count/ ha	Days to 50% Silk	Plant Height (cm)	Cob height (cm)	Cobs ha^{-1}	Fresh weight (kg ha^{-1})	Grain yield (kg ha^{-1})
15%	72421	53.3	254	119	70437	16961	11996
30%	71230	53	253	115	69517	16965	12111
45%	70833	54	257	115	67857	16405	11723
60%	67064	54.8	240	102	63202	13891	9855
LSD (5%)	NS	1.19	9.38	9.3	3564	743	633

The results presented in Table-52 showed that tallest maize plants were recorded from 45% MAD though statistically not different from 15% and 30% MAD whereas the shortest plants of 240 cm height were observed in T_4. Plants in T_1 bore cobs at highest point on plants while cobs in T_4 were located at lowest point of the plants. Maximum No. of cobs of 70437 ha_{-1} were recorded from T_1 and remained statistically same upto 45% MAD level. While lowest number of cobs was obtained from 60% MAD. Maximum fresh cob weight and grain yield ha^{-1} (16965 kg ha^{-1} and 12111 kg ha^{-1}, respectively) was obtained when field was re-irrigated at 30% MAD though it remained statistically at par with the treatment of 45% MAD level. While re-irrigating at 60% MAD produced lowest fresh cob and grain yield.

RABI 2019:

A. Research Trials at MMRI, Yusafwala Sahiwal

1. To Determine the irrigation water requirement of hybrid maize

The objective of the study was to estimate the water usage of maize hybrid under different planting methods. Treatments were laid out in RCBD with three replications. Treatments consisted of (T1) sowing on one side of 75cm apart ridges with plant spacing of 16.25cm, (T2) sowing on both sides of 90 cm wide beds with plant spacing of 26.25 cm, (T3) sowing on both sides of 105 cm wide beds with plant spacing of 22.5cm and (T4) sowing on both sides of 120 cm wide beds with plant spacing of 20 cm were evaluated under drip irrigation. Uniform plant population of 33000 $acre^{-1}$ was maintained. Total precipitation during the growth period recorded was 69.3mm. Plot comprised of 10 constructed structures of each size of bed while 15 ridges. Length of all the treatments was 20.3 m.

Table-53: Yield and Water Requirement of Maize under Different Planting Methods.

Treatment	Stand count ha^{-1}	Plant height (cm)	Cob height (cm)	Number of cobs ha^{-1}	Fresh cob wt (kg ha^{-1})	Grain yield (kg ha^{-1})	Water used (mm)
120cm beds	68760	242	124	62363	11084	8014 c	1036
105cm beds	80988	246	127	76941	14683	11012 a	779.78
90 cm beds	84565	253	131	83744	13122	9828 b	1315.7
75cm Ridge	80333	233	120	67132	10090	7507 c	1313.1
LSD (5%)	1150	10.7	5.5	2404	410	721	-

Results depicted in above table 53 suggest that significantly maximum and minimum stand count was recorded from 90 cm × 120 cm wide beds. Plant and cob height remained maximum under 90 cm wide beds which was not different from that of 105 cm wide beds. Similarly maximum number of cobs was obtained from 90 cm wide beds while minimum was recorded from 75 cm wide ridges. Maximum fresh cob weight and grain yield was obtained from 105 cm wide beds whereas lowest grain yield was obtained from 75 cm wide ridges and

120 cm wide beds. Maximum water (1315. 7mm) was used by 90 cm wide beds, which was followed by 75 cm wide ridges. Maize crop on 105cm wide beds took minimum water of 780 mm from sowing to maturity of crop.

2. Determination of Optimum Plant Population for Hybrid Maize in Bed Sowing

A trial was conducted to find out the suitable plant spacing for higher grain yield of maize hybrid (YH-5427 sown on 3.5 feet wide beds during Kharif 2018. Layout plan was RCB design with three replications. Treatments comprised of 17.5 cm, 20 cm, 22.5cm, 25 cm and 27.5 cm plant spacing on both sides of the bed. Data were recorded and tabulated for grain yield along with other agronomic traits and analyzed, which are presented in Table-54.

Table-54: Impact of Different Plant Spacing on Yield of Maize Hybrid in Bed Sowing.

Treatment (cm)	**Stand count** ha^{-1}	**Days to 50% Silking**	**Plant height** (cm)	**Cob height** (cm)	**Cobs** ha^{-1}	**Fresh cob wt (**kg ha^{-1})	**Grain Yield** (kg ha^{-1})
17.5 (7")	86243	54.3	227	106	87566	16111	11427 b
20.0 (8")	86772	55.3	226	111	89153	17646	12640 a
22.5 (9")	82275	55.7	228	113	91270	18333	12786 a
25.0 (10")	72751	55.7	237	114	75397	16413	11579 b
27.5 (11")	66138	56.3	236	121	68783	13780	9687 c
LSD (5%)	4370	1.03	3.2	4.3	10357	1206	671

Results depicted in above table 54 suggest that stand count was maximum at 20 cm plant spacing though not different (P>0.05) from 17.5 cm plant spacing. Plants at 17.5 cm spacing took least number of days (P<0.05) to reach 50% silking. Tallest plants were observed at 25 cm and 27.5 cm plant spacing. Maximum cobs ha^{-1}, fresh cob weight kg $ha^{-1}$and grain yield kg ha^{-1} was recorded at 22.5 cm plant spacing. These parameters decreased as plant spacing was decreased or increased.

3. Determination of Optimum Plant Spacing for Hybrid Maize in Ridge Sowing

A trial was conducted to find out the suitable plant spacing for higher grain yield of maize hybrid (YH-5395). It was planted on 75 cm spaced furrows during Rabi 2019. Layout plan was RCB design with three replications. Treatments comprised of 12.5 cm, 15 cm, 17.5 cm, 20 cm and 22.5 cm plant spacing on both sides of the bed. Data were recorded and tabulated for grain yield along with other agronomic traits and analyzed, which are presented in followingTable-55.

Table-55: Impact of Different Plant Spacing on Hybrid Maize

Treatment (cm)	**Stand count/ ha**	**Silking**	**Plant height**	**Cob height**	**Cobs/ha**	**Fresh cob wt** kg/ha	**Grain weight** kg/ha
12.5	75000	70.0	241	119	80278	11875	9283 a
15	66111	70.3	249	121	68056	11756	9537 a
17.5	62500	70.7	241	118	62222	10941	8677 b
20	55556	71.7	235	114	51111	10725	8604 b
22.5	50556	71.7	234	112	43333	8883	7232 c
LSD (5%)	3190	0.9	5.6	3.82	4176	404	348

Results presented in above table 55 suggest that stand count was maximum at 12.5 cm plant spacing and decreased (P<0.05) as plant spacing increased from 12.5 cm to 22.5 cm.

Plants at 12.5 cm spacing took least number of days (P<0.05) to reach 50% silking. Tallest plants were observed at 15 cm followed by plant sown at 12.5 and 17.5 cm. Maximum cobs ha^{-1} were recorded at 12.5 cm and decreased as plant spacing increased. Maximum fresh cob weight kg ha^{-1} and grain yield kg/ha was recorded at 15 cm plant spacing with fresh cob weight of 11756 kg ha^{-1} and grain yield of 9537 kg/ha^{1}. These parameters decreased as plant spacing was increased.

B. Agronomic Trials at Water Management Research Farm, Renala Khurd

1. Effect of Different Planting Geometries on Grain Yield of Maize Hybrid under Drip Irrigation

In Rabi 2019, four sowing geometries viz. T1) sowing on one side of 75cm apart ridges with plant spacing of 16.25cm, T2) sowing on both sides of 90 cm wide beds with plant spacing of 26.25 cm, T3) sowing on both sides of 105 cm wide beds with plant spacing of 22.5cm and T4) sowing on both sides of 120 cm wide beds with plant spacing of 20 cm were evaluated under drip irrigation. The experiment was sown on 01-03-2019. Treatments were applied in randomized complete block design with four replications. Net plot size was of 5.25 m × 4 m for treatment 1 and 3 while 5.4m ×4 m for treatment 2 and 4.8m × 4m for treatment 4 for data collection.

Table-56: Yield and other Parameters of Maize Grown under Different Planting Geometries under Drip Irrigation.

Treatments	**Stand count ha^{-1}**	**Days to 50% Silking**	**Cobs ha^{-1}**	**Fresh weight** (kg ha^{-1})	**Grain yield** (kg ha^{-1})
75 cm wide Ridge	78333	65.5	86528	20611	14464 a
90 cm wide beds	81713	64.5	93056	20162	14592 a
105 cm wide beds	78472	65	91865	15119	11432 b
120 wide beds	76910	65.5	89236	14931	11014 b
LSD (5%)	**2874**	**NS**	**NS**	**1179**	**1039**

Results revealed that maximum stand count was found at 90 cm wide beds while all other treatments were statistically similar regarding stand count. Impact of treatments on days to 50% silking and number of cobs/ha was not significant. Fresh cob weight was maximum (20611 kg/ha) when sowing was done at 75 cm wide ridges though it was statistically not different from sowing at 90 cm wide beds. The maximum grain yield of 14592 kg/ha was achieved at 90 cm wide beds, while lowest (11014 kg/ ha) was recorded at 120 cm wide beds.

2. Efficient Use of Fertilizers to Obtain Higher Grain Yield of Maize Hybrid under Drip Irrigation

Experiment was conducted in Rabi-2019. Treatment consists of four different fertilizer level viz. 1) 100% recommended, 2) 75% of recommendation, 3) 50 % of recommendation and 4) 25% of the recommendation. Recommended fertilizer was 83-33-83 NPK kg $acre^{-1}$. Crop was sown at 105 cm wide beds-furrow on both sides of the bed with plant spacing of 22.5. Treatments were laid in randomized complete block design with four replications. Gross plot size of 14m × 4m was maintained, however net plot size of 3.15 m × 4 m was allotted for data collection.

Table-57: Effect of Different Fertilizer Rates on Hybrid Maize Yield Under Drip Irrigation.

Treatments (Fertilizer rate)	Stand count ha^{-1}	Days to 50% Silking	Cobs ha^{-1}	Fresh weight (kg ha^{-1})	Grain Yield (kg ha^{-1})
100%	84524	68.5	90278	18373	13367 a
75%	83333	68.5	89087	18849	13646 a
50%	82341	67.75	86905	15933	11812 b
25%	78373	66.75	82540	12778	9507 c
LSD (5%)	3450	0.60	2969	1333	1011

Results presented in Table-57 suggest that stand count did not varied as fertilizer rate was decreased from 100 to 50% but decreased significantly as fertilizer rate was further decreased to 25%. Plants in 100% and 75% fertilizer rate took higher days to reach 50% silking while plants in 25% fertilizer rate were earliest to reach silking. Maximum number of cobs/ha were harvested from 100% and 75% fertilizer rates. Fresh cob weight and grain yield were maximum from 75% fertilizer rate though statistically not different from 100%, while minimum were recorded from 25% fertilizer rate.

3. **Estimation of optimum management allowed deficit (MAD) under drip irrigation for hybrid maize**

This Experiment was conducted in autumn2018. Treatments consists of four MAD levels viz. 1) 15% MAD, 2) 30% MAD, 3) 45% MAD and 4) 60% MAD. Crop was sown on 75 cm wide ridges while sowing was done on one side of the ridge with plant spacing of 20 cm. Treatments were laid in randomized complete block design with four replication. Gross plot size of 14m × 4m was maintained, however net plot size of 5.25 m × 4 m was allotted for data collection.

Table-58: Results of Trial for Estimation of Optimum Management Allowed Deficit (Mad) under Drip Irrigation for Hybrid Maize

Treatments (MAD)	Stand count ha^{-1}	Days to 50% Silking	Cobs ha^{-1}	Fresh weight (kg ha^{-1})	Grain yield (kg ha^{-1})
15%	85317 a	68.8 a	96032 a	19464 a	14203 a
30%%	84722 ab	68.8 a	94841 a	19167 a	13987 a
45%	83730 b	67.8 b	89881 a	16885 b	12462 b
60%	77579 c	66.3 c	84127 c	12599 c	9166 c
LSD (5%)	1481	0.884	4060	1322	1013

Results presented in above given Table-58 suggest that stand count ha^{-1} decreased ($P<0.05$) as MAD % increased from 15% to 60%. Plants from treatment of 15% and 30% MAD took more days to reach 50% silking while plants from 60% MAD were the earliest to reach 50% silking. No. of cobs ha^{-1} remained similar ($P>0.05$) upto 45% MAD decreased significantly when soil moisture was allowed to deplete further i.e. 60%. Fresh cob weight and grain yield was maximum from 15% MAD though statistically not different from which was obtained from 30% MAD. While lowest ($P<0.05$) fresh cob weight and grain yield was obtained from 60% MAD.

PLANT PATHOLOGY:

KHARIF 2018:

1. Testing of Stalk Rot (Fusarium Moniliforme) Intensity in Maize Hybrids by Artificial Inoculation during Kharif-2018.

The trial comprised of ten (10) maize hybrids i.e., YH-5427, YH-5555, YH-5556, YH-5539, YH-5421, YH-5534, YH-5534-1, YH-5581, YH-5556-1 and YH-5397. The experiment was conducted according to RCB design in two replications. Plot size was kept 4m x 1.5m. It was sown on 16-08-2018. At silking stage, five (5) plants per plot were inoculated artificially with self-prepared infected tooth picks. After one month of inoculation, each inoculated plant was torn apart by a scalpel and diseases reaction was recorded with the help of Hooker's disease rating scale. The data were recorded and presented as fallows in table-59.

Table- 59: Results of Stalk Rot Intensity in Maize Hybrids by Artificial Inoculation.

Names of maize Hybrids	Infection %age of inoculated internode	Hooker's disease rating scale	Reaction
-	1-25	1	Highly resistant
-	26-50	2	Resistant
YH-5427, YH-5555, YH-5556, YH-5539, YH-5421, YH-5534, YH-5534-1,YH-5581	51-75	3	Moderately Resistant
YH-5556-1,YH-5397	76-100	4	Moderately susceptible

The data presented in Table-59 revealed that maize hybrids YH-5427, YH-5555, YH-5556, YH-5539, YH-5421, YH-5534, YH-5534-1 and YH-5581 are moderately resistant against stalk rot while maize hybrids YH-5556-1 and YH-5397 are moderately susceptible against stalk rot.

Conclusion: There is 100% gap to develop the resistant hybrids for the future of Pakistan**.**

2. Testing of Seed Dressing Fungicides Against Seedling Blight in Maize During Kharif-2018 (Hybrid= YH-1898)

The trial comprised of five (5) treatments i.e. Topsin-M 70WP, Protocol 50WP, Hombre Excel 372-5FS, Dynasty 125FS and control. It was conducted according to RCB design with plot size 4m x 2.25m in four replications. It was sown on 16-08-2018. Data regarding plant stand count, seedling blight attack %age and grain yield were recorded which are presented in the table-60

Table-60: Results of Testing of Seed Dressing Fungicides against Seedling Blight in Maize.

Sr. No.	Treatments	Plant stand	Seedling blight attack %age	Grain yield (kg/ha)
1	Hombre Excel 372.5FS	47	3.2	6383
2	Topsin-M 70WP	42	3.5	5956
3	Protocol 50WP	47	4.29	5772
4	Dynasty 125FS	37	6.29	5439
5	Control	41	10.68	5017
C.V %age		**13.7**	**25.3**	**12.1**
LSD (5%)		**9**	**2.18**	**1067**

The data in table-60 reveals that Hombre Excel 372.5FS gave the best control against seedling blight expressing minimum seedling blight attack %age (3.2) with grain yield 6383 kg/ha as compared to the control %age (10.68) attack with grain yield 5017 kg/ha followed by Topsin-M 70WP expressing seedling blight attack percentage (3.5) over control (10.68) with grain yield 5956 kg/ha in comparison with control 5017 kg/ha.

Conclusion: Homhre Excel 372.5FS gives the best control under field conditions so; it can be recommended for the seed treatment in maize crop.

3. Screening of Different Maize Germplasms against Stalk Rot (Fusarium moniliforme) during Kharif-2018.

The total maize germplasms planted within the institute during Kharif-2018 were artificially inoculated at silking stage with stalk rot pathogen with the help of infected tooth picks method at second internode of plants from soil level. After Four weeks of the inoculation disease intensity was recorded with the help of Hooker's disease rating scale (1-10).

Following number of 1369 plots of different germplasms were screened out against stalk rot. The data were collected and after compilation are presented in the table-61.

Table-61: Screening of Different Maize Germplasms against Stalk Rot

Reaction /Scale	EIB lines	PEIB lines	Deriv -ations	PYT-1	PYT-2	PYT-3	DemoTrial	NUMY Trial
No. Of plots	691	143	256	62	62	30	25	100
Highly Resistant	00	00	00	00	00	00	00	00
Resistant	227	57	53	14	18	9	6	16
Moderately Resistant	334	73	`108	44	40	21	18	76
Mod. Susceptible	25	7	69	4	4	00	1	08
Susceptible	5	00	00	00	00	00	00	00
Highly Susceptible	00	00	00	00	00	00	00	00
No Germination	00	00	26	00	00	00	00	00

The data regarding maize germplasms screened out against stalk rot are presented in the Table-61which indicates that in EIB total 691 lines were screened out against stalk rot. The data revealed that there was no highly resistant line, 227 lines found resistant, 334 lines found moderately resistant, 25 lines found moderately susceptible, 5 lines found susceptible, no line was found highly susceptible and there was no germination in zero lines. In PIEB lines total 143 lines were screened out against stalk rot. The data revealed that there was no highly resistant line, 57 lines found resistant, 73 lines found moderately resistant, 7 lines found moderately susceptible, no lines was found susceptible, no line was found highly susceptible and there was no germination in zero lines. In derivation total 256 families were screened out against stalk rot. The data revealed that there was no highly resistant family, 53 families found resistant, 108 families found moderately resistant, 69 families found moderately susceptible, no family was found susceptible, no family was found highly susceptible and there was no germination in zero family. In PYT-1, total 62 hybrids were screened out against stalk rot. The data revealed that there was no highly resistant hybrid, 14 hybrids found resistant, 44 hybrids found moderately resistant, 4 hybrids found moderately susceptible, no hybrid was found susceptible, no hybrid was found highly susceptible and there was no germination in zero hybrids. In PYT-2, total 62 hybrids were screened out against stalk rot. The data revealed that there was no highly resistant hybrid, 18 hybrids found resistant, 40 hybrids found moderately resistant, 4 hybrids found moderately susceptible, no hybrid was found susceptible, no hybrid was found highly susceptible and there was no germination in zero hybrids. In PYT-3, total 30 hybrids were screened out against stalk rot. The data revealed that there was no highly resistant hybrid, 9 hybrids found resistant, 21 hybrids found moderately

resistant, no hybrid was found moderately susceptible, no hybrid was found highly susceptible and there was no germination in zero hybrids. In demonstration trial, total 25 hybrids were screened out against stalk rot. The data revealed that there was no highly resistant hybrid, 6 hybrids found resistant, 18 hybrids found moderately resistant, 1 hybrids found moderately susceptible, no hybrid was found susceptible, no hybrid was found highly susceptible and there was no germination in zero hybrids. In NUMY trial, total 100 hybrids were screened out against stalk rot. The data revealed that there was no highly resistant hybrid, 16 hybrids found resistant, 76 hybrids found moderately resistant, 8 hybrids found moderately susceptible, no hybrid was found susceptible, no hybrid was found highly susceptible and there was no germination in zero hybrids.

Conclusion: It is good news that we have variety of resistant lines to develop resistant maize varieties and hybrids.

SPRING 2019:

4. Testing of Stalk Rot (Fusarium moniliforme) Intensity in Maize Hybrids by Artificial Inoculation during Spring-2019.

The trial comprised of ten (10) maize hybrids i.e., YH-5427, YH-5555, YH-5556, YH-5539, YH-5421, YH-5534, YH-5534-1, YH-5581, YH-5556-1 and YH-5397. The experiment was conducted according to RCB design in two replications. Plot size was kept 4m x 1.5m. It was sown on 15-02-2019. At silk stage, five (5) plants per plot were inoculated artificially with self-prepared infected tooth picks. After one month of inoculation, each inoculated plant was torn apart by a scalpel and diseases reaction was recorded with the help of Hooker's disease rating scale. The data were recorded and presented in the following table-62.

Table-62: Results of stalk rot intensity in maize hybrids by artificial inoculation.

Names of Maize Hybrids	Infection %age of inoculated internode	Hooker's disease rating scale	Reaction
-	1-25	1	Highly Resistant
YH-5427, YH-5556-1, YH-5534 and YH-5534-1	26-50	2	Resistant
YH-5555, YH-5556, YH-5539, YH-5421, YH-5397 & YH-5581.	51-75	3	Moderately Resistant
-	76-100	4	Moderately susceptible

The data presented in Table-62 reveal that maize hybrids YH-5427, YH-5556-1, YH-5534 and YH-5534-1are found resistant against stalk rot while maize hybrids YH-5555, YH-5556, YH-5539, YH-5421, YH-5397 and YH-5581 are found moderately resistant against stalk rot during spring studies.

Conclusion: YH-5427, YH-5556-1, YH-5534 and YH-5534-1are found resistant against stalk rot**.**

5. Testing of Seed Dressing Fungicides Against Seedling Blight in Maize During Spring-2019 (Hybrid= YH-1898)

The trial comprised of five (5) treatments i.e. Topsin-M 70WP, Protocol 50WP, Hombre Excel 372-5FS, Dynasty 125FS and control. It was conducted according to RCB design with plot size 4m x 2.25m in four replications sown on 15-02-2019. Data regarding plant stand count, seedling blight attack %age and grain yield were recorded which are presented in the table-63.

Table-63: Results of Testing of Seed Dressing Fungicides against Seedling Blight in Maize.

Sr. No.	Treatments	Plant stand	Seedling blight attack %age	Grain yield (kg/ha)
1	Dynasty 125FS	51	3.33	9027
2	Hombre Excel 372.5FS	52	1.45	8333
3	Topsin-M 70WP	49	3.04	7500
4	Protocol 50WP	48	4.24	6944
5	Control	51	7.37	6111
	C.V %age	9.70	37.19	18.76
	LSD (5%)	NS	2.23	NS

The data in Table-63 reveal that Hombre Excel 372.5FS gave the best control against seedling blight expressing minimum seedling blight attack (1.45) with grain yield 8333kg/ha as compared to the control (7.37%) attack with grain yield 6111 kg/ha followed by Topsin-M 70WP expressing seedling blight attack percentage (3.04%) over control (7.37%) with grain yield 7500kg/ha in comparison with control 6111kg/ha.

Conclusion: Hombre Excel 372.5FS gives the best control under field conditions so during spring crop; it can be recommended for the seed treatment in maize crop in spring.

6. Screening of Different Maize Germplasms against Stalk Rot (Fusarium moniliforme) during Spring-2019.

Data could not be recorded due to drying of germplasm plants before reaching to maturity.

Other Activities:

- Plant protection measures were carried out in Maize, wheat, sunflower and potato crops.
- Implementation of standard operating procedures (SOPs) and instructions for curbing the menace of dengue in MMRI, Yusafwala-Sahiwal was ensured and weekly reports were submitted to the Directorate of Entomology AARI Faisalabad.
- The professor seed company Sahiwal was visited for inspection by Dr. Muhammad Arshad, (Director) and Mr. Amjad Khan, (Assistant Entomologist).
- Four internees of B. Sc (Hons.) form various campuses of UAF were inducted on February 11, 2019 and their training are under process.
- FFC farmer gathering at Arifwala was trained by Mr. Amjad Khan, (Assistant Entomologist). The telephonic field complaints of Mr. Faisal Hayyat (0345-8441298) of District Pakpattan was taken and advisory services were provided accordingly.
- On March 04, 2019 suspected larvae of the fall army worm FAW (*Spodoptera frugiperda*) were collected from Pakpattan and sent to UAF and Directorate of Entomology for confirmation.
- The additional field duty of monitoring of farmers trainings regarding cotton in Sahiwal was completed.

- Four internees of B.Sc. (Hons.) form various campuses of UAF have completed their internship training program.
- Weeds control was carried out in different localities of MMRI.
- Classes of B.Sc. (Hons.) Entomology and Plant Pathology from Various campuses of University of Agriculture Faisalabad visited MMRI and those were delivered comprehensive lectures on the respective subjects.

ENTOMOLOGY

KHARIF 2018

1. Testing of Different Sprayable Insecticides against Shootfly and Maize Borer during Khrif-2018 (Hybrid=YH-1898)

The trial comprised of five treatments i.e. Trisuper 40EC, Trizone 40EC, Bifenthrin 10EC, Lambda cyhalothrin 2.5EC and Control. It was conducted according to RCBD with plot size 4m x 2.25m in four replications, sown on 16-08-2018. Data regarding plant stand count, shootfly infestation %age pre-treatment (before spray), shootfly infestation %age 72 hours post-treatment (after spray), shootfly infestation %age 7 days after treatment (after spray), maize borer infestation %age before spray, maize borer infestation %age 72 hours after application of spray, maize borer infestation %age 7 days after application of spray and grain yield were recorded which are presented in the table-64.

Table-64: Results of different spray able insecticides against shoot fly and maize borer.

Sr. No	Treatments	Plant Stand	Shootfly Infestation %age before spray	Shootfly infestation %age 72HAA	Shootfly infestation %age 7DAA	Maize borer infestation %age before spray	Maize borer infestation %age	Maize borer infestation %age 7DAA	Grain yield (kg/ha)
1	Trisuper 40EC	41	2.3	1.15	0.56	1.92	0.56	0.56	5911
2	Bifenthrin 10EC	44	3.1	2.61	1.2	1.41	1.41	0	5717
3	Trizone 40EC	38	2.83	2.17	1.39	2.25	1.52	1.52	5186
4	Lambda Cyhalothrin 2.5EC	44	3.38	2.32	1.77	2.37	1.77	0	5122
5	Control	43	6.52	6.52	6.52	7.7	7.7	8.88	4103
	C.V %age	14.47	48.59	34.75	47.66	72.27	57.50	73.49	4.94
	LSD (5%)	NS	2.71	1.58	1.70	3.48	2.29	2.48	397

The data presented in Table-64 revealed that Trisuper 40EC gave the best control against shootfly expressing minimum shootfly infestation %age (0.56) followed by Bifenthrin 10EC expressing shoorfly infestation %age (1.2) whereas Bifenthrin 10EC and lambdacyhalothrin 2.5EC gave the best control against maize borer showing minimum maize borer infestation %age (0.0) respectively followed by Trisuper 40EC showing maize borer infestation %age (0.56). As far as the yield is concerned, Trisuper 40EC produced maximum yield (5911 kg/ha) followed by Bifenthrin 10EC which produced the yield (5711 kg/ha).

Conclusion: Trisuper 40EC can be recommended for the control of shootfly in maize while Bifenthrin10EC and Lambda Cyhaloththrin 2.5EC can be recommended for the control of maize stem borer in the field effectively.

2. Evaluation of Different Granular Insecticides against Cob/Ear Worm during Kharif-2018 (Hybrid= YH-1898).

The trial comprised of five (5) treatments i.e. Carto 4G, Refree 0.3G, Virtako 0.6Gr, Furadan 3G and control. It was conducted according to RCBD with plot size 4m x 2.25m in four replications, sown on 16-08-2018. Data regarding plant stand count, cob worm infestation %age and grain yield were recorded which are presented in the table-65.

Table-65: Results of Different Granular Insecticides against Cob Worm.

Sr. No.	Treatments	Plant Stand	Cob worm infestation % age	Grain yield (Kg/ha)
1	Virtako 0.6Gr	42	0	4878
2	Refree 0.3G	45	0	4792
3	Furadan 3G	36	0	4139
4	Carto 4G	43	4.88	4089
5	Control	36	3.13	3470
	C.V %age	14.9	177	13.4
	LSD (5%)	9.20	4.36	811

The data presented in Table-65 revealed Virtako 0.6G, Refree 0.3G and Furadan 3G gave the best control against cob worm showing minimum cob worm infestation %age (0,0 &0) respectively. As far as the yield is concerned, Virtako 0.6G produced maximum yield 4878 kg/ha followed by Refree 0.3G which produced the yield 4792 kg/ha.

Conclusion: Virtako 0.6Gr can be recommended for the control of ear worm on maize crop in the field level.

3. Study of Different Light Wavelengths for the Attraction of Insect Pests of Maize.

The automatic solar light tarp network was installed during autumn 2018 in four acres of maize crop. Bulbs of varying wavelengths were studied for the attraction and captures of insect pests populations of maize crop at MMRI. The weekly captures are given in the table-66 below for orange light bulbs and ultraviolet bulbs.

Table-66: Data of Light Trap Weekly Captures.

Light wave length	Date	S. inference	A. worm	C. partellus	H.zea
UV	14.09.18	10	15	17	4
Orange	14.09.18	3	3	2	0
UV	21.09.18	10	35	13	5
Orange	21.09.18	2	2	1	0
UV	28.09.18	7	23	6	2
Orange	28.09.18	3	2	3	0
UV	05.10.18	4	17	3	1
Orange	05.10.18	1	1	0	0
UV	12.10.18	3	6	8	2
Orange	12.10.18	1	0	1	0
UV	19.10.18	5	8	6	2
Orange	19.10.18	1	3	1	0
UV	26.10.18	2	6	3	3
Orange	26.10.18	0	0	0	0

Conclusion: The data presented in table-66 depicts that ultraviolet light is more attractive for insects as compared to the orange light and ultraviolet light can be used in IPM program.

2- Study of the Extent of Control of Stem Borers and Army Worms of Maize Crop with the help of UV Light Traps Network in Four acres of Land.

The automatic solar light tarp network was installed during autumn 2018 in four acres of maize crop at MMRI, Yusafwala Sahiwal. The infestation %age data of major insect pests of maize crop captured by the said traps network was collected from the non-trap areas taken as control for the comparison of trap-installed area (4 acres) data.
The data was collected and the statistics give maize stem borer control 59.70% over control field and army worm 36.40% over control in the autumn.

Conclusion: The said ultraviolet light traps network is very helpful for the control of insect pests of maize crop and should be taken as integral part of integrated pest management. There is lot of gap in the improvement of its efficacy in future and will be tried for the betterment of food security, health and environment.

Its efficacy may be studied on other major and minor crops, vegetable and fruit orchards.

SPRING 2019:

4. Testing of Different Sprayable Insecticides against Shootfly and Maize Borer during Spring-2019 (Hybrid=YH-1898)

The trial comprised of five treatments i.e. Trisuper 40EC, Trizone 40EC, Bifenthrin 10EC, Lambda Cyhalothrin 2.5EC and Control. It was conducted according to RCBD with plot size 4m x 2.25m in four replications. It was sown on 15-02-2019. Data regarding plant stand count, shootfly infestation %age pre-treatment (before spray), shootfly infestation %age 72 hours after treatment (after spray), and shootfly infestation % age 7 days after treatment. Maize borer infestation %age before spray, maize borer infestation %age 72 hours after application of spray, maize borer infestation %age 7 days after application of spray and grain yield were recorded which are presented in the table-67.

Table-67: Results of Different Spray Able Insecticides against Shoot Fly and Maize Borer

Sr. No	Treatments	Plant Stand	Shootfly Infestation %age before spray	Shootfly infestation %age 72HAA	Shootfly infestation %age 7DAA	Maize borer infestation %age before spray	Maize borer infestation %age 72HAA	Maize borer infesta-tion %age 7DAA	Grain yield (Kg/ha)
1	Lambda Cyhalothrin 2.5EC	57	2.21	1.79	0.88	2.60	1.30	0.00	12014
2	Bifenthrin 10EC	57	0.88	0.45	0.45	1.77	0.88	0.00	10555
3	Trisuper 40EC	55	2.19	1.77	0.85	0.42	0.42	0.42	10486
4	Trizone 40EC	54	0.91	0.49	0.00	1.43	0.48	0.00	10138
5	Control	54	5.98	5.98	6.91	6.45	6.45	8.30	8888
	C.V %age	3.70	57.08	59.65	48.85	52.54	62.27	33.73	7.86
	LSD (5%)	NS	2.14	1.93	1.37	2.05	1.83	0.91	1262

The data presented in Table-67 reveal that Trizone 40EC gave the best control against shootfly expressing minimum shootfly infestation (0.00%) followed by Bifenthrin 10EC expressing shootfly infestation (0.45%) whereas Lambda Cyhalothrin 2.5EC,Bifenthrin 10EC and Trizone 40EC gave the best control against maize borer showing minimum maize borer infes-

tation (0.00%) respectively followed by Trizone 40EC showing maize borer infestation (0.42%). As far as the yield is concerned, Lambda Cyhalothrin 2.5EC produced maximum yield (12014 kg/ha) followed by Bifenthrin 10EC which produced the yield (10555 kg/ha).
Conclusion: Trizone 40EC can be recommended for the control of shootfly in maize for spring crop while Lambda Cyhaloththrin 2.5EC, Bifenthrin10EC and Trizone 40EC can be recommended for the control of maize stem borer in the field for higher efficacy during spring crop.

5. Evaluation of Different Granular Insecticides against Cob/Ear Worm during Spring-2019 (Hybrid= YH-1898).

The trial comprised of five (5) treatments i.e. Carto 4G, Refree 0.3G, Virtako 0.6Gr, Furadan 3G and control. It was conducted according to RCBD with plot size 4m x 2.25m in four replications sown on 15-02-2019. Data regarding plant stand count, cob worm infestation %age and grain yield were recorded which are presented in the table-67.

Table-67: Results of Different Granular Insecticides against Cob Worm.

Sr. No.	Treatments	Plant Stand	Plants Harvested	Cob worm infestation % age	Grain yield (kg/ha)
1	Virtako 0.6Gr @ 4kg/acre	55	50	5.96	11597
2	Carto 4G@ 9Kg/acre	53	50	6.03	11527
3	Furadan 3G @8Kg/acre	55	51	5.81	11389
4	Refree 0.3G @8Kg/acre	52	50	6.14	11250
5	Control	54	50	6.03	10972
	C.V %age	5.91	6.85	13.23	8.44
	LSD (5%)	NS	NS	NS	NS

The data presented in Table-67 revealed that Furadan 3G expressed the best control showing minimum cob worm infestation (5.81%) with grain yield 11389 kg/ha followed by Virtako 0.6Gr showing cob worm infestation (5.96%) with grain yield 11597 kg/ha.

Conclusion: Furadan 3G can be recommended for the control of ear worm on spring maize crop.

6. Study of Different Light Wavelengths for the Attraction of Insect Pests of Maize.

The data from February 28, 2019 to April 08, 2019 was recorded on daily basis along with the metrological conditions which is presented in the below table-68.

Table-68: Data of Light Trap Daily Captures

Dates	Wave length	Stem borers	Aphids	Armyworms	Cob/earworms	Shoot fly	Max °C 1700Hrs	Min °C 800Hrs	RH % 1700Hrs	RH % 800Hrs
Feb 28,	Ultraviolet	00	01	00	00	01	22	08	86	79
	Orange	00	01	00	00	00				
March 01	Ultraviolet	00	05	00	00	00	25	09	87	79
	Orange	00	01	00	00	00				
March 04	Ultraviolet	00	05	00	00	00	25	11	88	61
	Orange	00	00	00	00	00				
March 05	Ultraviolet	01	06	00	00	00	23	11	88	50
	Orange	00	01	00	00	00				

March 07	Ultraviolet	00	13	01	00	01	27	11	78	50
	Orange	00	02	00	00	00				
March 08	Ultraviolet	00	04	00	00	00	28	12	68	50
	Orange	00	00	00	00	00				
March 11	Ultraviolet	00	23	01	00	05	28	12	78	50
	Orange	00	01	00	00	00				
March 12	Ultraviolet	00	07	00	00	00	23	11	89	50
	Orange	00	00	00	00	00				
March 13	Ultraviolet	00	05	01	00	00	23	12	83	50
	Orange	00	00	00	00	00				
March 14	Ultraviolet	00	00	02	00	00	23	12	83	50
	Orange	00	01	00	00	00				
March 15	Ultraviolet	00	05	00	00	00	24	11	89	39
	Orange	00	02	00	00	00				
March 18	Ultraviolet	00	15	02	00	03	28	13	70	30
	Orange	00	03	00	00	00				
March 19	Ultraviolet	00	16	00	00	00	29	14	70	33
	Orange	00	03	00	00	00				
March 20	Ultraviolet	00	40	00	00	01	32	15	85	53
	Orange	00	02	00	00	00				
March 21	Ultraviolet	00	04	00	00	00	27	14	70	53
	Orange	00	00	00	00	00				
March 22	Ultraviolet	00	04	00	00	01	28	15	70	53
	Orange	00	00	00	00	00				
March 25	Ultraviolet	01	22	02	00	00	31	16	72	55
	Orange	00	01	00	00	00				
March 26	Ultraviolet	00	37	01	00	00	33	16	59	42
	Orange	00	05	00	00	00				
March 27	Ultraviolet	00	20	06	00	00	32	16	58	42
	Orange	00	00	00	00	00				
March 28	Ultraviolet	00	25	02	00	00	35	16	58	33
	Orange	00	05	00	00	00				
March 29	Ultraviolet	04	32	00	00	00	35	20	68	33
	Orange	01	02	00	00	00				
April 02	Ultraviolet	05	35	04	00	00	36	21	42	33
	Orange	00	04	00	00	00				
April 03	Ultraviolet	01	09	01	00	00	38	18	46	26
	Orange	00	00	00	00	00				
April 04	Ultraviolet	01	00	01	00	00	40	20	50	39
	Orange	00	00	00	00	00				
April 05	Ultraviolet	00	00	00	00	00	36	20	50	39
	Orange	00	00	00	00	00				
April 08	Ultraviolet	03	00	00	01	00	35	20	49	39
	Orange	00	00	00	00	00				

The data presented in Table-68 shows that capture rates of insect pests of maize per night remained very low due to the uncertainty of weather conditions i.e. weekly once or twice rains along with wind storms. Such types of weather conditions keep the temperature of an area low and do not let the emergence of hibernated generation of insects. The moon light is also affecting the captures of the insects per night and to overcome the effect of the moon light the intensity of bulbs giving light is being increased.

4- Study of the Extent of Control of Stem Borers and Army Worms of Maize Crop with the help of UV Light Traps Network in Four acres of Land.

After proper calculations the precise results revealed that the subject traps network gave 83.00% control of stem borer without any chemical spray in four acres along with 89.00% control of army worm without any chemical spray in four acres of land.
The seasonal variation indicates that the efficacy increases with cool and calm environment without moon light. Its efficacy may be studied on other major and minor crops, vegetable and fruit orchards.

5- Screening of Different Promising Maize Hybrids against Mites under Natural Conditions

The weather of spring maize crop 2019 remained cold and moist due to frequent wind storms along with rains and over all environment remained non conducive to the attack of mites that is why no attack of mites observed on the experimental and the farmer maize crop as well.

Other Activities

- Plant protection measures were carried out in Maize, wheat, sunflower and potato crops.
- Implementation of standard operating procedures (SOPs) and instructions for curbing the menace of dengue in MMRI, Yusafwala-Sahiwal was ensured and weekly reports were submitted to the Directorate of Entomology AARI Faisalabad.
- The professor seed company Sahiwal was visited for inspection by Dr. Muhammad Arshad, (Director) and Mr. Amjad Khan, (Assistant Entomologist).
- Four internees of B.Sc (Hons.) form various campuses of UAF were inducted on February 11, 2019 and their training are under process.
- FFC farmer gathering at Arifwala was trained by Mr. Amjad Khan, (Assistant Entomologist). The telephonic field complaints of Mr. Faisal Hayyat (0345-8441298) of District Pakpattan was taken and advisory services were provided accordingly.
- On March 04, 2019 suspected larvae of the fall army worm FAW (*Spodoptera frugiperda*) were collected from Pakpattan and sent to UAF and Directorate of Entomology for confirmation.
- The additional field duty of monitoring of farmers trainings regarding cotton in Sahiwal was completed.
- Four internees of B. Sc (Hons.) form various campuses of UAF have completed their internship training program.
- Weeds control was carried out in different localities of MMRI.
- Classes of B. Sc. (Hons.) Entomology and Plant Pathology from Various campuses of University of Agriculture Faisalabad visited MMRI and those were delivered comprehensive lectures on the respective subjects.

Following advisory services were provided to the farmers:

1). Always adopt crop rotation
2). Free the fields from maize crop left over's and weeds
3). Irrigate the crop as per its need and avoid heavy irrigation
4). Drainage of rain water timely

5). Seed treatment with fungicide
6). Deep ploughing at the time of soil preparation
7). Plant to plant distance (8-9 inch) for autumn crop while (6-7 inches) for spring crop and row to row 2.5 feet for both the seasons should be maintained
8). Application of potash fertilizer and micronutrients should be done in future
9). Add suitable amount of well-rotted organic matter to the soil
10). Avoid sowing of maize after maize or maize after potato

- Annual report was compiled for the year autumn 2018 and submitted to the concerned quarters
- Three articles were written in urdu and published in the on line newspaper Agri Akhbaar on various dates of May 2019. For information http://www.agriakhbar.com can be visited
  - i- Amrican sundypowdyke phal waly hissy per hi hamlah quin kerty hay published on May 28, 2109 with Viewrs No 865 up to 30.05.2019
  - ii- Makai ki shalli per sundi ka hamlah aor iss ka kantrol published on May 18, 2109 with Viewrs No 1091 up to 30.05.2019
  - iii- Kapass ky kashatkar matwajah hoon on May 22, 2109 with Viewers No 563 up to 30.05.2019
- Assistant Entomologist was assigned the duty to join the travelling seminar from June 12-13, 2019. Among the local hybrids of Kissan seeds 1763 and 8363 were found disease and pest resistant with good look while 9608 was found stay green. Most of the hybrids of Pioneer were infested with mites and the rest were heat affected. The situation of Monsanto hybrids was found the same as that of the Pioneer Company
- Sweet corn on spot examination was joined on June 20, 2019 and briefing about earworm and armyworm attack near crop maturity was given to the participants
- Maize board meeting was arranged on June 27, 2019 in which near future insect pest problem regarding *Spodoptera frugiperda* (Fall Army Worm) was highlighted and detailed presentation on *Spodoptera frugiperda* (Fall Army Worm) was delivered by Assistant Entomologist for the stake holders
- Urdu article for the publication in Zaraat Nama of August 2019 was submitted
- Radio talk on "Jawar ky nuksaan dyh kery ty insdad" was got recorded during July 2019
- A joint venture of Government and private sector (CABI South Asia &Corteva agri. sciences) for the monitoring of fall army worm in Pakistan was designed and MMRI scientists Assistant Entomologist along with Assistant Agronomist attended the first meeting on July 26, 2019 in Lahore and gave the necessary inputs for the training of monitoring teams. The contacts of all the participants were shared among all the participants for online guidance and knowledge sharing

SEED PRODUCTION:

1. OPV'S MAIZE

Different seed categories of various maize varieties were produced for maintenance, experiments and sale purposes. The BNS BNS seed was produced through half-sib method by

hand pollination and Pre basic and basic in isolations through half-sib method by hand pollination and Pre basic and basic in isolations as detailed below in Table-69:

Table-69: **Maize OPV's BNS, Pre Basic, and Basic Seed Produced**

Sr. No.	Name of Crop Variety	BNS (kg)	Pre-basic (kg)	Basic (kg)	Certified (kg)
Maize Kharif, 2018					
1.	Pearl	30.0	3010	-	-
2.	YW-786	30.0	-	-	-
3.	YSC-15	15.0	-	-	-
4.	YPC-14	20.0	-	-	-
Maize Spring, 2019					
1.	Pearl	12.5	1800	-	-
2.	YW-786	6.5	-	-	-
3.	YSC-15	3.5	-	-	-
4.	CZP-132001	3.0	-	-	-

HYBRID MAIZE:

i. Maintenance of Female Parental Line (Y22)

Seed of Y22 was prepared (5 kg) and treated with weedicide and fungicide before sowing. Female parental line Y-22 was planted in isolation on an area of 4 kanals on 12-02-2019. Isolation was maintained in square No. 1/27 at Maize Seed Farm 64/5L, Yusafwala, Sahiwal. All the recommended agronomic practices (hoeing, weeding, irrigation & fertilizer application) were performed accordingly. Strict rouging (removal of from field) was carried out to purify the field from off type plants especially before and at the time of flowering. Cobs were harvested after crop maturity and sun-drying was performed to minimize the moisture level. Total Produce of Y-22 which gained during spring 2019 was 500 kg.

ii. Maintenance of Male Parental Line (Y27)

Male parental line Y-27 was maintained on an area of 30kanals cumulatively during kharif 2018 and spring 2019. Y-27 was sown in Hybrid Seed Production block with 4:1 female and male ratio. Seed production for male parental line was maintained in square No. 24, 26 & 27. All the recommended agronomic practices (hoeing, weeding, irrigation & fertilizer application) were performed accordingly. Strict rouging (removal of from field) was carried out to purify the field from off type plants especially before and at the time of flowering. Cobs were harvested after crop maturity and sun-drying was performed to minimize the moisture level. The selection for uniform and healthy plants/cobs was made during both seasons and total produce of Y-22 was 780 kg.

iii. **Hybrid Seed Production**

Under hybrid seed production program, female parental lines (Y-22) was sown along with male (Y-27) with 4:1 ratio on an area of 52 kanals during kharif 2018 and 102 kanals during spring 2019. Hybrid seed (F1) of YH-1898 was sown in square No. 27 on 07-07-2018 during kharif-18 while F1 seed of YH-1898 (Y22*Y27) & YH-5427 (Y222*Y27) hybrid was sown in square No. 24 & 27 on 12.02.2109 during spring-19. All the recommended agronomic practices (hoeing, weeding, irrigation & fertilizer application) were performed accordingly.

Strict rouging (removal of from field) was carried out to purify the field from off type plants especially before and at the time of flowering. Cobs were harvested after crop maturity and sun-drying was performed to minimize the moisture level. Total produce of YH-1898 was 3880 kg & 3640 kg during kharif 2018 & spring 2019, respectively. The produce gained for YH-5427 was 3020 kg during spring 2019.

iv. OPV/MMRI Yellow Seed Production

MMRI yellow which is an open pollinated variety was sown on an area of 2 kanal during kharif 2018. All the recommended agronomic practices (hoeing, weeding, irrigation & fertilizer application) were performed accordingly. Total produce for MMRI Yellow was 643 kg.

Table -70: Seed Production during Kharif 2018 and Spring 2019

MATERIAL	KHARIF 2018		SPRING 2019	
	AREA	PRODUCE	AREA	PRODUCE
YH-1898	52Kanals	3880 Kg	66	3640 Kg
YH-5427	-	-	36	3020 Kg
Y-22	-	-	4	500 Kg
Y-27	-	80 Kg	4	700 Kg
MMRI YELLOW	2Kanals	643 Kg	-	-
Project 904 (25 inbred Lines)	2Kanals	100 g / each line (Approximately)	2Kanals	20-30 g / each cross

ADVISORY SERVICES (FARMERS & OTHERS):

- Two (2) TV talks, Thirty (30) radio talks were delivered to farmers about the maize, sorghum and pearl millet
- One farmer day was conducted on 27.12.2018 for gaudiness of farmers regarding management of maize crop to get higher yield
- Master trainer of Agriculture Extension wings were trained for production and protection of maize crop.
- Training was conducted for capacity building of private seed companies for on 13.09.2018 regarding maize, sorghum, pearl millet and sorghum × Sudan grass production technology

2nd International Colloquium: Challenges and Opportunities of Maize Production

MMRI co-hosted the international colloquium organized by Department of Plant Breeding and Genetics, University of Agriculture, Faisalabad. One scientist of this institute gave presentation and visit of the participants of the colloquium arranged at this institute.

FOREIGN COLLABORATIONS:

The director MMRI is collaborating part of two international projects of maize (Agriculture Innovation Program, AIP and Heat Tolerant Maize for South Asia, HTMA). He along with one scientist visited Dubai on 17-18 January, 2019 to attend planning meeting of second phase of the project "Heat Tolerant Maize for South Asia through Public and Private Partnership" (HTMA). One scientist of this institute visited National Crop Resource Research Institute, Uganda to attend "New Maize Breeders Training Course" on 15-27 July 2018 organized by CIMMYT.

STATIONS AND SUB-STATIONS

MAIZE RESEARCH STATION, FAISALABAD

KHARIF 2018:

Season and Its Effects:

During July-December, 2018, 276.9 mm of rainfall was received. Highest rainfall was received in the month of July, 2018. The detail of average maximum, minimum temperatures and rainfall received during July 2018 to December 2018 is as follows:

Table-71: Weather Data for the Year 2018-19

Sr. No.	Month/Year	Average Temperature (c°)		Rainfall (mm)
		Maximum	Minimum	
1	July, 2018	36.5	26.9	175.3
2	August, 2018	37.4	26.9	15.2
3	September, 2018	36.5	24.6	85.4
4	October, 2018	32.9	18.4	0.6
5	November, 2018	27.6	12.2	Traces
6	December, 2017	22.3	5.47	0.4

Research Work Done:

Table-72: Detail of gene pool maintained during Kh-2019

Sr. No	Entries	Planted	Harvested
1	Inbred lines	223	213
2	Inbreeding generations.		
	S_0	36	36
	S_1	87	78
	S_2	95	84
	S_3	52	37
	S_4	38	28
	S_5	36	32
	S_6	19	13
	S_7	14	10
	Total	**377**	**318**

1. YIELD TRIALS:

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

1.1 Hybrid Maize Macro Yield Trial No. 1:(Kharif 2018)

This trial was comprised of nine single cross hybrids including two local and one commercial hybrid as check sown on 07-08-2018. The trial was laid out in RCB design with three replications. The plot size was kept 4m × 3m. Standard agronomic and plant protection

measures were carried out in the crop. The harvesting was done on 03-12-2018. Data regarding different agronomic traits were recorded and hybrids with good performance were selected for on farm testing. The data are given in Table 73.

Table-73: Results of Hybrid Maize Macro Yield Trial No. 1, Faisalabad

Rank No.	Entry	Grain yield kg/ha.	Days to 50% tassel.	Days to 50% silk	Plant height cm.	Cob height cm.	No. of plants harvest.	No. of cobs/ plot harvest.
1	FH-988	10568a	51	53	240	142	85	85
2	FH-1046(C)	9659ab	49	51	206	115	86	86
3	FH-922	9633ab	49	51	241	129	79	79
4	FH-1012	9422bc	55	57	212	108	78	78
5	FH-793	9077bc	49	51	202	119	73	73
6	FH-950	8570cd	50	52	253	147	74	72
7	YH-1898 (C)	8528cd	52	54	184	106	73	73
8	NK-6654 (C)	7918d	56	58	234	134	79	78
9	FH-949	7879d	51	52	188	109	66	63
	CV%	6.56	0.85	0.85	0.83	3.85	6.11	6.39
	LSD 5%	1025.5	0.78	0.78	3.14	8.22	8.14	8.46

Data presented in the Table-73 reveals that the significant differences due to hybrids were present in this trial and local hybrid FH-988 showing grain yield 10568 Kg/ha is at the top position. Other local hybrids FH-922, FH-102 and FH-793 showing grain yields 9633, 9422 and 9077 Kg/ha, respectively are at par with top yielding local hybrid and significantly higher grain yielder than local check hybrid YH-1898 (8528 kg/ha) and commercial hybrid NK-6654 (7918 Kg/ha). Significant differences were observed for days to 50% tasseling and silking. The commercial check NK-6654 took the maximum days for 50% tasseling (56) and silking (58) and a local hybrid FH-1012 took the second highest maximum number of days for 50% tasseling (55) and silking (57). The commercial check YH-1898 attained the minimum plant height of 184 cm with a cob height of 106 cm which is slightly above the mid bearing cob height. This cob height trend is also apparent in all other hybrids with cobs above the height of mid bearing cob position. Among the local hybrids, FH-949 attained the minimum plant height of 188 cm and FH-950 attained the maximum (253cm). Number of plants per plot and cobs harvested were also showing statistically significant differences.

1.2 Hybrid Maize Macro Yield Trial No. 2: (Kharif 2018)

Twelve entries including two local and one commercial hybrid as check were included in this trial. The trial was sown on 07-08-2018 in RCB design with three replications. The plot size was kept 4m x 2.25m. Standard agronomic and plant protection measures were carried out in the experiment. The harvesting was done on 03-12-2018. Data regarding different characters were recorded and results are presented in Table-74

Table-74: Results of Hybrid Maize Macro Yield Trial No. 2, Faisalabad

Rank No.	Entry	Grain yield kg/ha.	Days to 50% tassel.	Days to 50% silk	Plant height cm.	Cob height cm.	No. of plants harvest.	No. of cobs/ plot harvest.
1	FH-1046 (C)	11398a	53	55	180	99	56	56
2	NK-6654 (C)	11220ab	54	56	195	103	54	54
3	FH-1210	10179bc	51	53	201	98	54	54
4	FH-1125	9963cd	48	50	184	85	51	51

5	FH-932	9816cd	53	55	196	100	52	52
6	FH-1114	9264cde	55	57	171	92	55	54
7	YH-1898 (C)	9031de	53	55	182	97	53	53
8	FH-929	9015de	51	53	193	102	53	53
9	FH-1117	8482ef	52	54	197	112	51	51
10	FH-949	8302ef	51	53	185	98	52	51
11	FH-1137	7846f	54	56	149	74	50	49
12	FH-1166	7741f	48	50	193	102	55	55
CV%		7.07	2.35	2.14	7.55	7.61	4.78	4.88
LSD 5%		1120.4	2.06	1.95	23.11	12.57	N.s	N.s

The results presented in the Table-74 showed that the significant differences due to hybrids were present in this trial. Local check hybrid FH-1046 gave maximum grain yield (11398 kg/ha) followed by commercial check NK-6654 (11220 kg/ha). Local hybrids FH-1210, FH-1125, FH-932 and FH-1114 with grain yields 10179 kg/ha, 9963 kg/ha, 9816 kg/ha and 9264 kg/ha respectively, are significantly higher grain yielder than the local check hybrid YH-1898 (9031 kg/ha). Differences in days to 50% tasseling and silking were also significant. Local hybrid FH-1114 took the maximum days to 50% tasseling (55) and silking (57). Results for plant height and cob height were also showing statistically significant differences. The local hybrids FH-1210 attained maximum plant height (201 cm) and a cob height of 98 cm. This mid cob bearing trend is also present in the other hybrids too. The local hybrid FH-1137 attained minimum plant height (149 cm) with a mid bearing cob (74 cm). Number of plants per plot and cobs harvested were also showing statistically significant differences.

2.1 HYBRID MAIZE MICRO YIELD TRIALS NO.1: (KHARIF 2018)

Two sets of this trial were sown each with seventeen entries including two local and one commercial hybrid as check on 07-08-2018. The trial was laid out in RCB design with three replications. Plot size was kept 4m x 1.5m for each entry. Standard agronomic and plant protection measures were carried out in the experiment. The harvesting was done on 03-12-2018. Data regarding different traits were recorded and are given in Table-75.

Table-75: Results of Hybrid Maize Micro Yield Trial-1, Faisalabad

Rank No.	Entry	Grain yield kg/ha.	Days to 50% tassel.	Days to 50% silk	Plant height cm.	Cob height cm.	No. of plants harvest.	No. of cobs/ plot harvest.
1	FH-1036	12067a	55	57	190	113	39	39
2	FH-1206	10216b	55	57	184	94	36	35
3	FH- 988	9977b	53	55	172	109	38	38
4	FH-1046 (C)	9881b	55	57	181	105	40	40
5	Nk-6654 (C)	9832b	53	55	194	112	39	39
6	FH-1201	9499bc	55	57	184	100	32	32
7	FH-985	9463bc	51	53	159	87	34	34
8	YH-1898 (C)	9425bc	50	52	173	99	35	34
9	FH-1303	9371bc	52	55	161	85	40	40
10	FH-949	8925bcd	51	53	144	89	33	33
11	FH-1275	8766bcd	55	57	156	87	35	35
12	FH-1290	8747bcd	53	55	185	106	33	33
13	FH-1269	8135cde	55	57	154	90	34	34
14	FH-1280	7557de	56	58	141	75	38	38
15	FH-1352	7482de	54	56	182	98	30	29
16	FH-1360	6880e	55	57	193	110	35	35
17	FH-1287	6576e	54	56	207	113	30	31

CV%	8.66	1.75	1.50	1.11	0.95	8.17	8.28
LCD 5%	1650.2	1.97	1.76	4.10	1.97	6.08	6.14

The results presented in the Table-75 showed that statistically significant differences due to hybrids are observed for grain yield in this trial. Local hybrid FH-1036 gave maximum grain yield of 12067 kg/ha. Local hybrids FH-1206 and FH-988 were statistically at par with the commercial checks NK-6654 (9832 kg/ha) and local check FH-1046 (9881 kg/ha) while better yielder than local check YH-1898 (9425 kg/ha). Significant differences were also observed for days to 50% tasseling and silking. The minimum number of days to 50% tasseling (50) and silking (52) was observed for the commercial check YH-1898. Among the local hybrids FH-985 and FH-949 showed minimum number of days to 50% tasseling (51) and silking (53). Differences in plant height and cob height were also significant. The maximum plant height (207 cm) was shown by FH-1287 and the minimum plant height (141 cm) was observed for local hybrid FH-1280. Above the mid cob bearing trend was apparent in most of the hybrids. Number of plants per plot and cobs harvested were also statistically showing significant differences.

2.2 HYBRID MAIZE MICRO YIELD TRIAL NO.2: (KHARIF 2018)

Table-76: Results of Hybrid Maize Micro Yield Trial-2, Faisalabad

Rank No.	Entry	Grain yield kg/ha.	Days to 50% tassel.	Days to 50% silk	Plant height cm.	Cob height cm.	No. of plants harvest.	No. of cobs/ plot harvest.
1	FH-1036	11160	55	57	182	101	142	39
2	FH-1392	10873	54	56	192	85	139	40
3	FH-988	10277	55	57	153	73	113	35
4	FH-1046 (C)	10112	53	55	162	86	124	40
5	FH-1387	10106	55	57	194	94	144	39
6	FH-1377	10036	55	57	165	83	124	40
7	FH-1386	9853	55	57	180	77	129	38
8	FH-1390	9434	55	58	173	91	132	39
9	FH-1379	9285	55	57	159	83	121	35
10	FH-1210	8711	54	56	189	96	143	36
11	FH-1384	8507	53	55	201	106	153	36
12	NK-6654 (C)	8487	54	56	193	107	150	40
13	FH-1374	8442	53	55	177	83	130	36
14	FH-1370	8426	51	53	176	80	128	36
15	YH-1898 (C)	8146	53	55	182	94	138	37
16	FH-949	7986	52	54	175	86	130	32
17	FH-1375	7567	53	55	192	106	149	39
C V.%		11.28	1.06	1.17	1.00	2.08	5.93	5.20
LSD 5%		N.S	1.19	1.37	3.78	3.96	N.S	4.10

The results presented in the Table-76 regarding trial-2 showed that there are statistically non-significant differences due to hybrids for grain yield. Local hybrid FH-1036 gave grain yield of 11160 kg/ha and was at the top position. The two commercial checks NK-6654 and YH-1898 with grain yield 8487 kg/ha and 8146 kg/ha, respectively were at 12^{th} and 15^{th} positions among all the other hybrids. Significant differences were observed for days to 50% tas-

seling and silking. Local hybrid FH-1370 took the minimum days to 50% tasseling (51) and silking (53) showing its behavior toward earliness. Differences in plant height and cob height were also significant. The maximum plant height (201 cm) was shown by FH-1384 and the minimum plant height (153 cm) was observed for the local hybrid FH-988. Mid to a bit higher cob height was shown by most of the hybrids. Statistically non-significant differences were also observed for number of plants per plot but significant for number of cobs harvested.

2.3 HYBRID MAIZE MICRO YIELD TRIAL NO.3: (KHARIF 2018

Table-77: Results of Hybrid Maize Micro Yield Trial-3, Faisalabad

Rank No.	Entry	Grain yield kg/ha.	Days to 50% tassel.	Days to 50% silk	Plant height cm.	Cob height cm.	No. of plants harvest.	No. of cobs/ plot harvest.
1	FH-1420	12429a	52	54	168	88	41	41
2	FH-1398	11301ab	54	56	169	86	38	38
3	FH-1046 (C)	11132ab	53	55	166	109	36	37
4	FH-1396	10322bc	56	58	188	105	38	38
5	FH-1430	9661bcd	54	56	218	115	36	36
6	FH-1409	9522bcd	55	32	193	103	33	33
7	FH-1393	9325bcd	56	58	189	94	39	39
8	FH-949	9014cd	53	55	165	76	37	36
9	FH-1400	9002cd	55	57	212	114	38	39
10	NK-6654 (C)	8925cd	53	55	195	94	38	38
11	FH-1419	8640cde	52	55	219	114	35	34
12	FH-1418	8540cde	53	55	193	104	35	35
13	FH-1427	8484cde	54	56	183	108	36	36
14	YH-1898 (C)	8202de	53	55	130	68	31	31
15	FH-1424	8103de	52	54	182	57	34	34
16	FH-1412	7636de	55	57	136	70	35	35
17	FH-1411	6725e	55	57	162	84	37	36
C V.%		10.50	1.49	15.96	1.02	16.73	6.71	6.58
LSD 5%		2055.7	1.69	N.S	3.91	33.05	N.S	N.S

The results presented in the Table-77 regarding trial-3 showed that there are statistically significant differences due to hybrids for grain yield. Local hybrid FH-1420 gave grain yield of 12429 kg/ha and remained at the top position. The two other local hybrids FH-1398 (11301 kg/ha) and local check FH-1046 (11132 kg/ha) were statistically at par with the top yielding local hybrid. The local hybrids FH-1396, FH-1430, FH-1409 and FH-1393(10322, 9661, 9522, and 9325 kg/ha, respectively) were statistically higher grain yielder than commercial check NK-6654 (8925 kg/ha) and local check YH-1898 (8202 kg/ha). Significant differences were also observed for days to 50% tasseling but non-significant for 50% days to silking. Local hybrid FH-1424 took the minimum days to 50% tasseling (52) and silking (54) showing its behavior toward earliness. Differences in plant height and cob height were significant. The maximum plant height (219 cm) was shown by a local hybrid FH-1419 and the minimum plant height (130 cm) was observed for the commercial check YH-1898. The hybrids FH-1420, FH-1398, FH-1393, FH-949 and FH-1412 exhibited mid bearing cobs which will be helpful in developing lodging resistant hybrids. Most of the other hybrids possessed cobs

higher than this position. Statistically non-significant differences were observed for number of plants per plot and cobs harvested.

2.4 HYBRID MAIZE MICRO YIELD TRIAL NO.4 (KHARIF 2018)

Table-78: Results of Hybrid Maize Micro Yield Trial-4, Faisalabad

Rank No.	Entry	Grain yield kg/ha.	Days to 50% tassel.	Days to 50% silk	Plant height cm.	Cob height cm.	No. of plants harvest.	No. of cobs/ plot harvest.
1	FH-1046 (C)	11259a	53	57	197	104	39	39
2	FH-1360	10460ab	52	54	165	86	40	41
3	FH-949	9836abc	55	57	173	82	36	36
4	FH-1457	9551bc	49	55	189	105	36	36
5	FH-1458	9397bc	56	60	216	110	34	34
6	NK-6654 (C)	9369bcd	51	55	169	84	39	40
7	FH-1461	9249bc..e	55	57	201	105	37	37
8	FH-1455	9244bc..e	55	57	125	70	31	31
9	FH-1453	8409cd..f	52	56	183	97	34	34
10	FH-1463	8010def	51	54	195	96	32	32
11	YH-1898 (C)	7842ef	56	59	164	73	36	36
12	FH-1451	7760f	52	55	199	98	35	33
13	FH-1450	7663f	55	58	158	77	26	26
14	FH-1460	7604f	53	57	205	106	33	31
15	FH-1443	7442fg	56	58	184	84	33	33
16	FH-1471	7067fg	52	55	185	93	34	32
17	FH-1472	5988g	53	57	198	98	32	24
CV%		8.06	0.58	0.56	0.92	1.98	8.59	8.54
LCD 5%		1469.6	0.65	0.65	3.54	3.86	6.25	6.07

The results presented in the Table-78 regarding trial-4 showed that there are statistically significant differences due to hybrids for grain yield. Local check hybrid FH-1046 gave grain yield of 11259 kg/ha and remained at the top position followed by local hybrids FH-1360 (10460 kg/ha). The local hybrids FH-1457 and FH-1458 (9551 kg/ha and 9397 kg/ha) were statistically better grain yielder than the commercial check NK-6654 (9369 kg/ha) and local hybrid YH-1898 (7842 kg/ha). Significant differences were also observed for days to 50% tasseling and silking. Local hybrid FH-1457 took the minimum days to 50% tasseling (49) and silking (55) showing its behavior toward earliness. Differences in plant height and cob height were also significant. The maximum plant height (216 cm) was shown by FH-1458 and the minimum plant height (125 cm) was observed for the local hybrid FH-1455. Mid to a slightly high cob bearing trend was apparent in most of the hybrids in the trial. Statistically significant differences were also observed for number of plants per plot and cobs harvested.

3. HYBRID MAIZE PRELIMINARY YIELD TRIALS (KHARIF 2018)

3.1 HYBRID MAIZE PRELIMINARY YIELD TRIAL No. 1 (KHARIF 2018)

Six sets of this trial were sown on 07-08-2018 with twenty nine entries each including one commercial and one local hybrid as check. The trial was laid out in RCB design with three replications. One row of four meters length (plot size 4m x 0.75m) for each entry was planted.

Standard agronomic and plant protection measures were carried out in the crop. The harvesting was done on 04-12-2018. Date regarding different traits was recorded and elite hybrids were selected for further evaluation. The data are given in Table 5.

Table79: Results of Hybrid Maize Preliminary Yield Trial-1 (Kharif 2018), Faisalabad

Rank No.	Entry	Grain yield kg/ha.	Days to 50% tassel.	Days to 50% silk	Plant height cm.	Cob height cm.	No. of plants harvest.	No. of cobs/ plot harvest.
1	FH-1521	11460	54	56	136	72	18	18
2	FH-1512	11252	53	55	107	65	20	20
3	FH-1514	11150	53	55	171	80	21	21
4	FH-1517	10908	54	56	128	73	19	19
5	FH-1531	10824	58	59	158	85	19	19
6	FH-1524	10790	57	59	138	78	19	19
7	FH-1511	10767	54	55	157	75	20	21
8	FH-1530	10724	57	58	160	80	19	19
9	FH-1520	10695	54	56	146	86	19	19
10	FH-1525	10692	56	57	163	81	20	20
11	FH-1516	10516	59	59	103	59	19	19
12	FH-1522	10306	55	57	144	74	19	19
13	FH-1518	10274	56	59	163	92	20	20
14	FH-1513	10237	59	62	106	64	16	16
15	FH-1523	10194	55	57	165	84	20	20
16	FH-1515	10105	56	58	103	59	19	19
17	FH-1532	9967	57	58	173	90	18	17
18	NK-6654 (C)	9930	54	56	171	97	19	19
19	FH-1046 (C)	9810	56	58	119	50	20	20
20	FH-1528	9799	55	57	139	69	20	20
21	FH-1509	9784	52	55	147	92	19	19
22	FH-1519	9546	56	57	167	97	20	20
23	FH-1533	9450	55	56	148	81	20	20
24	FH-1510	9387	51	53	166	79	17	17
25	FH-1526	8841	56	57	166	101	16	16
26	FH-1508	8724	53	55	168	77	17	17
27	FH-1534	8609	54	57	171	92	16	16
28	YH-1898 (C)	8412	54	56	160	80	18	17
29	FH-1527	8086	56	58	108	67	15	14
30	FH-1529	7537	56	58	172	81	14	14
CV%		10.33	2.54	2.51	1.39	4.91	7.98	8.49
LSD 5%		N.S	2.85	2.91	4.20	7.87	2.97	3.17

The results of data regarding trial-1 presented in the Table-79 showed that there are statistically non-significant differences due to hybrids for grain yield kg/ha among entries included in this trial. The local hybrid FH-1521 with grain yields 11460 kg/ha remained at the top position followed by other local hybrids FH-1512 (11252 kg/ha) and FH-1514 (11150 kg/ha). The results for the number of days to 50% tasseling and 50% silking showed statistically significant differences. Local hybrid FH-1510 showed earliness taking minimum days to complete 50% tasseling (51) and 50% silking (53). Significant differences were observed for plant height and cob height. Local hybrid FH-1515 attained minimum plant height (103 cm). The local hybrid FH-1532 (173 cm) attained maximum plant height with cob height of 90 cm. Higher than mid cob bearing trend was observed in most of the local hybrids. Results for

number of plants harvested and No. of cobs harvested were also showing significant differences.

3.2 Hybrid Maize Preliminary Yield Trial No. 2 (Kharif 2018)

Table -80: Results of Hybrid Maize Preliminary Yield Trial-2 Faisalabad.

Rank No.	Entry	Grain yield kg/ha.	Days to 50% tassel.	Days to 50% silk	Plant height cm.	Cob height cm.	No. of plants harvest.	No. of cobs/ plot harvest.
1	FH-1555	11400a	56	58	143	84	21	21
2	FH-1554	10794ab	54	56	164	89	17	17
3	FH-1558	9799abc	55	57	163	90	20	20
4	FH-1535	9597abcd	57	59	142	73	20	20
5	FH-1553	9576abcd	55	57	144	83	19	19
6	FH-1552	9240bcde	56	58	158	93	19	19
7	FH-1550	9163bcde	54	56	156	88	20	20
8	FH-1546	9034bcde	55	58	142	89	18	18
9	FH-1536	9003bcde	55	57	144	82	18	18
10	YH-1898(C)	8958bcde	53	54	154	88	15	15
11	FH-1412	8892bcde	54	56	155	83	19	19
12	FH-1557	8880bcde	54	57	133	73	19	19
13	FH-1036	8773bcde	56	59	162	93	19	19
14	FH-1551	8762bcde	55	57	160	98	16	16
15	FH-1560	8729cde	55	57	161	90	18	18
16	FH-1542	8637cde	53	55	142	83	15	15
17	FH-1537	8519cde	54	56	160	92	18	18
18	FH-1548	8487cde	54	56	158	93	16	16
19	FH-1549	8389cde	53	56	151	84	16	16
20	FH-1545	8341cde	55	57	131	73	14	14
21	FH-1544	8307cde	55	57	123	73	17	17
22	NK-6654(C)	8070cdef	55	57	173	105	19	19
23	FH-1541	7975cdef	54	56	157	83	17	17
24	FH-1547	7973cdef	54	56	152	92	15	15
25	FH-1540	7962cdef	56	58	158	83	18	18
26	FH-1539	7669def	55	57	124	82	19	19
27	FH-1543	7581def	55	58	112	72	15	15
28	FH-1561	7420ef	55	57	156	84	17	17
29	FH-1556	7239ef	56	58	122	63	19	19
30	FH-1559	6201f	56	58	122	64	13	13
CV%		11.50	1.91	2.35	1.11	1.61	11.64	11.64
LCD 5%		2033.5	N.s	N.s	3.34	2.75	4.13	4.13

Statistical analysis of data presented in above Table-80 regarding trial -2 reveals that local hybrid FH-1555 out yielded all the hybrids with yield 11400 kg/ha followed by FH-1554 (10792 kg/ha), FH-1558 (9799 kg/ha), FH-1535 (9597 kg/ha) and FH-1553 (9576 kg/ha) which were statistically at par with the top yielding local hybrid. The commercial check hybrids YH-1898 (8958 kg/ha) and NK-6654 (8070 kg/ha) were at the 10^{th} and 22^{nd} position out of 30 hybrids in the trial. Days to 50% tasseling and 50% silking were showing statistically non-significant differences. FH-1535 took the maximum days to complete 50% tasseling (57) and 50% silking (59) respectively. Significant differences were observed for plant height and cob height. Maximum plant height was attained by FH-1554 (164 cm) and FH-1557 attained minimum plant height (133 cm). The cob bearing trend was higher than middle stem position

in most of the hybrids. Number of plants and cobs harvested per plot were also showing statistically significant differences.

3.3 HYBRID MAIZE PRELIMINARY YIELD TRIAL NO. 3 (KHARIF 2018)

Table:-81: Results of Hybrid Maize Preliminary Yield Trial-3 , Faisalabad.

Rank No.	Entry	Grain yield kg/ha.	Days to 50% tassel.	Days to 50% silk	Plant height cm.	Cob height cm.	No. of plants harvest.	No. of cobs/ plot harvest.
1	FH-1565	10807	53	55	145	68	18	18
2	FH-1571	9785	56	58	165	78	18	18
3	FH-1569	8791	57	59	125	69	21	22
4	FH-1566	8373	55	57	143	64	18	18
5	FH-1580	8360	55	58	147	69	16	16
6	FH-1581	8217	55	57	174	86	18	18
7	FH-1563	8208	55	57	153	77	19	19
8	FH-1567	8029	57	59	135	61	17	17
9	FH-1584	8018	55	57	157	89	20	21
10	NK-6654 (C)	7952	56	58	154	80	16	16
11	FH-1574	7925	55	57	137	72	19	19
12	FH-1585	7861	55	57	161	92	17	17
13	FH-1583	7844	57	59	150	58	16	16
14	FH-1575	7843	57	59	113	69	15	15
15	FH-1588	7791	55	57	176	98	15	15
16	FH-1582	7787	56	58	174	73	12	12
17	FH-1568	7523	54	56	145	72	14	14
18	FH-1572	7510	58	60	131	63	18	18
19	FH-1579	7476	55	57	139	71	15	15
20	FH-1564	7419	54	56	157	68	18	18
21	FH-1570	7392	55	58	146	71	15	15
22	YH-1898 (C)	7308	56	58	132	73	15	15
23	FH-1576	7295	57	59	111	59	16	16
24	FH-949	7289	54	56	157	75	17	16
25	FH-1587	7192	55	57	135	78	17	17
26	FH-1036	7188	57	59	146	55	16	16
27	FH-1510	7104	53	56	174	71	13	13
28	FH-1586	7040	58	60	100	45	14	14
29	FH-1573	6921	57	59	93	40	17	17
30	FH-1578	6197	54	56	173	95	16	16
CV%		11.53	1.81	1.76	6.80	8.28	9.87	11.14
LSD 5%		N.S	2.04	2.05	20.12	12.04	3.28	3.71

The data presented in above Table-81 regarding trial-3 observed statistically non-significant differences due to hybrids in grain yield kg/ha. The local hybrid FH-1565 out yielded all the hybrids with grain yield 10807 kg/ha followed by FH-1571 (9785 kg/ha) and FH-1569 (8791 kg/ha). One commercial check NK-6654 (7952 kg/ha) is at 10th position and other YH-1898 (7308 kg/ha) at 22nd position. Days to 50% tasseling and 50% silking were also showing statistically significant differences. FH-1572 took the maximum days to complete 50% tasseling (58) and 50% silking (60) respectively. Significant differences were observed for plant height and cob height. Maximum plant height was attained by FH-1588 (7791 cm) and FH-1573 attained minimum plant height (93 cm). Mid to low cob bearing was observed with maximum cob height (98 cm) of local hybrid FH-1588 and minimum cob height

(40 cm) of the local hybrid FH-1573 was observed. Number of plants and cobs harvested per plot were also showing statistically significant differences.

3.4 HYBRID MAIZE PRELIMINARY YIELD TRIAL NO. 4 (KHARIF 2018)

Table -82: Results of Hybrid Maize Preliminary Yield Trial-, Faisalabad.

Rank No.	Entry	Grain yield kg/ha.	Days to 50% tassel.	Days to 50% silk	Plant height cm.	Cob height cm.	No. of plants harvest.	No. of cobs/ plot harvest.
1	FH-1614	10604a	55	57	173	94	16	16
2	FH-1594	10578a	57	59	132	72	20	20
3	FH-1607	10506ab	54	56	207	105	20	21
4	FH-1601	10215abc	57	59	165	90	20	21
5	NK-6654	9683ab..d	55	57	209	107	19	19
6	FH-1591	9533ab..e	55	57	158	78	19	19
7	FH-1611	9360ab..e	54	56	194	105	20	20
8	FH-1603	9321ab..e	56	58	165	84	19	18
9	FH-1602	9256ab..f	55	57	195	92	16	16
10	FH-1606	9099bc..g	55	57	225	119	19	19
11	FH-1589	9038bc..h	58	60	143	75	18	18
12	FH-1597	8967cd..h	56	58	84	46	19	19
13	FH-1599	8874cd..h	59	61	194	94	16	16
14	FH-1604	8591de..i	56	58	185	89	18	18
15	YH-1898	8383de..j	57	59	133	72	18	18
16	FH-1609	8232de..j	54	56	163	72	16	16
17	FH-1598	8190ef..j	56	58	145	73	16	15
18	FH-1593	8160ef..j	56	58	142	72	17	17
19	FH-1610	7808fg..j	55	57	190	82	18	18
20	FH-1600	7775gh..j	55	58	145	82	16	16
21	FH-1605	7750gh..k	55	57	209	105	15	15
22	FH-1590	7694gh..k	58	60	163	106	18	18
23	FH-1592	7634gh..l	55	57	147	78	14	14
24	FH-1612	7616hi..m	54	56	182	105	19	18
25	FH-1046	7296ij..m	56	58	166	82	17	17
26	FH-1596	7120ij..m	59	61	93	48	16	16
27	FH-1613	7080jk..m	54	56	194	108	15	14
28	FH-1595	6289klm	57	59	125	67	16	16
29	FH-1615	6197lm	52	54	172	82	12	13
30	FH-1608	6153m	54	56	153	82	17	17
CV%		8.57	2.20	2.04	1.06	1.29	9.86	10.35
LCD 5%		1477.8	2.49	9.86	3.58	4.08	3.45	3.61

Statistical analysis of data presented in above Table-82 regarding trial-4 reveals that local hybrid FH-1614 out yielded all the hybrids with yield 10604 kg/ha followed by other local hybrids FH-1594 (10578 kg/ha), FH-1607 (10506 kg/ha), FH-1601 (10215 kg/ha), commercial hybrid NK-6654 (9683 kg/ha), FH-1591 (9533 kg/ha), FH-1611 (9360 kg/ha), FH-1603 (9321 kg/ha) and FH-1602 (9256 kg/ha). These all are at par with the top yielding local hybrid. Days to 50% tasseling and 50% silking were also showing statistically significant differences. Local hybrid FH-1615 took the minimum days to 50% tasseling (52) and silking (54) showing its behavior toward earliness. Significant differences were observed for plant height and cob height. Maximum plant height was attained by FH-1606 (225 cm) and FH-1597 attained minimum plant height (84 cm). Mid to a bit higher cob bearing trend was observed with maximum cob height (119 cm) of local hybrid FH-1606 and minimum cob height (46 cm) of

the local hybrid FH-1597 was observed. Number of plants and cobs harvested per plot were also showing statistically significant difference.

3.5 HYBRID MAIZE PRELIMINARY YIELD TRIAL NO. 5 (KHARIF 2018)

Table-83: Results of Hybrid Maize Preliminary Yield Trial-5, Faisalabad.

Rank No.	Entry	Grain yield kg/ha.	Days to 50% tassel.	Days to 50% silk	Plant height cm.	Cob height cm.	No. of plants harvest.	No. of cobs/ plot har-vest.
1	FH-1627	11390a	55	57	142	70	19	19
2	FH-1626	11100ab	55	57	156	84	20	20
3	FH-1621	10951ab	54	56	184	90	23	23
4	FH-1618	9941abc	54	56	199	93	20	20
5	FH-1046	9936abc	56	58	157	82	19	19
6	FH-1596	9761ab..d	57	59	99	48	17	16
7	FH-1617	9625ab..e	55	57	158	72	19	19
8	FH-1620	9500ab..f	54	56	189	88	15	16
9	FH-1630	9275ab..g	55	57	188	92	17	16
10	FH-1635	9012ab..h	56	58	128	80	17	16
11	YH-1898 (C)	8890ab..h	54	56	177	89	17	17
12	FH-1623	8740ab..h	56	58	188	90	20	20
13	FH-1637	8699ab..h	54	56	208	110	20	19
14	NK-6654 (C)	8663ab..h	56	58	215	107	18	19
15	FH-1622	8598ab..h	54	56	152	69	18	18
16	FH-1616	8568ab..i	52	54	180	92	18	18
17	FH-1624	8455bc..i	56	58	167	85	19	19
18	FH-1632	8327bc..i	56	58	205	108	16	16
19	FH-1619	8195bc..i	53	55	189	75	17	17
20	FH-1638	7211cd..i	53	55	209	105	16	16
21	FH-1636	7188cd..i	56	59	208	108	18	19
22	FH-1642	7141cd..i	54	56	128	64	15	14
23	FH-1641	6939de..i	54	56	123	52	18	18
24	FH-1634	6907de..i	54	56	144	62	15	15
25	FH-1639	6748ef..i	54	56	165	84	18	18
26	FH-1640	6683fg..i	54	56	145	62	17	17
27	FH-1036	6576ghi	54	56	183	93	12	13
28	FH-1631	6496ghi	56	58	165	84	17	16
29	FH-1628	6342hi	55	57	153	71	16	16
30	FH-1633	5656i	54	56	131	65	16	15
CV%		17.02	0.76	0.57	1.07	2.32	11.88	13.29
LSD 5%		2917.6	0.84	0.65	3.67	3.89	4.20	N.s

Statistical analysis of data presented in above Table-83 reveals that local hybrid FH-1627 out yielded all the hybrids with yield 11390 kg/ha followed by other local hybrids FH-1626 (11100 kg/ha), FH-1621 (10951 kg/ha), FH-1618 (9941 kg/ha), FH-1046 (9936 kg/ha), FH-1596 (9761 kg/ha), FH-1617 (9625 kg/ha), FH-1620 (9500 kg/ha), FH-1630 (9275 kg/ha), FH-1635 (9012 kg/ha), YH-1898 (8890 kg/ha), FH-1623 (8740 kg/ha), FH-1637 (8699 kg/ha), NK-6654 (8663 kg/ha), FH-1622 (8598 kg/ha) and FH-1616 (8568 kg/ha). These all are statistically at par with the top yielding local hybrid. Days to 50% tasseling and 50% silking were also showing statistically significant differences. Local hybrid FH-1616 took the minimum days to 50% tasseling (52) and silking (54) showing its behavior toward earliness. Significant differences were observed for plant height and cob height. Minimum plant height was attained by FH-1596 (9761 cm). Mid to a bit high cob bearing trend was observed in most of the hybrids with maximum cob height (110 cm) of local hybrid FH-1637 and minimum cob height (48 cm) of the local hybrid FH-1596

was observed. The number of plants harvested per plot was showing statistically significant differences but number of cobs harvested showed non-significant differences.

3.6 HYBRID MAIZE PRELIMINARY YIELD TRIAL NO. 6 (KHARIF 2018)

Table-84: Results of Hybrid Maize Preliminary Yield Trial-6, 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 harvest.	No. of cobs/ plot harvest.
1	FH-1036	10677a	56	59	163	91	21	21
2	FH-1660	10596ab	52	54	175	82	20	19
3	FH-1210	10093abc	55	57	155	80	17	16
4	FH-949	9958abc	55	57	135	68	17	16
5	FH-1659	9912abc	52	54	187	103	19	19
6	NK-6654 (C)	9581ab..d	54	56	172	84	19	19
7	FH-1647	9516ab..d	54	56	174	81	19	19
8	FH-1623	9493ab..d	53	55	162	86	18	18
9	FH-1656	9189ab..d	53	55	163	84	19	19
10	FH-1653	9120ab..e	56	59	155	82	14	14
11	FH-1650	9059ab..f	54	56	185	103	16	16
12	FH-1662	8687bc..g	54	56	161	82	19	19
13	FH-1666	8639bc..g	56	58	173	90	20	20
14	FH-1645	8400cd..h	53	55	164	88	19	19
15	FH-1654	8320cd..h	58	61	136	64	17	16
16	YH-1898 (C)	8129cd..h	53	56	164	87	20	21
17	FH-1663	7829de..i	53	55	164	82	17	17
18	FH-1644	7636de..j	56	59	173	92	15	14
19	FH-1661	7634de..j	54	56	172	90	18	18
20	FH-1658	7187ef..j	53	55	187	90	16	16
21	FH-1655	7172ef..j	55	57	161	83	16	16
22	FH-1664	7140fg..j	54	56	173	84	17	16
23	FH-1643	6872gh..j	56	59	142	73	12	12
24	FH-1649	6721gh..j	55	58	164	84	16	16
25	FH-1667	6570hij	54	56	162	85	18	18
26	FH-1657	6130ij	54	56	173	93	16	16
27	FH-1646	6025ij	54	56	174	91	14	14
28	FH-1651	5985ij	51	53	162	92	18	19
29	FH-1665	5741j	55	57	181	90	18	18
30	FH-1648	5692j	55	57	172	84	14	13
CV%		11.89	2.62	2.90	0.79	1.63	12.56	13.30
LSD 5%		1975.4	2.89	3.33	2.66	2.85	4.38	4.61

Statistical analysis of data presented in above table reveals that local hybrid FH-1036 out yielded all the hybrids with yield 10677 kg/ha followed by FH-1660 (10596 kg/ha), FH-1210 (10093 kg/ha), FH-949 (9958 kg/ha) and FH-1659 (9912 kg/ha). Days to 50% tasseling and 50% silking were also showing statistically significant differences. Local hybrid FH-1651 took the minimum days to 50% tasseling (51) and silking (53) showing its behavior toward earliness. Significant differences were observed for plant height and cob height. Minimum plant height was attained by FH-949 (135 cm) with cob height of 68 cm. Mid to a bit higher

than middle position cob bearing trend was apparent in most of the hybrids. Number of plants and cobs harvested per plot were also showing statistically significant differences.

4. NATIONAL UNIFORM HYBRID MAIZE YIELD TRIAL (KHARIF 2018)

4.1 NATIONAL UNIFORM HYBRID MAIZE YIELD TRIAL-(Yellow Maize)

This trial was sown with eighty three entries on 07-08-2018 laid out in RCB design with three replications. Two rows of four meters length for each entry were planted. Standard agronomic and plant protection measures were carried out in the experiment. Harvesting was done on06-12-2018. Data regarding different traits were recorded and elite hybrids were selected for further evaluation. The data are given in following table-85.

Table-85: Results of National Uniform Hybrid Maize (Yellow) Yield Trial, 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 harvest.	No. of cobs/ plot harvest.
1	SG-7852	10873a	54	56	186	106	37	37
2	S 9263	10760ab	54	56	205	115	34	34
3	NK 7124	10194abc	53	55	212	107	38	38
4	S 7750	10085ab..d	54	56	193	112	32	32
5	ST-1387	9915ab..d	54	56	193	104	39	40
6	WS131S/33y	9879ab..e	54	56	200	114	40	40
7	SB-6082	9854ab..e	53	55	189	105	36	36
8	SB-13	9746ab..f	53	54	195	133	37	37
9	SS-92	9376ab..g	53	55	194	110	36	36
10	77M87	9371ab..h	53	55	188	107	32	32
11	CM-107	9350ab..i	53	55	179	99	38	38
12	CS-2Y20	9203ab..j	55	57	183	96	37	37
13	MS-7411	9138ab..j	54	56	216	107	35	35
14	IS-5456	9118ab..k	51	54	199	107	34	34
15	IS-7628	9063ab..l	54	56	195	112	32	32
16	AH-9272	9054ab..m	53	55	185	102	34	34
17	AAS 9633	9029ab..m	54	56	206	111	34	34
18	Hi 9722	8910ab..m	53	55	211	105	37	37
19	JS-707	8906ab..n	54	56	185	105	38	38
20	Ag-4040	8827ab..n	53	55	198	115	33	33
21	MA-101	8817ab..n	53	55	183	103	32	32
22	RS-6464	8704ab..n	53	55	191	104	31	31
23	KWS 10	8692ab..o	55	57	195	102	35	35
24	RS936	8672ab..o	54	56	201	114	33	33
25	WS-313	8661ab..o	54	56	195	109	31	31
26	SB-9674	8592ab..p	50	52	179	91	34	34
27	C-905	8591ab..q	53	55	199	112	34	34
28	YH-5560	8587ab..q	53	55	193	104	34	34
29	NTH-6618	8583ab..r	51	54	175	92	34	34
30	77M86	8576ab..r	54	56	192	112	32	32
31	DS 3377	8562ab..r	56	57	208	101	32	32
32	SS-93	8552ab..r	56	58	190	107	33	33

33	SS-777	8493ab..r	53	55	196	99	36	36
34	G-3	8485ab..r	53	55	192	114	34	34
35	WS-93	8433ab..r	53	55	185	93	33	33
36	2141	8410ab..r	54	56	187	105	32	32
37	5015	8402ab..r	53	55	190	93	30	30
38	3066	8377ab..r	54	56	183	96	34	34
39	P888	8342bc..r	54	56	188	97	31	31
40	IS-5448	8331bc..r	54	56	179	101	30	30
41	MS-449	8323bc..r	54	56	196	108	37	37
42	H-3	8311bc..s	54	56	175	108	36	36
43	4050	8252bc..s	53	55	191	106	35	35
44	4060	8251b…s	54	56	205	120	35	35
45	4070	8250b…s	54	56	171	102	33	33
46	848	8244b…s	55	56	187	107	32	32
47	BF-92	8188b…s	54	56	187	93	37	37
48	BF-99	8177b…s	54	56	198	112	33	33
49	KWS T 744	8174b…s	52	54	177	85	33	33
50	RS-7677	8152b…s	55	57	199	106	34	34
51	KWS 8933	8085b…s	55	56	195	103	34	34
52	DS 3366	8080c…t	51	53	177	119	33	33
53	70M70	8053c…t	55	58	182	108	36	36
54	DS 2468	7998c…u	51	53	179	89	29	29
55	DS 2271	7949c…u	52	54	193	95	30	30
56	YH-5482	7926c…u	52	54	185	91	31	31
57	C-915	7844d…u	51	53	181	91	34	34
58	YH-5568	7832d…u	53	55	197	104	31	31
59	SD 17S23	7793d…u	51	53	199	103	30	30
60	YH-5427	7760d…u	50	52	190	93	33	33
61	YH-5561	7760d…u	51	53	176	85	32	32
62	YH-1292	7744d…u	54	56	177	96	31	31
63	7786	7743d...u	51	53	182	98	31	31
64	20 R 88	7725e...u	54	54	172	87	33	33
65	P3582	7719e...u	53	55	182	105	38	38
66	P3583	7667e...u	53	55	195	102	30	30
67	P3875	7656e...u	56	57	181	95	31	31
68	P4084	7626f...u	54	57	189	102	31	31
69	YAM-135C	7615f...u	53	55	178	93	32	32
70	HI 9788	7584g...u	52	54	170	88	36	36
71	AAS 9435	7565g...u	53	55	165	95	32	32
72	2582	7558g...u	53	55	167	97	29	29
73	846	7555h...u	53	54	185	102	32	32
74	SD 17S22	7542h...u	54	56	203	113	34	34
75	YH-5569	7538i...u	52	54	196	103	35	35
76	2452Y	7513i...u	52	54	177	91	28	28
77	SD 32S33	7427i...u	55	58	162	88	31	31
78	SD 3392	7427i...u	54	56	178	91	29	29
79	R-6176	7395i...u	53	55	173	94	32	32
80	R 6180	7320i...u	52	54	186	91	29	29

81	9066	7259j...u	55	57	166	87	33	33
82	9067	7229j...u	52	54	159	76	33	33
83	AS-5178	7206j...u	54	56	186	105	29	29
84	PSHY-0402	7193k...u	53	55	184	96	24	24
85	PSHY-0404	7178k...u	55	57	193	96	30	30
86	PSHY-0408	7151k...u	54	56	194	103	32	32
87	FS131	7087l...u	54	56	188	94	28	28
88	PSHY-7608	7037m...u	53	54	185	103	32	32
89	EW13E33	7012n...u	53	54	168	93	26	26
90	3399	6795n...u	53	55	189	100	29	29
91	SD 17S24	6761n...u	53	55	186	96	32	32
92	HP313	6760o...u	53	55	167	91	30	30
93	YH1898 (Check 2)	6746o...u	51	53	180	91	37	37
94	AS-5266	6622p...u	52	54	185	80	29	29
95	TG-YM-945	6566p...u	56	57	183	97	25	25
96	25W87	6481q...u	53	55	189	91	28	28
97	FS999	6375r...u	54	56	191	95	31	31
98	PSHY-7604	6140stu	52	54	203	100	31	31
99	30Y87 (Check 1)	5917tu	53	55	169	101	34	34
100	AS-5277	5748u	53	55	197	97	28	28
CV%		16.87	2.65	2.66	9.75	14.14	12.13	12.23
LSD 5%		1.78	2.27	2.36	N.S	N.S	6.39	6.44

Table-85 contains data analysis of the trial National Uniform Hybrid Maize (Yellow) Yield Trial at Faisalabad location. Analysis of data revealed that statistically significant differences exist for grain yield kg/ha among entries included in this trial. The hybrids SG-7852 with grain yield 10873 kg/ha out yielded all other entries included. The AS-5277 was lower yielder giving 5748 kg/ha at this location.

5. National Uniform Hybrid Maize (White) Yield Trial (Kharif 2018)

This trial was sown with forty one entries on 07-08-2018. The trials were 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 07-12-2018. Data regarding different traits were recorded and elite hybrids were selected for further evaluation. The data are given in following table-86.

Table-86: Results of National Uniform Hybrid Maize Yield Trial (Yellow/ Sweet corn), 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 harvest.	No. of cobs/ plot harvest.
1	1	7122	50	52	187	102	33	34
2	2	6478	51	53	200	114	35	35
3	3	6085	51	54	202	108	33	33
4	5	6007	51	54	180	96	31	31
5	4	5840	52	54	200	103	31	32
CV%		13.55	1.43	1.64	22.57	32.19	14.83	15.06
LSD 5%		N.S	N.S	N.S	N.S	N.S	N.S	N.S

Table 86 contains data analysis of the trial at Faisalabad location. Analysis of data revealed that statistically non-significant differences exist for grain yield kg/ha among entries included in this trial. The entry 1 with grain yield 7122 kg/ha out yielded all other entries included and the entry 4 was lower yielder giving 1355 kg/ha at this location.

6. NATIONAL UNIFORM VARIETAL (OPV) MAIZE YIELD TRIAL (KHARIF 2018)

This trial was sown with ten entries on 07-08-2018. The trials were 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 07-12-2018. Data regarding different traits were recorded and elite hybrids were selected for further evaluation. The data are given in following table -87.

Table -87: Results of National Uniform Varietal Maize Yield, Faisalabad.

OPV	Yousafwala, MMRI	AARI Faislabad	Vehari, Ali Akbar	Dadu, Sindh	Pirsabak, CCRI	Shergarh, Petal Seed	Mean
YW-786	6376.5	6696	7534	4971	2394	5269	5540
Pearl (Check)	5048.9	5188	7577	5596	3221	6292	5487
CZP-132001	5928.6	5928	7181	5056	2439	5995	5421
YSC-15	2986	3305	5051	4892	3069	5926	4205
Local Swat sweet corn (Check)	3302.4	3559	6154	5476	2265	4176	4155
YPC-14	2964.4	3336	5316	5959	2308	4003	3981
CZP-132001	1192.2	1313	8010	5070	3209	3369	3694
TP-1221	1054	1275	8382	5781	2636	2396	3587
Local Swat Pop-corn (Check)	1594.6	1933	3741	5877	2194	4020	3227
TP-1217	632	877	3191	5106	3080	3774	2776
CV%	32.78	23.14	4.69	6.99	18	81.28	-
LSD	1747.7	1326.3	499.85	644.46	828.1	6305.3	-

The results presented in Table-87 revealed that the entry YW-786 stood first and entry Pearl (Check(was second by giving grain yield 5540 and 5487 kg/ha respectively followed by CZP-132001 which showed 5421 kg/ha.

DEMONSTRATION/ ON-FARM YIELD TRIALS:

On-farm Trial of approved/promising Hybrids/ OPV

Table -88: Results of Demonstration/ On-Farm Yield Trials

Sr. No.	Entry	Kot Bahadur, 18 Hazari	Gojra more Jhang	Chak No. 710, Karala	Chak No. 322 S.B T.T. Singh	Chak No. 124 S.B Sargodha	Average Grain yield
		Grain Yield (kg/ ha)					
1	Malka 2016	6025	6947	6256	6372	4882	6096
2	DTC00101	7647	7873	8124	6745	5737	7225

SPRING 2019:

SEASON AND ITS EFFECTS:

During January to June 2019, 29.3 mm rainfall was received. High rainfall received in the month of February, 2019. The detail of average maximum and minimum temperature and rainfall received during January 2019 to June 2019 is as follows:-

Sr. No.	Month/Year	Average Temperature (c°)		Rainfall (mm)
		Maximum	Minimum	
1	January, 2019	19.3	5.7	18.4
2	February, 2019	20.5	8	56.8
3	March, 2019	26.1	12.7	39.6
4	April, 2019	35.2	20	33.6
5	May, 2019	38.7	23	31.6
6	June, 2019	41.4	26.3	29.3

Twelve (12) different yield trials of hybrids were sown for evaluation.

1. Hybrid Maize Macro Yield Trial No. 1 (Spring 2019)

A trial comprised of nine single cross hybrids including two commercial and two local hybrids as checks were sown on 12-02-2019 according to RCB design with three replications. The plot size was kept 4m x 3m. The harvesting was done on 25-06-2019. Data regarding different agronomic traits were recorded and hybrids showing good performances were selected for on farm testing. The data are given in table-89.

Table-89: Results of Hybrid Maize Macro Yield Trial No. 1, Faisalabad

Sr. No	Hybrid Name	Grain Yield kg/ha	Stand Count (%)	Days to 50% tasseling	Days to 50% silking	Plant Height (cm)	Ear Height (cm)	Plants harvested	Ears harvested
1	FH-1337	12803 a	90	84	86	189	99	78	78
2	FH-1036	12628 ab	92	81	83	217	102	77	77
3	FH-1046 (C)	11859 ab	92	81	83	185	97	80	80
4	FH-988	11427 abc	88	83	86	206	110	72	72
5	FH-1205	10761 bcd	90	81	84	189	100	69	69
6	FH-1377	9618 cde	91	79	81	159	87	70	70
7	P-1543 (C)	9549 de	85	78	80	180	84	76	76
8	NK-8441(C)	8571 ef	89	79	81	170	82	69	69
9	YH-1898 (C)	6988 f	86	80	82	164	91	52	52
CV%		**10.33**	**4.21**	**0.33**	**0.4**	**1.31**	**8.9**	**5.76**	**5.76**
LCD 5%		**2640**	**NS**	**0.46**	**0.58**	**4.17**	**14.6**	**7.14**	**7.14**

Data presented in the Table-89 reveal statistically significant differences in grain yield due to hybrids. The hybrid FH-1337 gave maximum grain yield of 12803 kg/ha followed by local hybrid FH-1036 (12628 kg/ha). The local hybrid FH-1036 was at par with the local check FH-1046 (11859 kg/ha). Local hybrids, FH-1337, FH-988, FH-1205 and FH-1377 showed higher yield over one local check hybrid YH-1898 (6988 kg/ha) and two commercial checks P-1543 (9549 kg/ha) NK-8441 (8571 kg/ha). Significant differences were observed for days to 50% tasseling and silking. Local hybrid FH-1337 took the maximum days for 50% tasseling (84) and silking (86). Local check hybrid FH-1046 attained the maximum plant

height of 217 cm while its cob height remained 102 cm. Most of the hybrids exhibited mid to low cob bearing character. Number of plants harvested and cobs harvested were also showing statistically significant differences.

2. HYBRID MAIZE MACRO YIELD TRIAL No.2 (SPRING 2019)

This trial comprised of nine single cross hybrids including two commercial and two local hybrids as checks was sown on 12-02-2019. The trial was laid out according to RCB design with three replications. The plot size was kept 4m x 3m. The harvesting was done on 25-06-2019. Data regarding different agronomic traits were recorded and hybrids with good performances were selected for on farm testing. The data are presented in Table-90.

TABLE--90: Results of Hybrid Maize Macro Yield Trial No. 2, Faisalabad

Sr. No	Hybrid Name	Yield kg/ha	Stand Count (%)	Days to 50% tasseling	Days to 50% silking	Plant Height (cm)	Ear Height (cm)	Plants harvested	Ears harvested
1	FH-1409	11543 a	70	82	84	186	96	75	75
2	FH-1046(C)	11148 ab	70	79	81	181	91	70	70
3	FH-1390	10800 ab	73	83	86	191	103	72	72
4	FH-1428	10547 ab	66	79	82	196	99	66	66
5	FH-1400	10483 ab	69	82	84	165	87	69	69
6	NK-8441(C)	10455 ab	73	79	81	192	97	73	73
7	FH-1419	9548 b	67	80	83	179	102	67	67
8	YH-1898(C)	7739 c	55	81	83	172	97	55	55
9	P-1543(C)	7634 c	69	78	80	186	93	69	69
CV%		**10.36**	**5.44**	**0.6**	**0.68**	**0.46**	**0.92**	**7.2**	**7.2**
LCD 5%		**2494**	**6.4**	**0.84**	**0.97**	**1.46**	**1.52**	**8.52**	**8.52**

Data presented in above Table-90 reveals that the differences in mean grain yields due to hybrid were significant with critical difference of 2494 kg/ha. The local check hybrid FH-1409 gave the highest grain yield of 11543 kg/ha followed by the local check hybrid FH-1046 (11148 kg/ha). Grain yield of local check FH-1046 (11148 kg/ha) and commercial check NK-8441 (10455 kg/ha were at the par of local hybrids FH-1390 (10800 kg/ha), FH-1428 (10547 kg/ha) and FH-1400 (10483 kg/ha). Differences in days to 50% tasseling and silking were also significant. The local hybrid FH-1390 took the maximum 83 days to 50% tasseling and 86 days to 50% silking. Local hybrid FH-1428 attained maximum plant height of 196 cm while its cob height remained 99 cm. The local hybrid FH-1400 attained the minimum plant height 165 cm with a cob height of 87 cm. Low to mid cob bearing trend was apparent in most of the hybrids. Number of plants per plot and cobs harvested were also showing statistically significant differences.

3. HYBRID MAIZE MICRO YIELD TRIALS (SPRING 2019)

This trial comprised of twelve (12) single cross hybrids including two commercial and two local hybrids as checks. They were sown on 12-02-2019, laid out according to RCB design with two replications. The plot size was kept 4m x 1.5m. The harvesting was done on 25-06-2019. 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 table-91.

Table-91: Results of Hybrid Maize Micro Yield Trial-1 (Spring 2019), Faisalabad

Sr. No	Hybrid Name	Grain Yield kg/ha	Stand Count (%)	Days to 50% tasseling	Days to 50% silking	Plant Height (cm)	Ear Height (cm)	Plants harvested	Ears harvested
1	FH-1046(C)	11022 a	48	82	84	168	103	48	36
2	FH-922	10939 a	46	81	83	177	105	50	35
3	FH-929	10651 ab	47	84	86	180	108	49	35
4	FH-1453	10039 ab	48	87	89	172	99	46	44
5	FH-1535	9647 abc	47	86	87	167	94	48	29
6	FH-793	9212 abc	44	84	86	147	86	47	39
7	FH-1411	8850 abc	44	82	84	164	89	43	33
8	P-1543(C)	8810 abc	47	76	78	172	97	42	34
9	FH-1368	8682 abc	45	81	83	182	92	49	37
10	NK-8441v	8334 abc	45	77	79	169	89	44	34
11	FH-1231	7812 bc	42	81	83	172	112	47	23
12	YH-1898(C)	6902 c	43	84	87	158	85	46	30
CV%		**15.2**	**3.9**	**0.81**	**0.49**	**1.96**	**3.33**	**5.92**	**15.55**
CD		**3091**	**NS**	**1.46**	**0.9**	**7.28**	**7.07**	**NS**	**NS**

Data presented in above table-91 reveals that differences in mean grain yields due to hybrids were statistically significant. Local hybrid check FH-1046 gave the maximum grain yield of 11022 kg/ha followed by the local hybrid FH-922 (10939 kg/ha) and remained at the par to each other. Significant differences were observed for days to 50% tasseling and silking. The minimum number of days to 50% tasseling (76) was observed for commercial check hybrid P-1543 while his days to 50% silking remained 78 days which was also the lowest. Differences in plant height and cob height were also significant, while mid cob bearing and a bit higher than the middle was observed in most of the hybrids. The maximum plant height (182 cm) was shown by local hybrid FH-1368 while the minimum plant height (147 cm) was observed for local hybrid FH-793 with a cob height of 86 cm which was also the lowest. Number of plants harvested, cobs harvested and stand count were showing statistically non-significant differences.

4. HYBRID MAIZE MICRO YIELD TRIALS (SPRING 2019)

This trial comprised of twelve (12) single cross hybrids including two commercial and one local hybrid as checks. They were sown on 12-02-2019, laid out according to RCB design with two replications. The plot size was kept 4m x 1.5m. The harvesting was done on 25-06-2019. 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-92: Results of Hybrid Maize Micro Yield Trial-2 (Spring 2019), Faisalabad

Sr. No	Hybrid Name	Yield kg/ha	Stand Count (%)	Days to 50% tasseling	Days to 50% silking	Plant Height (cm)	Ear Height (cm)	Plants harvested	Ears harvested
1	FH-1606	10416 a	42	79	81	186	99	38	32
2	FH-1630	9964 ab	44	81	84	186	110	39	29
3	FH-1603	9788 abc	43	80	82	164	81	36	39
4	FH-1616	9788 abc	45	83	85	181	100	35	44

5	FH-1560	8619 abcd	44	85	87	182	81	32	41
6	FH-1619	8364 abcd	48	77	84	177	94	38	36
7	E-2 X F-30	8137 abcd	47	81	83	189	106	33	37
8	NK-8441(C)	7745 bcd	46	80	82	177	86	37	39
9	FH-1601	7341 bcd	40	83	86	172	81	26	40
10	P-1543©	7247 cd	43	77	79	180	81	34	47
11	FH-1046(C)	6667 de	42	83	85	183	94	27	37
12	FH-1617	4227 e	45	85	86	179	104	18	39
CV%		**14.66**	**5.43**	**2.81**	**1.04**	**0.8**	**1.49**	**8.74**	**15.84**
LCD 5%		**2743**	**NS**	**5**	**1.91**	**3.14**	**3.11**	**6.24**	**NS**

Data presented in the above table-92 reveals the significant differences in mean grain yields due to hybrids. Local hybrids FH-1606 gave the maximum grain yield of 10416 kg/ha followed by FH-1630 (9964 kg/ha), FH-1603 (9788 kg/ha), FH-1616 (9788 kg/ha), FH-1560 (8619 kg/ha), FH-1619 (8364 kg/ha) and E-2 X F-30 (8137 kg/ha) were significantly higher yielder than the local and commercial check hybrids NK-8441 (7745 kg/ha), P-1543 (7247 kg/ha) and FH-1046 (6667 kg/ha). Mid to low cob bearing trend was observed in most of the hybrids. Differences in plant height and cob height were also significant. The maximum plant height (189 cm) was shown by E-2 X F-30 with a cob height of 106 cm. The minimum plant height (164 cm) was observed for local hybrid FH-1603 with a cob height of 81 cm. statistically significant differences was also observed for number of plants harvested.

5. HYBRID MAIZE PRELIMINARY YIELD TRIAL (SPRING 2019)

This trial comprised of four sets: two of them consisting of thirty single cross hybrids and remaining two contain twenty-six (26) cross hybrids including two commercial and two local hybrids in each set as checks. They were sown on 12-02-2019. The trials were laid out in RCB design with two replications. The plot size was kept 4m x 0.75m. The harvesting was done on 26-06-2019. 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-93: Results of Hybrid Maize Preliminary Yield Trial-1, 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-1571	8306a	70	72	192	94	22	22
2	FH-1569	8251ab	74	76	142	72	26	26
3	FH-1046 (C)	7772abc	70	72	182	101	21	21
4	FH-1584	7489ab..d	71	73	193	98	21	21
5	FH-1583	7081ab..e	71	73	183	93	23	23
6	FH-1564	7074ab..e	71	73	183	113	23	23
7	DK-9108 (C)	7031ab..e	73	75	202	92	25	25
8	FH-1565	6663ab..f	72	74	174	93	30	30
9	FH-1578	6630ab..f	70	72	194	98	23	23
10	FH-1588	6577ab..f	69	71	183	93	20	20
11	FH-1563	6577ab..f	70	72	174	100	21	21
12	FH-1585	6364ab..g	71	73	172	93	22	22
13	FH-1579	6270ab..g	68	70	192	110	25	25
14	FH-1570	6138ab…g	72	73	191	96	23	23
15	FH-1567	6028ab..g	73	75	172	83	23	23
16	FH-1587	5928bc..h	69	70	202	98	23	23
17	FH-1574	5769cd..h	73	76	182	85	22	22

18	FH-1582	5505cd..i	72	74	172	92	15	15
19	FH-1575	5440de..i	69	71	182	82	24	24
20	FH-1586	5277de..i	71	73	185	91	22	22
21	FH-1573	5236de..i	72	74	205	102	19	19
22	FH-1580	5229de..i	70	72	174	82	22	22
23	FH-1581	5094ef..i	72	74	163	72	19	19
24	FH-1568	4869ef..j	72	74	144	73	21	21
25	NK-8441 (C)	4630fg..j	71	73	173	83	18	18
26	FH-1576	4480fg..j	73	75	175	84	18	18
27	FH-1572	4060gh..j	71	73	209	110	19	19
28	FH-1566	3601hij	73	75	192	102	15	15
29	FH-1577	3256ij	74	76	172	72	15	15
30	FH-1562	2733j	69	71	152	76	11	11
CV (%)		**19.48**	**0.41**	**0.33**	**0.32**	**0.87**	**19.42**	**19.42**
LCD 5%		**238.7**	**0.60**	**0.50**	**1.16**	**1.61**	**N.s**	**N.s**

The data presented in the Table-93 shows statistically significant differences in grain yield due to hybrids. Local hybrid FH-1571 gave the highest grain yield of 8306 kg/ha followed by FH-1569 (8251 kg/ha) and commercial check FH-1046 (7772 kg/ha). These hybrids along with FH-1584, FH-1583, FH-1564, DK-9108, FH-1565, FH-1578, FH-1588, FH-1563, FH-1585, FH-1579, FH-1570 and FH-1567 were at par with the top yielding commercial hybrid. Days to 50% tasseling and 50% silking were showing statistically significant differences. The maximum days to tasseling (74) and silking (76) were taken by two local hybrids FH-1569 and FH-1577. Significant differences were observed for plant height and cob height. Maximum plant height was attained by FH-1572 (209 cm) with a cob height of 110 cm while FH-1569 attained minimum plant height of 142 cm and cob height of 72 cm. Number of plants and cobs harvested per plot were showing statistically non-significant differences.

Table-94: Results of Hybrid Maize Preliminary Yield Trial-2 (Spring 2019), 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-1605	9106a	74	76	151	74	24	24
2	DK-9108 (C)	8856ab	74	76	114	48	23	23
3	FH-1611	8692ab	78	80	160	76	23	23
4	FH-1598	8528ab	73	76	162	74	24	24
5	FH-1600	8506ab	77	79	134	63	19	19
6	FH-1594	8411ab	76	78	189	101	21	21
7	FH-1608	8111abc	73	75	143	70	24	24
8	FH-1609	8015ab..d	73	75	153	79	23	23
9	FH-1614	7782ab..e	75	77	180	77	24	24
10	FH-1599	7592ab..e	74	76	145	73	21	21
11	FH-1603	7452ab..e	72	74	147	62	19	19
12	FH-1601	7397ab..f	74	76	148	68	24	24
13	FH-1606	7345ab..f	75	78	127	62	21	21
14	FH-1604	7299ab..f	73	75	142	61	24	24
15	FH-1591	7112ab..f	74	76	169	78	19	19
16	FH-1607	7048bc..f	76	78	131	65	13	13
17	FH-1592	7005bc..f	73	75	182	97	23	23
18	FH-1046 (C)	7004bc..f	75	77	150	72	18	18
19	FH-1610	6955bc..f	72	74	156	75	23	23
20	FH-1615	6921bc..f	75	79	158	79	22	22
21	FH-1602	6916bc..f	75	77	146	80	21	21

22	FH-1612	6916bc..f	75	79	163	89	20	20
23	FH-1590	6312cd..f	72	74	176	91	19	19
24	FH-1595	6104cd..g	74	76	156	82	24	24
25	FH-1593	5993de..g	73	75	172	97	18	18
26	FH-1613	5955efg	73	76	175	74	21	21
27	FH-1589	5789efg	72	74	148	77	19	19
28	NK-8441 (C)	5399fg	74	75	143	81	18	18
29	FH-1597	4220gh	74	76	166	91	7	7
30	FH-1596	2633h	75	77	149	80	16	16
CV (%)		**14.06**	**1.19**	**0.71**	**1.60**	**3.06**	**16.60**	**16.60**
LCD 5%		**2026.5**	**1.80**	**1.11**	**5.03**	**4.77**	**6.88**	**6.88**

The data presented in the Table-94 shows statistically significant differences in grain yield due to hybrids. Local hybrid FH-1605 gave the highest grain yield of 9106 kg/ha followed by commercial check DK-9108 (8856 kg/ha). The local check FH-1046 (7004 kg/ha) and other commercial check NK-8441 (5399 kg/ha) remained at eighteenth and twenty eighth position. Days to 50% tasseling and 50% silking were showing statistically significant differences. Significant differences were observed for plant height and cob height. Maximum plant height was attained by FH-1594 (189 cm) with a cob height of 101 cm while commercial hybrid DK-9108 attained minimum plant height (114 cm) with a cob height of 48 cm. Number of plants and cobs harvested per plot were also showing statistically significant differences.

4. NATIONAL UNIFORM HYBRID MAIZE YIELD TRIAL No. 1 YELLOW (SPRING 2019)

This trial comprised of one hundred and ten (110) entries. Its sowing date was 25-02-2019. The trial was laid out in RCB design with three replications. The plot size was kept 4m x 1.5m. Standard agronomic and plant protection measures were carried out in the crop. Harvesting was done on 19-06-2019. Data regarding different traits were recorded and elite hybrids were selected for further evaluation. The data are given in the following table-95.

Table-95: Results of National Uniform Hybrid Maize (Yellow) Yield Faisalabad

Hybrid	Vehari, Ali Akar	Arifwal, Jullunder	Dadu, Sindh	Manga Mandi, Monsento	Sher Garh, Petal Seed	Papattan, Pioneer	Yusaf-wala, MMRI	AARI, Faisala-bad	Pirsabak, CCRI	Khanewal, Data Agro	Okara, Syngeta	NARC	Mean
SS-7350	10992	4308	6514	10633	7721	10293	10637	7163	3258	7565	11920	6121	8094
SS-801	10506	5196	5980	9928	9516	12191	10479	7986	3764	8456	10788	6897	8474
K-2061	11512	5051	7367	8314	7500	9987	8668	9085	3235	7560	10823	6609	7976
WS-3570	11741	5497	6514	9115	12889	11661	10476	8955	2967	9673	9564	6195	8771
MAXIMA	12124	5271	6194	9103	12577	11620	9532	9229	3796	8770	9777	6220	8684
J-7330	11773	4444	6194	10113	8615	13044	9165	8519	3298	7275	10461	5776	8223
J-7440	10184	6188	7367	9298	9709	10010	8392	8089	2316	8001	9751	5209	7876
J-1908	10761	4481	5980	9847	12430	11755	8908	8270	3165	8588	11159	7493	8570
J-1431	10936	4162	7367	7839	11506	9311	10019	7829	3002	8127	9520	6297	7993
J-2020	10238	4202	6407	8863	7744	7664	8355	6406	3125	5915	7515	5444	6823
J-1671	9437	5501	7367	7995	8964	7978	10008	7755	2264	6946	8454	5947	7385
ZS-9091	9832	5359	6514	8967	8345	9278	8439	7542	2186	7154	9658	5606	7407
ZS-7799	10221	4545	6620	9593	9621	10000	8414	6610	4753	7589	10443	6193	7884
YG-777	10192	4472	7367	8712	9895	8845	10128	6827	2915	7762	10737	5098	7746
YG-676	10137	4404	6620	8641	9195	10466	9339	6516	4731	7729	8868	5716	7697
DIAMON	10115	3142	7367	8031	8442	9373	8349	5842	3267	6660	9086	5137	7068

D-2025													
DIAMOND-2026	8469	3187	6620	8382	9075	8066	8042	5570	2645	6580	11885	5845	7031
YHM-111A	12345	4820	7047	11022	13361	12315	8237	8110	3812	8526	10431	7381	8950
CS-5806	9146	4609	6727	8607	7771	8774	7281	6264	3328	7488	9508	7073	7215
CS-5808	9884	4137	6514	8397	7646	9384	7396	6284	2838	7471	8585	7207	7145
MASCP-8104	13311	4118	7154	10177	14295	11375	7452	7076	3942	7991	10790	6365	8671
GS-MALKA	11909	4369	6834	8457	11150	9361	8572	6761	2048	6887	11214	6668	7852
HP-252	12015	5219	6407	8838	10252	11287	7833	7732	4733	7045	10564	6526	8204
HP-4590	12180	3993	6834	9350	9541	10785	7377	7814	2571	8069	10606	6767	7991
FM-19B70	12150	4779	6514	7916	27870	11113	7416	9538	3348	8396	11316	6295	9721
FM-19B88	10808	4225	6834	9600	10335	8690	8512	7895	2446	5984	10240	5559	7594
T-1729	11756	5999	6407	9827	10571	11050	8145	7119	2811	7594	11728	7200	8351
F-10	11990	7229	6727	9157	12202	12157	8326	9767	3636	8192	12095	6999	9040
AG-2020	11553	5495	6471	8675	7202	9881	8708	6335	3453	7316	10624	5658	7614
YH-5427	10969	5889	7111	9089	11103	10200	11391	9116	2904	8141	11736	5604	8604
YH-5482	10522	7645	6311	8425	10499	11574	10579	9604	3333	8332	10709	6901	8703
YH-5554	10467	4276	7580	9264	10418	9062	9421	7559	3296	6458	9207	6000	7751
YH-5535	11190	5460	6471	8842	8764	9380	8733	8710	4314	4442	10973	8231	7959
YH-5404	10255	5838	7580	9054	9521	10009	10740	8943	3351	7885	11263	5942	8365
YH-5397	9680	3524	7367	8361	7594	8400	8270	7266	3079	7546	9315	6109	7209
FH-1166	11689	4502	7154	8884	8919	6708	8166	6915	3797	6940	9342	5197	7351
FH-1210	9943	4488	7580	7784	8030	5586	8618	8275	3134	6890	9136	6080	7129
E-777	11051	4600	6727	9500	9173	10073	8176	7005	3488	8071	10506	6315	7890
SWAN-9696	11190	5492	6300	8419	9248	7759	7658	7415	2839	6316	8177	6271	7257
PB-PROA-2017	8496	2692	7580	7892	4788	5169	7443	6902	2316	4267	8119	4827	5874
Kefrancos	11490	6616	7367	8808	11499	11610	8190	7575	2787	6765	9286	5701	8141
STAR-1	10225	6551	7367	10365	12824	10732	8784	7643	5214	8180	10078	7296	8772
STAR-2	10647	4689	7367	10718	12086	9830	8215	7295	3876	7831	10082	5988	8219
C-7075	8881	5157	7047	9036	10785	10285	8211	7714	2698	7993	8242	7538	7799
C-5357	11492	6913	7580	7292	11222	11807	8590	7038	3622	7746	8745	5563	8134
SC-1901	12150	5878	6727	9293	9027	8946	7595	6460	2406	8273	7455	5409	7468
MM-2296	10528	5370	7154	8280	13020	12047	7980	6203	2131	8394	8293	7768	8097
MM-2299	10930	5536	7367	9565	13137	11412	8955	7585	3220	7967	7189	7542	8367
HC-9091	9970	4013	7154	8036	10724	8193	7677	7994	2107	5694	7672	6814	7171
HC-2090	9918	5471	6940	9004	11191	11818	8359	7932	3123	6171	8348	6230	7875
HC-2050	11510	4938	6834	10403	11185	12553	9728	6829	2915	8040	8089	7521	8379
MS-7433	11347	5329	7367	10208	11956	11058	8832	6991	3424	6892	8315	6458	8181
MS-3203	10607	6141	7047	9811	10670	11318	7314	7878	2463	7539	8220	5148	7846
3280	8842	2830	6194	7523	9398	8758	7524	9059	2743	6286	8232	5341	6894

5101	9935	6151	6620	9949	10088	10101	9931	8837	4151	7023	7249	4971	7917
5190	10871	5929	7154	10717	11674	10626	9243	8350	4008	7933	7537	6525	8381
63P15	10124	5520	6727	8744	7692	10343	7704	7748	2962	6088	7493	6222	7281
SZ-676	9152	4012	6514	8591	10415	9002	7758	8277	3290	6690	7588	5629	7243
CKD-215	11002	6211	6514	9806	-14986	10624	11819	8797	3293	8088	7162	5386	6143
CKD-244	9780	4885	6727	8925	10652	9981	9509	6531	4076	6947	9204	7067	7857
CKD-245	9069	3999	7367	8058	8593	8717	8063	7171	3547	5766	8802	6706	7155
CKD-348	10919	7416	6471	9894	13686	12758	9434	7146	3669	9915	7624	6373	8775
AAS-9633	12676	7505	6151	8566	8362	10632	7567	7821	2791	7714	7850	9293	8077
AAS-9435	12148	4789	6514	8164	8780	9933	10347	8834	3876	8819	8609	7245	8171
AAS-1723	13139	5452	7111	9634	8518	11664	9117	8622	2190	8394	9113	8589	8462
SB-9608	11528	5458	6471	8811	11103	9823	8203	7090	3346	8236	8707	6494	7939
SB-8363	11495	4073	6151	9860	8149	11039	9267	7105	2445	10631	9665	6195	8006
TG-1801	9848	6705	7367	9065	11867	10550	8085	7816	4110	7261	8319	6618	8134
TG-1901	12329	6462	7154	8835	12674	10360	7881	6599	3485	8064	9820	6956	8385
TG-1902	11473	7283	7580	9527	13852	12833	9311	8600	2158	9178	10023	7737	9130
CM-1107	10818	5031	6727	8257	9977	10930	7512	7357	1920	7937	8253	5231	7496
CM-1177	10786	5644	6300	8690	11257	10964	7323	7003	3529	8406	9189	5925	7918
SS-7499	11157	6067	7580	9191	12055	11250	11072	9163	3528	7355	8756	6455	8636
SS-8399	11811	4376	7367	8774	11961	10536	11064	7194	3100	8992	8646	5564	8282
Nagina-3	7532	4620	7367	8537	7937	10606	7724	6456	3047	5752	6871	5732	6848
Nagina-4	7508	4180	7367	8921	9825	8905	7734	7430	3382	6404	7770	6790	7185
G-9	10383	4890	7047	9985	9063	10116	7993	7271	3822	6783	7877	5486	7560
DKC70-24	11479	5216	7580	10614	14617	13089	8139	9199	5681	7590	9959	6380	9129
DK6612	11576	5559	6727	10470	13319	11116	10111	8402	2543	8581	10473	6628	8792
DK6564	12172	4903	7154	9983	12654	11796	8172	10378	2574	8556	10444	6208	8749
HS-7894	11844	5807	7367	9131	11052	11783	8247	9677	5006	8405	10629	6805	8813
HS-7896	12001	6654	7154	9305	12333	12673	7331	9775	4326	9408	10334	8163	9121
C-3386	11701	6187	6940	9236	11789	11124	7413	6379	4797	7769	10358	5762	8288
P1443	11808	5328	6834	9492	13418	12014	9176	9195	5135	8186	11080	7442	9092
P1535	9606	5595	7367	9469	11626	12811	7976	9084	2809	7327	11867	6154	8474
P1570	11949	4870	7047	8544	12298	11101	9811	9334	3668	7599	11112	7553	8740
P1602	13082	4884	6194	10233	11902	11145	8055	9340	3896	8385	9849	7868	8736
P1690	11148	5705	6620	10156	11605	10818	10188	9233	4343	8007	10713	6652	8766
Surkhab	11576	5838	7154	9802	13313	12544	10693	9853	3705	8498	10791	8385	9346
Shahkar	11447	5175	6727	10607	13164	12163	8864	9204	3183	8394	8454	7004	8699
7838	11358	3040	6514	9179	11461	10721	10581	9892	3576	8443	9664	7312	8478
7868	11430	5015	6514	9282	11752	10510	10154	9927	3920	7370	10042	7962	8656
NK-8568	8687	4104	6727	9604	7918	9815	8902	8036	2909	6931	10747	6851	7603
S-7720	12016	6808	7367	9381	11474	11721	10069	9277	3188	6859	9320	7112	8716
NK-7372	10612	5012	6471	9288	10097	10066	9414	8344	2816	6564	10670	6215	7964
NK-7793	10035	4483	6151	10616	12148	9648	10502	7954	3741	7867	8537	6027	8142
NK-7113	11108	3775	6514	8066	10141	9158	9487	6352	3267	6726	10820	5320	7561
S-7750	9755	4896	7111	7720	8629	5985	10079	6037	2319	7192	9226	5096	7004
IS-8647	10197	4552	6471	8710	10443	10370	11009	10042	3456	7755	8162	6135	8108

IS-9771	12844	7000	6151	9599	13947	12514	10380	8386	3190	8342	8885	6545	8982
22W33	10669	5959	7367	8325	12171	9765	10210	7152	3785	7739	10145	7062	8362
FS171	10255	5868	7154	8586	10453	11036	8434	8316	3605	8682	10227	8007	8385
AH-9236	7525	2938	7580	9579	8617	8248	8816	7143	4883	7393	10321	5305	7362
27D65	9687	4291	6514	8475	7872	9124	9464	6856	2754	7636	9303	5946	7327
37D55	9378	4852	7154	9117	8905	8532	10401	8529	2886	7500	10246	5158	7721
SS -7007	8694	5665	7260	7976	8022	9461	8149	8062	2205	7705	10579	5557	7445
NARC-1	4712	1040	7580	6588	2636	3637	9215	5435	2327	2189	9550	5166	5006
YH-1898 (Check)	7933	6644	6407	8146	6782	9539	7627	8193	2670	8197	8538	5388	7172
CS-5800 (Check)	9951	3818	6407	9075	6045	8445	10043	5713	2315	6215	7191	5957	6765
P-1429 (Check)	8917	3484	6620	8755	10217	9269	10012	6693	2871	5964	7805	6548	7263
CV %	10.65	27.99	-	12.67	-	11.05	11.09	14.12	30.35	13.86	-	20.51	-
LSD	1831	-	-	-	1250.41	1820	2678	1784.1	-	-	-	-	-

5.

6. National Uniform Hybrid Maize Yield Trial (White) Spring 2019, Faisalabad.

This trial comprising seven (07) entries was sown on 25-02-2019. The trial was laid out in RCB design with three replications. The plot size was kept 4m x 1.5m. Standard agronomic and plant protection measures were carried out in the crop. Harvesting of trial was done on 20-06-2019. Data regarding different traits were recorded and elite hybrids were selected for further evaluation. The data are given in table-96.

Table-96: Results of National Uniform Hybrid Maize White "B" Trial, Faisalabad

Sr. No.	Entry No.	Grain Yield kg/ha	Stand Count (%)	Days to 50% tasseling	Days to 50% silking	Plant Height (cm)	Ear Height (cm)	No. of Plants harvested	No. of Ears harvested
1	6	8634 a	36	71.67	73.67	173.33	81.67	32.67	33.67
2	3	8440 a	37	71.33	73.00	178.33	85.00	33.00	34.67
3	7	8438 a	37	72.00	73.67	170.00	85.00	33.67	34.67
4	1	7570 ab	35	68.00	70.00	168.67	79.00	30.67	31.67
5	5	6899 b	31	70.33	72.00	173.33	76.67	29.33	29.33
6	2	6674 b	32	69.67	72.00	165.00	79.33	28.33	28.33
7	4	6164 b	30	69.00	71.33	175.67	85.33	26.33	27.33
CV %		**11.08**	**4.68**	**0.86**	**1.22**	**6.97**	**10.86**	**7.64**	**6.18**
LCD 5%		**1487.3**	**2.8527**	**1.0749**	**1.5689**	**NS**	**NS**	**4.154**	**3.4505**

Data presented in Table-96 showed significant differences for grain yield kg/ha for seven entries. The Entry coded as '06' out yielded with grain yield 8634 kg/ha followed by entry '3' (8440 kg/ha). Entry coded as '4' was lower yielder with grain yield 6164 kg/ha. Statistically non-significant differences were also observed for plant height and ear height.

National Uniform Varietal (OPV) Maize Yield Trial (Spring 2019)

This trial was sown on 25-02-2019, with twelve (10) entries. The trial was laid out in RCB design with two replications. The plot size was kept 4m x 1.5m. Standard agronomic and plant protection measures were carried out in the crop. Harvesting of trial was done on 20-06-

2019. Data regarding different traits were recorded and elite hybrids were selected for further evaluation. The data are given in Table 09.

Table-97: Results of National Uniform White (OPV) Maize Yield, Faisalabad

OPV	Yousafwala, MMRI	AARI Faislabad	Vehari, Ali Akbar	Dadu, Sindh	Pirsabak, CCRI	Shergarh, Petal Seed	Mean
YW-786	6376.5	6696	7534	4971	2394	5269	5540
Pearl (Check)	5048.9	5188	7577	5596	3221	6292	5487
CZP-132001	5928.6	5928	7181	5056	2439	5995	5421
YSC-15	2986	3305	5051	4892	3069	5926	4205
Local Swat sweet corn (Check)	3302.4	3559	6154	5476	2265	4176	4155
YPC-14	2964.4	3336	5316	5959	2308	4003	3981
CZP-132001	1192.2	1313	8010	5070	3209	3369	3694
TP-1221	1054	1275	8382	5781	2636	2396	3587
Local Swat Pop-corn (Check)	1594.6	1933	3741	5877	2194	4020	3227
TP-1217	632	877	3191	5106	3080	3774	2776
CV%	32.78	23.14	4.69	6.99	18	81.28	-
LSD	1747.7	1326.3	499.85	644.46	828.1	6305.3	-

The results presented in Table-87 revealed that the entry YW-786 stood first and entry Pearl (Check) was second by giving grain yield 5540 and 5487 kg/ha respectively followed by CZP-132001 which showed 5421 kg/ha.

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

A. SCREENING OF HEAT RESILIENT MAIZE INBRED LINES

1. For screening against heat stress, one set of maize inbred lines (30) were sown in tunnel under controlled conditions during flowering and pollination stage (Month of May). The temperature was maintained high inside the tunnel to expose the inbred lines to heat stress. Following Avg. weekly temperature data were recorded inside and outside the tunnel:

Sr. No.	Duration	Outside temperature (Avg.)	Inside temperature (Avg.)
1	1st week of May	40° C	42-44 ° C
2	2nd week of May	37.8° C	40-43 ° C
3	3rd week of May	36.5° C	40-44 ° C
4	4th week of May	37.6° C	39-43 ° C

At this temperature stress the performance of inbred lines was observed as follows:-

Tolerance level	Seed setting % at tolerance level	Inbred lines
Resistant	100	-
Moderately resistant	Above 75	-
Tolerant	Above 50	F-132, F-243, F-272, F-282, F-322, F-340, F-383, F-385, F-423, F-435,

		SS11-21-2, SS15-22-2, SS16-3-3
Moderately tolerant	20-50	-
Susceptible	Less than 20	Remaining all

B. EVALUATION OF HYBRIDS IN PRELIMINARY YIELD TRIALS:

I. HYBRID MAIZE PRELIMINARY YIELD TRIAL NO. 1 (SPRING 2019)

This trial comprised of two sets each consisting of thirty single cross hybrids including two commercial and one local hybrids as check were sown on 13-02-2019. The trials were laid out in RCB design with three replications. The plot size was kept 4m x 0.75m. The harvesting was done on 28-06-2019. 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 98: Results of Hybrid Maize Preliminary Yield Trial-1, Faisalabad

Sr. No.	Hybrid	Grain Yield (kg/ha)	Stand Count (%)	Days to 50% tasseling	Days to 50% silking	Plant height (cm)	Ear height (cm)	Plants harvested	Ears harvested
1	FH-1734	12979 a	19	78	80.5	167	101.5	18	19
2	FH-1736	12946 a	20	84.5	86.5	168.5	105.5	18	20
3	FH-1731	12880 ab	18	76	78	173	97	17	18
4	FH-1739	12644 abc	20	77	79	166	93	19.5	21
5	FH-1726	11606 ab..d	20	85.5	87.5	130.5	71.5	20	20
6	FH-1727	11394 ab..d	19.5	84.5	86.5	161	105	18.5	21
7	FH-1725	11308 ab..d	20	77	79	172.5	51	19	20
8	FH-1724	11295 ab..d	18	76	78	176	106.5	16	17
9	FH-1720	11266 ab..e	20	76	78	179	94.5	20	21
10	FH-1735	10919 ab..f	19	84	86	195	115	18	20
11	FH-1732	10841 ab..f	19	77	79.5	182.5	100	18	18
12	P-1543	10128 ab..g	20	78	80	185	85	17	19
13	FH-1737	9927 ab..g	20	79.5	81.5	178	103	20	20
14	FH-1723	9707 bc..g	20	77.5	79.5	175	96	20	21
15	FH-1722	9648 cd..g	18	83	85	146.5	77.5	16	17
16	FH-1046	9624 cd..g	19	83	85	183	94	16	17
17	FH-1718	8939 de..g	17	76.5	79	170	96	16	16
18	FH-1728	8872 de..g	19	77	79	170	102.5	16	18
19	FH-1729	8810 de..g	19	81.5	83.5	193	101.5	18	19
20	FH-1733	8627 de..g	17	77.5	79.5	173	96.5	16	18
21	FH-1721	8443 de..g	19	80	82	159.5	105.5	18	18
22	FH-1738	8076 efg	15	77.5	44.5	188	106.5	13	14
23	NK-8441	7907 fg	16	78	80	169	95	15	16
24	FH-1719	7765 fg	19	83	85	170	108.5	17	17
25	YH-1898	7472 g	15	85	87	163	95	13	14
26	FH-1730	7118 g	11	77	79	158.5	90.5	10	10
CV%		15.43	11.45	2.73	2.22	1.64	11.43	10.45	11.26
LCD 5 %		3190	4.27	3.04	2.98	5.83	24.50	4.16	5.77

The data given in Table 10 showed statistically significant differences in grain yield kg/ha for the hybrids included in this trial. Local hybrid FH-1734 showed higher grain yield (12979 kg/ha) followed by the local hybrids FH-1736 (12946 kg/ha) and FH-1731 (12880 kg/ha). The results for the number of days to 50% tasseling and 50% silking showed statistically significant differences. Significant differences were observed for plant height and cob height. Local hybrid FH-1735 attained maximum plant height (195 cm) with a cob height of 115 cm. Minimum cob height 51 cm of local hybrid FH-1725 was observed with a plant height of 172 cm. Many local hybrids showed the mid to low cob bearing characteristic which is a desirable character in developing lodging resistant hybrids. Results for the number of plants harvested and the number of cobs harvested were showing significant differences.

Table -99: Results of Hybrid Maize Preliminary Yield Trial-2, Faisalabad

Sr. No.	Hybrid	Yield (kg/ha)	Stand Count (%)	Days to 50% tasseling	Days to 50% silking	Plant height (cm)	Ear height (cm)	Plants harvested	Ear harvested
1	FH-1745	13710 a	20	78.0	80.0	155.5	85.0	19	20
2	FH-1743	13621 ab	19	81.0	83.0	172.0	95.5	18	19
3	FH-1748	13519 abc	20	83.0	84.5	186.0	99.5	18	18
4	FH-1598	13144 ab..d	19	83.0	85.5	179.0	93.5	18	20
5	FH-1609	12966 ab..d	20	83.0	85.0	178.5	105.0	17	19
6	FH-1741	12653 ab..e	17	76.5	79.0	169.0	87.0	16	17
7	FH-1622	12519 ab..e	20	78.5	80.5	167.5	87.5	15	16
8	FH-1752	12425 ab..e	18	77.0	79.0	178.0	98.0	16	18
9	FH-1751	11577 ab..f	20	80.0	82.0	170.0	96.0	17	18
10	FH-1372	11436 ab..f	18	82.0	84.0	167.5	91.0	16	18
11	FH-1046	11295 ab..f	19	84	86	180	93	18	18
12	P-1543	11201 ab..f	20	79.5	81.5	168.0	90.0	19	21
13	FH-1750	10801 ab..f	17	77.0	79.0	162.0	91.5	14	15
14	FH-1749	10793 ab..f	16	82.5	84.5	171.5	103.0	15	16
15	FH-1518	9860 ab..g	20	77.0	79.0	192.0	107.5	19	19
16	FH-1521	9444 ab..g	16	78	80	185	85	14	16
17	FH-1742	9389 bc..g	17	81.0	83.0	166.5	92.5	15	15
18	FH-1624	9334 cd..g	15	81.0	83.5	184.5	104.5	14	14
19	NK-8441	9178 de..g	17	80	83	170	96	14	15
20	FH-1747	9025 de..g	15	82.5	84.5	169.5	96.5	14	14
21	FH-1566	8895 de..g	16	74.5	76.5	175.0	96.5	14	15
22	FH-1740	8598 efg	16	82.5	84.5	185.0	117.5	15	15
23	FH-1280	7530 fg	17	83.0	85.0	176.0	104.0	15	16
24	YH-1898	7334 fg	15	84	86	160	94	13	14
25	FH-1746	6236 gh	16	82.0	84.0	177.0	105.5	15	15
26	FH-1744	2636 h	15	77.5	79.5	169.0	91.5	12	12
CV%		**20.06**	**11.76**	**2.63**	**2.54**	**2.65**	**3.74**	**14.6**	**10.26**
LCD 5 %		**4276**	**NS**	**2.82**	**2.89**	**7.18**	**7.8**	**NS**	**5.77**

The data presented in the Table-99 shows statistically significant differences in grain yield. Local hybrid FH-1745 gave the highest grain yield of 13710 kg/ha followed by FH-1743 (13621 kg/ha), FH-1748 (13519 kg/ha) and FH-1598 (13144 kg/ha). Days to 50% tasseling and 50% silking were also showing statistically significant differences. Mid to a bit high cob bearing trend was apparent in most of the hybrid present in the trial. Significant differences were observed for plant height and cob height. Minimum plant height was attained by

FH-1745 (155 cm) with a cob height of 85 cm while FH-1518 attained maximum plant height (192 cm) with a cob height of 107 cm. The number of cobs harvested showed statistically significant differences.

C. **ON-FARM TESTING**

Table-100: On Farm Hybrids Evaluation Trial Spring 2019 for heat stress tolerance

R. NO.	Name of Hybrids	Chak No. 473/G.B, Sumundri, Fd.	Thatti Shahni Moza Sahiwal, Sargodha	Chak No. 469/J.B, Jhang	Vill-Walley, Tehsil Lalian Distt. Chiniot.	Chak No. 165/J.B, Jhang	Average Yield (kg/ha)
1	**YH-1898**	9733	10219	10848	9331	10114	10049
2	**FH-1046**	10367	11519	12312	9827	9736	10752
3	**FH-1166**	9879	10723	12563	8768	9315	10250
4	**P-1543 (C)**	9543	9175	10528	8125	9038	9282
5	**JPL-1908 (C)**	9138	9970	11360	8614	8843	9585
6	**NK-8441 (C)**	8718	8676	10726	7958	8549	8925
7	**YH-5427**	10252	8918	9900	8289	8339	9140
8	**YH-5404**	10578	9618	11551	9270	8227	9849

8. SEED PRODUCTION:

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

TABLE-101: SEED PRODUCTION, FAISALABAD

Sr. No.	Entry	Seed production (kg)
1	DTC	535
2	Malka-16 (OPV)	755

MILLETS RESEARCH STATION, RAWALPINDI

Season and Its Effect:

Meteorological data of Millets Research Station, Rawalpindi for the financial year 2017-2018 and 2018-2019 are given below. During the year 2018-2019, 1076.00 mm rain was received (up to 26 April 2019) compared with 2017-2018 (1032.00 mm). Due to heavy rain 218 mm and 96 mm on 06.08.2018 and 13.08.2018 respectively badly affected the germinating Pearl millet crop. Low plant population even after re sowing and transplanting resulted in significant decrease in grain and fodder yield

Table-102: Meteorological Data for the Financial Year 2017-18 and 2018-19

Sr. No.	Month	Temperature ^{o}C				Rainfall (mm)	
		Maximum		Minimum			
		(2017-18)	(2018-19)	(2017-18)	(2018-19)	(2017-18)	(2018-19)
1	July	34.6	40.5	20.6	21.3	269.0	182.5
2	August	37.5	38.0	20.0	19.0	270.8	494.9
3	September	36.5	37.0	19.0	17.5	81.6	34.5
4	October	35.7	31.0	11.4	10.5	4.6	52.0

5	November	27.8	28.0	4.5	5	31.7	20.0
6	December	24.8	24.0	2.0	-2	65.4	22.0
7	January	23.0	-0.5	16.5	21	0.0	121.2
8	February	26.3	1	1.5	23	69.6	93.2
9	March	35.5	5	7.0	32	38.7	55.6
10	April	38.0	11	10.5	36	91.0	52.5
11	May	41.0	-	18.5	-	84.2	-
12	June	43.0	-	21.0	-	25.0	-
Total						**1032.00**	**1076.00**

Research Work Done:

Following research work on pearl millet was conducted during the year 2018-19 at Millets Research Station, Rawalpindi.

Kharif-2018:

Pearl Millet:

1. Crossing Block of Pearl Millet

Forty eight pearl millet germplasm lines were sown on 30-07-2018 in strips. Each genotype consisted of two rows of five meter length. Inter row and inter plant distances were kept as 75 cm and 20 cm respectively. Gap filling and thinning was done from 27-08-2018 to 28-08-2018. Forty six lines were maintained through hand pollination while two lines were discarded due to poor performance. Seed was harvested on 29-10-2018 and retained for future utilization in the breeding program for the development of dual purpose variety.

Twenty successful fresh crosses were made, harvested and seed was retained to raise F_1 population during kharif- 2019.

2. Development of Dual Purpose Pearl Millet Variety

Five breeding populations (F_1, F_2, S_1, S_2 and S_3) were sown during kharif 2018, in strips. Plant to plant and row to row distances were kept as 20 cm and 75 cm respectively. F_1 crosses were selfed and off type plants were rogued out. Phenotypically superior plants selected from F_2 population were self-pollinated, harvested and seed was retained. Phenotypically superior and identical plants from S_1 and S_2 populations were self-pollinated and seed was bulked for each line separately. Eight uniform lines from S_2 population while three superior uniform lines were selected from S_3 population for evaluation in micro trials. The detail is given in the Table-103 below**.**

Table-103: Pearl Millet Populations Studies

S. No.	Population	Studied	Selected
1	F_1	20	20
2	F_2	20	25 single plants
3	S_1	65	38 lines
4	S_2	38	31+ 08 lines
5	S_3	12	03 lines

3. Pearl Millet Micro Yield Trial -I

The trial, comprising of twelve pearl millet genotypes, was sown on 02-08-2018 using randomized complete block design with three replications. The plot size was kept 5m x 2.25m with row to row spacing of 75 cm and plant to plant spacing of 20 cm respectively. Gap filling/ thinning was done on 30-08-2018 to ensure required plant population. Harvesting was completed on 23-10-2018. The observations recorded on different plant parameters are summarized in the given below Table-104.

Table-104: Results of Pearl Millet Micro Yield Trial - I

R. No.	Varieties	Plants harvested	Grain Yield (kg/ha)	Days to 50% flowering	Plants height (cm)
1.	17RBS-33	65	1395a	45	214
2.	17RBS-41	69	1390a	53	218
3.	17RBS-35	64	1352ab	47	198
4.	17RBS-31	62	1314ab	58	214
5.	17RBS-37	64	1220bc	54	229
6.	17RBS-36	61	1112cd	59	237
7.	HBS-27	65	1103cd	48	200
8.	17RBS-40	62	1031de	60	217
9.	17RBS-38	63	1015de	61	244
10.	17RBS-32	61	945e	59	236
11.	17RBS-39	59	898e	61	230
12.	17RBS- 34	62	894e	57	210
CV %		5.16	8.04	3.76	3.92
LSD 5%		7.50	210.83	4.78	19.92

The results presented in Table-104 revealed highly significant genetic differences among genotypes for parameters like grain yield, days to 50% flowering and plant height except plants harvested. The genotypes, 17RBS-33 and 17RBS-41 gave maximum grain yield of 1395 kg/ha and 1390 kg/ha respectively followed by 17RBS-35 (1352 kg/ha). While the genotype, 17RBS-34 gave minimum yield of 894 kg/ha. Six advanced lines excelled the check variety HBS-27 regarding grain yield. The first three genotypes (table -3) are best suited to the **B**arani areas as these are medium statured and early maturing with maximum grain yield. The genotype 17RBS-35 and 17RBS-37 took minimum number of days (45 and 47 days) respectively to complete 50% flowering.

4. Pearl Millet Micro Yield Trial -II

The trial, comprising of twelve pearl millet genotypes, was sown on 02-08-2018 using randomized complete block design with three replications. Each plot consisted of four rows of five meter length with row to row and plant to plant spacing of 75cm and 20 cm respectively. Gap filling/ thinning was done on 31-08 2018 to ensure required plant population. Harvesting was completed on 24-10-2018. The observations recorded on different plant parameters are summarized in the Table-105.

Table -105: Results of Pearl Millet Micro Yield Trial- II

R. No.	Varieties	Plants harvested	Grain Yield (kg/ha)	Days to 50% flowering	Plants height (cm)
1.	16RBS-15	70	2241a	56	202
2.	16RBS-10	67	1857b	53	208

3.	16RBS-26	63	1396c	46	206
4.	HBS-27	68	1386c	48	193
5.	16RBS-24	58	1336c	49	190
6.	16RBS-20	66	1331c	51	191
7.	16RBS-12	61	1105d	54	196
8.	16RBS-14	59	985e	56	200
9.	13RBS-10	59	953ef	54	187
10.	16RBS-11	56	948ef	46	193
11.	16RBS-22	60	898f	56	205
12.	16RBS-23	59	793g	51	184
CV %		2.87	3.56	1.54	1.83
LSD 5%		4.09	104.05	1.83	8.29

The results presented in the above table-105 revealed highly significant genetic differences for all the parameters like grain yield, days to 50% flowering, plant height and plants harvested. The genotype 16RBS-15 gave maximum grain yield (2241 kg/ha) followed by 16RBS-10 (1857 kg/ha). Three advanced lines excelled the check variety (HBS-27) regarding grain yield. These genotypes are best suited to the Barani areas due to medium stature, early maturity and high grain yield. Rest of the genotypes did not perform up to the mark although some of the lines are medium statured and early maturing.

5. 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 03-08-2018 according to randomized complete block design with three replications. The plot size was 11.25m^2 with four rows of five meter length of each genotype. Row to row and plant to plant distances were kept as 75cm and 20 cm respectively. Thinning/gap filling through transplanting was done on 29-08-18 which produced good effect on plant growth and population. The harvesting was completed on 25-10-2018. The data of various plant parameters were recorded and the summary of the results is presented in below table-106.

Table-106: Results of Pearl Millet Varietal Yield Trial

R. No.	Varieties	Plants harvested	Grain Yield (kg/ha)	Days to 50% flowering	Plants height (cm)
1.	14RBS-05	52	2093a	56	204
2.	14RBS-01	54	1970a	51	197
3.	YBS-98	59	1620b	54	202
4.	14RBS-02	54	1485bc	53	180
5.	YBS-95	60	1354cd	57	207
6.	YBS-94	60	1233de	47	209
7.	YBS-89	58	1127ee	48	214
8.	YBS-93	57	1107ee	54	212
9	YBS-83	61	1080f	57	203
10.	YBS-92	58	1080f	46	208
CV %		2.69	6.29	2.93	3.01
LSD 5%		3.61	209.29	3.61	14.42

Analysis of variance of the data presented in Table-106 showed highly significant differences among genotypes for grain yield, days to 50% flowering, plant height and plants harvested. Table 5 revealed that genotype 14 RBS-05 gave maximum grain yield of 2093 kg/ha followed by 14 RBS-01 (1970 kg/ha) whereas check variety YBS-98 produced grain yield of 1970 kg/ha. The genotype 14 RBS-05 exhibited medium maturity and stature while the genotype 14 RBS-01 exhibited early maturity and medium stature.

6. Adaptability/National Uniform Millet Hybrid Yield Trial, Kharif 2018

The experiment comprised of ten pearl millet genotypes, received from National Agricultural Research Centre, Islamabad was sown on 31-07-2018 at Millets Research Station, Rawalpindi, during Kharif 2018. Randomized complete block design with three replications was used to lay out the experiment. Each plot consisted of four rows of five meter length spaced at 75 cm. Plant to plant distance was kept as 20 cm. Due to poor germination the trial was re sown on 17.08.2018 .The experiment was harvested on 01-11-2018 and the data recorded on different plant parameters are summarized in table-107.

Table-107: Results of Adaptability/National Uniform Pearl Millet Yield Trial

R. No.	Varieties	Plants harvested	Grain Yield (kg/ha)	Days to 50% flowering	Plants height (cm)
1.	10	63	1991a	53	180
2.	8	63	1775b	59	176
3.	5	62	1710bc	58	173
4.	4	59	1678bc	60	159
5.	6	58	1581bc	58	181
6.	7	60	1581bc	58	181
7.	3	63	1536c	53	155
8	1	60	1525c	56	141
9	2	56	1234d	60	157
10	9	58	1154d	60	172
CV %		5.88	7.91	1.33	2.84
LSD 5%		6.08	214.01	1.32	8.17

Analysis of variance revealed highly significant differences among all the genotypes for characters like grain yield, days to 50% flowering, plant height except for plants harvested (table-107). The genotype No. 10 gave maximum grain yield of 1991 kg/ha followed by the genotype No. 8 (1775 kg/ha) whereas, genotype No. 9 produced minimum grain yield (1154 kg/ha). The genotype that excelled the all other entries regarding grain yield took minimum number of days (53 days) to complete 50% flowering while it attained a height of 180cm which indicated that Entry No.10 is most suitable genotype for Pothowar conditions regarding both grain and stalk yield.

MAIZE BREEDING SUB STATION, CHHARRAPANI (MURREE)

RESEARCH WORK DONE:

During the spring crop season 2017, two maize inbred lines (F-308 and F-165) were received from the office of Associate Maize Botanist, Maize Research Station, Faisalabad for constitution of single cross (F-308 x F-165) and seed multiplication of inbred line F-165.

Sowing was done on April 12, 2017 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. Flisto Gold (Pre emergence weedicide) was sprayed after sowing. Virtaco 0.6 granules @ 04 kg / acre against stem borer and insecticide (Actara25 wg) @24 gm / acre against shoot fly was also applied.

During the cropping season proper rogueing was done to maintain purity of the inbred lines. A total number of 1507 cobs of single cross (FH-1046) and 731 cobs of the inbred line F-165 were harvested during the third week of August -2017 and shifted to the Associate Maize Botanist, Maize Research Station, Faisalabad for sowing in the kharif season. Total germplasm / grain weight (11 kg) of single cross and 04 kg of maize inbred line after drying, shelling and grading was entered in the store book for further utilization in maize hybrid development program.

SORGHUM RESEARCH SUB-STATION, DERA GHAZI KHAN

Season and Its Effects

During the year 2018-19, 87.50 mm rainfall was received as compared to the year 2017-18, 106.50 mm rainfall was received. Non availability of Irrigation water during month of July-2018, delayed sowing of trials till the last day of this month. A dry spell during September to December-18, helped in harvesting and threshing of kharif trials-18 at this sub-station.

Table-108: Climate Data of Dera Gazi Khan during Kharif-2018 and Spring-2019

Sr. No.	Month	Average Temperature C*				Rainfall (mm)	
		Maximum		Minimum			
		2017-18	2018-19	2017-18	2018-19	2017-18	2018-19
1	July	38.22	38.48	28.61	29.38	57.00	5.00
2	August	37.70	36.83	28.41	28.87	---	---
3	September	33.68	34.77	25.87	26.43	---	---
4	October	35.38	33.58	20.67	20.61	---	---
5	November	23.48	27.16	12.80	13.13	---	---
6	December	22.06	22.10	7.54	7.10	---	2.00
7	January	19.29	19.71	7.96	6.13	4.50	---
8	February	24.35	20.54	12.22	8.36	2.00	2.00
9	March	29.00	29.97	15.93	12.45	2.00	9.50
10	April	37.56	34.70	22.06	19.47	5.00	39.00
11	May	42.06	38.90	28.23	24.61	21.00	---
12	June	38.00	40.47	28.00	26.53	15.00	30.00
Total rainfall						**106.50**	**87.50**

SORGHUM

1. SORGHUM VARIETAL YIELD TRIAL, KHARIF-2018

Ten entries of Sorghum were planted on 28.07.2018 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 1.5 m. 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 19.12.2018. The data recorded for different morphological traits are presented in table-109.

Table-109: Results of Sorghum Varietal Yield Trial at D. G. Khan

Serial No	Entry Name	Crop Stand	Grain Yield (kg/ha)	Stalk Yield (kg/ha)	Plant Height (cm)	Days to 50% anthesis
1	YSS-17	39	3689a	29000	233	79
2	YSS-10	39	3377a	25777	280	82
3	YS-16 c	39	2889b	30000	257	88
4	YSS-41	38	2844b	23444	255	84
5	YSS-18	39	2844b	14889	158	82
6	YSS-38	39	2756b	22000	226	78
7	YSS-31	38	2623bc	22111	182	78
8	YSS-42	39	2311cd	25000	239	94
9	YSS-25	38	1911de	30111	376	90
10	YSS-23	39	1689e	22777	393	91
CV%		3.33	8.92	3.42	0.78	1.72
LSD 5%		----	196.22	684.12	1.65	1.19

The results reveal that differences of means due to genotypes were significant for all traits under study. Maximum grain yield of 3689 kg/ha was recorded for the entry YSS-17 while minimum grain yield (1689 kg/ha) was recorded for entry YSS-23. Highest stalk yield was recorded for the variety YSS-25 (30111 kg/ha) while minimum stalk yield 14889 kg/ha was observed for YSS-18. Maximum plant height (393 cm) was observed for variety YSS-23 while minimum plant height (158 cm) was observed for YSS-18. Entries YSS-42 took maximum days to 50% anthesis while entries YSS-31 and Yss-38 took minimum 78 days.

2. SORGHUM HYBRID YIELD TRIAL, KHARIF-2018

16 crosses and two check varieties of Sorghum were planted on 28.07.2019 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 26.12.2018. The data recorded for different morphological traits are presented in table-110.

Table-110: Results of Sorghum Hybrid Yield Trial at D. G. Khan

Sr. No.	Entry Name	Crop stand	Grain yield (kg/ha)	Stalk yield (kg/ha)	Plant height (cm)	Days to 50% anthesis
1	YSH-132	36	4267a	41000	240	80
2	YSH-134	37	4089ab	28889	243	86
3	YSH-128	35	4045ab	19111	187	70
4	YSH-137	35	3733bc	21555	209	81
5	Lasani ©	36	3644cd	22000	204	83
6	YSH-130	35	3289de	14111	187	71
7	YSH-131	35	3200ef	27444	178	79
8	YSH-136	35	3200ef	27333	184	79
9	YSH-138	36	3022efg	16000	197	74
10	YS-16 c	35	2889fg	27778	262	88
11	YSH-129	36	2711g	16778	192	74
12	YSH-154	36	1955h	33444	259	86
CV%		3.05	6.72	3.05	3.69	1.51
LSD 5%		----	183.84	613.47	6.39	0.98

The above table reveals that differences of means due to genotypes were significant for all traits under study. The maximum grain yield of 4267 kg/ha was produced by entry YSH-132 followed by YSH-134 with grain yield of 4089 kg/ha. Highest stalk yield was also recorded for the hybrid YSH-132 (41000 kg/ha) which is followed by the hybrid YSH-154(33444) kg/ha while minimum stalk yield was observed for YSH-130 (14111 kg/ha). Maximum plant height was observed for entry YS-16 c (262 cm)) while minimum plant height of 178 cm was observed for the hybrid YSH-131. YS16c took maximum 88 days to 50% anthesis while YSH-128 took minimum 70 days for 50 % anthesis.

3. NATIONAL UNIFORM SORGHUM HYBRID YIELD TRIAL, KHARIF-2018

Six hybrids of Sorghum were planted on 28.07.2018 to evaluate the promising 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 21.12.2018. The data recorded for different morphological traits are presented in table-111.

Table-111: Results of National Uniform Sorghum Grain Yield Trial at D. G. Khan

Sr. No.	Entry Name	Crop stand	Grain yield (kg/ha)	Stalk Yield (kg/ha)	Plant height (cm)	Days to 50% anthesis
1	E-4	45	3200a	28889	229	88
2	E-5	44	2889b	32444	258	83
3	E-3	45	2756b	24333	178	83
4	E-2	44	2533c	14778	135	87
5	E-1	45	2400c	24889	138	83
6	E-6	44	2089d	20889	240	89
CV%		2.89	6.86	3.01	0.94	1.20

LSD 5%	----	150.96	599.74	1.51	0.84

The results reveal that differences of means due to genotypes were significant for all traits under study. Maximum grain yield of 3200 kg/ha was recorded for E-4 while minimum grain yield of 2089 kg/ha was recorded for E-6. Highest stalk yield was recorded for E-5 i.e., 32444 kg/ha while minimum stalk yield was recorded for E-2 i.e. 14778 kg/ha. Maximum plant height of 258 cm was observed for E-5 while minimum plant height of 135 cm was observed for E-2. Hybrid E-6 took maximum 89 days to 50% anthesis while E-5 took minimum 83 days.

4. NATIONAL UNIFORM SORGHUM HYBRID YIELD TRIAL, KHARIF-2018

Thirteen hybrids of Sorghum were planted on 28.07.2018 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 x1.5m. 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 24.12.2018. The data recorded for different morphological traits are presented in table -112.

Table-112: Results of National Uniform Sorghum Grain Yield Trial at D. G. Khan

Sr. No.	**Entry Name**	**Crop stand**	**Grain Yield** (kg/ha)	**Stalk Yield** (kg/ha)	**Plant height** (cm)	**Days to 50% anthesis**
1	E-11	35	3555a	10000	141	86
2	E-10	33	3289b	16444	155	89
3	E-2	34	3067b	31000	127	84
4	E-13	33	2400c	23333	237	87
5	E-12	34	1867d	18333	237	86
6	E-9	34	1733d	7778	126	73
7	E-4	35	1467e	13333	154	89
8	E-3	34	1333ef	24778	311	88
9	E-5	34	1200f	17444	356	82
10	E-8	34	1138f	62667	138	83
11	E-6	34	1111f	18000	314	83
12	E-7	33	702g	16889	341	86
13	E-14	34	662g	19778	357	86
CV%		3.82	8.52	107.30	11.40	1.60
LSD 5%		----	125.93	18854.00	21.44	1.11

The results reveal that differences of means due to genotypes were significant for all traits under study. Maximum grain yield of 3555 kg/ha was recorded for E-11 while minimum grain yield of 662 kg/ha was recorded for E-14. Highest stalk yield was recorded for E-8 i.e., 62667 kg/ha while minimum stalk yield was recorded for E-9 i.e. 7778 kg/ha. Maximum plant height of 357 cm was observed for E-14 while minimum plant height of 126 cm was observed for E-9. Hybrid E-4 took maximum 89 days to 50% anthesis while E-9 took minimum 73 days.

5. NATIONAL UNIFORM SORGHUM (FODDER) YIELD TRIAL, KHARIF-2018

Seven lines/varieties of Sorghum were planted on 28.07.2018 to evaluate the promising lines/varieties for green fodder yield. The layout was done according to Randomized

Complete Block Design with three replications in a plot size 1.8m x 6m. Plant to plant and row to row distances were kept 15cm and 30cm respectively. Standard agronomic and plant protection measures were carried out in the experiment. The harvesting for Fresh Fodder was done on 16.10.2018. The data recorded for different morphological traits are presented in table-113.

Table-113: Results of National Uniform Sorghum Fodder Yield Trial at D. G. Khan

Entries	Name	MMRI Y.Wala	RARI, BWP	D.G. Khan	DADU	Average	% Increase
1	W-3535	2641	2957	1667	3370	2659	-15.53
2	R-3636	2208	2624	1759	2850	2360	-25.03
3	S-22, RARI	2455	2541	1914	3150	2515	-20.11
4	**YSH-95**	**3435**	**3568**	**2222**	**4323**	**3387**	**+7.59**
5	**YS-16(C)**	**2997**	**3790**	**2006**	**3797**	**3148**	
6	YSS-42	2467	3457	1450	4360	3184	+1.14
CV%		19.33	10.08	-	18.28		
LSD (0.05%)		NS	578.6	-	NS		

The results reveal that differences of means due to genotypes were significant for all traits under study. Maximum grain yield of 2222 kg/ha was recorded for YSH-95 while minimum gain yield was recorded S-22 RARI.

6. NATIONAL UNIFORM SORGHUM (FODDER) YIELD TRIAL, KHARIF-2018

Two lines/varieties of Sorghum were planted on 04.08.2018 to evaluate the promising lines/varieties for green fodder yield. The layout was done according to Randomized Complete Block Design with three replications in a plot size 1.8m x 6m. Plant to plant and row to row distances were kept 15cm and 30cm respectively. Standard agronomic and plant protection measures were carried out in the experiment. The harvesting for Fresh Fodder was done on 16.10.2018. The data recorded for different morphological traits are presented in table-114.

Table -114: Results of National Uniform Sorghum Fodder Yield Trial at D. G. Khan

Sr. No.	Entry Name	Crop stand	Green fodder yield (kg/ha)	Dry matter yield (kg/ha)	Plant height (cm)
1	A	84	33796a	12104	205
2	B	85	19753b	6453	192
CV%		1.67	1.87	1.78	1.76

LSD 5%	----	408.33	134.98	2.85

The results reveal that differences of means due to genotypes were significant for all traits under study. Maximum green fodder yield of 33796 kg/ha was recorded for line/variety A while minimum green fodder yield of 19753 kg/ha was recorded for B. Highest Dry matter yield was recorded for advance line A i.e., 12104 kg/ha while minimum dry matter yield was recorded for entry B i.e. 6453 kg/ha. Maximum plant height of 205 cm was observed for A while minimum plant height of 192 cm was observed for B.

7. SORGHUM GENE POOL

Hundred sorghum cultivars/lines comprising of local and exotic origin were sown on 28.07.2018 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 31.12.2018 and threshed carefully that will be sown for maintenance during Kh-19

PEARL MILLET:

1. PEARL MILLET VARIETAL YIELD TRIAL, KHARIF-2018

Ten lines/varieties of Pearl Millet were planted on 04.08.2018 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 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 23.11.2018. The data recorded for different morphological traits are presented in table-115.

Table-115: Results of Pearl Millet Varietal Yield Trial at D. G. Khan

Sr. No.	Entry Name	Crop stand	Grain yield (kg/ha)	Stalk yield (kg/ha)	Plant height (cm)	Days to 50% anthesis
1	YBS-94	44	1500a	12292	264	65
2	YBS-98	45	1417ab	11042	252	65
3	YBS-89	45	1333bc	13889	267	66
4	YBS-83	45	1278c	12917	252	67
5	YBS-95	43	1139d	10208	259	63
6	YBS-93	45	1111d	12847	281	68
7	14-RBS-01	43	1028de	10903	231	65
8	14-RBS-02	44	972ef	10833	234	69
9	YBS-92	44	945ef	8056	257	64
10	14-RBS-05	42	867f	11180	238	68
CV%		2.05	5.95	2.05	1.31	1.69
LSD 5%		----	135.00	191.22	2.70	0.91

The results reveal that differences of means due to genotypes were significant for all traits under study. Maximum grain yield of 1500 kg/ha was recorded for YBS-94 which is followed by the entry YBS-98 having grain yield value of 1417 kg/ha while minimum grain yield of 867 kg/ha was recorded for 14-RBS-05. Highest stalk yield of 13889 kg/ha was recorded for YBS-89 while minimum stalk yield of 8056 kg/ha was recorded for YBS-92. Maximum plant height of 281 cm was observed for YBS-93 while minimum plant height of 231

cm was observed for 14-RBS-01. YBS-95 took minimum 63 days to 50% anthesis as compared to 14-RBS-02 which took maximum 69 days.

2. NATIONAL UNIFORM MILLET YIELD TRIAL, KHARIF-2018

Ten lines/varieties of pearl millet were planted on 04.08.2018 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 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 24.11.2018. The data recorded for different morphological traits are presented in table-116.

Table-116: Results of National Uniform/Adaptability Millet Yield Trial at D. G. Khan

Hybrid/ Variety	D. I Khan	D. G. Khan	Pioneer	MRS Rawalpindi	RARI Bhawalpur	MMRI Yousafwala	Mean
86 M 90	1584	2750	3057	1536	3528	3486	2657
YBS-95	2166	3500	2385	1991	2444.3	2875	2560
KOS HM 3	1662	3167	2667	1168	3333.3	3181	2530
HM 535	2516	2167	2548	1474	3139	3297	2524
55 S 85	2393	2028	2491	1678	2611	3317	2420
14 RBS-02	2175	2778	2399	1765	2444.3	2300	2310
RARI-Composite 7	1781	2167	2203	1582	2472	3642	2308
14 RBS-05	1843	3333	1991	1582	2569.3	2234	2259
YBS-98 (Check)	1548	1889	2332	1721	2611	2725	2138
14 RBS-01	1360	2833	2384	1154	2639.7	2203	2096
CV%	9.54	5.84	8.28	7.73	6.05	10.73	-
LSD(0.05)	311.3	266.7	347.1	207.6	288.7	269.3	-

The results reveal that differences of means due to genotypes were significant for all traits under study. Maximum grain yield of 2657 kg/ha was recorded for line/variety 86 M 90 while minimum grain yield of 2096 kg/ha was recorded for 14 RBS-01.

3. National Uniform Millet (Fodder) Yield Trial

Seven lines/varieties of Sorghum were planted on 04.08.2018 to evaluate the promising lines/varieties for green fodder yield. The layout was done according to Randomized Complete Block Design with three replications in a plot size 1.8m x 6m. Plant to plant and row to row distances were kept 15cm and 30cm respectively. Standard agronomic and plant protection measures were carried out in the experiment. The harvesting for Fresh Fodder was done on 05.10.2018. The data recorded for different morphological traits are presented in table-117.

Table -117: Results of National Uniform Millet Fodder Yield Trial at Dera Ghazi Khan

Serial No.	Entry Name	Crop stand	Grain yield (kg/ha)	Stalk yield (kg/ha)	Plant height (cm)
1	F	78	40123a	9973	220
2	D	80	34568b	7778	169
3	A	78	34259b	7253	170

4	C	78	25771c	6700	193
5	B	78	24769d	5214	179
6	G	76	23688e	5605	185
7	E	75	19830f	4512	206
CV%		3.30	1.39	3.18	3.28
LSD 5%		----	328.27	174.30	5.056

The results reveal that differences of means due to genotypes were significant for all traits under study. Maximum green fodder yield of 40123 kg/ha was recorded for line/variety F while minimum green fodder yield of 19830 kg/ha was recorded for E. Highest Dry matter yield was recorded for advance line F i.e., 9973 kg/ha while minimum dry matter yield was recorded for entry E i.e. 4512 kg/ha. Maximum plant height of 220 cm was observed for A while minimum plant height of 169 cm was observed for D.

4. On-Farm Pearl Millet Yield Trail

Two advance lines and a standard variety YBS-98 of pearl millet were tested at three 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-118.

Table-118: Results of On-Farm Pearl Millet Yield Trail at Dera Ghazi Khan

Sr. No.	Address of location	Grain yield (kg/ha)		
		YBS-89	**YBS-95**	**YBS-98**
1	Qasim Qureshi, Mouza Chak Salaari, D.G.Khan.	1186	1147	1285
2	Muhammad Mirza, Mauza Chak Buzdar, Kot Chutta, D.G.Khan.	1127	1028	1186
3	Atta Ullah, Mouza Mohammad Hora Jampur, D.G.Khan.	1107	988	1166
Average		**1140**	**1054**	**1212**

This table shows that the Variety YBS-98 gave maximum grain yield on an average i.e. 1212 kg/ha as compared to rest of the varieties of the trial at three different locations in D.G. Khan Division.

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	17	03	20
15	Superintendent	-	01	01
16	Field Assistant	16	11	27
17	Plant Observer	10	03	13
18	Ministerial Staff	12	03	15
19	Laboratory Assistant	02	01	03
20	Computer Operator	01	-	01
21	Stenographer	01	01	02
22	Foreman	01	-	01
23	Mechanic	01	-	01
24	Driver	05	-	05
25	Electrician	01	-	01
26	Naib Qasid	06	01	07
27	Tube well Operator	05	01	06
28	Beldar	39	07	46
29	Chowkidar	05	01	06
30	Mali	01	-	01
31	Sweeper	01	-	01
32	Cook	01	-	01
Total		**143**	**35**	**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	Mr. Asrar Mehboob	Agronomist	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. Amjad Khan Tareen	Assistant Entomologist	M. Sc. (Hons) Agri.
12	Mr. Khadim Hussain	Assistant Botanist Maize	M. Sc. (Hons) Agri.
13	Mr. Ehsan-U-Allah	Assistant Botanist Sor-	M. Sc. (Hons) Agri.
14	Dr. Javaid Iqbal	Assistant Agronomist	Ph.D.
15	Mr. Abdul Razaq	Assistant Botanist Maize	M. Sc. (Hons) Agri.
16	Dr. Nadeem Iqbal	Assistant Agronomist	Ph.D.
17	Mr. Ghulam Murtaza	Assistant Research Officer	M. Sc. (Hons) Agri.
18	Dr. Muhammad Shoaib	Assistant Research Officer	Ph.D.
19	Mr. Shahid Hussain	Assistant Research Officer	M. Sc. (Hons) Agri.
20	Mr. Aamir Ghani	Assistant Research Officer	M. Sc. (Hons) Agri.
21	Mr. Muhammad Shakeel	Assistant Research Officer	M. Sc. (Hons) Agri.
22	Mrs. Guljana Nazir	Assistant Research Officer	M. Sc. (Hons) Agri.
23	Miss. Saeeda Khanum	Assistant Research Officer	M. Sc. (Hons) Agri.
24	Mrs. Zaib-un-Nisa	Assistant Research Officer	M. Sc. (Hons) Agri.
25	Mr. Barkat Ali	Assistant Research Officer	M. Sc. (Hons) Agri.
26	Mr. Naveed Kamal	Assistant Research Officer	M. Sc. (Hons)Agri.
27	Mr. Aamer Mumtaz	Assistant Research Officer	M. Sc. (Hons)Agri.
28	Dr. Waseem Akbar	Assistant Research Officer	Ph.D.
29	Mr. Muhammad Irfan Yousaf	Assistant Research Officer	M. Sc. (Hons)Agri.
30	Mr. Hafiz Mutahir Javed	Assistant Research Officer	M. Sc. (Hons)Agri.
31	Mr. Aamar Shehzad	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.**	10.81	Research work on maize.
5.	**Millets Research Station, Rawalpindi.**	2.0	Research work on millets.
6.	**Sorghum Research Sub-Station, Dera Ghazi Khan.**	0.663	Research work on sorghum (Yield Trials).
7.	**Maize Breeding Sub-Station, Chhar-rapani, Murree**	0.781	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
2016-2017	93,880,600	92,589,983	10,643,400	11,127,299
2017-2018	96,159,924	95,303,116	10,200,000	11,299,240

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

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.

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

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

ABRIDGED REPORT 2018-19

Dr. Muhammad Arshad
Director

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OVERVIEW

Maize and Millets Research Institute, Yusafwala, Sahiwal was upgraded as research institute from a maize research and seed production farm in1968-69. The main objective of this institute is to develop new varieties/hybrids of maize and millets crops and their pre-basic and basic seed production. This institute has two zonal research stations, Maize Research Station, Faisalabad working on maize hybrids development program since 1990 and Millets Research Station Rawalpindi established in 1976 to enhance the production of Pearl millet and maize crops through high yielding varieties and modern crop production technology in rain fed areas of Punjab. Maize crop has a significant role in Pakistan's economy due to its diversified uses as feed for poultry industry, food for human being and fodder for live stock. In Punjab due to adoption of hybrids per hectare yield of maize has been increased from 1890 kg/ha (2001-02) to 6566 kg/ha (2017-18). This institute has released 12 OPV's, 14 hybrids of maize, four varieties of sorghum and two varieties of pearl millets so far. One maize hybrid (FH-1036), four maize OPV's (Sahiwal Gold, Gohar, POP-1, CIMMYT-PAK) and one sorghum hybrid (Fakhar-e-Punjab) has been recently recommended by the Expert Sub-Committee for approval. Moreover ten (10) maize hybrids, one maize OPV and two sorghum OPV's are being tested in National Uniform Yield Trials and under DUS studies. These new high yielding hybrids and OPV's will be helpful in self-sufficiency. Quality seed of maize hybrids and OPV's, sorghum and millets varieties will be available at lower cost and also curtail the import bill incurred on import of seed. The research work conducted in 2018-19 and salient achievements are as under:

HYBRID MAIZE (*Zea mays* L.)

Maintenance and Derivation of Yellow Maize Inbred Lines

Six hundred ninety one (691) elite and one hundred forty three (143) pre elite in Kharif 2018 while eight hundred and seven (807) elite and one hundred and twelve (112) pre elite inbred families were maintained at Maize & Millets Research Institute, Yusafwala in Spring 2019 by hand pollination. 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 characters. Data regarding days to silking, tasseling, stalk rot infestation and other required parameters were recorded for all the lines separately.

Two hundred fifty six (256) derivative families in Kharif 2018 while four hundred and six (406) derivative families were sown ear to row during Spring 2019 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, disease and heat tolerance were self-pollinated in all the families.

At Maize Research Station, Faisalabad two hundred ten (210) inbred lines were maintained and two hundred fifteen (215) inbred families generations were advanced in Kharif-2018. Twenty (20) new inbred lines were included in genepool.

Maintenance and Derivation of White Maize Inbred Lines

For maintenance and derivation of inbred lines through hand pollination sixty eight (68) inbred lines and one hundred twenty three (123) derivative families of different generations were sown in ear to row fashion during Kharif-2018. Fifty one (51) inbred lines were finally selected and maintained while 5, newly derived inbred lines, were also added in maintenance which resulted in 56 inbred lines.

Selfed plants were harvested at maturity and seed of 164 families was collected / added for further derivation and selection cycles.

During Spring-2019, 56 inbred lines and 164 derivative families were sown in ear to row fashion for maintenance and derivation of inbred lines respectively. Thirty-three (33) inbred lines were finally selected while five newly derived lines were added in maintenance block. Similarly, one hundred and seventeen (127) derivative families were selected/added for further derivation and selection cycles.

Fig 1: FH-988 a heat resilient hybrid

Hybrid Constitution

Development of high yielding maize hybrids tolerant to diseases, insects and temperature is a continuous project. At MMRI, Yusafwala one hundred and thirteen (113) single crosses with four males in Kharif 2018 while one hundred eighty six (186) single crosses also with four males were constituted in Spring 2019 in isolated blocks through de-tasselling of female lines for evaluation in coming seasons.

Fifty two (52) new single cross hybrids were constituted in two isolations and by hand pollination Yusafwala during Kharif-2018 at Maize Research Station, Faisalabad

Hybrid Evaluation

Preliminary Yield Trials

One hundred forty five (145) single cross hybrids were evaluated in three preliminary yield trials along with different commercial checks at MMRI. A local hybrid YH-5603 gave maximum grain yield i.e.12858 kg/ha followed by YH-5615 and YH-5607 giving 12371 and 11945 kg/ha respectively in comparison to check DK-8789 (10882 kg/ha) and check 30Y87 (9050 kg/ha) during Kharif 2018.

Fig 2: High yielding maize hybrid (YH-5421)

While during Spring 2019, 155 single cross hybrids were evaluated in six preliminary yield trials along with different commercial checks at MMRI. One multinational P-1543 and one local hybrid YH-5602 statistically gave higher grain yield i.e.13292 kg/ha & 12999 respectively followed by two local hybrid YH-5427 & YH-5417 giving 12433 Kg/ha & 11919 Kg/ha respectively in comparison to check NK-8441 (12009 Kg/ha).

During Kharif-2018, one hundred eight (108) single cross hybrids were evaluated in four trials consisting of 27 hybrids each at MRS, Faisalabad, Local hybrids FH-1627, FH-1626 and FH-1621 with grain yield of 11390, 11100 and 10951 kg/ha respectively were higher yielder than average grain yield of check hy-

brids FH-1046 (8774 kg/ha), YH-1898 (8177 kg/ha) and NK 6654 (8970 kg/ha) on average basis.

Fig 3: High yielding maize hybrid (YH-5427)

Fig 4: Local hybrid FH-1627

Fig 5: High yielding maize hybrid (FH-1420)

Micro Yield Trials

Objective was to select high yielding single crosses having desirable characteristics. At MRS, Faisalabad sixty (60) single cross hybrids were evaluated in four trials consisting of 15 hybrids each during Kharif 2018. Local hybrids FH-1420, FH-1398 and FH-1392 with grain yields 12429, 11301 and 10873 kg/ha respectively, were found higher yielder as compared to checks FH-1046 (10596 kg/ha), YH-1898 (8404 kg/ha) and NK 6654 (9153 kg/ha).

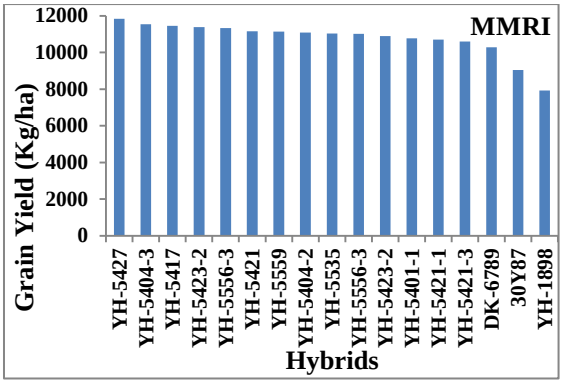

Fig. 6.Preliminary hybrid maize yield trial 1

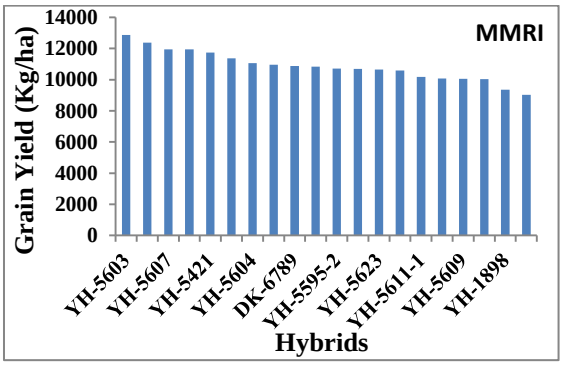

Fig. 7.Preliminary hybrid maize yield trials II &III

Fig. 6. Seventeen (17) representative hybrids were placed in a bar chart on X-axis against grain yield on Y-axis in preliminary yield trial I at MMRI in Kharif 2018.

Fig. 7. Ten (10) representative hybrids were placed chart on X-axis against grain yield on Y-axis in preliminary yield trials II &III at MMRI in Khariff 2018.

Fig 8: High yielding maize hybrid (FH-1210)

Macro Yield Trials

At MRS, Faisalabad seventeen (17) single cross hybrids were evaluated in two trials during Kharif 2018. FH-988, FH-1210 and FH-1125 with respective grain yields 10568, 10179 and 9963 kg/ha were found better yielder than check YH-1898 (8780 kg/ha) and NK 6654 (9569 kg/ha) on average basis.

During Spring 2019 in macro yield trial ten (10) hybrids are under evaluation

National Uniform Maize Hybrid Yield Trial

To evaluate different national and multinational maize hybrids for adaptability in different

agro-climatic zones across the country, a trial consisting of 100 hybrids in Kharif, 2018 received from the National Co-coordinator PARC, Islamabad was laid out. The results revealed that hybrid P3582 and P3875 exhibited the highest grain yield of 13497and 12140 kg/ha respectively.

Fig 9: High yielding maize hybrid in the process of approval (YH-5482)

At MRS, Faisalabad, in National Uniform Yield Trial (Yellow) during Kharif 2018, entry No. 25W87, Ag-4040 and P-4084 with respective yield values 10736, 10250 and 10366 kg/ha were found higher yielder.

Fig 10: Maize candidate hybrid (YH-5593)

ON GOING PROJECTS

ADP PROJECT

Evaluation of Single Crosses for Heat Tolerance

Objective was to select high yielding temperature tolerant single crosses having desirable characteristics. 56 single crosses were sown late in March, in three preliminary maize yield trails. Results will be reported after harvesting. At, MRS Fsd, fifty (50) new maize hybrids were constituted using heat resilient inbred lines in Kharif 2018. While in Spring 2019, fifty (50) single crosses has been sown in two preliminary maize yield trails for evaluation against heat stress. Two sets of 30 inbred lines each have been sown, one under controlled conditions in tunnel and other delayed sowing in field to expose to heat stress. On-farm trials consisting of eight maize hybrids have been sown at 5 locations for assessment of yield potential in comparison with multinational hybrids.

Fig 11: Maize candidate hybrid in the process of approval (YH-5427)

Development of Inbred Lines under Optimal and High Temperature

Seventy five inbred lines were sown under optimal and high temperature i.e. late in March. The objective was to expose the lines to high temperature and to develop high temperature tolerant lines .Thirty selected inbred lines were also sown in tunnel to give them high temperature shock at flowering.

Effect of Pre and Post Emergence Weedicides on Grain Yield of Hybrid Seed Production YH-1898

The trial was conducted during Kharif 2018. Data regarding grain yield and its components were recorded and statistically analyzed. The data showed that different weedicides significantly control the weeds. Maximum control was observed Dual Gold (600ml/acre pre-emergence) having grain yield 2646 Kg/ ha over control having grain yield 785 kg/ha.

Effect of Born and Zinc Micronutrient Application on Grain Yield of Hybrid Seed Production YH-1898

The trial was conducted during Kharif 2018. Data regarding grain yield and its components were recorded and statistically analyzed. The data showed that micronutrients zinc and born applications significantly affected the grain yield of hybrid seed production. Maximum grain yield of 2472 kg/ha was obtained where

Zinc (33%) + Boron (11%) @11.25 kg/ha was applied. While the grain yield under control was 1912 kg/ha.

PARB PROJECTS

Nutritional Enhancement of Crops, Fruits and Vegetables (PARB No. 904)

Thirteen (13) existing maize hybrids and OPV were analyzed. Local hybrid FH-1461 was found having higher percentage of crude fat (4.30 %) than the check hybrid NK-6654 (4.19%). Local hybrid FH 1046 was showing higher values of crude protein (8.75%) and Beta-carotene (241.83 µg/100gm) than the commercial check hybrid NK 6654 (8.23% and 219.75 µg/100gm). In Spring 2019, Twelve (12) inbred lines were selected and sown in crossing block for constitution of single cross hybrids in square No. 24. Hand pollination was performed at the time of anthesis and silking. More than 100 crosses were constituted during this season and almost 20-30 g seed of each cross was harvested

Acceleration of Maize Breeding through Inducer Lines Mediated Doubled Haploids (PARB No. 900)

In Kharif 2018 local inducer lines were maintained. In Spring 2019, a haploid induction block including inducer lines and F_2 population of hybrids has been sown to produce 800-1000 haploid seeds at MMRI and MRS, Fsd.

In Spring 2019, two inducer lines were sown in tunnels with source papulation for haploid induction. Total crossed seed obtained was 18180, out of which 759 were haploids and 17421 were diploids. Total induction %age was 4.18%.

MAIZE OPVs

Fig 12: High yielding Maize OPV (CZP-132001) in the process of approval

National Uniform Maize Yield Trial (OPVs)

The trial comprising of 11 entries received from National Coordinator (Cereal System), was sown at MMRI in Kharif 2018. The results revealed that entry 1 stood first and entry 10 was second by giving grain yield 5530 and 4676 kg/ha, respectively, followed by entry No. 13 which showed 4468 kg/ha yield.

At MRS, Faisalabad, in NUMYT (OPV) entries 10 & 12 yielded 6800 and 6780 kg/ha respectively while in sweet corn varietal trial entry 1 (7052 kg/ha) and 2 (6570 kg/ha) were higher yielder.

Fig 13: High yielding Maize OPV (YW-786) in the process of approval

Fig 14: High yielding candidate OPV (YY-15) in the process of approval

Micro Plot Maize Yield Trial (OPVs)

During Kharif 2018, a trial comprising of seven (7) maize OPVs was sown at MMRI. Result revealed that Pearl stood 1st position by giving grain yield of 8490 kg/ha followed by YW-2055 with grain yield of 8454 kg/ha while Agaiti-85 gave the minimum grain yield of 2271 kg/ha. While in Spring 2019, a trial comprising of 7 entries was conducted. Results revealed that maximum grain Yield (5252

kg/ha) was given by MMRI Yellow followed CZP-132001 with a yield of 4950 kg/ha while minimum yield (2450 kg/ha) was shown by YW-787.

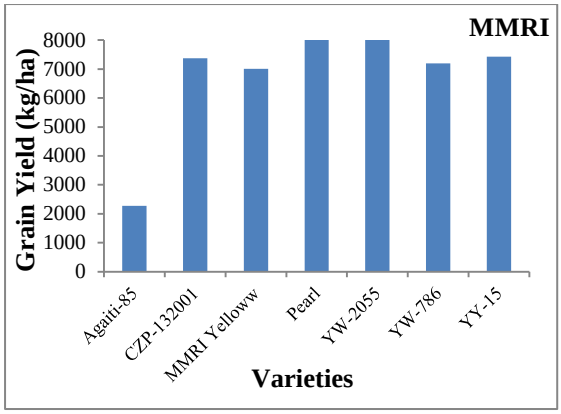

Fig 15: Micro plot maize yield trial (OPVs) (yellow and white) during Kharif 2018

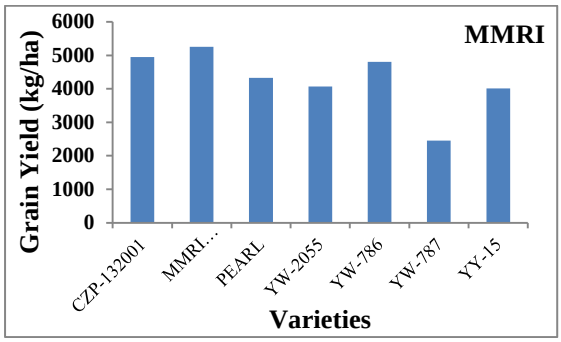

Fig 16: Micro plot maize yield trial (OPVs) (yellow and white) during Spring 2019

Fig. 16. Seven (7) maize OPVs were placed in a bar chart on X-axis against grain yield on Y-axis in microplot maize yield trial at MMRI in Kharif 2018.
Fig.17. Seven (7) maize OPVs were placed in a bar chart on X-axis against grain yield on Y-axis in microplot maize yield trial at MMRI in Spring 2019.

Development of Pakistan's 1st Popcorn Variety

Popcorn, a special kind of corn, is purely grown for eating purpose and is utilized after popping. There was no approved variety or hybrid of popcorn in Pakistan therefore either landraces or imported popcorn was being utilized. The use of local landraces results in lower yield as well as inferior popping expansion while import of popcorn was creating extra burden on country economy. Moreover, flakes of landraces and imported popcorn were not delicious. Therefore, industry had to add various flavors to improve deliciousness of the pops. So, there was dire need for indigenous popcorn varieties in the country. Feeling this deficiency, MMRI worked hard to develop a popcorn variety suitable for local agro-ecological conditions with higher yield and better popping expansion**.** The task was started in 2008 and after effort of almost ten years; the Institute became successful in developing a popcorn variety which has been recommended for approval from Expert Sub-Committee.it is hoped that this initiative will work for lowering the economic burden and improving the local Popcorn Industry.

Fig 17: High yielding candidate Pop-Corn OPV (YPC-14) in the process of approval

SORGHUM (*Sorghum bicolor* L.)

Germplasm Maintenance and Hybrids Constitution

For screening and maintenance of genepool and hybrids constitution, one hundred and twenty two local entries along-with 26 exotic pure lines were planted at Yusafwala and 100 entries were planted at D.G. Khan. Five (5) plants in each entry were maintained by covering the panicles. Forty seven (47) local and sixteen (16) exotic entries from gene pool were rejected due to disease susceptibility, remaining Sorghum lines were maintained. Fourteen local and 31 exotic CMS (A) lines with their counterpart (B) lines and twenty six local with 18 exotic fertility restorer (R) lines were planted at Yusafwala. One exotic CMS line was rejected due to disease susceptibility while 13 restorers, not germinated while remaining CMS and Restores lines were maintained. Thirty three (CMS x R) crosses were constituted (23 in two isolations and 10 by hand). Twelve (12) CMS (A) lines were planted with Sudan grass for sorghum × Sudan grass crosses while eleven crosses were constituted for planting in Spring 2019. Five F_4 families from F_3 and three F_5 families from F_4 were selected during Kharif 2018. Six phenotypically superior plants from F_6 were selected for a varietal trial based on their head length and

brix value. 11 entries of M_4 were selected from mutated entries.

Evaluation of Hybrids and OPVs

(i) 16 (CMS x R) hybrids and two checks were tested in a hybrid yield trial at MMRI, Yusafwala and SRSS, D. G. Khan. The results revealed that YSH-130 gave significantly higher yields (3878 kg/ha) followed by YSH-134, (3520 kg/ha) & YSH-138 (3507 kg/ha) in comparison to check YSH-95 (3417 kg/ha) &Lasani (2242 kg/ha) at MMRI, while at SRSS, D.G. khan, YSH-132 gave significant higher grain yields 4267 kg/ha followed by YSH-134 (4089 kg/ha).

(ii) Twenty two hybrids with three checks were tested in other two trials at MMRI, Yusafwala. The results revealed that YSH-157 (5202 kg/ha) gave significantly higher yields followed by YSH-151 (5068 kg/ha) comparison to check YSS-98 (4456 kg/ha) and Lasani (2706 kg/ha).

(iii) Nine entries along with one check were tested in a varietal yield trial at MMRI, Yusafwala and SRSS, D. G. Khan. The results revealed that YSS-31 and YSS-18 gave higher yields (2840 and 2815 kg/ha) followed by YSS-17 (2730 kg/ha), YSS-42 (2717 kg/ha) & YSS-10 (2707 Kg/ha) at MMRI in comparison to check YS-16 (2467 kg/ha), while at SRSS, D. G. khan, YSS-17 gave highest grain yields (3689 kg/ha) in comparison to check YS-16 2889 kg/ha.

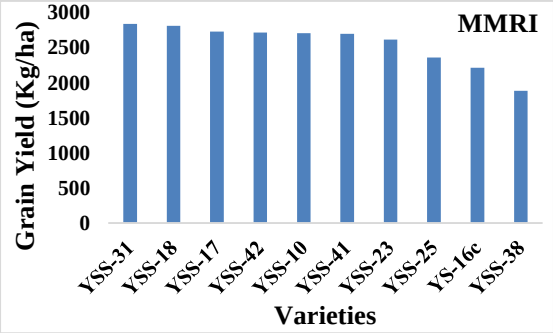

Fig 18: Sorghum varietal yield trial

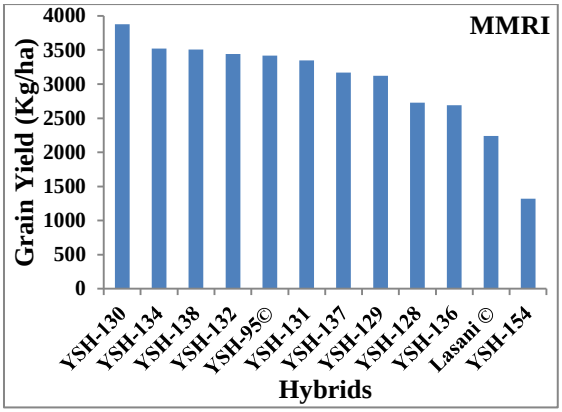

Fig 19: Sorghum hybrid yield trial 1

Fig. 18. Ten (10) sorghum varieties were placed in a bar chart on X-axis against grain yield on Y-axis in a yield trial at MMRI in Kharif 2018.

Fig.19. Twelve (12) sorghum representative hybrids were placed in a bar chart on X-axis against grain yield on Y-axis in sorghum hybrid yield trial I at MMRI in Kharif 2019.

National Uniform Yield Trial

A trial consisting of six entries were planted at MMRI, Yusafwala and D.G. Khan. The results revealed that variety YSS-42 gave highest yield (3467 kg/ha) followed by hybrid YSH-42 (3435 kg/ha) at MMRI while at SRSS, DG Khan hybrid YSH-95 gave significantly the highest grain yield of 3200 kg/ha.

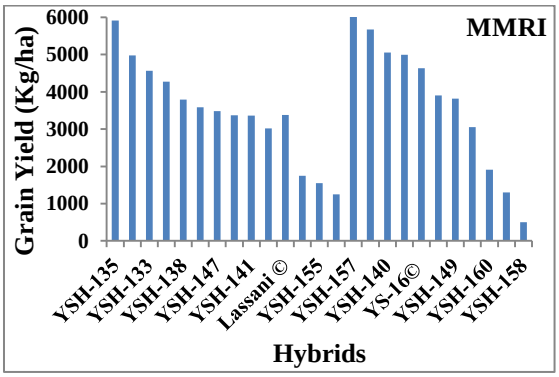

Fig 20: Sorghum hybrid yield trial II & III

Fig. 20. Twelve (13) sorghum representative hybrids were placed in a bar chart on X-axis against grain yield on Y-axis in sorghum hybrid yield trial II & III at MMRI in Kharif 2019.

Fig 21: A high yielding candidate sorghum hybrid YSH-95 in the process of approval

Pearl Millet (*Pennisetumtyphoides*)

Maintenance of Germplasm / Derivations / Constitutions

Sixteen germplasm entries, 17 CMS (A) lines with respective counterpart (B) lines, 25 R-lines, were maintained by hand pollination. Thirty two segregating families were sown. Three to four heads in each family were selfed and harvested for planting during next generation.

At MRS, Rawalpindi, forty eight (48) lines were sown during Kharif -2018. Forty six lines were maintained through hand pollination while two lines were discarded due to poor performance.

Thirty two crosses were made out of which 24 were of YBS lines × YBS lines. Three were of YCMS A lines × YBS lines and 5 were of YCMS A lines * R lines while Twenty successful crosses were made at MRS, Rawalpindi.

Fig 22. Maintenance of Pearl millet germplasm

Development of Dual Purpose Pearl Millet Variety

Twenty (20) F_1 populations were maintained through selfing. Twenty five (25) single plants from F_2 populations, thirty 38 lines from S_1 population and 31 lines from S_2 Populations respectively were selected for further evaluation. Eight (8) superior lines were selected from S_2 and three lines from S_3 population for micro trial Kharif -2019 at MRS, Rawalpindi.

Yield Evaluation

Pearl Millet Hybrid Yield Trials

In this trial 24 hybrids were evaluated for grain yield. The result showed that two hybrids YBH-278 andYBH-289 were at top regarding grain yield with 4717 kg/ha followed by hybrid YBH-283 with 3192 kg/ha in comparison to check 27B93 (2367 Kg/ha).

Pearl Millet Varietal Yield Trial

In pearl millet varietal yield trial, ten varieties were evaluated for yield. The results showed that YBS-89 ranked first by producing grain yield of 4281 kg/ha and, followed by YBS-95 with yield of 3983 kg/ha in comparison to check YBS-98 (3689 kg/ha) at MMRI while at MRS, Rawalpindi the genotype 14RBS-05 gave maximum yield (2093 kg/ha) followed by 14RBS-01 (1970 kg/ha) in comparison to check YBS-98 (1620 kg/ha) while YBS-92 gave minimum yield of 1080 kg/ha. At SRSS, DG Khan YBS-94 gave significantly the highest grain yield of 1500 kg/ha in comparison to check YBS-98 (1417 kg/ha)

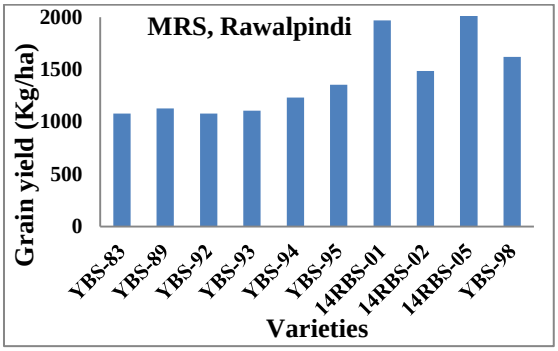

Fig 23. Pearl millet varietal yield trial

Fig. 23. Ten (10) pearl millet varieties were placed in a bar chart on X-axis against grain yield on Y-axis in a yield trial at MRS, Rwp in Kharif 2018.

Pearl Millet Micro Yield Trial

(i) Twelve promising lines developed at Millets Research Station, Rawalpindi with one check were evaluated in two trials. The genotype 16RBS-10 (1857 kg/ha) and 17-RBS-33 (1395 kg/ha) gave maximum yield followed by 17RBS-41 (1390 kg/ha) in comparison to check HBS-27 (1386 kg/ha). While genotype

17RBS-34 and 16 RBS-23 gave minimum yield of 894 kg/ha and 793 kg/ha respectively.

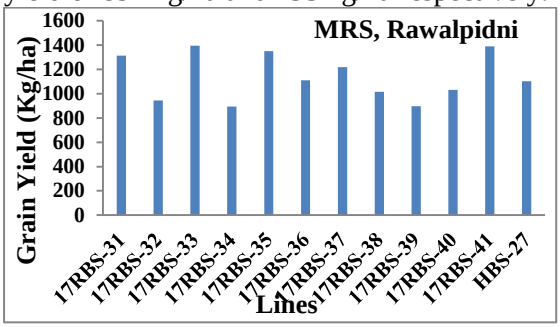

Fig 24: Pearl millet micro yield trial 1

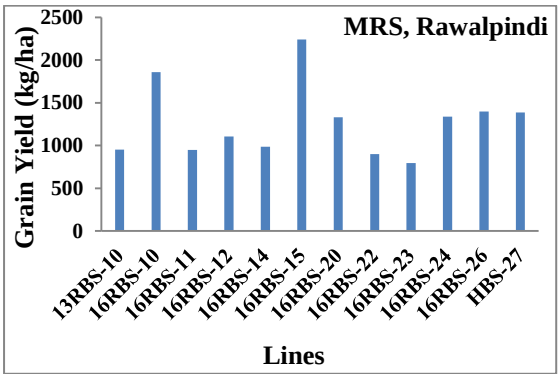

Fig 25: Pearl millet micro yield trial II

Fig. 24. Twelve (12) pearl millet were placed in a bar chart on X-axis against grain yield on Y-axis in a micro yield trial I at MRS, Rwp in Kharif 2018.

Fig. 25. Twelve (12) pearl millet were placed in a bar chart on X-axis against grain yield on Y-axis in a micro yield trial II at MRS, Rwp in Kharif 2018.

SEED PRODUCTION

Table 1: Seed Production of Maize, Sorghum and Pearl Millet Crop 2017-18

	BNS	Pre-Basic	Total Kg
Maize Hybrid	-	-	4496
Maize OPV Inbred Line	158	10653	10811
Sorghum	-	-	235
Pearl Millet	38	3900	3938
	-	920	920

Table 1. Total seed produced at MMRI is divided into three categories based on its production procedure.

(ii) AGRONOMIC STUDIES

Determination of Optimum Plant Population for Hybrid Maize in Bed Sowing

This trial was conducted to find out the suitable plant spacing for higher grain yield of hybrid maize sown on 3.5 feet wide beds during Kharif 2018. Layout plan was RCB design with three replications. The results revealed that maximum grain yield (10529 kg/ha) was recorded at 22.5 cm plant spacing (82963 plants/ha) though statistically not different from sowing at 20 cm spacing (9901 kg/ha) while lowest yield of 8687 kg/ha was recorded at 27.5 cm plant spacing. In spring 2019, preliminary results show that higher grain yield was recorded at 20 cm.

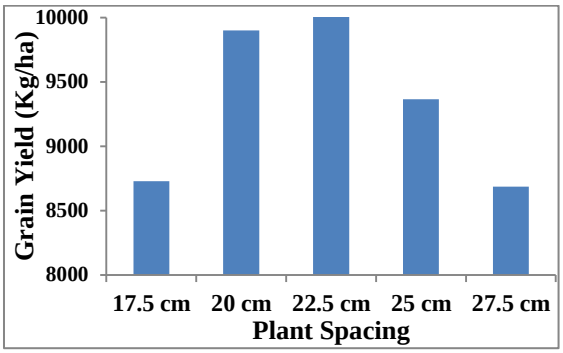

Fig 26: Result of determination of optimum plant population for hybrid maize in bed sowing

Fig. 26. Five plant spacings of YH-1898 were placed in a bar chart on X-axis against grain yield on Y-axis at MMRI in Kharif 2018.

Evaluation of Different Weedicides for Weed Control in Pearl Millet

During Kharif 2018 herbicides were evaluated for effective weed control in pearl millet. Results suggest that maximum grain yield of 3911 kg/hathat was 50% higher yield from control was obtained by Mesotrione + atrazine (550SC) @ 250 ml/acre. Which was followed by Mesotrione + Atrazine (550SC) @ 300 ml/acrewith a grain yield of 3492 kg/ha. While the control treatment (No weedicide) produced the lowest grain yield of 2606 kg/ha.

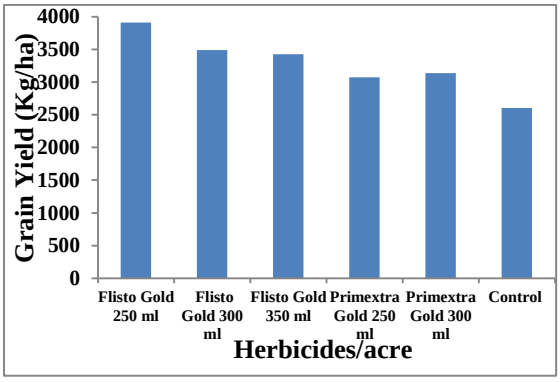

Fig 27: Results of evaluation of different weedicides for weed control in pearl millet

Fig. 27. Five herbicides and control (No herbicide application) were placed in a bar chart on X-axis against grain yield on Y-axis for pearl millet at MMRI in Kharif 2018.

Fig 28: Effect of weedicides on weed control in pearl millet

Evaluation of Different Weedicides for Weed Control in Sorghum

Herbicides were evaluated for better weed control in sorghum. Control (no herbicide) treatment was maintained for comparison. Analysis of the data revealed that maximum grain yield was recorded at Mesotrione + atrazine (550SC) @ 350 ml/acre that yielded (5306 kg/ha) which was followed by Mesotrione + Atrazine (550SC) @ 300 ml/ acre with grain yield of 4728 kg/ha. While lowest yield was recorded by the control treatment that gave 3039 kg/ha.

Effect of Plant Spacing on Plant Growth and Grain Yield of Promising Sorghum Line YSS-42

The trial was conducted during Kharif 2018. Result suggested that 7″ apart plant to plant gave maximum grain yield 1208 kg/ha whereas minimum grain yield 845 kg/ha was obtained under 10'' plant spacing's.

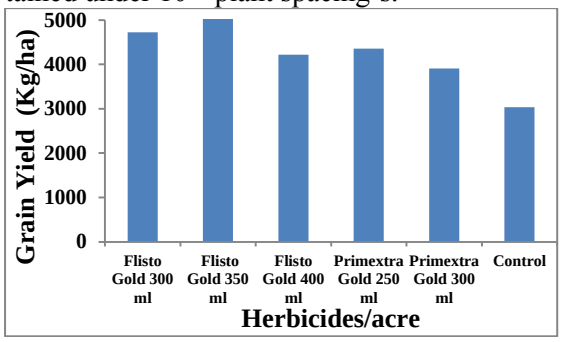

Fig 29: Effect of weedicides on weed control in pearl millet

Fig. 29. Five herbicides and control (No herbicide application) were placed in a bar chart on X-axis against grain yield on Y-axis for sorghum line at MMRI in Kharif 2018.

Determine the irrigation water requirement of hybrid maize under different planting geometries.

During spring 2019 an experiment was conducted to evaluate the water requirement and yield response of maize hybrid under different planting geometries. Treatments consist of sowing on both sides of 90 cm, 105cm and 120 cm wide beds and 75cm spaced ridge. Results suggest that maximum grain yield was recorded by 105 cm wide beds followed by 90 cm wide beds. While data on water requirement of treatments is under progress.

Effect of Different Planting Geometries on Grain Yield of Maize Hybrid under Drip Irrigation

In Kharif 2018, Four sowing geometries viz. T1) sowing on one side of 75cm apart ridges with plant spacing of 16.25cm, T2) sowing on both sides of 90 cm wide beds with plant spacing of 26.25 cm, T3) sowing on both sides of 105 cm wide beds with plant spacing of 22.5cm and T4) sowing on both sides of 120 cm wide beds with plant spacing of 20 cm were evaluated under drip irrigation. The experiment was sown on 09-08-2018. Treatments were applied in randomized complete block design with four replications. Net plot size was of 5.25 m × 4 m for treatment 1 and 3 while 5.4m ×4 m for treatment 2 and 4.8m × 4m for treatment 4 for data collection. Results revealed that sowing on both sides of 90 cm spaced beds with 26.25 cm plant spacing produced maximum grain yield of 12234 kg/ha. While sowing of maize on 105 cm wide beds with 22.5 cm spacing produced second best yield of 11767 kg/ha. While sowing on ridges with 16.25 cm plant spacing gave statistically lowest grain yield of 9696 kg/ha. In spring 2019, maximum grain yield was obtained at 90 cm wide beds which was followed by sowing on ridges.

Efficient Use of Fertilizers to Obtain Higher Grain Yield of Maize Hybrid under Drip Irrigation

Experiment was conducted in Kharif-2018. Treatment consists of four fertilizer level of 83-33-83 NPK kg/acre. Treatments are. 1) 100% recommended, 2) 75% of recommendation, 3) 50 % of recommendation and 4) 25% of the recommendation. Treatments were laid in randomized complete block design with four replication. Gross plot size of 14m × 4m

was maintained, however net plot size of 3.15 m × 4 m was allotted for data collection. Results revealed that, treatments with 75% of recommended fertilizer produced the highest grain yield of 11483 kg/ha. Whereas the lowest grain yield of 9597 kg/ha was recorded by 25% fertilizer rate. In spring 2019, maximum grain yield was obtained by 75% fertilizer rate which was closely followed by 100% fertilizer rate.

Fig 30: Data recording at maize trials under drip Irrigation System at Water Management Research Farm, Renala Khurd, Okara

Estimation of Optimum Management Allowable Deficit (Mad) under Drip Irrigation for Hybrid Maize

Experiment was conducted in autumn-2018. Treatments consists of four MAD levels viz. 1) 15% MAD, 2) 30% MAD, 3) 45% MAD and 4) 60% MAD. Crop was sown on 105 cm wide beds on both sides with plant spacing of 22.5cm. Results revealed that maize grain yield did not varied significantly among first three MAD levels (15%, 30% and 45%). Maximum grain yield of 12111 kg/ha was achieved at re-irrigating at 30% soil moisture depletion which was not different from 15% (11996 kg/ha) and 45% (11723 kg/ha). While re-irrigating at soil moisture depletion of 60% produced lowest grain yield of 9855 kg/ha. In spring 2019, maximum grain yield was obtained when field was irrigated at 15% moisture depletion which was followed when irrigation was done at 30% soil moisture depletion.

Effect of Sowing Dates on the Grain Yield of Hybrid Seed Production of YH-1898

Experiment was conducted in Spring 2019. Treatments consists of 7 sowing dates. Maximum grain yield (4362 Kg/ha) was observed on 1st March sowing followed by 10th February sowing date (4277 Kg/ha). Lowest grain yield (2119 Kg/ha) was observed on 10th March.

Effect of Boron and Zinc Application on Grain Yield of YH-5427

Experiment was conducted in Spring 2019. There were 7 treatments of different combinations of boron and zinc. Maximum Yield of 4116 Kg/ha was observed where born + zinc @30Kg/ha was applied followed by 4103 Kg/ha where only zinc 3 Kg/ha was applied. While the lowest grain yield (3501 Kg/ha) was observed in control where no boron & zinc was applied.

Effect of Plant Spacing on Grain Yield of Hybrid Seed Production of YH-5427

There were seven treatments ranging from 5' apart plant to plant upto 11 inches apart plant to plant. Maximum yield of 4178 Kg/ha was observed in 5' apart plant to plant followed by 7' apart plant to plant 4166 Kg whereas lowest yield of 3845 Kg/ha was achieved, where plant to plant 11' apart sown.

ENTOMOLOGY

Testing of Sprayable Insecticides against Shootfly and Maize Borer

During kharif 2018 & Spring 2019, four insecticides namely Trisuper 40EC, Trizone 40EC, Bifenthrin 10EC and Lambds were tested against shootfly and mazie borer at recommended doses. The results showed that Trisuper gave the best control against shootfly showing minimum shootfly infestation %age (0.56) with grain yield (5911 kg/ha) followed by Bifenthrin 2.5EC showing shootfly infestation %age (1.20) with grain yield (5717 kg/ha) whereas Bifenthrin 10EC and Lambda cyhalothrin 2.5EC gave the best control against maize borer showing maize borer infestation %(0,0) respectively followed by Trisuper 40EC showing maize borer infestation %age (0.56) in Khairf 2018 while in Spring 2019, Trizone 40EC gave the best control against shootfly showing minimum shootfly infestation %age (0.00) with mean grain yield (10133 kg/plot) followed by Bifenthrin 10EC showing shootfly infestation %age (0.45) with grain yield (10555kg/ha) where as Trizone 40EC, Bifenthrin 10EC and Lambda cyhalothrin 2.5EC gave the best control against maize borer showing maize borer infestation %(0,0&0) respectively followed by Trisuper

40EC showing maize borer infestation %age (0.41).

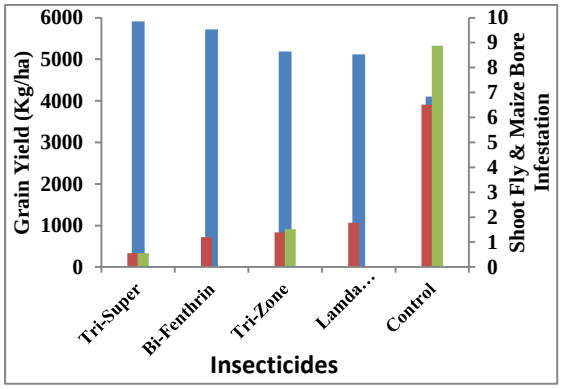

Fig 31:Testing of sprayable insecticides against shoot-fly and maize borer

Fig. 31. Five insecticides and control (without any insecticide application) were placed in a bar chart on X-axis while at Primary Y-axis grain yield was placed and at secondary Y-axis infestation %age of shoot fly and maize borer were placed. Grain yield was put on different axis due to a very large difference in data.

Evaluation of Different Granular Insecticides against Cob/Ear Worm

Four granular insectides namely Carto 4G, Refree 0.3G, Virtako 0.6G and Furadan 3G ware tested against cob worm during Kharif 2018 & Spring 2019. The results showed that Virtako 0.6G and Refree 0.3G gave the best control against cob worm showing minimum infestation %age (0,0,0) respectively with grain yield 4878 Kg/ha & 4792 Kg/ha, in Kharif 2018 while in Spring 2019, Furadan 3G gave the best control against cob worm expressing minimum cob worm infestation %age (5.81) with grain yield (11388Kg/ha) followed by Virtako 0.6Gr expressing cob worm infestation %age (5.96) with grain yield (11588Kg/ha).

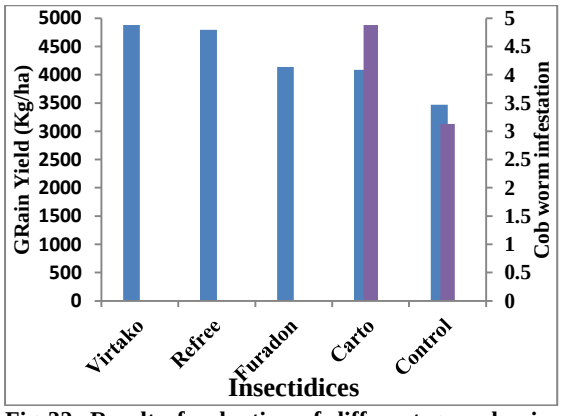

Fig 32: Result ofevaluation of different granular insectides against Cob/Ear worm

Fig. 32. Four insecticides and control (without any insecticide application) were placed in a bar chart on X-axis while at Primary Y-axis grain yield was placed and at secondary Y-axis cob/ear worm infestation was placed. Grain yield was put on different axis due to a very large difference in data.

Study of the Extent of Control of Stem Borers and Army Worms of Maize Crop with the Help of Ak-Tareen Uv Light Traps Network in Four Acres of Land.

After proper calculations the precise results revealed that the subject traps network gave 83.00% control of stem borer without any chemical spray in four acres along with 89.00% control of army worm without any chemical spray in four acres of land.

The seasonal variation indicates that the efficacy increases with cool and calm environment without moon light.

PLANT PATHOLOGY

Testing of Stalk Rot Intensity in Maize Hybrids by Artificial Inoculation

Ten maize hybrids were tested in order to see stalk rot intensity. The results showed that YH-5427, YH-5555, YH-5556, YH-5539, YH-5421, YH-5534, YH-5534-1 and YH-5581 were moderately resistant against stalk rot while YH-5556-1 and YH-5397 were moderately susceptible against stalk rot during Kharif 2018. In Spring 2019, YH-5427, YH-5556-1, YH-5534 & YH-5534-1 were resistant against stalk rot while YH-5555, YH-5556, YH-5539, YH-5421, YH-5397 and YH-5581were found moderately resistant against stalk rot.

Testing of Seed Dressing Fungicides against Seedling Blight in Maize

Recommended doses of four fungicides namely Topsin-M 70WP, Protocol 50WP, Hombre Excel 372.5FS and Dynasty CST 125FS were tested against seedling blight during Kharif 2018 and Spring 2019. The results showed that Hombre Excel 372.5FS gave the best control showing minimum seedling blight attack %age (3.20) with grain yield 6383 kg/ha followed by Topsin-M 70WP showing seedling blight attack %age (3.5) with grain yield 5956kg/ha during Kharif 2018 while in Spring 2019 Hombre Excel 372.5FS gave the best control showing minimum seedling blight attack %age (1.44) with grain yield (8333 kg/ha) followed by Topsin-M 70WP showing seedling blight attack %age (3.04) with grain yield (7500kg/ha)

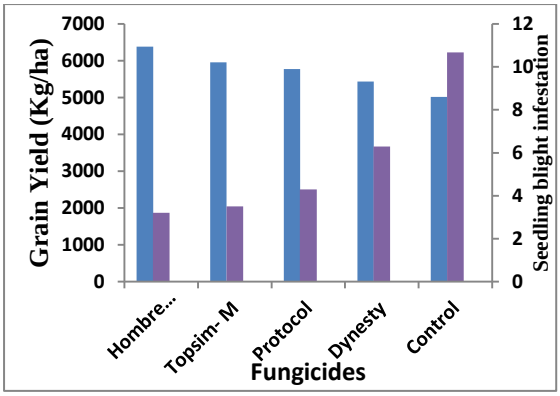

Fig 33: Results of testing of seed dressing fungicides against seedling blight in maize

Fig. 33. Four fungicides and control (without any fungicide application) were placed in a bar chart on X-axis while at Primary Y-axis grain yield was placed and at secondary Y-axis seedling blight infestation was placed. Grain yield was put on different axis due to a very large difference in data.

Screening of Different Maize Germplasms against Stalk Rot

Total 1469 inbred families of maize germplasms were screened out against stalk rot. The detail is as follows, 691 elite inbred lines, 143 pre-elite inbred lines, 256 derivations, 62 PYT-1, 62 PYT-2, 30 PYT-3, 25 demonstration trials and 200 plots of NUMY trial were screened out against stalk rot. In elite lines, 227 lines found resistant, 334 lines found moderately resistant, 25 found moderately susceptible. In pre-elite inbred lines, 57 lines found resistant, 73 found moderately resistant, 7 found moderately susceptible while no line was found susceptible. In derivations, 53 found resistant, 108 found moderately resistant, 69 found moderately susceptible, No line among all categories was found highly susceptible. In PYT and demonstration trials 47 hybrids found resistant, 123 found moderately resistant, 9 found moderately susceptible and no hybrids was susceptible or highly susceptible.

Advisory Services:

Two (2) TV talks, Thirty (30) radio talks were delivered to farmers about the maize, sorghum and pearl millet.

One farmer day was conducted on 27.12.2018 for gaudiness of farmers regarding management of maize crop to get higher yield. Master trainer of Agriculture Extension wings were trained for production and protection of maize crop. Training was conducted for capacity building of private seed companies for on 13.09.2018 regarding maize, sorghum, pearl millet and sorghum × Sudan grass production technology.

Foreign Collaborations: The director MMRI is collaborating part of two international projects of maize (Agriculture Innovation Program, AIP and Heat Tolerant Maize for South Asia, HTMA). He along with one scientist visited Dubai on 17-18 January, 2019 to attend planning meeting of second phase of the project "Heat Tolerant Maize for South Asia through Public and Private Partnership" (HTMA). One scientist of this institute visited National Crop Resource Research Institute, Uganda to attend "New Maize Breeders Training Course" on 15-27 July 2018 organized by CIMMYT.

2nd International Colloquium: Challenges and opportunities of Maize Production

MMRI co-hosted the international colloquium organized by Department of Plant Breeding and Genetics, University of Agriculture, Faisalabad. One scientist of this institute gave presentation and visit of the participants of the colloquium arranged at this institute.

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3. Mehmood, A., M. I. Yousaf, K. Mehmood and M. Shabbir. 2018. African-Asian Journal of Rural Development. 51(1): 24-38.
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11. Haq, M. I., M. Siddique, S. Khanum and N. Kamal. 2019. Genetic analysis of different biometric characters in Pearl millet. International Journal of Biology and Biotechnology, 16(1): 137-139

URDU ARTICLES IN *ZARAT NAMA*

1. ***موسمی مکئی کی کاشت (1st July, 2018)***
2. **موسمی مکئی میں پودوں کی فی ایکڑتعداد اور یکساں نشونما کی اہمیت (15th July, 2018)**
3. ***موسمی مکئی کی فصل کے لیے کھادوں کا استعمال (1st August, 2018)***
4. ***موسمیمکئی کی جڑی بوٹیاں اور ان کا انسداد (15th August, 2018)***
5. ***موسمیمکئی کے لیے آبپاشی کی اہمیت و ضرورت (1st September, 2018)***
6. ***مکئی کو محفوظ طریقے سے ذخیرہ کرنا (15th November, 2018)***
7. ***بہاریہ کی کاشت (1st January, 2019)***
8. ***بہاریہ مکئی کے لیے زمین کی تیاری اور طریقہ کاشت (15th January, 2019)***
9. ***بہاریہ مکئی کی فصل کے جڑی بوٹیوں کی تلفی (1st February, 2019)***
10. ***بہاریہ مکئی کی بھرپور پیداوار کے حصول کے لیے سفارشات (15th February, 2019)***
11. ***بہاریہ مکئی کی فصل سے جڑی بوٹیوں کی تلفی (15th March, 2019)***
12. ***بہاریہمکئی کی برداشت اور سنبھال (01 June, 2019)***

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Metrological Data Recording at Maize & Millets Research Institute, Yusafwala during 2018-19