

ANNUAL PROGRESS REPORT 2019-20



**MAIZE AND MILLETS RESEARCH INSTITUTE,
YUSAFWALA, SAHIWAL**

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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° 41' N, longitude of 73° 12' E and the elevation of 175 meters from sea level. The land of Yusafwala, District Sahiwal was converted into Government Seed Farm in the year 1925 and was handed over to the Agriculture Department (Ext. Wing) for multiplication of quality seed of wheat and cotton etc. Research work on maize was started in the 1940's and was abandoned in its infancy with the partition of sub-continent. A regular research work on maize was restarted in the year 1953-54 at Faisalabad. The research and seed production work of maize was transferred to Yusafwala in the year 1958-59. In 1968-69 the status of this farm was raised to a research institute, named as Maize and Millets Research Institute. The main objective of this institute is to conduct research work on maize and millets crops to develop new varieties/hybrids and their seed production on large scale. Maize 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 5 acres 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 6655 kg/ha (2019-20) in Punjab due to adoption of hybrids. This institute has released 16 OPV's, 16 hybrids of maize, three varieties and one hybrid of sorghum, and two varieties of pearl millets so far. During this year, two maize hybrids (YH-5427, FH-1036), five maize OPV's (Sahiwal Gold, Gohar, POP-1, CIM-MYT-PAK, Sweet-I) and one sorghum hybrid (Fakhar-e-Punjab) has been approved by the Punjab Seed Council. Moreover ten (10) maize hybrids, one maize OPV and two sorghum OPV's and one sorghum hybrid are being tested in National Uniform Yield Trials and under DUS studies. 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 during 1973 on the basis/ provisions in Bhutto's Land Reform 1972. Sharing of produce between Pattadars and the Government @ 60% and 40% started implementation on Stay Order, issued on initial hearing of Writ Petition No. 1075/73 by the Lahore High Court, Lahore in the year 1973. During course of hearing, the Maize Botanist changed the Pattanama, unilaterally, and enforced the Pattadars to be agreed on the ratio of 50:50, against which, the Pattadars again filed a writ petition in the Lahore High Court, Lahore that was dismissed, accordingly, on 03-05-1981. Against the decision of Lahore High Court, the Pattadars filed an appeal (CPLA NO. 813/1981) in the Honorable Supreme

Court of Pakistan. The Supreme Court of Pakistan disposed of the above petition on 17-07-1988 that the petitioners are allowed to settle the matter with the Govt. out of court. In the light of above CPLA, the Government of Punjab, Agriculture Department agreed on sharing ratios of 60:40 on 25-10-1989.

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

Govt. of the Punjab, Agriculture Department, Lahore, accepted the above decision of the Supreme Court of Pakistan and offered the Pattadars to get renew the Pattanamas verbally as well as through newspaper but almost all of them refused to do so and went on deadlock/non-sharing since Kharif 2000. Since then, the Ex-Pattadars are indulging the administration of the Institute in numerous false, baseless & frivolous cases which is a big hurdle in smooth running 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 2018-19 and 2019-20 are given below. During the year 2019-2020, total 400.61 mm rainfall was received in comparison to previous 2018-2019 out of which 221.8 was received only in August 2019 and March 2020. During fiscal year 2018-19 total 260.60 mm rainfall was received.

Table 1: Summary of Metrological Data at MMRI

Sr. No.	Month	Average temperature °C				Rainfall (mm)	
		Maximum		Minimum		(2018-19)	(2019-20)
		(2018-19)	(2019-20)	(2018-19)	(2019-20)	(2018-19)	(2019-20)
1	July	40.29	41.41	27.87	28.60	58.70	48.81
2	August	40.38	40.16	27.26	28.30	16.00	101.50
3	September	38.80	40.23	25.13	27.66	14.00	-
4	October	34.42	31.90	20.58	19.41	-	11.40
5	November	27.90	27.56	13.80	12.83	-	-
6	December	22.48	18.00	7.26	6.35	4.50	12.00
7	January	19.50	15.32	5.70	5.52	24.00	46.00
8	February	19.35	23.64	8.17	5.00	41.30	7.20
9	March	28.03	26.45	13.45	14.41	5.50	120.30
10	April	36.60	35.93	20.40	19.20	31.60	4.40
11	May	40.64	38.93	22.09	23.38	28.7	18.00
12	June	44.03	41.36	25.76	21.00	36.30	31.00
Total Rainfall =						260.60	400.61

YUSAFWALA - SAHIWAL (HEADQUARTER)

MAIZE (*Zea mays* L)

HYBRID MAIZE (YELLOW)

KHARIF 2019:

Germplasm Maintenance

1.1 Maintenance of Inbred Lines

Four hundred fifty-three (453) elite families of 84 inbred lines were sown on 17-08-2019 ear to row for maintenance during Kharif-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 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

Fifty-five (55) pre-elite families of 13 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 17-08-2019 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 four hundred and thirty (430) derivatives including dent & flint derivative lines were completed on 17-08-2019 for derivation through hand pollination during Kharif-2019. 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 verticillioides*) and Selection of resistant germplasm

All inbred lines (Elite and Pre-Elite) and hybrids were inoculated with stalk rot fungus (*Fusarium verticillioides*, 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 internode. 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 fifty-three (53) female inbred lines with one male Y-27 in an isolation block was done for constitution of new single crosses on 23-08-2019. Off-type plants were rogued out. Plants were harvested to collect crossed seed for sowing and evaluation in spring-20.

2.2 Isolation No. 2

Sowing of fifty-one (51) female inbred lines with one male P-222 for new single cross constitution in isolation in Colony area on 21-08-2019. Off-type plants were rogued out. Plants were harvested to collect crossed seed for sowing and evaluation in spring-20.

2.3 Isolation No. 3

Sowing of forty-one (41) female inbred lines with one male GR-9 for new single cross constitution in isolation block was done on 23-08-2019. Off-type plants were rogued out. Plants were harvested to collect crossed seed for sowing and evaluation in spring-20.

3 Seed Increase through open pollination in isolations blocks

3.1 Isolation No.1

Sowing of promising female inbred line DDR-32-2 for maintenance / seed increase sown on 06-09-2019. Germination of the crop is normal. Off-type plants were rogued out.

3.2 Isolation No.2

Sowing of promising female inbred line DDR-51 for maintenance / seed increase sown on 06-09-2019. Germination of the crop is normal. Off-type plants were rogued out.

3.3 Isolation No.3

Sowing of promising female inbred line P-222 for maintenance / seed increase sown on 06-11-2019. Germination of the crop is normal. Off-type plants were rogued out.

4 Hybrid Evaluation

Replicated Yield Trials

4.1 Preliminary Hybrid Maize Yield Trial No. 1. Kharif-2019.

This trial was comprised of thirty-four (34) 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.

Table 2: Results of Preliminary Hybrid Maize Yield Trial No. 1. Kharif-2019

Sr. No.	Hybrid	Yield Kgs/Ha	Stand Count	50% Tassel	50% Silking	Plant Height	Ear Height	Plants Harvest	Ear Harvest
1	YH-5568	10194	32	49	52	253	140	32	36
2	NK-7720	10015	28	48	51	250	133	28	33
3	YH-5404-3	9923	32	47	50	220	125	32	41
4	YH-5482	9827	27	48	51	245	135	27	34
5	YH-5421-2	9722	34	47	50	220	130	34	41
6	YH-5662	9600	29	47	50	250	138	29	32
7	YH-5395	9578	33	47	50	198	105	33	33

8	YH-5657	9552	25	47	50	255	140	25	33
9	YH-5398	9333	30	48	51	213	120	30	35
10	30T60	9266	22	51	54	265	118	22	27
11	YH-5421-3	9163	28	47	50	203	115	28	36
12	YH-5660	9069	25	47	50	215	110	25	33
13	YH-5661	9067	27	48	51	215	123	27	37
14	YH-5655	8998	27	48	51	248	143	27	32
15	YH-5659	8896	24	47	50	218	115	24	27
16	YH-5421-5	8568	26	48	51	213	120	26	32
17	YH-5421-6	8557	26	47	50	205	115	26	26
18	YH-5404-2	8366	28	47	50	223	118	28	28
19	YH-5545-2	8143	26	47	50	195	108	26	35
20	YH-5421-1	7909	28	46	49	200	103	28	34
21	YH-5545-1	7722	27	47	50	183	90	27	31
22	YH-5421-7	7643	29	48	51	210	118	29	31
23	YH-5421-8	7552	31	48	51	188	100	31	30
24	YH-5421-4	7346	25	47	50	205	110	25	25
25	YH-5397	7273	30	48	51	173	83	30	35
26	YH-5534	6822	28	47	50	170	93	28	33
27	YH-5404	6789	22	47	50	228	125	22	23
28	YH-5545-3	6553	26	47	50	188	98	26	24
29	YH-5554	6528	23	47	50	190	103	23	27
30	YH-5654	6117	25	51	54	210	108	25	26
31	YH-5559	5984	24	48	51	203	113	24	17
32	YH-5439-1	5945	26	47	50	188	103	26	27
33	YH-5439	5756	28	47	50	175	98	28	30
34	YH-1898	5148	25	47	50	223	120	25	19
CV %(LSD)		18.05	16.36	1.31	1.23	5.93	9.28	18.53	16.55
Cd		8292.4	26.98	47.3	50.309	212.65	114.93	29.95	30.71

It is evident from the results presented in the above Table 2 that significant differences were found only among thirty four hybrids for yield, days to silking. Local promising hybrid YH-5568 remained at top position by giving grain yield of 10194 kg/ha followed by commercial hybrid NK-10015 which gave grain yield of 10015 kg/ha. Local Hybrid-5421-1 seemed to be early maturing by taking 49 days to complete its fifty percent silking that comparatively portrayed as early maturing hybrid. Commercial hybrid 30T60 showed maximum plant height (265 cm) while local hybrid YH-5535 showed minimum plant height (170 cm). YH-5397 showed lowest cob bearing (83 cm) while Hybrid YH-5657 showed highest cob bearing (140 cm).

4.2 Preliminary Hybrid Maize Yield Trial No. 2, Kharif -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 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.

Table 3: Results of Preliminary Hybrid Maize Yield Trial No. 2. Kharif-2019

Sr. No.	Hybrid	Yield Kgs/Ha	Stand Count	50% Tassel- ing	50% Silking	Plant Height	Ear Height	Plants Harvest	Ear Har- vest
1	YH-5671	9328	23	48	51	218	133	25	24
2	YH-5569	9316	23	46	49	198	113	26	33
3	YH-5664	8165	22	46	49	235	128	25	29
4	YH-5427	7860	20	47	50	210	118	22	21
5	NK-7720	7771	20	47	50	248	113	20	24
6	YH-5670	7525	22	48	51	200	113	24	24
7	YH-5665	7372	21	46	49	190	100	26	26
8	YH-5675-1	7372	20	48	51	193	100	20	20
9	YH-5673	7221	21	45	48	205	110	24	26
10	YH-5676	6960	22	49	52	195	105	22	21
11	YH-5674-1	6740	20	46	49	185	100	23	25
12	YH-5675	6696	18	46	49	190	100	19	19
13	30T60	6590	19	51	54	258	135	21	21
14	YH-5673-1	6488	21	45	48	173	85	23	23
15	YH-1898	6432	21	47	50	208	118	19	20
16	YH-5678	6311	21	48	51	213	110	22	23
17	YH-5674-3	6155	17	47	50	180	103	18	21
18	YH-5395-2	6154	18	48	51	200	103	23	21
19	YH-5667	6116	23	47	50	175	95	25	22
20	YH-5535	6004	21	47	50	210	105	20	18
21	YH-5679	6002	19	48	51	198	110	18	18
22	YH-5479	5949	24	47	50	168	98	23	21
23	YH-5669	5930	20	47	50	178	88	19	21
24	YH-5674	5785	19	48	51	185	98	21	23
25	YH-5673-2	5689	24	46	49	180	100	20	21
26	YH-5677	5295	17	47	50	193	100	17	17
27	YH-5533	4784	16	47	50	213	113	16	17
28	YH-5213	4322	23	47	50	210	115	20	17
29	YH-5666	4202	21	46	49	173	85	19	19
30	YH-5490-1	4006	20	48	51	173	90	19	20
CV%(LSD)		6484.6	20.26	46.81	49.81	198.25	105.92	21.10	21.58
Cd		15.08	15.48	1.99	1.87	5.80	9.01	16.97	16.94

It is evident from the results presented in the above Table 3 that significant differences were found only among thirty hybrids for yield, days to silking and plants harvest. Local Hybrid YH-5671 remained at top position by giving grain yield 9328 kg/ha followed by local hybrid YH-5569 & YH-5664 gave grain yield 9316 kg/ha and 8165 kg/ha respectively. Local hybrid YH-5673 seemed to be early maturing by taking 48 days to complete its fifty percent silking that comparatively portrayed as early maturing hybrid. Commercial hybrid 30T60 showed maximum plant height (258 cm) while local hybrid YH-5666 showed minimum plant height (173 cm). YH-5673-1 showed lowest cob bearing (75 cm) while local hybrid YH-5686-7 showed highest cob bearing (135 cm).

4.3 Preliminary Hybrid Maize Yield Trial No. 3, Kharif -2019.

This trial was comprised of twenty-eight (28) entries including Standard hybrids of different maturity groups and ratios of temperate to tropical genetic material. The trial was sown 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.

Table 4: Results of Preliminary Hybrid Maize Yield Trial No. 3. Kharif-2019

Sr. No.	Hybrid	Yield Kgs/Ha	Stand Count	50% Tassel-ing	50% Silk-ing	Plant Height	Ear Height	Plants Har-vest	Ear Har-vest
1	YH-5568	11116	38	54	56	255	128	40	44
2	NK-7720	10567	33	53	56	238	123	35	41
3	YH-5705	10407	32	49	51	220	105	37	39
4	YH-5685	10294	40	50	52	213	118	35	39
5	YH-5703	9798	35	52	55	225	120	36	37
6	YH-5632	9698	33	51	54	210	103	34	33
7	YH-5568	9335	35	50	52	198	103	32	40
8	YH-5685-4	9215	36	52	56	205	98	31	33
9	YH-5632-2	8776	34	50	53	198	88	31	29
10	YH-5685-3	8627	35	48	50	185	88	33	34
11	YH-5702	7986	37	55	58	185	93	35	36
12	YH-5685-1	7884	35	48	51	168	78	30	38
13	YH-5686-7	7851	29	49	52	200	108	33	32
14	YH-5704	7840	35	53	56	213	113	38	37
15	YH-5686-8	7781	33	50	53	168	83	35	35
16	YH-5688	7678	27	51	53	173	75	37	33
17	4\YH-5632-1	7466	31	50	52	180	90	34	30
18	YH-5685-2	7286	32	50	52	195	98	31	30
19	YH-1898	6385	31	52	55	188	103	30	31
20	YH-5700-1	6170	33	50	52	175	100	32	35
21	YH-5680-1	5075	31	54	57	168	75	25	29
22	YH-5682	4939	26	53	56	185	95	19	21
23	YH-5680	4502	29	52	55	223	88	26	25
24	YH-5704	4455	27	50	53	148	65	28	25
25	YH-5701	4341	33	50	52	160	68	28	22
26	YH-5699	3958	36	50	53	178	85	35	28
27	YH-5687	3923	31	51	54	148	75	30	25
28	YH-5706	3368	28	50	52	148	73	29	24
CV%(LSD)		7440.9	32.42	50.67	53.33	190.6	93.92	31.85	32.08
Cd		11.90	10.83	2.20	2.17	8.29	9.04	8.44	14.63

It is evident from the results presented in the above Table 4 that significant differences were found among Twenty Eight hybrids for all characters. Local hybrid YH-5568 remained

at top position and gave yield 11116 kg/ha followed by commercial hybrid NK-7720 by giving grain yield 10567 kg/ha. Local hybrid YH-5685-1 seemed to be early maturing by taking 51 days to complete its fifty percent Silking that comparatively portrayed as early maturing hybrid. Local hybrid YH-5706 showed lowest cob bearing (73 cm). Non-significant results were not found for any characters which depicted presence of sufficient variation among hybrids for these characters.

4.4 Preliminary Hybrid Maize Yield Trial No. 4, Kharif -2019.

This trial was comprised of twenty-eight (28) entries including Standard hybrids of different maturity groups and ratios of temperate to tropical genetic material. The trial was sown 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.

Table 5: Results of Preliminary Hybrid Maize Yield Trial No. 4. Kharif-2019

Sr. No.	Hybrid	Yield Kgs/Ha	Stand Count	50% Tassel-ing	50% Silk-ing	Plant Height	Ear Height	Plants Har-vest	Ear Har-vest
1	NK-7720	10266	33	53	56	223	110	32	35
2	YH-5568	10222	33	50	53	185	103	35	36
3	YH-5569	8991	31	50	53	190	88	33	35
4	YH-5718	8925	28	50	53	190	93	29	30
5	YH-5721	8534	29	53	56	208	113	33	32
6	YH-5728	8382	25	51	53	210	103	29	29
7	YH-5708	8181	26	53	55	195	85	28	28
8	YH-5711	8113	33	51	53	223	105	35	33
9	30T60	7679	28	54	57	240	118	31	26
10	YH-5727	7605	23	50	52	208	98	23	23
11	YH-5722	6633	27	56	58	193	105	26	25
12	YH-5724	6362	24	51	53	193	85	21	20
13	YH-5710	6067	31	50	52	205	100	31	25
14	YH-5683-2	5569	30	52	55	168	75	29	27
15	YH-5732	5185	22	52	55	158	83	20	21
16	YH-1898	5152	29	50	53	193	100	29	28
17	YH-5717	4510	26	51	54	165	85	26	21
18	YH-5631	4328	26	51	53	173	80	22	22
19	YH-5729	4277	22	49	52	178	98	19	19
20	YH-5723-2	4251	22	52	54	153	68	25	24
21	YH-5716	4144	32	49	51	170	88	31	27
22	YH-5715	4140	27	48	51	173	95	28	25
23	YH-5714	4066	28	51	54	160	73	30	23
24	YH-5726	3946	14	54	57	190	93	13	12
25	YH-5725	3777	11	56	59	193	98	11	14

26	YH-5719	3705	26	51	54	165	78	24	20
27	YH-5723-3	3486	21	51	54	160	73	21	16
28	YH-5629	2381	20	52	55	170	75	18	18
CV%(LSD)		6031.4	25.66	51.26	53.85	186.61	91.42	25.83	24.55
Cd		23.82	12.93	3.46	3.47	4.63	8.01	13.12	24.51

It is evident from the results presented in the above Table 5 that significant differences were found among thirty hybrids for all characters. Commercial Hybrid NK-7720 remained at top position by giving yield 10266 kg/ha followed by local hybrids YH-5568 & YH-5569 by giving yield 10222 kg/ha & 8991 kg/ha respectively. Local hybrid YH-5715 seemed to be early maturing by taking 51 days to complete its fifty percent Silking that comparatively portrayed as early maturing hybrid. Commercial hybrid 30T60 showed maximum plant height (240 cm) while local hybrid YH-5723-2 showed minimum plant height (153 cm). YH-5723-2 showed lowest cob bearing (68 cm) while commercial hybrid 30T60 showed highest cob bearing (118 cm).

4.5 Preliminary Hybrid Maize Yield Trial No. 5, Kharif -2019.

This trial was comprised of twenty-six (26) 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.

Table 6: Results of Preliminary Hybrid Maize Yield Trial No. 6. Kharif-2019

Sr. No.	Hybrid	Yield Kgs/Ha	Stand Count	50% Tassel-ing	50% Silk-ing	Plant Height	Ear Height	Plants Har-vest	Ear Har-vest
1	YH-5569	12167	42	52	55	253	128	36	44
2	YH-5721-1	11512	36	52	56	200	103	34	48
3	NK-7720	10738	38	53	56	238	123	44	42
4	YH-5482	10338	38	48	51	203	95	38	36
5	30Y87	9903	38	55	58	215	115	35	42
6	YH-5721-2	9497	42	53	55	195	90	38	39
7	YH-5660-6	9484	46	54	56	230	105	43	43
8	YH-5550-2	9027	42	52	55	225	105	41	41
9	YH-5560-5	8656	43	54	57	220	103	41	41
10	YH-5723-1	8300	38	46	49	180	88	35	35
11	YH-5482	8083	38	52	54	185	90	37	37
12	YH-5701	7780	45	48	50	170	88	42	39
13	YH-5550-1	6871	40	54	57	218	108	34	35
14	YH-5549	6697	44	52	55	193	105	38	38
15	YH-5560-4	6491	45	54	57	198	113	38	35
16	YH-5560-8	6460	42	52	55	163	80	35	37
17	YH-5427	6402	39	51	53	180	88	39	33

18	YH-5723-2	5868	30	47	50	180	80	32	23
19	YH-5701-2	5693	43	49	52	173	85	42	37
20	YH-1898	5481	42	51	54	178	93	34	34
21	YH-5482	5166	38	53	55	213	100	41	34
22	YH-5699	5007	32	48	50	170	85	36	29
23	YH-5746	4882	40	54	57	185	110	41	31
24	YH-5683-2	4474	32	49	52	173	75	30	26
25	YH-5632	4073	35	49	52	190	95	32	26
26	YH-5680-1	2784	33	52	54	175	88	34	20
CV%(LSD)		7378.3	39.11	51.09	53.84	196.06	97.40	37.07	35.36
Cd		16.55	9.41	3.17	2.88	6.78	8.96	9.35	14.15

It is evident from the results presented in the above Table 6 that significant differences were found among thirty hybrids for all characters. Local hybrid YH-5569 remained at top position by giving grain yield 12167 kg/ha followed by local hybrid YH-5721-1 which gave yield 11512 kg/ha. Local hybrid YH-5723-1 seemed to be early maturing by taking 49 days to complete its fifty percent Silking that comparatively portrayed as early maturing hybrid. Local hybrid YH-5683-2 showed lowest cob bearing (75 cm). Non-significant results were not found for any characters which depicted presence of sufficient variation among hybrids for these characters.

4.6 Microplot Hybrid Maize Yield Trial No. 01 Kharif -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 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.

Table 7: Results of Micro Hybrid Maize Yield Trial No. 1. Kharif-2019

Sr. No.	Hybrid	Yield Kgs/Ha	Stand Count	50% Tassel-ing	50% Silk-ing	Plant Height	Ear Height	Plants Har-vest	Ear Har-vest
1	YH-5568	11470	32	54	57	240	113	36	42
2	NK-7720	9917	32	53	56	240	130	37	38
3	YH-5421	9752	26	49	51	198	115	32	35
4	YH-5404	9417	30	52	54	218	120	34	36
5	YH-5569	9285	32	52	54	218	105	32	32
6	YH-5555	8959	43	49	51	195	103	34	32
7	YH-5390	8317	33	53	56	210	113	34	30
8	YH-5550	8137	29	54	57	223	113	31	33
9	YH-5417	7921	32	51	53	188	103	37	32
10	YH-5554	7920	29	49	51	148	83	28	33
11	YH-5556	7853	31	49	51	193	100	34	34
12	YH-5417	7712	33	52	55	190	93	37	29
13	YH-1898	7545	32	51	53	195	118	33	32

14	YH-5427	7503	33	50	52	180	95	35	32
15	YH-5482	7284	33	52	55	205	98	36	38
16	YH-5535	7250	35	49	51	195	100	31	32
17	YH-5547	7151	31	52	55	203	100	31	33
18	YH-5556	7137	28	51	54	190	100	36	33
19	YH-5490	6990	33	51	53	178	85	34	29
20	YH-5597	6539	29	55	58	215	110	34	31
21	YH-5556-1	6497	32	53	56	180	115	33	32
22	YH-5543	6244	27	55	58	210	105	32	29
23	YH-5559	5946	33	55	57	218	118	29	33
24	YH-5598	5872	30	55	58	198	108	33	32
25	YH-5482	5778	33	52	55	183	78	35	31
26	YH-5133	5514	32	55	58	188	88	31	28
27	YH-5588	5301	32	48	50	190	93	34	29
28	YH-5423	5105	36	51	53	163	93	34	31
29	YH-5439	4290	26	52	55	173	85	34	26
30	YH-5599	3935	33	55	58	165	80	34	29
CV%(LSD)		7322.9	31.36	51.69	54.27	196.36	101.98	33.33	31.94
Cd		12.05	15.51	2.78	2.70	6.17	10.35	6.31	13.08

It is evident from the results presented in the above Table 7 that significant differences were found among thirty hybrids for all characters. Local hybrid YH-5568 remained at top position by giving grain yield 11470 kg/ha followed by commercial hybrid NK-7720 by giving yield 9917 kg/ha. Local hybrid YH-5588 seemed to be early maturing by taking 50 days to complete its fifty percent Silking that comparatively portrayed as early maturing hybrid. Local hybrid YH-5482 showed lowest cob bearing (78 cm) while commercial hybrid NK-7720 showed highest cob bearing (130 cm). Non-significant results were not found for any characters which depicted presence of sufficient variation among hybrids for these characters.

4.7 Microplot Hybrid Maize Yield Trial No. 02 Kharif -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 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.

Table 8: Results of Micro Hybrid Maize Yield Trial No. 2. Kharif-2019

Sr. No.	Hybrid	Yield Kgs/Ha	Stand Count	50% Tassel-ing	50% Silk-ing	Plant Height	Ear Height	Plants Har-vest	Ear Har-vest
1	YH-5569	12413	32	48	51	198	85	36	47
2	YH-5685	9872	30	52	55	200	93	30	34
3	30T60	9719	27	53	56	248	110	28	31
4	NK-7720	9147	29	53	55	206	108	26	31

5	YH-5568	9002	35	50	52	178	93	34	37
6	YH-5645	8997	26	50	52	200	95	39	37
7	YH-5685-4	8876	36	51	54	180	93	36	38
8	YH-5642	8593	36	49	51	180	88	37	36
9	YH-5708	8482	28	53	56	190	80	28	30
10	YH-5652	8466	28	52	55	165	75	37	40
11	YH-5641	8174	28	52	54	200	103	36	31
12	YH-5427	7836	32	51	53	163	93	26	29
13	YH-5648	7667	34	52	54	158	80	36	40
14	YH-5636	7298	30	50	52	183	100	34	34
15	YH-5685-1	6674	31	48	51	165	68	31	33
16	YH-5685-2	6117	26	50	52	185	100	28	24
17	YH-5637	5581	37	52	54	168	75	34	28
18	YH-5482	5484	25	52	54	180	85	22	21
19	YH-5644	5420	34	52	54	178	83	39	32
20	YH-5682	5366	34	54	57	195	90	36	31
21	YH-5707	5294	28	51	53	160	65	25	24
22	YH-5629	5149	32	53	56	160	75	33	26
23	YH-5646	5061	39	53	55	155	75	38	33
24	YH-5643	5034	30	49	51	175	90	35	26
25	YH-5630	4511	32	52	54	153	83	31	26
26	YH-5631	4496	30	52	55	163	80	31	30
27	YH-5635	3502	24	49	52	148	58	34	22
28	YH-5633	2933	37	52	55	170	78	36	19
29	YH-5638	2557	14	50	52	158	73	13	13
30	YH-5650	624	30	58	61	105	45	10	7
CV%(LSD)		6611.5	30.18	51.16	53.58	175.37	83.76	31.10	29.35
Cd		18.59	19.48	2.40	2.54	7.50	8.08	16.56	16.05

It is evident from the results presented in the above Table 8 that significant differences were found among thirty hybrids for all characters. Local Hybrid YH-5569 remained at top position by giving grain yield 12413 kg/ha followed by Local hybrid YH-5685 by giving yield 9872 kg/ha respectively. Local hybrid YH-5685-1 seemed to be early maturing by taking 51 days to complete its fifty percent Silking that comparatively portrayed as early maturing hybrid. Commercial hybrid 30T60 showed maximum plant height (248 cm) while hybrid YH-5650 showed minimum plant height (105 cm). Local hybrid YH-5650 showed lowest cob bearing (45 cm) while commercial hybrid 30T60 showed highest cob bearing (110 cm). Non-significant results were not found for any characters which depicted presence of sufficient variation among hybrids for these characters.

4.8 Demo-1: Local Maize hybrid in comparison to commercial hybrids Kharif 2019

This trial was comprised of forty eight (48) 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 4mx0.75mx5. The data regarding various parameters are presented in the following table.

Table 9: Results of Demonstration-1. Kharif-2019

Sr. No.	Hybrid	Yield Kgs/Ha	Stand Count	50% Tassel-ing	50% Silk-ing	Plant Height	Ear Height	Plants Har-vest	Ear Harvest
1	YH-5404-3	10055	93	50	53	215	115	108	121
2	YH-5421-2	10020	94	49	53	195	120	91	93
3	YH-5482	10014	72	50	53	205	90	80	85
4	NK-7720	9238	78	52	55	245	130	80	77
5	YH-5421-1	8929	107	49	52	205	125	103	94
6	YH-5685-2	8856	108	48	51	205	110	93	103
7	30T60	8828	81	53	56	240	110	84	84
8	YH-5632-3	8769	105	53	56	205	90	96	90
9	YH-5686-7	8754	98	49	52	200	100	89	104
10	YH-5704	8640	87	55	58	220	115	73	100
11	YH-5404-1	8603	107	49	52	205	120	103	102
12	18YH-5728	8595	76	52	55	210	115	80	106
13	YH-5421-3	8514	117	49	52	185	105	75	95
14	YH-5395	8502	95	48	50	200	110	118	98
15	YH-5560-6	8363	83	51	54	220	110	81	84
16	YH-5713	8235	101	49	52	190	85	101	91
17	YH-5721	8208	111	53	56	220	105	107	83
18	YH-5559	7980	92	52	55	215	115	102	82
19	T-150	7905	90	47	50	230	130	86	90
20	YH-5685-4	7874	105	51	54	190	95	96	105
21	YH-5656	7798	92	52	55	220	115	88	82
22	YH-5421-6	7653	70	50	53	215	125	67	73
23	YH-5686-8	7594	94	47	50	190	95	86	87
24	YH-5660	7433	74	49	52	225	130	64	69
25	YH-5421-7	7320	95	50	53	185	110	85	83
26	YH-5671	7267	96	53	56	175	100	93	75
27	YH-5560-5	7190	87	50	53	215	120	85	81
28	YH-1898	7003	67	50	53	195	100	66	79
29	YH-5421-8	6986	90	50	52	180	110	93	79
30	YH-5421-4	6921	87	50	53	200	120	92	85
31	YH-5678	6626	53	53	56	180	90	51	57
32	YH-5560-4	6552	74	49	53	210	110	77	79
33	YH-5679	6365	63	51	54	170	95	65	61

34	YH-5685-1	6294	102	48	51	180	95	101	97
35	YH-5667	6274	90	50	53	180	100	87	83
36	YH-5717	6263	89	50	52	175	85	88	87
37	YH-5560-4	6170	71	53	56	195	105	69	73
38	YH-5421-1	6136	64	49	52	170	80	58	70
39	YH-5560-8	6131	77	52	55	170	80	79	76
40	YH-5632-1	6041	72	54	57	175	80	87	74
41	YH-5683	5804	74	50	52	185	95	87	73
42	YH-5732	5704	79	53	56	165	85	67	72
43	YH-5707	5525	59	50	53	155	60	56	44
44	YH-5682	5452	61	55	58	190	100	59	47
45	YH-5395-2	5235	71	48	51	185	95	50	56
46	YH-5746	4929	88	53	56	190	105	86	73
47	YH-5714	4255	74	49	51	165	65	93	59
48	YH-5685-6	3927	78	49	52	185	85	86	85

The above Table 9 depicted the performance of forty eight hybrids. Local hybrid YH-5404-3 remained at top position by giving 10055 kg/ha followed by local hybrid YH-5421-2 by giving yield (10020 kg/ha). Local hybrid YH-5395 seemed to be early maturing by taking 50 days to complete its fifty percent silking that comparatively portrayed as early maturing hybrid. Commercial hybrid NK-7720 showed maximum plant height (245 cm) while YH-5707 showed minimum plant height (155 cm). YH-5714 showed lowest cob bearing (65 cm) while commercial hybrid NK-7720 showed highest cob bearing (130 cm).

4.9 Demo-2: Local Maize hybrid in comparison to commercial hybrids Kharif 2019

This trial was comprised of thirteen (13) entries including Standard hybrids of different maturity groups and ratios of temperate to tropical genetic material. The trial was sown in strips. The data regarding various parameters are presented in the following table.

Table 10: Results of Demonstration-2. Kharif-2019

Sr. No.	Hybrid	Yield Kgs/Ha	Stand Count	50% Tassel-ing	50% Silk-ing	Plant Height	Ear Height	Plants Har-vest	Ear Harvest
1	YH-5678	9116	123	51	54	190	80	127	113
2	NK-7720	9111	127	53	56	230	120	132	148
3	30Y87	8268	153	55	58	230	125	138	131
4	30T60	8187	136	53	56	235	105	127	126
5	YH-5482	7873	108	53	56	165	85	114	110
6	DK-6789	7718	148	55	58	215	100	105	153
7	YH-1898	6854	155	50	53	295	110	98	113
8	T-150	6717	116	46	59	230	120	82	88
9	YH-5421-6	6667	75	46	49	200	105	60	80

10	YH-5395-2	6569	108	52	54	170	85	111	90
11	YH-5560	6247	78	52	54	190	100	66	87
12	YH-5559	5575	105	49	52	215	120	61	77
13	FH-1046	5544	102	53	56	170	90	105	90
14	12NK-6621	5063	123	58	61	180	90	89	86
15	YH-5427	4963	105	53	56	160	80	103	72
16	YH-5667	3610	91	51	54	160	85	90	100

The above Table 10 depicted the performance of twenty five hybrids. Local Hybrid YH-5678 remained at top position by giving grain yield 9116 kg/ha followed by commercial hybrid NK-7720 gave yield 9111 kg/ha. Local hybrid YH-5421-6 seemed to be early maturing by taking 49 days to complete its fifty percent silking that comparatively portrayed as early maturing hybrid. Local hybrid YH-1898 showed maximum plant height (295 cm) while YH-5667 showed minimum plant height (160 cm). YH-5678 showed lowest cob bearing (80 cm) while Commercial hybrid 30Y87 showed highest cob bearing (125 cm).

5.1 National Uniform Maize Hybrid Yield Trial (Set-A) Kharif 2019

This trial was planted with one hundred and forty (140) entries having plot size of 4mx0.75mx2 with three replications using Alpha Lattice design. The data regarding various parameters are presented in the following table.

Table 11: National Uniform Maize Hybrid Yield Trial (Set-A) Kharif 2019

Sr. No.	Hy-brid	Yield Kgs/Ha	Stand Count	50% Tassel-ing	50% Silking	Plant Height	Ear Height	Plants Harvest	Ear Harvest
1	5	10807	31	49	52	257	145	38	35
2	105	10792	33	51	54	227	123	30	31
3	97	10662	35	48	51	245	110	29	31
4	110	10515	28	50	53	243	138	29	32
5	100	10456	33	50	53	252	148	33	34
6	20	10438	28	46	50	233	108	32	32
7	3	10366	33	49	52	243	135	30	27
8	16	10332	29	50	53	253	143	31	31
9	95	10313	29	50	53	232	120	32	32
10	65	10300	35	50	53	247	133	31	32
11	104	10297	29	51	54	232	122	30	31
12	71	10251	34	47	50	247	130	32	34
13	33	10200	31	51	54	235	130	33	32
14	48	10180	33	49	52	260	155	33	31
15	62	10164	36	49	52	257	145	31	31
16	50	10139	32	50	53	265	147	32	31
17	101	10125	30	51	54	262	147	30	31
18	138	10117	28	50	53	262	138	29	32
19	42	10073	37	49	52	260	153	33	32

20	36	10011	32	50	53	242	137	31	29
21	8	9943	30	49	52	250	140	30	33
22	83	9852	36	50	53	222	127	30	30
23	31	9814	37	50	53	242	127	33	31
24	117	9804	32	51	54	252	135	32	32
25	123	9778	29	51	54	252	108	30	31
26	54	9720	34	51	54	262	142	30	30
27	23	9693	31	49	52	265	145	31	29
28	120	9670	31	50	53	163	102	28	34
29	55	9667	36	50	53	262	155	30	27
30	15	9664	27	51	54	270	132	30	31
31	22	9658	32	47	50	222	130	31	31
32	93	9654	35	48	51	223	128	26	29
33	47	9637	31	46	49	213	102	31	31
34	136	9636	33	48	51	250	128	36	33
35	87	9578	36	49	52	257	147	30	30
36	66	9564	37	52	55	277	143	25	28
37	80	9524	30	49	52	252	140	28	28
38	115	9519	32	49	52	285	155	31	34
39	88	9518	38	49	52	263	160	28	30
40	119	9487	33	51	54	268	142	29	32
41	35	9418	29	50	53	235	133	35	31
42	99	9400	35	49	52	263	160	30	30
43	82	9382	33	50	53	255	142	31	28
44	28	9351	29	51	54	245	145	33	32
45	30	9348	31	50	53	253	152	29	28
46	61	9317	34	51	54	248	140	32	29
47	92	9225	33	51	54	237	117	29	27
48	19	9220	31	51	54	227	123	31	29
49	86	9217	34	48	51	223	145	28	29
50	26	9202	35	50	53	253	142	32	31
51	57	9158	37	47	50	237	120	30	30
52	52	9155	35	45	48	243	122	35	32
53	127	9150	31	52	55	250	117	31	29
54	133	9111	34	47	50	197	110	30	27
55	45	9093	35	49	52	253	147	28	27
56	51	9093	27	49	52	213	117	34	34
57	78	9065	31	50	53	260	152	31	30
58	89	9053	32	50	53	255	150	31	30
59	14	9001	33	49	52	247	138	29	28
60	34	8959	34	50	53	247	155	32	30
61	64	8876	38	49	52	285	152	31	30
62	9	8866	32	51	54	245	150	29	29
63	108	8846	11	51	54	200	107	25	25
64	2	8828	32	50	53	252	140	30	29

65	70	8812	29	50	53	280	138	29	29
66	102	8748	27	51	54	233	135	31	27
67	132	8723	31	50	53	197	97	31	27
68	72	8701	36	49	52	262	145	30	30
69	131	8677	29	52	55	222	118	32	31
70	98	8656	34	50	53	247	147	28	25
71	32	8653	30	48	51	235	123	29	29
72	38	8646	31	52	55	232	107	32	32
73	126	8597	30	49	52	235	120	30	27
74	91	8580	36	51	54	243	143	30	28
75	17	8568	33	50	53	260	153	33	30
76	76	8567	30	48	52	220	123	30	29
77	107	8509	31	51	54	248	143	30	28
78	39	8504	31	50	53	247	143	31	29
79	139	8445	30	51	54	243	132	28	28
80	63	8331	34	50	53	247	137	30	28
81	27	8330	31	50	53	233	128	34	26
82	41	8326	36	49	52	260	152	26	26
83	130	8323	31	50	53	240	143	28	30
84	140	8304	29	48	51	217	122	28	30
85	68	8265	35	48	51	258	145	28	26
86	60	8210	33	49	52	248	133	28	26
87	81	8198	31	49	52	190	140	27	25
88	18	8196	30	50	53	258	152	29	23
89	94	8194	33	49	52	195	112	29	27
90	75	8124	38	49	52	243	137	29	28
91	77	8084	32	49	52	252	143	29	25
92	122	8071	29	46	49	262	130	28	24
93	121	7990	32	48	51	262	152	32	30
94	116	7887	33	46	49	208	117	32	28
95	21	7863	32	49	52	258	148	28	24
96	7	7855	33	49	52	260	148	25	28
97	112	7852	32	50	53	247	142	33	31
98	135	7832	30	46	49	212	128	29	28
99	43	7814	36	48	51	252	135	24	26
100	134	7811	33	46	49	173	100	30	28
101	6	7786	31	49	52	253	140	28	24
102	96	7773	38	49	52	242	147	25	26
103	4	7761	34	47	50	240	103	27	26
104	73	7746	31	49	52	245	138	23	25
105	49	7654	33	49	52	262	150	25	26
106	10	7628	25	49	52	243	142	34	33
107	111	7626	29	48	51	263	142	27	22
108	1	7614	31	50	54	227	132	28	26
109	13	7597	33	48	51	195	113	30	26

110	59	7567	30	49	52	233	92	26	27
111	24	7545	35	49	52	230	118	29	29
112	25	7461	16	51	54	235	135	29	27
113	109	7433	31	48	51	222	137	29	25
114	29	7421	32	50	53	250	137	28	25
115	12	7413	32	51	54	255	138	31	30
116	79	7366	32	49	52	253	138	32	26
117	114	7288	34	48	51	262	148	29	27
118	129	7128	36	47	50	245	127	27	23
119	137	7107	31	50	53	172	95	29	27
120	90	7045	33	50	53	233	128	27	23
121	125	6984	24	51	54	237	135	28	21
122	118	6958	29	52	55	280	143	32	30
123	103	6911	25	50	53	222	123	29	24
124	69	6910	28	48	51	240	118	25	23
125	44	6881	35	49	52	262	138	27	23
126	58	6866	35	50	53	243	125	27	24
127	106	6804	30	51	54	245	140	30	25
128	74	6694	35	51	53	257	135	22	22
129	113	6430	28	51	54	200	108	31	23
130	40	6419	38	45	48	257	115	26	21
131	85	6258	34	49	52	252	123	24	23
132	46	6174	34	50	53	247	132	28	28
133	84	6155	34	50	53	240	125	19	18
134	56	6085	29	51	54	247	138	28	23
135	37	5915	34	49	52	262	152	20	22
136	53	5750	33	49	52	213	97	33	28
137	11	5541	30	52	55	270	143	25	20
138	128	5100	30	51	54	225	117	26	21
139	124	5003	31	50	53	232	123	26	24
140	67	4981	37	50	53	238	128	28	22
CD (LSD)		8523.6	31.91	49.43	52.44	242.4	133.1	29.45	28.06
CV%		27.68	14.55	1.93	1.81	6.81	8.56	17.52	21.23

It is evident from the results presented in the above Table 11 that significant differences were found among one hundred hybrids for all studied characters. Entry No. 5 remained at top position by giving grain yield 10807 kg/ha followed by Entries No. 105 & 97 gave the yield 10792 kg/ha & 10662 kg/ha respectively. Entry No. 52 seemed to be early maturing by taking 48 days to complete its fifty percent silking that comparatively portrayed as early maturing hybrid. Entry no. 70 & 118 showed maximum plant height (280 cm) while entry no.137 showed minimum plant height (172 cm). Entry No. 59 showed lowest cob bearing (92 cm) while Entry No. 88 & 99 showed highest cob bearing (160 cm). Non-significant results were found not found for any trait which depicted presence of sufficient variation among hybrids for these characters.

5.2 National Uniform Maize Hybrid Yield Trial (Set-B) Kharif 2019

This trial was planted with one hundred and sixty-four (64) entries having plot size of 4mx0.75mx2 with three replications using Alpha Lattice design. The data regarding various parameters are presented in the following table.

Table 12: Result of National Uniform Maize Hybrid Yield Trial (Set-A) Kharif 2019

Sr. No	Hybrid	Yield Kgs/Ha	Stand Count	50% Tassel-ing	50% Silking	Plant Height	Ear Height	Plants Harvest	Ear Har-vest
1	22	10371	26	56	59	253	143	31	32
2	24	9689	27	51	54	233	138	33	32
3	58	9450	27	52	54	227	118	27	30
4	55	9297	23	52	55	235	112	26	31
5	13	9261	25	52	54	258	117	26	27
6	47	9233	32	52	55	242	137	34	34
7	57	9230	35	51	52	182	83	34	35
8	48	9197	32	53	55	272	122	34	34
9	14	9081	26	53	56	257	122	25	24
10	35	9028	33	51	54	237	133	29	33
11	46	8841	34	48	51	230	117	31	33
12	54	8723	28	53	56	240	130	30	33
13	41	8627	32	54	57	225	115	35	34
14	31	8595	31	52	55	232	127	28	34
15	44	8565	34	52	54	237	135	35	35
16	21	8527	26	51	53	205	98	34	26
17	27	8515	30	54	57	237	118	30	30
18	43	8488	34	50	53	218	105	35	36
19	29	8381	29	52	55	235	130	28	29
20	33	8373	32	53	56	230	132	30	33
21	18	8332	37	50	53	210	98	36	37
22	20	8289	24	52	55	218	123	28	29
23	51	8271	27	51	54	238	130	28	29
24	56	8237	28	54	57	242	120	29	28
25	63	8167	24	52	54	218	105	25	25
26	53	8126	32	52	55	243	130	31	29
27	32	8094	27	53	55	235	132	31	33
28	49	7918	30	52	55	237	133	28	29
29	23	7773	33	48	51	218	118	31	32
30	59	7772	32	48	51	217	82	32	32
31	15	7661	27	52	55	230	127	26	24
32	42	7594	30	53	56	238	135	29	29
33	7	7538	28	53	56	228	108	28	23
34	45	7518	34	53	56	217	105	34	32
35	38	7489	32	53	56	207	110	30	30
36	16	7409	27	52	54	227	122	25	26
37	1	7236	27	52	54	208	98	24	25
38	52	7230	29	52	55	235	135	28	29
39	5	7157	25	48	51	207	102	27	27
40	2	7132	32	49	52	207	110	27	25

41	19	7081	33	50	53	187	100	25	21
42	28	7081	27	52	55	227	125	28	28
43	4	6993	25	50	53	187	98	28	29
44	30	6915	25	52	54	225	123	29	22
45	61	6849	27	53	55	223	112	25	26
46	6	6740	30	53	56	210	110	29	29
47	64	6725	23	51	54	237	128	25	23
48	39	6527	31	52	55	215	103	30	30
49	36	6516	31	52	55	235	132	25	25
50	50	6342	32	52	54	190	98	32	32
51	8	6210	30	53	56	202	102	25	27
52	40	6178	26	52	54	190	102	30	28
53	17	6174	25	50	53	202	108	27	23
54	3	6162	27	50	52	212	93	26	24
55	25	6005	28	53	55	247	145	28	30
56	34	5511	33	54	57	202	115	31	28
57	37	5504	33	54	57	207	102	33	27
58	11	5280	28	52	55	207	98	27	22
59	26	5263	23	52	55	198	98	20	24
60	62	5165	31	49	52	193	110	31	31
61	9	4903	25	55	58	237	110	27	26
62	10	4871	28	49	53	158	73	21	22
63	60	3461	27	48	52	197	72	21	19
64	12	2344	26	53	56	157	82	20	15
CD (LSD)		7425.1	29	51.70	54.37	220.89	113.98	28.68	28.34
CV%		18.57	16.29	2.57	2.35	7.22	9.91	16.59	19.99

It is evident from the results presented in the above Table 12 that significant differences were found among one hundred hybrids for all studied characters. Entry No. 22 remained at top position by giving grain yield 10371 kg/ha followed by Entries No. 24 & 58 gave the yield 9689 kg/ha & 9450 kg/ha respectively. Entries No. 23, 46 & 59 52 seemed to be early maturing by taking 51 days to complete its fifty percent silking that comparatively portrayed as early maturing hybrid. Entry no. 48 showed maximum plant height (272 cm) while entry no.12 showed minimum plant height (157 cm). Entry No. 60 showed lowest cob bearing (72 cm) while Entry No. 25 showed highest cob bearing (145 cm). Non-significant results were found not found for any trait which depicted presence of sufficient variation among hybrids for these characters.

SPRING 2020

Germplasm Maintenance

1 Maintenance of Elite Inbred Lines

Four Hundred Seventy (470) elite families of 145 inbred lines were sown ear to row for maintenance during spring-2020. 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

Thirty Seven (37) pre-elite families of 10 inbred lines were sown ear to row during spring-2020 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 Nineteen (419) lines including dent and flint derivatives lines were sown ear to row during spring-2020 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 Four Hundred Seventy (470) elite families, Thirty Seven (37) pre-elite families and Four Hundred Nineteen (419) derivatives were inoculated with stalk rot fungus carrier toothpicks at second node from the base. At harvesting stems of self-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, 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-2020 seventy five (75) inbred lines were sown on 20-3-2020 for screening against high temperature. At flowering the temperatures remained above 40°C. At harvesting sixty 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 2020 to provide high temperature regimes by covering the tunnels with plastic sheet at flowering under ADP project. At harvesting only 7 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. 01, 02 and 04 were sown under ADP projects for evaluation of single crosses under high temperature. The material

was sown late on 20-3-2020. 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 (50) elite inbred lines were used as female with DR-51 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 in kharif-2020. The best performing single crosses will be selected.

5.2 Isolation No.2

Fifty (50) 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 in kharif-2020. The best performing single crosses will be selected.

5.3 Isolation No.3

Fifty (50) elite inbred lines were used as female with DR-51 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 trial in kharif-2020. The best performing single crosses will be selected.

5.4 Isolation No.4

Six (06) 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 in kharif-2020. The best performing single crosses will be selected.

5.5 Isolation No.5

Seed increase of inbred line P-222 was sown in tunnels, about 10 Kg seed was obtained.

6. Hybrid Evaluation under Normal Season (Replicated Yield Trials)

6.1 Preliminary Maize Hybrid Yield Trial No. 1 Spring-2020

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 0.75m. The data regarding various parameters are presented in the following table.

Table 13: Results of Preliminary Maize Hybrid Yield Trial No. 1 Spring-2020

Entry	SC	Tass	Silk	PH	CH	C. Hr	GY
P-1543	23	65	68	213	105	20	13907
YH-5759	21	66	69	195	113	20	13212
FH-1046	22	67	70	203	118	23	13115
DK-6724	20	62	65	223	93	23	13087
YH-5757	24	65	68	208	120	20	12545
YH-5632-3	21	65	68	210	110	21	12096
YH-5682-4	21	65	68	215	120	21	11811
YH-5682-2	22	65	68	213	123	22	11437

YH-5682-3	21	67	70	213	123	21	11329
YH-5685-1	24	63	66	213	115	20	11317
YH-5752	22	63	66	205	110	22	11219
YH-5754	18	63	66	210	115	21	10845
YH-5683-1	16	67	70	198	100	18	10754
YH-5427	20	65	68	213	113	17	10633
YH-5758	19	64	67	185	95	20	10464
YH-5632-1	17	64	67	200	105	19	10289
YH-5750	18	67	70	195	100	19	10061
YH-5749	19	67	70	195	115	20	9651
YH-5755	16	67	70	195	113	17	9410
YH-5754	21	66	69	215	118	19	9396
YH-5756	20	65	68	215	120	16	9028
YH-5683-2	22	67	70	203	100	21	8921
YH-5683-3	19	68	71	190	95	20	8902
YH-5751	17	67	70	198	105	16	8825
YH-5748	17	66	69	203	108	18	8816
YH-5682	16	69	72	208	125	16	8329
CV %	16.49	2.9	2	2	10.94	18.24	17.67
LSD (5 %)	56.56	4.32	3.81	14.25	17.94	5.25	2242

Abbreviation used in the Tables: SC=Stand Count, TAss. = Days to 50% tasseling, Silk= Days to 50% silking, PH= Plant Height, CH= Cob height, C.Hr=Number of cobs harvested, GY= Grain Yield

The result in Table 13 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 P-1543 gave maximum yield (13907 kg/ha) followed by YH-5759 (13212 kg/ha). DK-6724 seemed to be early maturing by taking 65 days to complete its fifty percent silks while YH-5682 was late maturing taking 72 days to silks. DK-6724 showed maximum plant height (223 cm) while YH-5758 showed minimum plant height (185 cm). DK-6724 showed low cob bearing (93 cm) while YH-5682 showed high cob bearing (125 cm).

6.2 Preliminary Maize Hybrid Yield Trial No. 2 Spring-2020

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 0.75m. The data regarding various parameters are presented in the following table.

Table 14: Results of Preliminary Maize Hybrid Yield Trial No. 2 Spring-2020

Entry	SC	Tass	Silk	PH	CH	C. Hr	GY
P-1543	22	62	65	223	98	27	13567
DK-6427	26	62	65	210	95	25	12840
YH-5783	25	63	66	185	100	23	12027
YH-5762	17	64	67	213	118	20	12013
YH-5775	19	66	69	183	93	22	11545
YH-5765	19	66	69	190	93	22	11521
YH-5767	17	67	70	203	128	18	11403

YH-5427	23	66	69	198	130	22	11402
YH-5785	22	65	68	173	95	21	11365
YH-5780	15	67	70	205	128	17	11207
YH-5773	14	67	70	195	125	15	10632
YH-5788	22	67	70	200	108	18	10073
YH-5772	21	65	68	185	95	20	10068
YH-5782	21	66	69	210	105	19	10045
YH-5789	23	65	68	193	115	22	10039
YH-5769	16	67	70	203	125	15	9989
YH-5770	15	70	73	193	120	16	9961
YH-5781	21	64	67	183	100	18	9796
YH-5777	14	67	70	198	123	14	9467
YH-5774	18	68	71	190	98	15	9080
YH-5764	18	65	68	195	100	19	8894
YH-5761	21	63	66	185	93	15	8564
YH-5784	18	62	64	190	85	20	8152
YH-5766	19	62	65	195	103	18	8062
YH-5779	12	67	70	210	133	12	8060
YH-5776	14	67	70	190	113	14	7017
CV %	19.53	2.15	1.17	4.49	8.11	14.66	12.36
LSD (5%)	5.67	4.5	3.63	14.45	18.7	6.36	2315

The result in Table 14 unveiled that significant differences were found among all hybrid for all characters in preliminary maize hybrid yield trial (PYT-02). It is evident from the results that P-1543 gave maximum yield (13567 kg/ha) followed by DK-6427 (12840 kg/ha). YH-5784 seemed to be early maturing by taking 64 days to complete its fifty percent silks while YH-5770 was late maturing taking 73 days to silks. P-1543 showed maximum plant height (223 cm) while YH-5785 showed minimum plant height (173 cm). YH-5784 showed low cob bearing (85 cm) while YH-5779 showed high cob bearing (133 cm).

6.3 Preliminary Maize Hybrid Yield Trial No. 3 Spring-2020

This trial was comprised of thirteen (13) 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 0.75m. The data regarding various parameters are presented in the following table.

Table 15: Results of Preliminary Maize Hybrid Yield Trial No. 3 Spring-2020

Entry	SC	Tass	Silk	PH	CH	CHr	GY
P-1543	19	62	65	208	90	18	10330
DK-6724	17	63	66	203	88	17	8690
YH-5846	16	68	71	178	113	18	8628
YH-5845	11	66	69	193	103	13	7998
YH-5848	16	69	72	188	118	15	7925
YH-5848-1	13	69	72	188	118	12	7735

YH-5427	16	65	68	180	95	15	7591
YH-5849	14	68	71	193	120	15	7228
YH-5846-1	18	67	68	163	83	18	5987
YH-1046	15	68	71	185	100	12	4696
YH-5847	13	67	70	175	103	12	4419
YH-5847-2	12	70	73	168	90	9	2882
YH-5847-1	16	69	72	155	73	12	2558
CV %	16.20	2.30	2.29	6.9	8.21	16.76	16.61
LSD (5%)	5.26	3.35	3.47	13.5	17.74	5.16	2412

The result in Table 15 unveiled that significant differences were found among all hybrid for all characters in preliminary maize hybrid yield trial (PYT-03). It is evident from the results that P-1543 gave maximum yield (10330 kg/ha) followed by DK-6724 (8690 kg/ha). P-1543 seemed to be early maturing by taking 65 days to complete its fifty percent silks while YH-5847-2 was late maturing taking 73 days to silks. P-1543 showed maximum plant height (208 cm) while YH-5847-1 showed minimum plant height (155 cm). YH-5847-1 showed low cob bearing (73 cm) while YH-5849 showed high cob bearing (120 cm).

6.4 Preliminary Maize Hybrid Yield Trial No. 4 Spring-2020

This trial was comprised of Thirty Six (36) 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.

Table 16: Results of Preliminary Maize Hybrid Yield Trial No. 4 Spring-2020

Entry	SC	Tass	Silk	PH	CH	CHr	GY
YH-5838	14	69	72	203	118	15	12320
YH-5803	20	66	69	190	105	18	10964
YH-5800	19	66	69	195	108	19	10927
YH-5798	14	68	71	223	115	16	10576
YH-5799	18	63	66	188	105	18	10430
YH-5831	17	69	72	190	110	14	10036
YH-5834	19	68	71	188	113	14	9871
YH-5814	16	67	70	198	95	13	9718
YH-5806	17	65	68	208	120	15	9360
YH-5797	13	66	69	203	115	15	9278
YH-5835	14	68	71	185	110	17	8886
YH-5796	18	68	71	205	113	16	8876
YH-5802	14	76	78	145	74	15	8722
YH-5427	16	70	72	150	69	17	8647
YH-5818	17	65	68	183	98	19	8327
YH-5801	17	66	69	195	115	18	8318
YH-5823	17	63	66	190	105	10	8012
DK-6724	19	64	67	220	95	15	7998
YH-5836	16	66	69	158	66	15	7954

YH-5804	19	65	68	190	110	15	7950
YH-5807	14	65	68	190	115	16	7850
YH-5793	17	66	69	195	113	16	7840
YH-5811	16	65	68	195	108	18	7690
YH-5824	20	70	73	125	43	17	7296
YH-5813	18	70	73	153	53	18	7288
YH-5827	18	65	68	173	100	16	6979
YH-5826	14	67	70	178	93	13	6911
YH-5841	6	74	77	183	98	11	6866
YH-5795	19	67	70	198	123	16	6788
YH-5791	10	70	73	188	95	9	6673
YH-5833	13	77	80	170	88	18	6658
YH-5817	11	66	69	163	56	14	6503
YH-5842	18	62	65	213	113	16	6160
YH-5792	8	68	71	190	103	9	5746
YH-5828	12	76	79	175	88	17	5124
YH-5816	12	67	70	153	56	11	4532
CV %	20.89	6.5	3.5	7.5	1.82	6.13	25.98
LSD (5%)	7.45	98.5	2.57	29.69	19.15	7.29	3039

The result in Table 16 unveiled that significant differences were found among all hybrid for all characters in preliminary maize hybrid yield trial (PYT-04). It is evident from the results that YH-5838 gave maximum yield (12320 kg/ha) followed by YH-5803 (10964 kg/ha). YH-5842 seemed to be early maturing by taking 65 days to complete its fifty percent silks while YH-5833 was late maturing taking 80 days to silks. YH-5798 showed maximum plant height (223 cm) while YH-5427 showed minimum plant height (150 cm). YH-5824 showed low cob bearing (43 cm) while YH-5806 showed high cob bearing (120 cm).

6.5 Micro Plot Hybrid Maize Yield Trial No.01 Spring 2020

This trial was comprised of Forty-Eight (48) 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 x 1.5m. The data regarding various parameters are presented in the following table.

Table 17: Results of Micro Plot Hybrid Maize Yield Trial No.01 Spring 2020

Entry	SC	Tass	Silk	PH	CH	CHr	GY
YH-5678	38	67	70	198	110	40	12226
YH-5656	32	66	69	205	125	31	12146
YH-5675-1	34	66	69	193	125	36	12065
YH-5657	35	66	69	218	123	40	11952
YH-5655	37	66	69	215	128	40	11802
YH-5677	33	67	70	203	115	37	11644
YH-5421-3	38	65	68	178	85	36	11611
YH-5404-3	38	65	68	198	113	38	11507

P-1543	35	65	68	215	95	39	11452
DK-6724	39	63	66	213	95	38	11353
FH-1046	37	67	70	195	113	33	11120
YH-5663	36	66	69	210	113	37	10951
YH-5668	35	67	70	183	98	37	10818
YH-5545-3	33	63	66	193	108	33	10548
YH-5427	35	64	67	185	103	34	10453
YH-5559	24	68	71	183	103	24	10272
YH-5421-1	34	65	68	163	88	36	10237
YH-5679	31	68	71	190	110	30	10172
YH-5671	25	67	70	190	113	23	9951
YH-5421-7	34	66	69	190	113	34	9877
YH-5654	29	69	72	188	108	28	9752
YH-5670	33	63	66	195	120	37	9722
YH-5662	34	65	68	185	103	35	9698
YH-5667	30	63	66	170	98	32	9662
YH-5665	34	66	69	173	95	34	9655
YH-5674-3	35	66	69	178	103	32	9551
YH-5672	23	68	71	190	115	24	9542
YH-5395	37	67	70	183	95	31	9331
YH-5554	27	65	68	173	88	29	9327
YH-5421-2	37	66	69	178	105	33	9193
YH-5664	36	67	70	193	115	27	9014
YH-5675	30	66	69	193	113	30	9010
YH-5545-2	27	64	67	190	105	29	8987
YH-1898	32	70	73	188	118	34	8969
YH-5660	24	66	69	160	110	27	8912
YH-5676	30	63	66	193	100	30	8902
YH-5404-1	35	64	67	193	108	32	8561
YH-5673-1	29	67	70	178	90	30	7692
YH-5439-1	27	67	70	173	98	29	7465
YH-5673-2	34	67	70	173	88	31	7069
YH-5395-2	24	66	69	188	98	27	6438
YH-5545-1	25	63	65	168	85	20	5907
YH-5673	29	66	69	180	95	26	5756
YH-5421-6	14	68	71	200	98	17	5618
YH-5666	23	65	68	158	75	21	5584
YH-5490-1	25	67	70	178	90	23	5477
YH-5674-1	31	66	69	168	83	25	5467
YH-5674-2	34	67	70	170	88	21	3183
CV %	10.28	1.89	17.35	7.63	9.33	11.32	17.35
LSD (5%)	6.45	2.50	2.50	28.63	19.35	7.01	3239

The result in Table 17 unveiled that significant differences were found among all hybrid for all characters in preliminary maize hybrid yield trial (MPMYT-01). It is evident from the results that YH-5678 gave maximum yield (12226 kg/ha) followed by YH-5656 (12146 kg/ha). YH-5545-1 seemed to be early maturing by taking 65 days to complete its fifty percent silks while YH-1898 was late maturing taking 73 days to silks. YH-5657 showed maximum plant height (218 cm) while YH-5421-1 showed minimum plant height (163 cm). YH-5666 showed low cob bearing (75 cm) while YH-5655 showed high cob bearing (128 cm).

6.6 Micro Plot Hybrid Maize Yield Trial No.02 Spring 2020

This trial was comprised of Forty-Eight (48) 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.

Table 18: Results of Micro Plot Hybrid Maize Yield Trial No.02 Spring 2020

Entry	SC	Tass	Silk	PH	CH	CHr	GY
YH-5711	29	65	68	213	123	42	11194
YH-5685-6	34	64	67	188	95	40	10852
P-1543	31	62	64	218	100	34	10649
YH-5704	34	65	68	210	113	35	10545
YH-5560-6	37	63	66	215	95	32	10495
DK-6724	33	63	66	218	105	35	10481
YH-5560-4	32	66	69	195	98	32	10474
YH-5721	28	68	71	188	108	29	10225
YH-5705	32	64	67	230	123	38	10198
YH-5550-2	32	63	66	225	100	28	10180
YH-5699	36	63	66	193	110	36	10061
YH-5550-1	29	64	67	210	105	28	9915
YH-5427	31	65	68	188	98	34	9885
YH-5702	29	67	70	208	98	30	9632
YH-5560-8	34	63	66	175	80	30	9540
YH-5560-7	30	65	68	193	95	31	9389
YH-5686-8	30	63	66	180	98	34	9307
YH-5685-5	27	64	67	203	100	33	8887
YH-5682-2	29	64	67	198	95	33	8839
YH-5703	31	65	68	220	124	33	8813
YH-5746	26	68	72	198	105	25	8703
YH-5549	28	67	70	173	83	31	8491
YH-5700	30	63	66	188	103	31	8338
YH-5682	19	67	70	195	100	22	8268
YH-5712	33	66	69	188	100	28	8112
YH-5713	30	67	70	180	98	28	8045
YH-5716	28	63	66	173	83	30	8039
YH-5714	27	67	70	178	98	35	7977
YH-5632-1	25	63	66	188	95	28	7740

YH-5728	25	65	68	183	95	25	7686
YH-5718	22	64	67	193	55	31	7675
YH-5632-3	22	64	67	200	103	27	7581
YH-5727	19	66	69	195	108	22	7350
YH-5719	22	64	67	180	80	27	7315
YH-5685-1	25	63	66	180	90	24	7261
YH-5725	21	66	69	185	93	23	6984
YH-5708	22	65	68	188	90	24	6873
YH-5680-1	24	67	70	193	103	24	6759
YH-5724	13	67	70	190	100	22	6732
YH-5706	22	63	66	175	93	22	6668
YH-5722	21	66	69	190	108	15	6151
YH-5732	13	63	66	188	103	17	6032
YH-5715	24	63	66	205	108	21	5598
YH-5701	20	63	66	178	83	20	5437
YH-5717	20	65	68	178	90	20	5214
YH-5707	19	64	67	160	73	17	5169
YH-5723-3	14	64	67	183	93	13	5011
YH-5729	16	65	68	183	78	18	5005
CV %	5	1.87	1.79	5.31	12.78	16.14	1.07
LSD (5%)	6.3	2.42	2.42	20.56	24.96	8.96	2326

The result in Table 18 unveiled that significant differences were found among all hybrid for all characters in preliminary maize hybrid yield trial (MPMYT-02). It is evident from the results that YH-5711 gave maximum yield (11194 kg/ha) followed by YH-5685-6 (10852 kg/ha). P-1543 seemed to be early maturing by taking 64 days to complete its fifty percent silks while YH-5746 was late maturing taking 72 days to silks. YH-5705 showed maximum plant height (230 cm) while YH-5707 showed minimum plant height (160 cm). YH-5707 showed low cob bearing (73 cm) while YH-5703 showed high cob bearing (124 cm).

6.7 National Uniform Maize Yield Trial-01 (First Year Testing) Spring-2020

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.

Table 19: Results of National Uniform Maize Yield Trial-01 Spring-2020

Entry	SC	Tass	Silk	PH	CH	CHr	GY
42	35	68	71	233	118	38	15129
44	36	65	69	208	90	40	13995
69	38	67	71	193	85	41	13630
43	33	66	69	203	105	40	13249
3	34	64	67	213	85	39	12973
59	34	67	70	190	98	38	12837
33	32	68	71	218	110	41	12451
73	36	67	70	213	95	41	12434
72	27	66	69	213	103	40	12358

23	33	64	68	220	93	37	12337
24	33	69	73	213	110	36	12335
75	36	63	67	203	88	38	12122
70	30	67	69	210	108	40	12045
15	37	69	72	203	93	39	11887
57	37	68	72	218	113	39	11879
9	36	66	69	193	108	38	11851
81	30	64	67	205	90	37	11798
30	34	69	72	223	108	35	11774
21	34	69	72	223	108	37	11598
77	35	66	69	218	108	38	11568
40	33	70	74	200	100	36	11532
49	31	67	70	210	103	37	11520
46	34	69	72	213	105	38	11497
61	35	67	71	220	113	36	11482
60	31	65	68	223	100	37	11471
52	34	66	69	210	103	39	11453
12	30	69	71	220	108	34	11331
78	33	68	71	225	103	39	11170
4	33	64	67	225	98	36	11130
48	31	64	68	228	100	36	11103
74	26	73	71	203	113	39	10984
62	35	69	72	218	120	42	10976
45	32	65	68	208	100	37	10963
68	33	67	71	233	110	37	10958
38	35	64	67	203	83	35	10884
25	34	64	68	210	100	37	10826
31	37	64	67	218	95	38	10826
66	28	69	73	213	105	35	10797
27	27	69	72	225	113	32	10754
63	34	67	70	228	108	36	10718
65	35	67	70	215	115	36	10705
1	31	63	66	185	70	35	10672
28	33	69	73	208	108	33	10648
22	31	69	72	198	103	38	10638
58	33	70	74	215	113	36	10617
11	35	63	66	213	95	35	10526
35	30	73	76	200	98	32	10473
36	36	69	72	190	98	35	10445
17	32	67	70	205	100	34	10427
5	32	63	67	228	108	34	10389
39	29	69	73	225	110	28	10302
26	30	67	70	210	98	32	10295

14	32	63	66	175	98	35	10263
56	33	65	68	223	93	38	10235
37	30	65	68	200	90	35	10198
20	34	69	72	215	128	36	10147
18	26	68	71	223	113	33	10099
6	32	67	70	223	103	35	9985
67	32	66	69	235	120	34	9899
19	34	64	67	188	63	34	9804
79	32	63	66	225	100	38	9598
54	36	66	69	213	95	37	9476
64	32	66	69	190	95	33	9356
34	30	69	72	228	93	33	9305
29	26	67	70	213	98	31	9297
80	27	68	71	205	85	36	9143
76	30	67	71	213	105	33	8966
50	32	64	67	220	100	34	8962
47	30	64	67	203	95	34	8800
8	29	64	68	215	103	32	8735
53	27	65	69	205	90	33	8707
32	27	67	71	218	100	28	8614
51	30	63	66	198	88	34	8607
55	28	65	68	213	103	32	8569
2	29	64	67	193	88	30	8446
10	27	67	70	190	80	32	8446
13	29	72	75	200	118	28	8379
7	34	63	65	183	83	32	8365
71	31	64	67	210	105	34	8346
16	25	73	76	205	113	27	8171
41	25	70	73	185	82	26	6523
CV %	11.42	2.11	2.30	7.67	11.08	10.56	14.82
LSD (5%)	7.192	2.782	3.184	32.06	22.09	7.39	3139

It is evident from Table No. 19 that all the hybrids expressed statistically significant differences among all hybrid for all characters in. It is evident from the results that Entry No. 42 gave maximum yield (15129 kg/ha) followed by Entry No. 44 (13995 kg/ha). Entry No. 7 seemed to be early maturing by taking 65 days to complete its fifty percent silks while Entry No.40 was late maturing taking 74 days to silks. Entry No. 42 showed maximum plant height (233 cm) while Entry No. 7 showed minimum plant height (183 cm). Entry No. 41 showed low cob bearing (82 cm) while Entry No. 20 showed high cob bearing (128 cm).

7 Hybrid Evaluation at High Temperature under ADP project

7.1 Preliminary Maize Hybrid Yield Trial-01 under High Temperature Spring-2020

This trial was comprised of Twenty Six (26) 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 20-3-2020. Plot size was kept 4m x 075 m x1. The data regarding various parameters are presented in the following table.

Table 20: Results of Preliminary Maize Hybrid Yield Trial-01 under High Temperature Spring-2020

Entry	SC	Tass	Silk	PH	CH	CHr	GY
YH-5752	17	60	63	210	110	18	11454
YH-5685-1	20	57	60	213	108	17	10088
YH-5750	16	58	61	205	110	20	10081
YH-5682-3	17	58	61	220	105	15	9885
YH-5632-1	19	57	60	198	100	18	9836
YH-5682-4	17	60	63	180	80	16	9694
YH-5682	16	59	62	183	113	17	9672
YH-5632-3	16	59	62	178	80	16	9321
P-1543	13	57	60	200	100	16	9312
DK-6724	14	62	65	195	100	19	9167
YH-5754	15	58	61	215	118	15	9160
YH-5755	18	56	59	203	110	15	9099
YH-5748	18	59	62	208	103	15	9053
YH-5682-2	15	59	62	198	93	14	8739
YH-5427	14	58	61	183	80	16	8594
YH-5757	15	62	65	198	93	14	8401
FH-1046	14	61	64	177	85	13	8387
YH-5683-2	12	59	62	193	93	11	7931
YH-5758	14	57	60	195	88	13	7583
YH-5683-3	11	57	60	203	98	13	7580
YH-5756	16	59	62	190	88	13	7432
YH-5683-1	15	59	62	205	108	13	7425
YH-5754	14	57	60	200	113	11	7016
YH-5751	16	57	60	208	79	10	6839
YH-5759	14	60	64	188	90	12	6439
YH-5749	10	58	61	180	98	10	5960
CV %	25.80	1.57	1.68	5.83	9.46	24.56	23.77
LSD (5%)	5.12	3.12	3.57	14.3	18.14	5.66	2612

It is evident from Table 20 that all the hybrids expressed statistically significant differences among all hybrid for all characters in. It is evident from the results that YH-5752 gave maximum yield (11454 kg/ha) followed by YH-5685-1 (10088 kg/ha). YH-5755 seemed to be early maturing by taking 59 days to complete its fifty percent silks while YH-5757 and DK-6724 was late maturing taking 65 days to silks. YH-5682-3 showed maximum plant height

(220 cm) while FH-1046 showed minimum plant height (177 cm). YH-5751 showed low cob bearing (79 cm) while YH-5754 showed high cob bearing (118 cm).

7.2 Preliminary Maize Hybrid Yield Trial-02 under High Temperature Spring-2020

This trial was comprised of twenty-six (26) 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 20-3-2020. Plot size was kept 4m x 075 m x1. The data regarding various parameters are presented in the following table.

Table 21: Results of Preliminary Maize Hybrid Yield Trial-2 under High Temp Sp.20

Entry	SC	Tass	Silk	PH	CH	CHr	GY
YH-5770	23	57	60	195	98	22	15071
YH-5779	24	56	58	215	100	23	14564
YH-5780	22	60	63	198	105	21	14441
YH-5776	20	56	59	213	83	19	13666
YH-5766	20	59	62	205	118	18	13241
YH-5772	17	60	63	205	108	19	13178
P-1543	17	58	61	193	103	19	12888
YH-5784	26	58	61	200	115	24	12747
YH-5774	23	58	61	193	88	21	12515
YH-5761	18	59	62	200	105	16	12270
YH-5427	14	62	65	198	113	12	12115
YH-5788	20	57	60	175	77	16	12028
YH-5762	19	57	60	188	78	18	11789
YH-5777	20	58	61	195	95	17	11765
YH-5775	19	58	61	188	108	19	11696
YH-5785	17	59	62	180	93	17	11460
YH-5767	12	62	65	208	113	14	11186
YH-5783	19	58	61	195	98	17	11127
YH-5773	17	61	64	208	118	14	10758
YH-5789	94	62	65	203	110	12	10457
YH-5781	17	59	62	195	90	16	10326
YH-5782	15	60	63	203	113	13	10247
YH-5769	12	59	62	203	110	11	9954
DK-6427	15	58	61	210	95	13	9633
YH-5764	14	56	59	185	95	10	9527
YH-5765	8	62	65	216	113	7	6612
CV %	23.77	25.80	1.77	1.68	5.83	9.46	24.56
LSD (5%)	5.58	3.78	4.25	13.0	18.21	5.58	2218

It is evident from Table 21 that all the hybrids expressed statistically significant differences among all hybrid for all characters in. It is evident from the results that YH-5770 gave maximum yield (15071 kg/ha) followed by YH-5779 (14564 kg/ha). YH-5779 seemed to be early maturing by taking 58 days to complete its fifty percent silks while YH-5427, YH-5767

and YH-5789 were late maturing taking 61 days to silks. YH-5765 showed maximum plant height (216 cm) while YH-5788 showed minimum plant height (175 cm). YH-5788 showed low cob bearing (77 cm) while YH-5766 showed high cob bearing (118 cm).

7.3 Preliminary Maize Hybrid Yield Trial-04 under High Temperature Spring-2020

This trial was comprised of thirty-six (36) 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 20-3-2020. Plot size was kept 4m x 0.75 m x 1. The data regarding various parameters are presented in the following table.

Table 22: Results of Preliminary Maize Hybrid Yield Trial-04 under High Temp. Sp.20

Entry	SC	Tass	Silk	PH	CH	CHr	GY
YH-5841	19	68	71	170	85	20	13266
YH-5800	19	62	65	215	118	17	12360
YH-5801	17	61	64	233	140	17	12098
YH-5804	19	59	62	200	110	22	12081
YH-5793	19	59	62	225	118	16	12075
YH-5798	18	63	66	248	125	17	12051
YH-5826	15	59	62	210	113	16	12030
YH-5797	14	61	64	233	103	15	11808
YH-5828	14	65	68	193	95	16	11700
YH-5795	15	61	64	218	120	16	11371
YH-5796	16	60	63	213	110	16	11355
YH-5791	13	63	66	235	130	18	11288
YH-5427	19	59	62	208	108	19	11180
YH-5833	15	66	69	190	90	13	11163
YH-5811	17	58	61	220	110	17	11017
YH-5816	15	59	62	228	103	15	10906
YH-5807	14	58	61	208	113	17	10851
YH-5835	14	62	65	200	110	14	10779
YH-5836	12	62	65	218	118	13	10707
YH-5802	17	62	65	210	113	18	10698
YH-5814	12	62	65	240	110	17	10587
YH-5813	14	59	62	233	125	14	10516
YH-5799	10	58	61	200	103	12	10289
YH-5842	12	61	64	193	98	13	9978
YH-5806	16	58	62	210	125	16	9956
YH-5803	15	61	64	208	105	16	9885
YH-5817	17	60	63	218	108	15	9851
YH-5824	16	59	62	208	113	15	9609
DK-6724	13	57	60	208	90	15	9381
YH-5792	13	64	67	210	108	13	9227
YH-5831	12	65	68	225	115	12	8011
YH-5818	11	59	62	213	113	11	7914

YH-5834	12	60	63	195	108	11	7570
YH-5827	10	60	63	208	125	11	6878
YH-5838	11	64	67	185	108	10	6684
YH-5823	11	63	66	210	115	11	5969
CV %	29.68	2.44	2.33	6.48	10.75	29.28	23.94
LSD (5%)	8.62	3.01	3.00	27.89	24.213	8.83	5037

It is evident from Table 22 th at all the hybrids expressed statistically significant differences among all hybrid for all characters in. It is evident from the results that YH-5841 gave maximum yield (13266 kg/ha) followed by YH-5800 (12360 kg/ha). DK-6724 seemed to be early maturing by taking 60 days to complete its fifty percent silks while YH-5841 was late maturing taking 71 days to silks. YH-5791 showed maximum plant height (235 cm) while YH-5841 showed minimum plant height (170 cm). YH-5841 showed low cob bearing (85 cm) while YH-5801 showed high cob bearing (140 cm).

8 Hybrid Evaluation under drought

This trial was comprised of six (11) 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 25-2-2020. 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.

Table 23: Results of Hybrid Yield Trial under Drought (Drought-1) Spring-2020

Entry	SC	Tass	Silk	PH	CH	CHr	GY
YH-5811	82	66	68	174	84	85	12771
NK-8441	81	66	69	204	96	84	11723
FH-1046	78	70	73	181	96	82	11400
P-1543	80	66	69	205	106	82	10954
YH-5427	81	66	69	199	85	83	10113
YH-5482	74	67	70	193	99	75	9531
YH-1898	69	70	73	171	90	69	9423
YH-5550	75	69	72	179	83	79	8760
YH-5893	81	70	73	219	111	81	7999
YH-5560	55	66	69	201	108	60	7861
YH-5591	76	71	74	161	90	78	7777
CV %	6.64	0.83	0.73	3.52	3.35	1.52	6.64
LSD (5%)	18.56	3.51	3.63	40.47	18.0	16.49	1000.56

It is evident from above Table 23 that all the hybrids expressed statistically significant differences among all hybrid for all characters in. It is evident from the results that YH-5811 gave maximum yield (14771 kg/ha) followed by NK-8441 (11723 kg/ha). YH-5811 seemed to be early maturing by taking 68 days to complete its fifty percent silks while YH-5591 was late maturing taking 74 days to silks. P-1543 showed maximum plant height

(205 cm) while YH-5591 showed minimum plant height (161 cm). YH-5550 showed low cob bearing (83 cm) while YH-5893 showed high cob bearing (111 cm).

9. On-Farm Yield Trial Spring-2020

Seven local and multinational hybrids were sown on seven different locations at farmer fields to evaluate their yield potential under ADP project in spring-2020.

Table 24: Yield Results of On-form Yield Trial Spring-2020

Name of Hybrids	D.O.H	YH-5427	YH-5482	DK-6724	FH-1046	YH-1898	NK-8441	P-1543
Harapa	11-06-20	10565	10421	10854	10189	8037	9088	8065
Sahiwal	21-06-20	10188	9765	9976	10077	8855	9785	8845
Okara	16-06-20	11015	11054	10233	9967	10456	10450	8623
Arif Wala	12-06-20	10878	11249	10068	10217	10012	7812	9570
Mian Channu	26-06-20	11234	11076	10522	10873	85521	7054	6145
Mailsi	06-07-20	10277	10099	9812	10634	8887	7122	6543
Chichawatni	20-07-20	8066	7254	7677	6900	7543	6021	4054
Samundri	14-06-20	11681	10527	10324	11736	10310	9965	9863
Mouza Abu Saeed Chah In-sarian, Chiniot	18-06-20	11865	10935	10745	12058	9827	10347	11126
Tehsil Lalian, Chiniot	13-06-20	10127	9551	9017	9711	9021	9163	9933
Gojra	07-06-20	10241	9920	8791	10365	9671	9102	9307
Khidar Wala	06-06-20	9097	8897	8906	9563	8788	8365	9019
Average		10436	10062	9744	10191	9163	8690	8424

It is evident from Table 24 that hybrid YH-5427 produces higher yield (10436 kg/ha) followed by FH-1046 (10191 kg/ha), YH-5482 (10062 kg/ha) and DK-6724 (9744 kg/ha). The lowest yield was given by P-1543 (8424 kg/ha), So these high yielder hybrids (YH-5427, FH-1046 & YH-5482) would be recommended to farmers for general cultivation.

AGRONOMIC TRIALS UNDER ADP:

KHARIF 2019 (ADP TRIALS)

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

Trial was conducted during autumn 2019 following RCB design with four replications to determine effect of Boron and Zinc application on grain yield of YH-5427 seed production. Maize: inbred lines Y222 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 below table.

Table-25: Effect of Boron and Zinc Application on Grain Yield of YH-5427 Seed Production

Treatment Boron + Zinc kg ha ⁻¹	Stand count/ plot	Plant Height (cm)	Cob Height (cm)	No. of cobs har- vested /plot	Grain Yield (kg/ha)
T1 = 0+0	112.25ab	94.50 c	34.50 c	101.00 b	1056 c
T2 = 7.5+0	109.25 a	101.50 b	39.50 b	105.00 ab	1118 bc
T3 = 0+7.5	110.75 ab	102.75ab	37.50 bc	107.00 ab	1088 bc
T4 = 7.5+7.5	104.00 b	109.00 a	44.25 a	103.00 ab	1326 a

T6 = 0+11.25	110.00 ab	105.50 ab	40.25 b	100.00 b	1172.5 b
T7 = 11.25+0	109.50 b	104.75 ab	38.75 b	104.00 ab	1157.25 bc
T1 = 11.25+11.25	115.00a	106.50 ab	41.25 ab	110.00 a	1340.00 a
LSD (5%)	8.52	5.76	3.78	7.73	115

The results presented in the above Table 25 showed that different doses of boron and zinc significantly affected different yield components and grain yield as well. Better stand count, more number of cobs per plot, relatively taller plants and higher grain yield was noticed where micronutrients boron and zinc were applied compared to control where no such practice done or where only one element applied. Significantly higher grain yield 1340 kg per hectare was produced in treatment T7 followed by T4 1326 kg per hectare statistically at par with each other whereas the lowest grain yield 1056 kg per hectare was produced in control where none micronutrient was applied..

ii) **Effect of Different Pre and Post Emergence Weedicides on Seed Production of Maize Hybrid YH5427.**

During Kharif 2019 trial was conducted following RCB design with three replications keeping plot size 5 × 5.25m. Data regarding stand count, plant height, cob height, harvested cobs, and grain yield were recorded and analyzed statistically, which are presented in below table

Table 26: Effect of Different Pre and Post Emergence Weedicides on Grain Yield of Maize Hybrid YH-5427.

Treatment	Stand count/plot	Plant Height (cm)	Cob Height (cm)	No. of harvested cobs/plot	Grain Yield (kg/ha)
T1 Weedy check (control)	66 c	101.33 ab	40.67	63.33 d	644 c
T2 Gangvi @ 500ml/ac (Post – em.)	124. b	104.67 ab	41.67	121.67 bc	811bc
T3 Primextra g old @ 800 ml/ac (pre. em.)	151, a	109.00 a	44.67	148.67 ab	1096 a
T4 Maxpro @ 500 g/ac (Post – em.)	131.ab	105.33 ab	42.67	128.00 abc	865 b
T5 Dual gold @ 600 ml/ac (post – em.)	156.b	104.00 ab	42.00	150 .00 a	831 b
T6 Flesto gold @ 1000 ml/ac (post – em.)	130. ab	99.30 b	39.33	125.67 abc	757 bc
T7 Atrazine @ 500ml/ac (Post – em.)	117.3ab	103.67 ab	39.33	113.30 c	709 bc
LSD (5%)	24.93	9.58	N.S.	27.16	176.02

The results presented in the above Table 26 disclosed that different chemical weed control practices significantly enhanced different yield and yield components of hybrid maize seed production over control. The inbred lines being tender and sensitive were severely affected by quick growing weed intensity especially at early stages. The pre emergence weedicide Primextra gold @ 800 ml/ac produced significantly higher grain yield 1096 kg per hectare of maize hybrid seed production YH-5427 followed by post emergence weedicides dual gold, Flestogold and Gangvi statistically at par with each other. Atrazine having no control on narrow leaved weeds and sedges produced relatively low grain yield however the lowest seed yield 644 kg per hectare was observed in control where no weed control practice done.

SPRING 2020 (ADP TRIALS)

i. **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 m². 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-

Table-27: Result of Effect of Micronutrient Boron and Zinc Application on Grain Yield of Maize Hybrid YH-5427 Seed Production

Treatment (kg/ha)	Stand count per plot	Plant Height (cm)	Cob Height (cm)	No. of harvested cobs/plot	50% Tasseling (days)	50% silking (days)	Grain Yield (kg/ha)
T1= B+ Zn (0+0)	156.5ab	97.5 d	37 bc	107.5c	52 a	57 a	1189 c
T2= B+ Zn (0+7.5)	161 a	102cd	38 bc	109.25 bc	51.ab	56 ab	1285 cd
T3= B+ Zn (7.5+0)	160 ab	105 bc	38 bc	109.25 bc	50.75ab	56.5 a	1241 de
T4= B+ Zn (7.5+7.5)	154.5 ab	106.5bc	41 a	112 ab	51.75ab	54.25 bc	1407ab
T5= B+ Zn (0+11.25)	153 ab	109 ab	36 c	109bc	50.5 b	55 bc	1356bc
T6= B+ Zn (11.25+0)	1587ab	105 cd	37 bc	113 a	50.5 b	55.5 ab	1380 b
T7= B+ Zn (11.25+11.25)	144 b	110 .5a	39 ab	113 a	51.25ab	52.5 c	1477 a
LSD 0.05	16.45	4.83	2.3	3.73	2.4	2.11	93.667

The data presented in above mentioned Table 27 revealed that boron and zinc application enhanced grain yield maximum grain yield of 1477kg per hectare was achieved where boron + zinc @ 7.5 kg/ha whereas minimum grain yield 1189 noticed where no such practice adopted. Hence it is concluded that micronutrient application enhances grain yield of hybrid seed production YH-5427

ii. **Effect of sowing dates on grain yield of Maize hybrid YH1898 seed production**

Four sowing dates starting from 20th Feb with an interval of ten days upto 20th March 20020 were sown using parent inbred lines Y-22 and Y-27 with 4:1 ratio as female and male. Plot size was 6X10 m² 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.

Table-28: Effect of sowing dates on grain yield of Maize hybrid YH1898 seed production

Treatment (sowing)	Stand count per plot	Plant Height (cm)	Cob Height (cm)	50% Tasseling (days)	50% Silking (days)	No. of harvested cobs/plot	Grain Yield (kg/ha)
D1 = 20 th February	49.75 b	105.5 a	56	56	54.25	50.75 a	1550 a
D2= 1 st March	50.75 ab	108 a	55	56.75	53.75	51.5 a	1550 a
D3= 10 th March	50.25 ab	108.5 a	55.5	56	54.5	52.5 a	1483 a
D4= 20 th March	49.75 b	108 a	54	55	53.75	53 a	1412 a
LSD 0.05	1.81	NS	NS	NS	NS	NS	NS

The data presented in Table 28 revealed that sowing dates did not affected grain yield due to rainy spell the trail did not started at its proper time , the late sowing entered hot spell at pollination/maturity period which equally effected grain setting hence having no significant effect on grain yield.

HYBRID MAIZE (WHITE)

KHARIF 2019

1. Derivation of Inbred Families

One hundred & forty one (141) derivative families of different generations were sown in ear to row fashion during Kharif-2019 for derivation of inbred lines through hand pollination. At maturity, selfed plants were harvested in each family, separately, and seed of 114 families was collected / added for further derivation and selection cycles.

2. Maintenance of Inbred Lines

During Kharif-2019, forty nine (49) inbred lines were sown in ear to row fashion for maintenance through hand-pollination. Forty nine (49) inbred lines were finally selected and maintained while 4, newly derived inbred lines, were also added in maintenance which resulted in 53 inbred lines.

3. Hybrid Constitution

Twenty eight (28) females were sown in isolation with one male in 4:1 ratio for constitution of 28 new single cross white maize hybrids during Kharif-2019. Female lines were detasseled before anthesis to avoid inbreeding. The isolation was harvested at maturity and seed of twenty eight new single cross hybrid was collected which will be evaluated in spring 2020.

SPRING 2020

1. Derivation of Inbred Families

One hundred & fourteen (114) derivative families of different generations were sown in ear to row fashion during Spring-2020 for derivation of inbred lines through hand pollination. At maturity, selfed plants were harvested in each family, separately, and seed of 134 families was collected / added for further derivation and selection cycles.

2. Maintenance of Inbred Lines

During Spring-2020, fifty five (55) inbred lines were sown in ear to row fashion for maintenance through hand-pollination Fifty five (55) inbred lines were finally selected and maintained while 6, newly derived inbred lines, were also added in maintenance which resulted in 61 inbred lines

3. Hybrid Constitution

Twenty -two (22) females were sown in isolation with one male in 4:1 ratio for constitution of 28 new single cross white maize hybrids during Spring-2020. Female lines were detasseled before anthesis to avoid inbreeding. The isolation was harvested at maturity and seed of twenty-two new single cross hybrid was collected.

a. Preliminary Maize Hybrid Yield Trial

A trial consisting of 33 entries, including five commercial checks, was conducted in RCBD 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.

Table -29: Results of Preliminary Hybrid Maize Yield Trial No. 1

Sr. No.	Entry	Grain Yield kg/ha	50% Tass.	50% Silking	Plant Height (cm)	Ear Height (cm)
1	CR-16	11876 ab	70	72.5	210	95
2	SB-292	11780 ab	75.5	78.5	187.5	90
3	CS-220	11464 abc	75	77	212.5	105
4	CR-19	11020 bcd	72.5	74.5	205	100
5	CR-22	10862 cde	73	74.5	207.5	97.5
6	SB-3942	10776 cde	76	80	187.5	95
7	CR-23	10625 c--f	73.5	75.5	202.5	90
8	CR-25	10576 c--f	71.5	74	204	100
9	CR-18	10295 b--g	70.5	73	207.5	95
10	CR-24	9980 c--h	73	76	212.5	100
11	CR-29	9924 c--h	74.5	74.5	205	87.5
12	CR-20	9759 d--h	70.5	73	142.5	97.5
13	CR-27	9714 d--h	74.5	76	200	85
14	CS-240	9513 d--h	74.5	77.5	207.5	96
15	CR-17	9241 e--i	69.5	72.5	205	97.5
16	CR-26	9037 f--i	74.5	76	212.5	100
17	CR-14	8922 g--j	72	74	200	90
18	CR-15	8915 g--j	69	71.5	205	95
19	CR-13	8814 g--k	69	72.5	205	90
20	CR-28	8744 g--k	73.5	75.5	182.5	80
21	CR-8	7602 ijk	73.5	78	170	65
22	CR-9	7362 jkl	75	76.5	157.5	55
23	CS-200	7203 kl	75	78	197.5	85
24	CR-4	5856 lm	73.5	76.5	180	75
25	CR-3	4220 mn	76.5	76	150	62.5
26	CR-7	4088 n	74	76	177.5	70
27	CR-1	4042 n	76	78	150	65
28	CR-11	4005 n	74.5	77	155	60
29	CR-21	3603 n	75	77	157.5	65
30	CR-10	2927 n	76	77.5	152.5	55
31	CR-2	2913 n	75.5	77.5	145	60
32	CR-5	2892 n	75	77	147.5	60
33	CR-6	2883 n	75.5	78	145	55
CV %		4.9	2.2	2.4	7.8	11.6
LSD (5%)		1643	6	7	60	40

It is evident from the Table 29 that there was significant difference among the genotypes for all the traits under consideration, that is, Grain yield, days to 50% tasseling & silking, plant height and cob height. CR-16 showed higher grain yield (11876 kg/ha) followed by SB-292 (11780) without a significant difference while lowest grain yield was produced by CR-6 which showed 2883 kg grain yield per hectare. It is interesting to note that CR-16 was far much early in starting reproductive phase (70 days for tasseling) as compared to the SB-292

(75.5 days). The highest plant height (215cm) was obtained by CR-26 & CS-220 followed by CR-16 (210cm) while minimum plant height was CR-20 (142.5cm). Lowest cob bearing (55cm) was revealed by CR-6 while highest cob height was shown by CS-220 as 105cm.

OPV MAIZE: KHARIF 2019

Pool-60

Seed of selected half-sib families were mixed in equal proportion and the resultant bulk was sown in isolation to allow open pollination and get maximum genetic variability. At the time of harvesting, 300 cobs were selected from desirable plants on the basis of visual observation. 150 cobs were finally selected from these 300 cobs based on cob length, seed length etc. and seed was prepared which will be sown in spring 2020 for evaluation.

SPRING 2020

1. Pool-60

150 selected families from Kharif 2019 were evaluated during Spring-2020. On the basis of cob length, seed setting and seed depth, 10 families were selected visually. The remnant seed of these selected families was mixed in equal proportion to form a base population to start new selection cycle.

1. Seed Production of Open Pollinated Variety Sahiwal Gold

Seed from previous year crop was sown in an isolation of 4kanal during spring 2020 at MMRI & 2 Acres at Govt. Maize Seed Farm Iqbal Nagar. 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 2019 was mixed and sown in isolation of 2kanals during spring 2020. Crop was harvested at maturity and random sample from bulk material was kept for next sowing.

3. Ear to Row Trial for new variety development

Fifty Two selected cobs from previous trial were sown ear to row method. Detasseling was made with the ratio of 1:3. About 160 ears were selected from different plants on the basis of plant height, stem girth, light tassel, cob length and lodging resistance. Out of 160 ears 62 ears were further selected on the basis of ear related (cob length, thin pith, no. of rows / ear, now of grains / row and grain boldness) characteristics for sowing in next season.

Adaptability / National Uniform Maize Varietal Yield Trial, Spring 2019

The trial comprising of 4 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 below table.

Table 30: Result of National Uniform Maize Varietal Yield Trial, Spring 2019

Entry	Days to Flowering (Male)	Days to Flowering (Female)	Grain Yield (kg/ha)	Plant Height
1	64	62	5752	202

2	61	59	5664	227
3	61	59	5430	225
4	66	63	5704	201
CV	6.77	7.08	19.12	3.07
LSD	NS	NS	NS	13.42

PARB PROJECTS:

PARB PROJECT 900:

Kharif 2019:

Development of DH-inbred lines from selected haploid seeds in spring-2019 through artificial chromosome doubling.

Steps in chromosome doubling:

A) Seed Germination

Haploid seeds were sown on moist germination paper treated with 0.05% bleach to avoid fungal growth. Three layered germination paper was folded tightly and tied with rubber band on both ends. These folded germination papers in plastic tray were placed in incubation chamber where temperature was maintained around 25-28⁰C. Seeds were allowed to germinate for 72 hours.

B) Preparation of Seedlings

After incubation period of 72 hours, seed bundles were removed from incubation chamber and spread on working table. Before colchicine treatment root and shoot tissues were cut using sterile blade at about 2cm and 1cm from tip, respectively. Non-germinated seeds were bundled again and kept in growth chamber for one more day. The same procedure of cuttings for seedlings was followed for next two days.

C) Colchicine treatment

A solution with 0.04% colchicine and 0.5% DMSO was used for chromosome doubling. Colchicine powder was weighed and dissolve in mixture of distilled water and DMSO in a beaker wrapped with aluminum foil. Colchicine powder dissolved in water along with DMSO with the aid of magnetic stirrer for 2-3 hours. The prepared seedlings were then dipped in colchicine solution for 12 hours.

Table 31: Recipe for Chromosome Doubling Of Haploid Maize Seedlings.

Sr#	Reagents	Quantity (for 1Liter)
1	Colchicine (0.04%)	0.4g
2	Dimethyl sulfonate (0.5%)	5ml
3	Distilled water	Up to the mark

Seedling transplanting and green house management

Seedlings were transplanted to peat moss cups in green house where temperature was maintained around 25-28⁰C. Water was used for irrigation. From second irrigation NPK solution used to promote root growth and seedling establishment. To prevent fungal attack fungicide (Topsin-M) was used. Moreover, systemic insecticide was used a week before transplanting the seedling to field. Two weeks seedlings contained 2-3 leaves were selected for transfer to field.

Transplanting to Field

Seedlings were transplanted to field early in the morning to avoid mid-day high temperature. After transplantation, drip irrigation valves were opened for watering to avoid stress. Total 220 DH plants were transplanted to field.

Survival rate

Due to high mortality rate along with harsh climatic condition only 50- DH-plants survived out of 220 transplanted DH plants.

SPRING 2020:

These forty double haploids were sown in split plot design and each entry sown in a single row on 18.02.2020. Phosphate and urea fertilizer were used for good crop growth. Further, best plant protective measure was adopted to protect crop from insect-pest attack. Moreover, the observation on days to 50% tasseling, days to 50% silking, plant height and ear height was recorded (Table-32). Beside this, silks and tassels are covered for selfing and crossing of double haploids, which were harvested on 12 May, 2020.

Table 32: Data of DH lines

Plot No.	Pedigree	50%Tassel (Days)	50%Tassel (Days)	Plant Height (cm)	Cob height (cm)
1	DH-1	67	70	166	70
2	DH-2	68	71	165	69
3	DH-3	65	68	168	72
4	DH-4	67	70	150	75
5	DH-5	66	69	224	113
6	DH-6	68	71	200	103
7	DH-7	66	69	231	117
8	DH-8	66	69	145	73
9	DH-9	68	71	181	95
10	DH-10	69	72	205	90
11	DH-11	69	72	185	106
12	DH-12	65	68	175	92
13	DH-13	69	72	180	101
14	DH-14	68	71	220	109
15	DH-15	66	69	228	115
16	DH-16	64	67	149	73
17	DH-17	65	68	183	96
18	DH-18	69	72	225	105
19	DH-19	66	69	160	69
20	DH-20	68	71	155	76
21	DH-21	69	72	149	75
22	DH-22	66	69	205	100
23	DH-23	68	71	180	92
24	DH-24	65	68	223	105
25	DH-25	69	72	205	100
26	DH-26	65	68	165	70
27	DH-27	67	71	215	95

28	DH-28	68	71	155	78
29	DH-29	65	68	220	110
30	DH-30	66	69	173	90
31	DH-31	68	71	180	93
32	DH-32	67	70	220	109
33	DH-33	64	67	160	75
34	DH-34	66	69	165	70
35	DH-35	68	71	150	70
36	DH-36	67	70	173	69
37	DH-37	65	68	208	92
38	DH-38	68	71	180	95
39	DH-39	66	69	225	112
40	DH-40	67	70	186	96

PARB PROJECT NO. 904.

KHARIF 2019

Output 3 / Activity 1:

Evaluation of hybrids in multi-location replicated trials for yield and quality parameters during 01-07-2019 to 31-12-2019 under PARB project no. 904.

Following activities were carried out during this period.

Seed was prepared and sowing 147 F1 single cross hybrids on.06.08.2019 was completed at MMRI & MRS Faisalabad. Data were recorded for flowering and plant dimensions. Material (cobs) was harvested on 27.11.2019 and exposed for sun drying. Shelling, weighing and storage of material were completed

SPRING 2020

Output 3 / Activity 2:

Maintenance of selected parental lines through controlled pollination during 01-01-2020 to 30-06-2020 under PARB project no. 904.

Following activities were carried out during this period.

Parental inbred lines (20) of tested hybrids were sown in field on 18.02.2020. Hand pollination was remained in progress during month of April and May. Material was harvested and exposed to sun drying during month of June. 100 – 200 g seed was obtained for each line

SORGHUM

KHARIF 2019:

1. MAINTENANCE OF BREEDING MATERIAL:

i. Gene Pool

Eighty Four (84) 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. Three lines 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 (44) cytoplasmic male sterile (A) lines and their counterpart (B) lines were planted for maintenance in strips having 5 m x 2.25 m plot size. Panicles of ten plants from each A and B line were covered before anthesis for the production of pure seed of lines. Five lines were rejected due to disease susceptibility. All the remaining “A” lines were maintained with their counterpart “B” lines.

iii. Fertility Restorer Lines

Thirty one (31) restorer (R) lines were planted for maintenance in strips with 5m x 1.5m plot size. Five true to type plants were selected in each line and their panicles were covered before anthesis to avoid pollen contamination. At maturity, panicles of each line were harvested separately and enough seed was collected for further maintenance and utilization in hybrid programme. Three lines were rejected due to disease susceptibility. Remaining all lines were maintained.

2. BREEDING:

i. Hybrids Constitution: (CMS × Restorers)

Sixty Eight hybrids (68) (CMS x R) crosses were constituted (61 in isolation and 7 by hand) during Kharif 2019 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 7 kg seed of YSH-95 was produced.

ii. Filial Generations:

17 F₃ families were selected from 10 F₂ in Kharif 2019. one F₅ family was selected from eight F₄, Three F₆ were selected from 3 F₅; phenotypically superior plants from families were selected. Eight F₆ generations were planted and six lines were selected for varietal trial based on their plant aspect, head length and brix value. Ten (10) F₂ families were selected form hybrid trials based on their head length and brix value.

iii. Mutated Lines

Eleven (11) Mutated selected lines from Kharif 2019 were planted and 11 entries were selected based on their head length and brix value for sowing in Kharif 2020.

iv. 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-33

Table-33: Number of Heads of Each Variety

Sr. No.	Variety	No. of Selected Heads	Status
1	YSS-98	102	Approved
2	YS-16	320	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 2019.

Eighteen (18) (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 below table.

Table-34: Results of Sorghum Hybrid Yield Trial 1

Hybrid	Stand Count	Days to Heading	Plant Height (cm)	Head length	FLA (cm ²)	Inter-nodal L. (cm)	Stalk Weight (kg/ha)	Grain Yield (kg/ha)
YSH-132	17	72	209	36	148.13	8.67	33662	3486
YSH-139	22	68	199	34	155.50	8.33	26667	3032
YSH-137	18	70	189	32	158.50	8.67	20868	3009
YSH-151	21	72	192	31	124.00	7.00	25352	2968
YSH-131	20	69	169	29	112.88	8.33	30826	2933
YSH-153	21	70	199	30	77.38	9.00	25463	2897
YSH-138	21	66	193	36	126.75	8.67	31795	2686
YSH-95	19	72	194	34	148.00	7.33	28333	2462
YSH-152	20	67	187	34	119.50	8.67	20766	2420
YSH-142	22	66	187	28	99.75	9.00	18194	2407
YSH-128	19	68	179	37	116.00	7.33	19583	2355
YSH-148	21	69	184	32	185.50	7.67	24126	2245
YSH-134	19	71	202	33	169.13	9.67	21750	2020
YSH-129	19	66	183	39	147.25	8.00	24167	2010
YSH-141	20	66	187	33	129.00	8.00	25370	1983
Lasani ©	21	75	219	32	133.88	9.67	26250	1912
YSH-130	22	66	194	31	134.13	8.33	22292	1728
YS-16©	18	77	214	25	112.75	9.67	16343	520
CV	10.24	2.55	6.27	6.00	25.93	11.59	18.35	14.90
LSD	3	3	20	3	57.32	1.62	7472	591

It is evident from the above Table-34 that YSH-132 gave significantly higher yields (3486 kg/ha) followed by YSH-139 (3032 kg/ha) in comparison to check Lasani© which was 1912 kg/ha at MMRI while YSH-137, YH-151 were also at par. Maximum stalk yield of 33662 kg/ha was produced by YSH-132 followed by YSH-138 (31795 kg/ha), YSH-131 (30826 kg/ha) and Fakhar e Punjab (28333 kg/ha). Plant height ranged from 169 to 219 cm and days to 50% anthesis from 66 to 77.

ii. Sorghum Hybrid Yield Trial 2, Kharif 2019.

Ten (10) (CMS x R) hybrids were tested including one check Lasani (Private company hybrid). The trial was laid out according to RCB design with two replications having plot size of 5m x 1.5m. Data regarding grain yield and other important plant characteristics were recorded and presented in below table.

Table-35: Results of Sorghum Hybrid Yield Trial 2.

Hybrid	Stand Count	Days to Heading	Plant Height (cm)	Head length (cm)	FLA (cm ²)	Inter-nodal L	Grain Yield	Stalk Weight
YSH-171	24	63	186	32	114.75	7.00	4419	26250
YSH-170	23	74	240	37	196.88	6.50	3224	21250

YSH-166	24	62	185	34	152.81	8.50	2436	23750
YSH-167	25	61	194	30	157.13	8.00	2291	20000
YSH-146	24	72	194	31	90.75	6.00	1905	15000
Lasani ©	26	74	227	32	135.38	9.50	1598	23750
YSH-165	25	63	202	34	175.50	7.00	1485	24375
YSH-135	25	68	231	33	112.50	8.00	1450	21250
YS-16©	25	77	242	24	123.00	9.00	1345	21250
YSH-169	24	78	222	26	141.75	8.00	135	18750
CV	7.91	3.83	5.48	7.59	24.02	16.91	15.09	11.34
LSD	4	6	26	5	76.10	2.96	692	5532

It is evident from the above Table 35 that YSH-171 gave significantly higher yields (4419 kg/ha) followed by YSH-170 (3224 kg/ha) in comparison to check Lasani which yielded 1598 kg/ha. Maximum stalk yield of 26250 kg/ha was produced by YSH-171 followed by YSH-165 (24375 kg/ha) and YSH-166 (23750 kg/ha). Plant height ranged from 185 to 242 cm and days to 50% anthesis from 61 to 78.

iii. Sorghum Hybrid Yield Trial 3, Kharif 2019.

Ten (10) (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 two replications having plot size of 5m x 1.5m. Data regarding grain yield and other important plant characteristics were recorded and presented in below table.

Table-36: Results of Sorghum Hybrid Yield Trial 3.

Hybrid	Stand Count	Days to Head-ing	Plant Height (cm)	Head length	FLA	Inter-nodal Length	Stalk Weight	Grain Yield
YSH-173	6	77	284	33	111.38	8.00	42500	3573
YSH-143	9	70	170	28	134.25	7.00	20000	2780
YSH-172	7	76	236	29	150.75	6.50	22500	1950
YSH-140	7	66	178	36	171.00	7.50	22500	1253
Lasani ©	13	76	226	29	117.38	8.50	26250	1219
YSH-136	10	77	183	26	93.38	6.50	22500	370
CV	23.41	0.86	15.01	6.61	29.55	23.35	17.40	14.93
LSD	5	2	82	5	98.51	4.40	11645	713

It is evident from the above Table 36 that YSH-173 gave higher yield (3573 kg/ha) followed by YSH-143 (2780 kg/ha). Maximum stalk yield of 42500 kg/ha was produced by YSH-173. Plant height ranged from 170 to 284 cm and days to 50% anthesis from 66 to 77.

iv. Sorghum Varietal Yield Trial I, Kharif 2019.

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 in below table.

Table 37: Results of Sorghum Varietal Yield Trial I.

Variety	Stand Count	Days to Heading	Plant Height	Head length	Brix	FLA	Inter-nodal Length	Stalk Weight	Grain Yield
YSS-17	19	75	289	30	11.90	135.75	9.33	27521	3509
YSS-31	18	74	260	24	12.77	183.00	10.33	31740	2977
YSS-42	20	76	225	27	10.77	78.00	8.00	28250	2824
YSS-25	19	73	274	26	17.50	121.75	12.67	34375	2748
YS-16©	19	72	232	20	9.47	128.25	10.67	29085	2667
YSS-23	18	77	238	25	7.30	145.00	13.00	32964	2583
YSS-18	19	72	245	22	15.83	112.50	7.33	29333	2463
YSS-10	20	75	216	28	12.07	108.00	8.33	29000	2311
YSS-38	20	74	207	29	12.97	114.00	11.00	21820	2241
YSS-41	19	72	259	23	11.97	110.00	9.33	25259	2179
CV	4.64	1.82	20.6	10.33	11.25	35.10	18.39	16.87	16.03
LSD	2	2	86	5	2.43	74.43	3.15	8375	729

Statistical analysis of the data given in Table 37 revealed that the Entry YSS-17 gave significantly higher yields (3509 kg/ha) along with YSS-31 (2977 kg/ha) and YSS-42 (2824 kg/ha) at MMRI in comparison to check YS-16, 2667 kg/ha. All the varieties were statistically at par except check YS-38 and YSS-41. Maximum stalk yield of 34375 kg/ha was produced by YSS-25 followed by YSS-23 (32964 kg/ha). Plant height ranged from 207 cm to 289 cm and days to 50% anthesis from 72 to 77.

v. Sorghum Varietal Yield Trial II, Kharif 2019.

Eight varieties (selected from F₆ in Kharif 2018) 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 in below table.

Table 38: Results of Sorghum Varietal Yield Trial II.

Variety	Stand Count	Days to Heading	Plant Height	Head length (cm)	Brix (%)	FLA (cm ²)	Inter-nodal Length (cm)	Stalk Weight (kg/ha)	Grain Yield (kg/ha)
YSS-48	19	74	295	28	8.60	97.00	13.33	34583	3255
YSS-98©	19	74	177	28	9.33	126.25	8.67	28333	2640
YSS-16©	19	77	261	23	14.63	99.25	11.33	23750	2266
YSS-43	20	75	274	28	10.17	188.25	10.00	27000	2072
YSS-50	20	74	320	28	9.50	86.00	10.00	37917	1678
YSS-49	18	75	193	26	10.57	119.00	8.33	21250	1666
YSS-45	20	76	177	29	10.53	80.25	8.67	28750	1462
YSS-44	20	78	224	27	12.47	121.50	11.33	21667	1203
YSS-46	19	78	209	29	17.63	178.50	12.00	23750	1165

YSS-47	19	75	325	26	17.67	106.75	13.67	19583	868
CV	3.41	1.5	11.23	5.91	4.69	36.8	22.78	17.83	15.94
LSD	1	2	47	3	0.98	75.93	4.19	8151	500

Statistical analysis of the data given in Table 38 revealed that the Entry YSS-48 gave significantly higher yields (3255 kg/ha) along followed by check YSS-98 (2461 kg/ha) and YSS-16 (2266 kg/ha). Maximum stalk yield of 37917 kg/ha was produced by YSS-50. Plant height ranged from 177 cm to 325 cm and days to 50% anthesis from 74 to 78.

vi. National Uniform Yield Trial Kharif 2019

Six 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 below table.

Table 39: National Uniform Yield Trial.

Sr. No.	Entry	Grain Yield (kg/ha)
1	YSH-134	3152
2	YSS-42	2977
3	YSH-132	2922
4	YSH-95©	2858
5	GS-66	2735
6	SG-87	1812
Source: PARC, Islamabad		

The results presented in Table 39 reveal that YSH-134 gave highest yield (3152 kg/ha) followed by YSS-42 (2977 kg/ha) and YSH-132 (2922 kg/ha).

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

KHARIF 2019:

BREEDING:

1. Maintenance of Gene Pool

Sixteen (16) gene pool lines were planted on 08-08-2019. Each entry was sown in two row strips 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 19-11-2019, sundried, threshed and seed was stored for future use.

2. Maintenance of Cytoplasmic Male Sterile Lines

Nine (9) cytoplasmic male sterile (A) lines and twenty-five (25) cytoplasmic male fertile (B) lines were planted on 08-8-2019 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 19-01-2020, sundried and threshed. Reasonable seed was collected, which was stored.

3. Maintenance of Fertility Restorer Lines

Twenty-five (25) fertility restorer lines were planted on 08-8-2019 in 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 the 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 19-11-2019, sundried and threshed. Reasonable seed was collected, which was stored.

4. Derivation of Fertility Restorer Lines

Five S₄, three S₅ and twenty-one S₆ Fertility Restorer Derivative lines were sown in two row strips of 4-meter length for derivation on 08-08-2019. 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 the 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 harvested separately on 19-11-2019, sundried and threshed. Reasonable seed was procured and stored for future use.

1.5 Constitution of Pearl Millet Hybrids.

During kharif 2019, thirty-six (36) new crosses were made by hand pollination with in germplasm line. Crossed heads from female parents were harvested separately. The harvested heads were sundried, threshed clean and packed after cleaning for planting in next season.

EVALUATION:

1. Pearl Millet Varietal Yield Trial, Kharif-2019

The trial was comprised of twelve (12) varieties including two check varieties (YBS-98) and (86M88) sown in Randomized Complete Block Design with three replications on 08-08-2019. Plot size was kept 1.5m x 5m. Row to row and plant to plant distances were kept 75 cm and 20 cm respectively. Trial was harvested on 22-11-2019 Data were recorded for grain yield and various other agronomic traits some of which are presented in the following table: -

Table 40: Results of Pearl Millet Varietal Yield Trial

Sr. No.	Verities	Grain Yield kg/ha	Stalk Yield Tons/ha	Plant Height	Days to 50%	Head Wt. kg/plot	Stand Count/plot
01	YBH-278	5158	45239	226	59	2.56	26
02	86M88	4730	46033	225	55	3.04	23
03	YBS-98	3928	39683	265	54	2.04	22
04	14RBS-01	3492	40477	276	54	2.15	26
05	YBS-95	3421	46033	268	58	1.96	24
06	YBS-83	3309	41271	280	57	2.22	25
07	YBS-89	2984	43652	265	58	1.70	23
08	14RBS-02	2809	31747	275	53	1.58	24
09	YBS-94	2619	46033	285	55	1.57	25
10	YBS-93	2555	48414	260	55	1.59	26
11	YBS-92	2452	36509	286	52	1.49	21
12	14RBS-05	2373	30953	276	51	1.39	21
CV%		16.75	5.55	1.71	1.87	13.65	7.35
Cd1		1650	6814	13.49	3.07	0.788	5.28

The results presented in Table 40 reveal that YBH-278 produced maximum grain yield of 5158 kg/ha followed by 86M88(check) and YBS98 (Check) with grain yield of 4730 and 3928 kg/ha respectively. Whereas 14RBS-05 remained at the bottom with grain yield of 2373 kg/ha.

2. Adaptability/National Uniform Pearl Millet Hybrid Yield Trial Kharif-2019

The trial comprising of twenty-eight (28) entries was received from the National Coordinator of MSM, NARC, Islamabad, sown on 08-08-2019 in Randomized Complete Block Design with three replications keeping plot size of 5m x 3 m. The row to row and plant to plant distances were 75 cm and 20 cm respectively. The trial was harvested on 25-11-2019 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

Table 41: Results of Adaptability/National Uniform Pearl Millet Hybrid Yield Trial

Sr. No.	Entries	Grain Yield (kg/ha)	Stalk Yield (kg/ha)	Plant Height (cm)	Days to 50%	Head Wt. (gm)	Stand Count
1	YBH-278	5666	45239	232	60	3.12	25
2	86M88 (check)	5178	33334	235	55	2.97	28
3	YBH-302	4643	38096	245	45	2.97	27
4	YBH-277	4560	34525	232	55	2.72	21
5	YBH-294	4441	27382	247	51	1.58	24
6	YBH-292	4298	32144	232	54	2.50	28
7	YBH-283	4059	38096	287	48	2.62	25
8	YBH-289	3940	33334	227	51	2.47	23
9	YBH-285	3929	28572	270	50	2.43	24
10	YBH-301	3845	39287	257	52	2.66	26
11	YBH-307	3845	32144	205	49	2.51	29
12	YBH-306	3691	44049	222	54	2.52	26
13	YBH-284	3536	22620	242	50	2.19	24
14	YBH-286	3512	33334	257	51	2.85	25
15	YBH-279	3440	32144	227	49	2.28	26
16	YBH-280	3428	40477	267	51	2.01	22
17	YBH-293	3393	32144	267	49	2.09	22
18	YBH-295	3369	34525	232	51	2.30	23
19	YBH-288	3214	23810	232	51	1.92	23
20	YBH-305	3167	42858	217	55	2.01	24
21	YBH-282	3047	36906	230	47	2.15	28
22	YBH-304	2976	29763	202	51	1.85	29
23	YBH-276	2869	17858	182	50	1.63	19
24	YBH-281	2666	28572	232	46	2.07	25
25	YBH-287	2464	25001	232	51	1.64	19
26	YBH-303	2440	34525	245	49	1.63	27
27	YBH-291	2274	30953	232	49	1.68	26
28	YBH-290	2261	26191	217	52	1.53	19
CV%		7.35	6.15	1.85	1.17	9.81	4.54
Cd1		1082	8301	18.04	2.47	0.908	4.62

The results presented in Table 41 indicate that YBH-278 gave maximum grain yield of 5666 kg/ha followed by 86M88 (5178 kg/ha).

3. National Uniform Pearl Millet Yield Trial Kharif-2019

Table 42: Results of Adaptability/National Uniform Pearl Millet Grain Yield Trial

Sr. No.	Entries	Grain Yield (kg/ha)	Stalk Yield (kg/ha)	Plant Height (cm)	Days to 50%	Head Wt. (gm)	Stand Count
1	KQS-HM-03	6222	34128	220	51	3.42	30
2	SM-01	6055	34128	230	55	3.50	28
3	HS-888	5912	34128	248	54	3.27	29
4	86M38	5849	30159	241	48	3.34	27
5	Fareed-01	5595	33214	231	50	3.07	31
6	HP-233	5452	33334	226	49	3.31	31
7	86M20	5389	24604	226	50	2.86	29
8	AA-7868	5325	26985	206	48	2.83	27
9	Shahansha	5246	34128	235	50	2.93	27
10	SHAHANSHA	5246	36509	228	49	3.17	28
11	SD-55S90	5214	30953	220	56	2.95	30
12	YBS-98	5206	34128	260	50	2.90	24
13	MP-24	5135	31747	236	49	2.79	31
14	SD-55S20	5023	34128	235	52	2.75	27
15	YBS-278	4913	34921	236	54	2.92	27
16	SD-55S95	4897	34128	230	55	3.17	27
17	YBS-89	4563	34921	285	51	2.57	29
18	14RBS-01	4031	31747	248	50	2.19	27
19	Herculeus	3920	29366	223	50	2.21	28
20	14RBS-02	3801	32540	251	49	2.22	30
21	PARI-7 Comp	3143	26191	285	47	1.79	29
22	14RBS-05	3087	27778	266	46	1.70	27
CV%		12.24	12.95	4.83	2.63	14.62	8.77
Cd1		1900	12957	36.22	4.19	1.28	7.85

The results presented in Table 42 indicate that KQS-Hm-03 revealed maximum grain yield of 6222 kg/ha followed by SM-01 (6055 kg/ha), whereas 14RBS-05 performed poorly in the trial with merely 3087kg/ha yield.

SPRING 2020

1. Seed Multiplication of CMS-A Line Along Its Counter Part B Line

CMS- 72-A line along with its counterpart B line which were sown during the month of January to February in four blocks with different sowing dates to evaluate the developmental behavior of these lines during spring season/winter as well as for seed increase purpose. Pre-cautionary measures were adopted to save the crop from birds at grain filling stage. Seed setting remained poor in January sowing blocks and not exceeded 30% whereas last block with late February sowing date showed good seed setting (85%) due to the relatively cool temperature due to rains and cloudy environment. Harvesting of all four blocks was completed. Heads were threshed and stored.

Table 43: Seed Increase in All Micro Seed Increase Plots

S.no	Name of line/ entry	Yield (kg)
1	CMS-line 72 A	40
2	B Line (counterpart)	58
	Total	98

2. OPV Seed Production

Pear millet approved variety YBS-98 was sown during the spring season, crop was harvested and threshed. Seed setting remained about 40 percent (40%) due to high temperature at the time of seed setting and about 560 kg seed was obtained from this seed multiplication plot.

3. Hybrid Seed Production (micro plot experimental production)

An experiment for hybrid seed production (YBH-278) in micro plot was conducted to access the anthesis of male and female lines during the spring season. Sowing of Male line was done on 13-02-20 and female line was sown on 16-03-20. About 3.0 kg seed was produced from the micro seed production block comprised of only three ridges with female lines. Poor synchronization was observed during the winter season among lines and difference in anthesis was noted for next winter season to achieve better synchronization.

AGRONOMY:

KHARIF 2019:

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

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 2019. Layout plan was RCBD with three replications on 4 m × 3.15 m plots. 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 44: 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")	45.6	48.7	209	75 b	84524 a	10573 ab
20.0 (8")	45.3	48.0	218	83 a	86508 a	11163 a
22.5 (9")	45.3	47.7	221	84 a	76587 b	9936 bc
25.0 (10")	45.7	47.7	220	85 a	75397 b	9506 bc
27.5 (11")	46.0	47.7	213	84 a	76587 b	9282 c
LSD(5%)	ns	ns	ns	2.9	5265	1006

The results presented in Table 44 explain that the days to 50% tasseling and silking and plant height remained unaffected of the treatments. However cob height was statistically affected by the treatments. Cobs were at lower point on plants at 17.5 cm plant spacing while cobs appeared on higher nodes in 25 cm plant spacing that was statistically not different from other treatments. Maximum number of cobs/ha were recorded by 20 cm and 17.5 cm plant spacing while lowest was achieved by 25 cm plant spacing. Greatest grain yield was recorded at 20 cm spacing which was not different from 17.5 cm spacing. While, the lowest grain yield was recorded at 27.5 cm plant spacing. Therefore on bed sowing plant spacing of 17.5-20 cm yield higher yield in kharif season.

2. 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 kharif 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 following table.

Table-45: Impact of Different Plant Spacing on Hybrid Maize

Treatment (cm)	Days to 50% tasseling	Days to 50% silking	Plant height (cm)	Cob height (cm)	No. of cobs/ha	Grain yield (kg /ha)
12.5	47.0	49.7	215 b	99 c	56009 ab	8202 b
15	47.7	50.3	226 a	105 ab	60884 a	9292 a
17.5	47.0	50.3	227 a	106 a	54362 bc	7709 b
20	47.7	50.7	228 a	105 ab	49969 cd	7232 bc
22.5	48.0	51.3	224 a	102 b	48322 d	6590 c
LSD(5%)	ns	ns	6.6	3.58	4422	1008

Results depicted in table 45 suggest that days to 50% tasseling and silking remained unaffected of treatments. Shortest plants were observed in 12.5 cm plant spacing while tallest maize plants were observed at 20 cm plant spacing. Similarly at 12.5 cm spacing cobs appeared at lower plant nodes than other treatments. While, cobs were at the highest nodes at 17.5 cm plant spacing. Greatest number of cobs/ha were recorded at 15 cm spacing while minimum was recorded at 22.5 cm plant spacing. The greatest grain yield of 9202 kg/ha was recorded at 15 cm plant spacing followed by at 12.5 cm with grain yield of 8202. While, lowest grain yield was recorded at 22.5 cm plant spacing with grain yield of 6590 kg/ha.

3. Determination of the Irrigation Water Requirement of Hybrid Maize

Trial was conducted during kharif 2019 with 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 35000 acre⁻¹ was maintained. Total precipitation during the growth period recorded was 96.4.

Table 46: Yield and Water Requirement of Maize under Different Planting Methods.

Treatment	Days to 50% tasseling	Days to 50% silking	Plant height (cm)	Cob height (cm)	No. of cobs/ha	Grain yield (kg /ha)	Water applied (mm)
75cm Ridge	51.00	53.33	231.00	109.67	60185 b	8331 a	320
90 cm beds	49.33	52.00	226.67	104.00	75386 a	8248.7 a	292.1
105cm beds	50.33	52.67	238.33	109.13	72553a	8557.7 a	264.2
120cm beds	50.33	52.67	234.0	107.33	60163 b	6949.0 b	244.3
LSD(5%)	NS	0.9418	NS	NS	11914	352.58	

Results depicted in table 46 suggest that effect of treatments on days to 50% tasseling was non-significant while days to 50% silking were significant. Plant on 90 cm wide beds reached to silking earliest with 52 days. However plant on ridge took 53.33 days to reach the silking. Plant height and number of cobs/ha remained unaffected of the treatments. Grain yield remained highest (8558 kg/ha) at 105 cm wide beds though statistically no different from 90 cm wide beds (8331 kg/ha) and 75 cm apart ridges (8248 kg/ha). Minimum irrigation water (244.3 mm) was applied to 120 wide beds followed by 105 mm wide beds with 264.2 mm water. Maximum amount of water was applied to 75 cm wide furrows.

SPRING 2019:

1. To Determine the Irrigation Water Requirement of Hybrid Maize

Experiment was conducted to find out the water requirement of hybrid maize from sowing to maturity under local climatic conditions. Maize hybrid YH-1898 was sown in four 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. Uniform plant population of 33000 acre⁻¹ was maintained across the treatments. Cut throat flume was installed to gauge the applied water. Total ten irrigations were applied. Total effective precipitation during the growth period recorded was 145 mm. length of each plot was 25 m. width of plots was based on structures. Each plot comprise of 12 bed structures while T₄ consist of 15 ridges.

Table 47: Yield and Water Requirement of Hybrid Maize under Different Planting Methods.

Planting Method	No. of Ears ha ⁻¹	Fresh Cob Weight (kg ha ⁻¹)	Grain Yield (kg ha ⁻¹)	Water Applied (mm)	Effective Rainfall (mm)	WUE (kg/ha/mm)
75 cm (Ridge)	70222 c	12971 b	9923 b	620	145	13
90 cm (Bed)	73432 b	13023 b	10522 a	617	145	13.8
105cm (Bed)	101336 a	13595 a	10319 ab	431	145	17.9
120 cm (Bed)	66815 d	10856 c	8316 c	567	145	11.7
LSD (5%)	2080.9	551.56	441.07			

Results of the experiment are depicted in above Table 47. Number of ears ha⁻¹ varied (P<0.05) in response to sowing method. Maximum number of ears (101336 ears ha⁻¹) was recorded at 105cm wide beds while 75 cm ridges recorded lowest number of ears. Fresh and grain yield was maximum at 105 cm wide beds while lowest fresh and grain yield was recorded by 120 cm wide beds though grain yield produced by 90 cm wide beds was not statistically different. Minimum water was utilized by 105 cm wide beds while maximum water was applied to the 75 cm wide ridges (620 cm) and 90 cm wide beds (917). Greatest water use efficiency was calculated by 105 cm wide beds while 120 cm wide beds recorded lowest

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

The objective of this trial was to determine the appropriate plant population for hybrid maize on bed sowing. Maize hybrid YH-5427 was sown on 105 cm (3.5 feet) wide beds during spring 2020. 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, analysed and tabulated for grain yield along with other agronomic traits which are presented in Table 48.

Table 48: Impact of Different Plant Spacing on Yield of Maize Hybrid in Bed Sowing.

Treatment (cm)	Stand count ha ⁻¹	Days to 50% Silk-ing	Plant height (cm)	Cob height (cm)	Cobs ha ⁻¹	Fresh cob wt (kg ha ⁻¹)	Grain Yield (kg ha ⁻¹)
17.5 (7")	95238 a	55.3 b	222 c	102 c	94180 a	13000 b	10462 b
20.0 (8")	87831 b	55.3 b	223 c	105 c	86508 b	14802 a	12195 a

22.5 (9")	76984 c	56 ab	227 b	109 bc	83069 b	1404 8 a	11397 a
25.0 (10")	70635 d	56 ab	234 a	114 ab	73810 c	12480 b	10395 b
27.5 (11")	63757 e	57 a	235 a	117 a	68519 c	12500 b	10126 b
LSD(5%)	5015.8	1.4	4.0	7.5822	6328.1	952.93	823.03

Results depicted in above Table 48 suggest that stand count was highest at 17.5 cm plant spacing and gradually decreased as plant spacing increased. Generally days to 50% silking increased as plant spacing increased and maximum number of days (57 days) was taken by plants in 27.5 spacing to reach at 50% flowering. As the plant spacing increased, plant height and cob position on plant also increased. Maximum number of cobs ha⁻¹ was obtained at 17.5 cm plant spacing and number of cobs decreased as plant spacing decreased. Fresh cob weight and grain yield was highest (14802 kg ha⁻¹ and 12195 kg ha⁻¹) at 20 cm plant spacing though statistically not different from that produced at 22.5 cm plant spacing. However minimum fresh and grain yield was recorded at 27.5 cm plant spacing.

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

Objective of this field trial was to find out the suitable plant spacing for higher grain yield of maize hybrid in ridge sowing. Maize hybrid YH-5395 was planted on one side of the 75 cm apart ridge. Treatments comprised of 12.5 cm, 15 cm, 17.5 cm, 20 cm and 22.5 cm plant spacing. Treatments were laid out in RCB design with three replications. Data were recorded and tabulated for grain yield along with other agronomic traits and analyzed, which are presented below.

Table 49: Impact of Different Plant Spacing on Hybrid Maize

Treat-ment (cm)	Days to 50% Tas-seling	Days to 50% Silking	Plant height (cm)	Ear Height (cm)	No. of ears ha ⁻¹	Fresh cob weight (kg ha ⁻¹)	Grain yield (kg ha ⁻¹)
12.5	51.3 c	53.3 c	223 b	103	92222 a	11933 ab	9426 a
15	52.0 bc	54.0 bc	230 b	104	74444 b	12039 a	9389 a
17.5	52.0 bc	54.0 bc	230 a	104	64444 c	11378 bc	9215 a
20	52.6 b	54.6 b	232 a	110	57778 c	11156 c	8727 b
22.5	53.6 a	55.7 a	234 a	109	49444 d	10444 d	8264 b
LSD _{0.05}	0.9	0.91	6.78	ns	7887	568.19	469

Results suggest that days to 50% tasseling responded significantly to the treatments. Plants took more number of days to 50% tasseling and silking as spacing among them increased from 12.5 to 22.5 cm. Plant height also increased with increasing plant spacing. Tallest plants with 234 cm height were recorded at 22.5 cm spacing. While ear height remained non-significant. Maximum number of cobs ha⁻¹ (92222) was recorded at 12.5 cm plant spacing that decreased as plant spacing increased upto 22.5 cm. Maximum fresh ear weight (kg ha⁻¹) was recorded at 15 cm plant spacing while maximum grain yield (9489 kg ha⁻¹) was recorded at 12.5 cm plant spacing though statistically not different from the yield recorded at 15cm and 17.5 cm plant

PLANT PATHOLOGY:

KHARIF 2019:

1-Testing of Stalk Rot Intensity (*Fusarium Moniliforme*) in Maize Hybrids by Artificial Inoculation during Kharif-2019.

The experiment comprised of ten maize hybrids i.e. YH-5390, YH-5417, YH-5521, YH-5533, YH-5535, YH-5545, YH-5554, YH-5556, YH-5559 and YH-5593. The experiment was conducted according to RCBD in two replications. Plot size was kept 4×1.5m. It was sown on 22-08-2019. At silking stage, 5 plants per plot were inoculated with self-prepared tooth picks with fungus, *Fusarium moniliforme*. After one month of inoculation, each inoculated plant was torn apart by a scalpel and disease reaction was recorded with the help of Hooker's disease rating scale. The data were recorded and are presented in the following table.

Table 50: Results of Stalk Rot Intensity in Maize Hybrids by Artificial Inoculation.

Names of maize hybrid	Infection %age of inoculated inter-node	Hooker's disease rating scale	Reaction
---	1-25	1	Highly Resistant
YH-5559	26-50	2	Resistant
YH-5390, YH-5417, YH-5535, YH-5554, YH-5556, YH-5593	51-75	3	Moderately Resistant
YH-5521, YH-5533, YH-5545	76-100	4	Moderately Susceptible

The data revealed that maize hybrid YH-5559 is found resistant against stalk rot of maize, maize hybrids YH-5390, YH-5417, YH-5535, YH-5554, YH-5556 and YH-5593 are found moderately resistant against stalk rot while maize hybrids YH-5521, YH-5533 and YH-5545 are found moderately susceptible against stalk rot of maize.

Conclusion: Maize hybrid YH-5559 is resistant against stalk rot.

2-Testing of Different Fungicides against Stalk Rot of Maize by Treating the Soil at their Recommended Doses during Kharif-2019 on Hybrid=Yh-5555.

The experiment comprised of five treatments i.e. Topsin-M 70WP, Alitte 80WP, Score 250SC, Emesto 24FS and Control. It was conducted according to RCBD with plot size 4×2.25m in four replications. It was sown on 22-08-2019. The data regarding plant stand count, plants harvested, stalk rot infection % age and grain yield were recorded which are presented in below table.

Table 51: Results of different fungicides against stalk rot.

S.No.	Treatments	Plant stand	Plants harvested	Stalk Rot Infection %age	Stalk Rot Infection Reduction %age	Grain Yield (kg/ha)
1	Topsin-M 70 WP	57	56	0	100	8256
2	Emesto 24FS	58	56	0.47	94.24	8075
3	Alitte 80WP	57	55	0.43	92.27	7603

4	Score 250SC	58	54	0.92	83.30	7373
5	Control	57	52	6.32	0	7023
	CV %age	3.42	3.49	58.99	16.51	7.25
	LSD@5%	3.02	2.91	1.48	18.82	856

The data revealed that Topsin-M 70WP gave the best control against stalk rot of maize showing minimum stalk rot infection %age (0 %) and stalk rot infection reduction %age (100 %) with grain yield 8256 kg/ha followed by Alitte 80WP showing stalk rot infection %age (0.43%) and stalk rot infection reduction %age (92.27%) with grain yield 7603 kg/ha.

Conclusion: Topsin M 70WP can be used to control the stalk rot.

3-Screening of Different Maize Germ Plasm against Stalk Rot (*Fusarium Moniliforme* during Kharif-2019.

The maize germ plasm planted within the institute during Kharif-2019 were artificially inoculated at silking stage with stalk rot pathogen with the help of infected tooth picks method at second internodes of plants from soil level. After one month of inoculation, disease intensity was recorded with the help of hooker's disease rating scale (1-10).

Following number of 636 plots of different maize germplasms were screened out against stalk rot. The data is presented in the table given below.

Table 53: Screening of Different Germplasm against Stalk Rot during Kharif-2019.

Reac- tion/Scale	NUMYT SET(1)	NUMYT SET(2)	PYT-3	PYT-4	PYT-5	EIB LINES	PEIB LINES	DR
No of plots	140	64	28	28	26	176	18	156
Highly Resistant	00	00	00	00	00	00	00	00
Resistant	03	08	01	00	00	00	00	00
Moder- ately Re- sistant	51	34	13	17	09	09	00	04
Moder- ately sus- ceptible	82	22	14	11	17	142	18	149
Suscepti- ble	3	00	00	00	00	18	00	03
Highly Suscepti- ble	1	00	00	00	00	07	00	00

The data regarding maize germplasms were screened out against stalk rot are presented in the Table 53 above which indicates that in NUMYT SET-1, total 140 hybrids were screened out against stalk rot. The data revealed that there was no highly resistant hybrid, 03 were found resistant, 51 hybrids were found moderately resistant, 82 hybrids were found moderately susceptible and 01 hybrid was found highly susceptible.

In NUMYT SET-2, 64 hybrids were screened out against stalk rot. The data revealed that there was no highly resistant hybrid, 08 were found resistant, 34 hybrids were found moderately resistant, 22 hybrids were found moderately susceptible, no hybrid was found susceptible and no hybrid was found highly susceptible.

In PYT-3, total 28 hybrids were screened out against stalk rot. The data revealed that there was no highly resistant hybrid, 01 hybrid was found resistant, 13 hybrids were found moderately resistant and 14 hybrids were found moderately susceptible, no hybrid was found susceptible and no hybrid was found highly susceptible.

While set PYT-4, total 28 hybrids were screened out against stalk rot. The data revealed that there was no highly resistant hybrid, no hybrid was found resistant, 17 hybrids were found moderately resistant and 11 hybrids were found moderately susceptible, no hybrid was found susceptible and no hybrid was found highly susceptible.

In set PYT-5, total 26 hybrids were screened out against stalk rot. The data revealed that there was no highly resistant hybrid, no hybrid was found resistant, 09 hybrids were found moderately resistant and 17 hybrids were found moderately susceptible, no hybrid was found susceptible and no hybrid was found highly susceptible.

In Elite inbred lines (EIB) total 176 lines were screened out against stalk rot, The data revealed that there was no highly resistant line, no line was found resistant, 09 lines were found moderately resistant, 142 lines were found moderately susceptible, 18 lines were found susceptible and 07 lines were found highly susceptible.

In Pre-inbred lines (PEIB) total 18 lines were screened out against stalk rot. The data revealed that there was no highly resistant line, no line was found resistant, no line was found moderately resistant, 18 lines were found moderately susceptible, no line was found susceptible and no line was found highly susceptible.

In Derivation trials, total 156 derivative families were screened out against stalk rot. The data revealed that there was no highly derivative family, no derivative family was found resistant, 04 derivative families were found moderately resistant, 149 derivative families were found moderately susceptible, 03 derivative families were found susceptible and no derivative family was found highly susceptible

SPRING 2019:

1- Testing of Stalk Rot Intensity (*Fusarium Moniliforme*) in Maize Hybrids by Artificial Inoculation (Spring-2020).

The experiment comprised of ten maize hybrids i.e. YH-5748, YH-5683-2, YH-56332-1, YH-5632-3, YH-5685-2, YH-5762, YH-5775, YH-5777, YH-5788 and YH-5789. The experiment was conducted according to RCBD in two replications. Plot size was kept 4m×1.5m. It was sown on 18-02-2020. At silking stage, 5 plants per plot were inoculated with self-prepared tooth picks with fungus, *Fusarium moniliforme*. After one month of inoculation, each inoculated plant was torn apart by a scalpel and disease reaction was recorded with the help of Hooker's disease rating scale. The data were recorded and are presented in the following table.

Table 54: Results of Stalk Rot Intensity in Maize Hybrids by Artificial Inoculation.

Names of maize hybrid	Infection %age of inoculated inter-node	Hooker's disease rating scale	Reaction
---	1-25	1	Highly Resistant
---	26-50	2	Resistant
---	51-75	3	Moderately Resistant
YH-5748, YH-5683-2, YH-5632-1, YH-5632-3, YH-5685-2, YH-5762, YH-	76-100	4	Moderately Susceptible

5775, YH-5777, YH-5788, YH-5789			
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The data revealed that maize hybrids YH-5748, YH-5683-2, YH-5632-1, YH-5632-3, YH-5685-2, YH-5762, YH-5775, YH-5777, YH-5788 and YH-5789 are found moderately susceptible against stalk rot of maize.

Conclusion: Among tested hybrids, no maize hybrid was found resistant against stalk rot.

2- Testing of Different Fungicides against Stalk Rot of Maize by Treating the Soil at Their Recommended Doses on (Hybrid=YH-5535).

The experiment comprised of five treatments i.e. Topsin-M 70WP, Alitte 80WP, Score 250SC, Emesto 24FS and Control. It was conducted according to RCBD with plot size 4m × 2.25m in four replications. It was sown on 18-02-2020. Data regarding plant stand count, plants harvested, stalk rot infection % age and grain yield were recorded which are presented in table below.

Table 55: Results of Different Fungicides against Stalk Rot.

Sr.#	Treatments	Plant stand	Plants harvested	Stalk Rot Infection %age	Stalk Rot Infection Reduction %age	Grain Yield (kg/ha)
1	Alitte 80WP	51	49	4.13	64.60	9166
2	Score 250SC	57	55	5.41	54.41	8911
3	Emesto 24FS	55	51	5.96	48.09	8555
4	Topsin-M 70WP	54	51	6.86	42.17	8211
5	Control	51	49	11.80	0	7899
	CV %age	11.61	10.90	22.78	27.98	6.69
	LSD@5%	9.67	8.54	2.39	18.04	881

The data revealed that Alitte 80WP showed the best control against stalk rot of maize expressing minimum stalk rot infection %age (4.13 %) and stalk rot infection reduction %age (64.60 %) with grain yield 9166 kg/ha followed by Score 250SC expressing stalk rot infection %age (5.41 %) and stalk rot infection reduction %age (54.41 %) with grain yield 8911 kg/ha.

3- Screening of Different Maize Germplasm against Stalk rot (*Pusarium moniliforme*) during Spring-2020.

The maize germ plasm and different hybrids planted within the institute during Spring-2020 were artificially inoculated at silking stage with stalk rot pathogen with the help of infected tooth picks method at second internodes from soil level of plants. After one month of inoculation, disease intensity was recorded with the help of hooker's disease rating scale (1-10).

Following number of 526 plots of different maize hybrids and germplasms were screened out against stalk rot. The data is presented in the table below.

Table 56: Screening of Different Germplasm and Hybrids against Stalk Rot

Reaction/Scale	PYT-1	PYT-2	PYT-3	PYT-4	MPMYT-1	MPMYT-2	EIB LINES	PEIB LINES	DR
No of plots	26	26	13	36	48	48	160	15	154
Highly Resistant	00	00	00	00	00	00	00	00	00
Resistant	00	00	00	00	02	00	03	00	01
Moderately Resistant	00	00	00	05	02	00	18	02	05
Moderately susceptible	16	07	09	25	36	28	137	13	145
Susceptible	07	13	04	06	07	17	02	00	02
Highly Susceptible	03	06	00	00	01	03	00	00	01

The data regarding different maize hybrids and maize germplasms were screened out against stalk rot are presented in the table 3.1 which indicate that in PYT-1,PYT-2,PYT-3,PYT-4,MPMYT-1,MPMYT-2, total 197 hybrids were screened out against stalk rot. The data revealed that no hybrid was found highly resistant, 02 hybrids were found resistant, 07 hybrids were found moderately resistant, 121 hybrids were found moderately susceptible, 54 hybrids were found susceptible and 13 hybrids were found highly susceptible.

In elite inbred lines, no line was found highly resistant, 03 lines were found resistant,18 lines were found moderately resistant,137 lines were found moderately susceptible,02 lines were found susceptible and no line was found highly susceptible.

In pre-elite inbred lines, no line was found highly resistant, no line was found resistant, 02 lines were found moderately resistant, 13 lines were found moderately susceptible, no line was found susceptible and no line was found highly susceptible.

In derivations, no family was found highly resistant, 01 family was found resistant,05 families were found moderately resistan,145 families were found moderately susceptible,02 families were found susceptible and 01 family was found highly susceptible.

ENTOMOLOGY

KHARIF 2019

1- Testing of Different Sprayable Insecticides against Army worm and Cob worm during Kharif-2019 on Hybrid=5427.

The experiment comprised of five treatments i.e. Marshall 5EC, Match 40EC, Talstar 10EC, Coragen 20SC and Control. It was conducted according to RCBD with plot size 4×2.25m & four replications. It was sown on 19-08-2019. Data regarding plant stand count, army worm infestation %age pre-treatment (before spray), army worm infestation %age 72 hours after of treatment (after spray) and army worm infestation %age 7 days after treatment, cob worm infestation %age before spray, cob worm infestation %age 72 hours after application

of spray, cob worm infestation %age 7 days after application of spray and grain yield were recorded which are presented in table below:

Table 57: Results of Different Sprayable Insecticides against Army Worm and Cob Worm

Sr.No	Treatments	Plant Stand count	Armyworm Infestation %age before spray	Armyworm Infestation %age 72 HAA	Armyworm Infestation %age 7DAA	Cobworm Infestation %age before spray	Cob worm infestation %age 72 HAA	Cob Worm Infestation %age 7DAA	Grain yield (kg/plot)
1	Coragen 20SC	59	19.34	0	0.86	33.35	21.58	17.98	7695
2	Talstar 10EC	60	13.00	2.91	4.99	34.26	21.40	17.94	7506
3	Match 40EC	58	16.37	2.27	6.89	34.58	22.91	19.32	7389
4	Marshall 5EC	58	12.11	0	8.14	31.61	23.39	19.93	7206
5	Control	58	26.41	28.15	30.73	32.89	50.20	53.93	6478
	C.V %age	3.97	47.25	69.51	73.45	9.42	16.25	19.54	5.78
	LSD @ 5%	3.58	12.81	7.14	11.68	4.84	6.99	7.78	646

The data revealed that Coragen 20SC gave the best control against army worm showing minimum army worm infestation (0.86 %) followed by Talstar 10EC (4.99%) whereas Talstar 10EC gave the best control against cob worm showing minimum cob worm infestation (17.94%) followed by Coragen 20SC showing cob worm infestation (17.98%). As for as the yield is concerned Coragen 20SC produced maximum yield (7695kg/ha) followed by Talstar 10EC which produced the yield (7506 kg/ha).

Conclusion: Coragen 20SC can be recommended for the control of army worm while Coragen 20SC and Talstar 10EC can be recommended for the control of cob worm/ear worm.

2-Testing of Different Sprayable Insecticides against Corn Aphid and Shootfly during Kharif-2019 (Hybrid=5427).

The experiment comprised of five treatments i.e. Commando 75SP, Commando Plus 97DF, Confidor 20SL, Actara 25WG and Control. It was sown on 19-08-2019. It was conducted according to RCBD with plot size 4×2.25m in four replications. Experiment was kept under continuous observation but during the whole season the infestation of shootfly and corn aphid was found nil throughout the crop development period so no treatment could be tested.

3-To Evaluate the Efficacy of Different Granular Insecticides Brands Against *Chilo Partellus* by Soil Application During Kharif-2019 on Hybrid=5427.

The experiment comprised of five treatments i.e. Furadan 3G, Virtako 0.6Gr, Regent 80WG, Cartap 4G and Control. It was conducted according to RCBD with plot size 4×2.25m in four replications. It was sown on 19-08-2019. The data regarding plant stand count, plants harvested, borer infestation %age and grain yield were recorded which are presented in table below:

Table 58: Results of different granular insecticides against *chilo partellus*.

S.No	Treatments	Plant Stand	Plants Harvested	Borer Infestation %age	Borer infestation reduction %age	Grain Yield (kg/h)
1	Regent 80 WG	54	53	2.35	86.34	7664
2	Furadan 3G	54	53	5.15	61.20	7189
3	Cartap 4G	53	50	8.03	55.68	6936

4	Virtako 0.6 Gr	53	52	8.05	50.41	6708
5	Control	51	46	15.22	0	6217
	CV %age	5.59	4.52	49.41	49.79	8.89
	LSD @ 5%	4.58	3.52	5.91	38.91	951

The data revealed that Regent 80WG gave the best control showing minimum borer infestation (2.35%) and borer infestation reduction (86.34%) with grain yield 7664 kg/ha followed by Furadan 3G showing borer infestation (5.15%) and borer infestation reduction (61.20%) with grain yield 6936 kg/ha.

Conclusion: Regent 80 WG can be recommended for the control of maize stem borer (*chilo partellus*)

4-To Evaluate the Efficacy of Different Sprayable Insecticide Mixtures Against *Chilo Partellus* During Kharif-2019 on Hybrid=5427.

The experiment comprised of five treatments i.e. Belt 48SC+Fipronil 5SC (1:1), Lambda Cyhalothrin 2.5SC+Fipronil 5SC (1:3), Match 50EC+Polytrin C 440EC (3:4), Decis Super 10EC+Fipronil 5SC (1:1) and Control. It was conducted according to RCBD with plot size 4× 2.25m in four replications. It was sown on 19-08-2019. Data regarding plant stand count, plants harvested, borer infestation %age and grain yield were recorded which are presented in table below:

Table 59: Results of Different Sprayable Insecticides against *Chilo Partellus*.

S.No	Treatments	Plant Stand	Plants Harvested	Borer Infestation %age	Borer infestation reduction %age	Grain Yield (kg/h)
1	Decis Super 10 EC+Fipronil 5SC	52	50	0.51	94.13	7492
2	Belt 48SC+Fipronil 5SC	53	51	1.84	77.95	7167
3	Lambda Cyhalothrin 2.5 SC+Fipronil 5SC	50	48	3.00	59.06	6725
4	Match 50EC+Polytrin C 440 EC	49	47	3.74	56.57	6223
5	Control	51	43	7.83	0.00	6000
	CV %age	7.29	6.80	76.58	54.82	8.56
	LSD @ 5%	5.75	5.00	3.99	48.60	886

The data revealed that Decis Super 10 EC + Fipronil 5SC gave the best control against maize borer showing minimum borer infestation (0.51%) and borer infestation reduction (94.13%) with grain yield 7492 kg/ha followed by Belt 48SC+Fipronil 5SC showing borer infestation (1.84%) and borer infestation reduction (77.95%) with grain yield 7167 kg/ha.

Conclusion: A mixture of sprayable insecticides Decis Super 10 EC + Fipronil 5SC can be recommended for the control of maize stem borer.

SPRING 2019:

1- Testing of Different Sprayable Insecticides against Army Worm and Cob Worm on (HYBRID=5533).

The experiment comprised of five treatments i.e. Marshall 5EC, Match 40EC, Talstar 10EC, Coragen 20SC and Control. It was conducted according to RCBD with plot size 4m × 2.25m in four replications. It was sown on 18-02-2020. Data regarding plant stand count, army worm infestation % age pre-treatment (before spray), army worm infestation % age after 72 hours of treatment (after spray) and army worm infestation %age after 7 days of treatment, cob worm infestation %age before spray, cob worm infestation %age after 72 hours of application of spray, cob worm infestation %age 7 days after application of spray and grain yield were recorded which are presented in table below:

Table 60: Results of Different Sprayable Insecticides against Army Worm and Cob Worm.

Sr. #	Treatments	Plant stand Count	Army worm infestation %age before spray	Army worm infestation %age 72 HAA	Army worm infestation %age 7DAA	Cob worm infestation %age before spray	Cob worm infestation %age 72 HAA	Cob Worm infestation %age 7DAA	Grain yield (kg/plot)
1	Marshal 5EC	45	0	0	0	11.65	0.51	1.59	11611
2	Match 40 EC	44	0	0	0	16.11	2.55	3.49	9144
3	Talstar 10 EC	46	0.47	0	0	10.89	0	3.94	8733
4	Coragen 20 SC	45	0	0	0	13.09	2.04	4.09	8299
5	Control	45	4.47	7.20	10.05	16.93	21.98	25.45	8033
	C.V %age	14	98.34	66.25	41.62	44.55	45.51	24.29	20.37
	LSD @ 5%	10	1.49	1.72	1.28	9.42	3.79	2.99	2878

The data revealed that Marshal 5EC, Match 40EC, Talstar 10EC and Coragen 20SC showed the best control against army worm expressing minimum army worm infestation (0%) whereas Marshal 5EC showed the best control against cob worm expressing minimum cob worm infestation (1.59%) followed by Match 40EC expressing cob worm infestation (3.49%). As for as the yield is concerned Marshal 5EC produced the maximum yield 11611 kg/ha followed by Match 40EC which produced the yield 9144 kg/ha.

2- Testing of Different Sprayable Insecticides against Corn Aphid and Shootfly on (Hybrid=5533).

The experiment comprised of five treatments i.e. Commando 75SP, Commando Plus 97DF, Confidor 20SL, Actara 25WG and Control. It was sown on 18-02-2020. The experiment was kept under continuous observation but during the whole season the infestation of shootfly and corn aphid was found nil throughout the crop development period so no treatment could be teste

3- To Evaluate the Efficacy of Different Granular Insecticide Brands against *Chilo partellus* by Soil Application on (Hybrid=5533).

The experiment comprised of five treatments i.e. Furadan 3G, Virtako 0.6Gr, Regent 80WG, Cartap 4G and Control. It was conducted according to RCBD with plot size 4m × 2.25m in four replications. It was sown on 18-02-2020. Data regarding plant stand count, plants harvested, borer infestation %age, borer infestation reduction %age and grain yield were recorded which are presented in table below:

Table 61: Results of Different Granular Insecticides against *Chilo partellus*.

S.No	Treatments	Plant Stand Count	Plants Harvested	Borer Infestation %age	Borer infestation reduction %age	Grain Yield (kg/h)
1	Regent 80 WG	57	55	21.76	41.82	9733
2	Virtako 0.6 Gr	58	58	24.52	33.71	9066
3	Furadan 3G	54	53	26.19	28.02	8744
4	Cartap 4G	59	58	32.75	11.42	8533
5	Control	59	55	37.08	0	8211
	CV %age	10.66	9.60	25.12	77.95	9.66
	LSD @ 5%	9.47	8.31	11.01	27.62	1319

The data revealed that Regent 80 WG showed the best control expressing minimum borer infestation (21.76 %) and borer infestation reduction (41.82 %) with grain yield 9733 kg/ha followed by Virtako 0.6 Gr showing borer infestation (24.52 %) and borer infestation reduction (33.71 %) with grain yield 9066 kg/ha.

4- To Evaluate the Efficacy of Different Sprayable Insecticide Mixtures against *Chilo partellus* on (Hybrid=5533).

The experiment comprised of five treatments i.e. Belt 48SC+Fipronil 5SC (1:1), Lambda Cyhalothrin 2.5SC+Fipronil 5SC (1:3), Match 50EC+Polytrin C 440EC (3:4), Decis Super 10EC+Fipronil 5SC (1:1) and Control. It was conducted according to RCBD with plot size 4m×2.25m in four replications. It was sown on 18-02-2020. Data regarding plant stand count, plants harvested, borer infestation %age, borer infestation reduction %age and grain yield were recorded which are presented in table below.

Table 62: Results of Different Sprayable Insecticide Mixtures against *Chilo partellus*.

S.No	Treatments	Plant Stand	Plants Harvested	Borer Infestation %age	Borer infestation reduction %age	Grain Yield (kg/h)
1	Decis Super 10 EC+Fipronil 5SC	55	55	16.97	45.20	9966
2	Match 50EC+Polytrin C 440 EC	59	58	17.55	41.87	9577
3	Belt 48SC+Fipronil 5SC	58	58	18.12	40.55	9422
4	Lambda Cyhalothrin 2.5 SC+Fipronil 5SC	56	55	28.06	9.75	8655
5	Control	54	50	30.82	0	8099
	CV %age	7.29	7.38	29.43	78.64	9.69
	LSD @ 5%	6.37	6.05	10.11	33.29	1365

The data revealed that Decis Super 10 EC + Fipronil 5SC showed the best control against maize borer showing minimum borer infestation (16.97%) and borer infestation reduction (45.20%) with grain yield 9966 kg/ha followed Match 50EC+Polytrin C 440EC showing borer infestation (17.55%) and borer infestation reduction (41.87%) with grain yield 9577 kg/ha.

SEED PRODUCTION:

1. OPV'S MAIZE

Different seed categories of various maize varieties were produced for maintenance, experiments and sale purposes. The BNS seed was produced through half-sib method by hand pollination and Pre basic and basic in isolations through half-sib method by hand pollination and Pre basic and basic in isolations as detailed below in Table-69:

Table-62: Maize OPV's BNS, Pre Basic, and Basic Seed Produced

Sr. No.	Name of Crop Variety	BNS (kg)	Pre-basic (kg)
Maize Kharif, 2019			
1.	Gohar-19	4.0	2000
2.	CIMMYT PAK	8.0	-
3.	Pop-1	3.5	160
4.	Sweet-1	4.5	176
Maize Spring, 2020			
1.	Gohar-19	6.0	4500
2.	CIMMYT PAK	5.0	-
3.	Pop-1	4.0	1560
4.	Sweet-1	3.0	1200

**HYBRID MAIZE:
KHARIF 2019**

i. Maintenance of Female Parental Line (Y27)

Seed of Y27 was prepared (18 kg) and treated with weedicide and fungicide before sowing. Male parental line Y-27 was planted in Hybrid Seed Production block with 4:1 female and male ratio on an area of 18 kanals on 20-08-2019 in square No. 27 and 32 at Maize Seed Farm 64/5L, Yusafwala, Sahiwal. All the recommended agronomic practices (hoeing, weeding, irrigation & fertilizer application) were performed accordingly. Field issues like gap filling and thinning were addressed accordingly. Strict rouging (removal of off-types 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 Y27 which gained during kharif 2019 was 270 kg.

ii. Hybrid Seed Production

Under hybrid seed production program, seed production block of YH-1898 (Y22*Y27) was maintained in square No. 32 during kharif 2019. Female parental line (Y-22) was sown along with male (Y-27) with 4:1 ratio on an area of 12 kanals on 20-08-2019. Similarly, seed production block of YH-5427 (Y222*Y27) was maintained in square No. 27 and 32 during kharif 2019. Female parental line (Y-222) was sown along with male (Y-27) with 4:1 ratio on an area of 60 kanals on 20-08-2019.

All the recommended agronomic practices (hoeing, weeding, irrigation & fertilizer application) were performed accordingly. Field issues like gap filling and thinning were addressed accordingly. Strict rouging (removal of off-types 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 and YH-5427 was 760 kg & 855 kg during kharif 2019, respectively.

Table 64: Seed Production of Sorghum

Variety	Kharif 2019		Spring 2020
	Breeder	Pre-basic	Pre-basic
YS-16	40	1705	1800
YSS-98	9	1440	60

Table 65: Seed Production of Pearl Millet

Variety/Hybrid	Kharif 2019		Spring 2020
	Breeder	Pre-basic	Pre-basic
YBS-98	2	546	401
18-BY	2	40	-
YBH-278	-	1140	-

SPRING 2020**i. Maintenance of Parental Lines (Y22, Y27 and Y222) of Maize**

Seed of two female parental lines (Y22 and Y222) and one male parental line (Y27) was prepared and treated with weedicide and fungicide before sowing. Isolation was maintained for each line. Male parental line Y-27 was planted on an area of 2.5 kanals isolation in square No. 26 on 12.02.2020. Y22 and Y222 were planted on area of 6 kanals and 4.5 kanals in square No. 27 on 19.02.2020, respectively at Maize Seed Farm 64/5L, Yusafwala, Sahiwal. Total Produce of Y22, Y27 and Y222 were 501 kg, 790 kg and 600 kg respectively.

ii. Hybrid Maize Seed Production

Under hybrid seed production program, seed production blocks of YH-1898 (Y22*Y27), YH-5427 (Y222*Y27) and FH-1046 (F308*Y27) were maintained in square No. 26 during Spring 2020. Female parental lines were sown along with in 4:1 ratio on an area of 67 kanals for YH-1898, 5 kanals for YH-5427 and 4 kanals for FH-1046 on 13.02.2020. Total produce of YH-1898, YH-5427 and FH-1046 were 3790 kg, 840 kg and 220 kg, respectively during spring 2020.

Table 65: Seed Production of Hybrid Maize

MATERIAL	KHARIF 2019	SPRING 2020
	PRODUCE (Kg)	PRODUCE (Kg)
YH-1898	760	3790
YH-5427	855	840
FH-1046		220
Y22		501
Y222		600
Y-27	270	790
20 inbred lines under PARB 904		100-200 g / each

ADVISORY SERVICES (FARMERS & OTHERS):

Three (3) TV talks, Twenty five (25) radio talks were delivered to farmers about the maize, sorghum and pearl millet crops.

One farmer day was conducted on 28.11.2019 for guidance of farmers regarding production technology of maize crop to get higher yield.

A meeting regarding maize in the scenario of Covid-19 was held in the conference room of MMRI, Yusafwala-Sahiwal under the chairmanship of DG Agri-Ext on April 30, 2020.

Capacity building of local seed companies regarding hybrid seed production technology of Maize & Millets crops under agricultural innovation program (AIP) was conducted on June 18, 2020 in the seminar room of MMRI, Yusafwala- Sahiwal

A training regarding “Profitable maize production technology in changing scenario under CIMMYT-LED heat tolerance maize for Asia (HTMA) Project” was conducted on June 24, 2020 in the seminar room of MMRI, Yusafwala- Sahiwal.

STATIONS AND SUB-STATIONS

MAIZE RESEARCH STATION, FAISALABAD

SEASON AND ITS EFFECTS:

During the year 629 mm rainfall was received. High rainfall received in the month of July, 2019 (144.6 mm) and March 2020 (135.0 mm). The detail of average maximum and minimum temperature and rainfall received during July 2019 to December 2019 is as follows:

Table 66: Summary of Metrological Data at MRS, Faisalabad

Sr. No.	Month/Year	Average Temperature (c°)		Rainfall (mm)
		Maximum	Minimum	
1	July, 2019	37	26.7	144.6
2	August, 2019	37.2	26.9	84
3	September, 2019	36.9	26.4	48.1
4	October, 2019	32.9	18.9	22.4
5	November, 2019	26.3	12.8	3
6	December, 2019	17	6	7
7	January, 2020	17.3	5.5	50.8
8	February, 2020	23.8	8.7	24.8
9	March, 2020	24.5	13.9	135.0
10	April, 2020	33.1	18.8	20.4
11	May, 2020	37.5	23.1	19.1
12	June, 2020	39.0	25.8	69.8

KHARIF 2019:

RESEARCH WORK DONE:

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

Table 67: Detail of Gene Pool

Sr. No	Entries	Planted	Har-vested
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

Hybrid Evaluation Yield Trials:

Eight (8) different yield trials of hybrids were sown for evaluation.

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

A trial comprised of six single cross hybrids including three local hybrids as checks were sown on 6-08-2019 according to RCB design with three replications. The plot size was kept 4m x 3m. The harvesting was done on 25-11-2019. Data regarding different agronomic traits were recorded and hybrids showing good performances were selected for on farm testing. The data are given in table below:

Table 68: Results of Hybrid Maize Macro Yield Trial No. 1 (Kharif 2019), Faisalabad

Sr. No	Hybrid	Grain Yield kg/ha	Stand Conut (%)	Days to 50% tasseling	Days to 50% silking	Plant Height (cm)	Ear Height (cm)	Plants harvested	Ears harvested
1	FH-1337	6540.5 a	73	50.5	53	170	95	67.5	70
2	FH-1036	6391.3 a	66.5	50	54	162.5	80	59.5	63
3	FH-988	5869.7 ab	64	53	55	172.5	95	56	60.5
4	YH-5427 (C)	5577.6 ab	56	51.5	53.5	160	82.5	52.5	55
5	FH-1046(C)	3808.3 b	58.5	51	54	170	85	49.5	52.5
6	YH-1898(C)	3451.1 b	50.5	51	54.5	167.5	80	45	47
CV %		NS	8.35	0.71	NS	NS	NS	NS	NS
CD		2504	13.2	0.93	1.5	17	16.6	16.1	17.1

Data presented in the Table 68 reveals that differences in grain yield due to hybrids statistically at par with local hybrids. The hybrid FH-1337 gave maximum grain yield of 6540.5 kg/ha followed by local hybrid FH-1036 (6391.3 kg/ha). Local hybrids, FH-1337, FH-1036 and FH-988 showed higher yield over local check hybrid YH-5427 (5577.6kg/ha), FH-1046 (3808.3kg/ha) Significant differences were observed for days to 50% tasseling. Local hybrid FH-998 took the maximum days for 50% tasseling (53) and silking (55). Local check hybrid FH-988 attained the maximum plant height of 172 cm while its cob height was 95 cm. Most of the hybrids exhibited mid to low cob bearing character. Over all local hybrids produced more number of plants harvested and cobs harvested.

2. Hybrid Maize Macro Yield Trial No.2 (Kharif 2019)

This trial comprised of eight single cross hybrids including three local hybrids as checks was sown on 06-08-2019. 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 25-11-2019. Data regarding different agronomic traits were recorded and hybrids with good performances were selected for on farm testing. The data are presented in table below:

Table 69: Results of Hybrid Maize Macro Yield Trial No. 2 (Spring 2019), Faisalabad

Sr. No	Hybrid	Yield kg/ha	Stand Co-nut (%)	Days to 50% tasseling	Days to 50% silking	Plant Height (cm)	Ear Height (cm)	Plants harvested	Ears harvested
1	FH-1409	7912.6 a	69.5	51	53.5	160	80	63.5	66
2	YH-5427(C)	7269.4 ab	72	51	54	167.5	87.5	60	64
3	FH-1046(C)	7261.2 ab	64.5	51	53	155	62.5	51.5	54.5
4	FH-1400	6476.8 ab	62.5	51	54	170	69.5	53.5	55
5	FH-1428	5757.9 ab	55	51.5	54	170	85	49	52
6	FH-1898(C)	5306.9 ab	60	50	52	162.5	70	53	54
7	FH-1390	5026.5 ab	41.5	50	52	182.5	102.5	37.5	39
8	FH-1419	4370.4 b	57	52	54	165	82.5	43.5	45
CV %		NS	NS	NS	1.22	NS	NS	NS	NS
CD		3517	26.7	1.4	1.5	23.4	35.8	26.4	30.1

Data presented in Table 69 reveals that Grain yield of local hybrid FH-1409 were at the par of local check YH-5427 and also gave the highest grain yield of 7912.6 kg/ha followed by the local check hybrid FH-5427 (7269.4 kg/ha). Grain yield of local hybrids FH-1400 and FH-1428 were at par with local check FH-1898. Differences in days to 50% silking was significant. The local hybrid FH-1428 took the maximum 51.5 days to 50% tasseling and 54 days to 50% silking. Local hybrid FH-1390 attained maximum plant height of 182.5 cm while its cob height was 102.5 cm. The local check FH-1046 attained the minimum plant height 155 cm with a cob height of 62.5 cm. Low to mid cob bearing trend was apparent in most of the hybrids. Number of plants harvested, cobs harvested and stand count were showing statistically non-significant differences.

3. Hybrid Maize Micro Yield Trials (Kharif 2019)

This trial comprised of twelve (9) single cross hybrids including three local hybrids as checks. They were sown on 06-08-2019, laid out according to RCB design with two replications. The plot size was kept 4m x 1.5m. The harvesting was done on 25-11-2019. 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 70: Results of Hybrid Maize Micro Yield Trial-1 (Kharif 2019), Faisalabad

Sr. No	Hybrid	Yield kg/ha	Stand Conut (%)	Days to 50% tasseling	Days to 50% silking	Plant Height (cm)	Ear Height (cm)	Plants harvested	Ears harvested
1	FH-1453	10087 a	39.5	50.5	53	165	87.5	34.5	38
2	FH-922	9854 a	40	51.5	54.5	185	110	35.5	39
3	YH-5427(C)	8965 ab	39	51.5	53.5	182.5	92.5	36.5	40.5

4	FH-1046(C)	8050 abc	39	51.5	53.5	175	87.5	33	35.5
5	YH-1898(C)	7412 abc	33.5	50.5	53.5	170	95	27	28
6	FH-929	6362 abc	36.5	51.5	53.5	175	90	29.5	31
7	FH-1368	6355 abc	26.5	51	53	172.5	87.5	22	22.5
8	FH-1231	5207 bc	27.5	50	52.5	162.5	87.5	22	22.5
9	FH-793	4188 c	20	52.5	54.5	165	77.5	17	17.5
CV %		NS	NS	NS	NS	NS	4.37	NS	NS
CD		4478	20.5	1.4	1.9	17.98	9.11	17.6	19.6

Result presented in Table 70 revealed that Local hybrids FH-1453 and FH-922 were statistically at par with the local check YH-5427 (8965 kg/ha) while better yielder than local check FH-1046 (8050 kg/ha) and YH-1898 (7412). Local hybrid FH-1453 gave maximum grain yield of 10087 kg/ha. The minimum number of days to 50% tasseling (50) and silking (52.5) was observed for the local hybrid FH-1231. Differences in cob height were significant. The maximum plant height (185 cm) and cob height (110cm) were shown by FH-922 and the minimum plant height (162.5 cm) was observed for local hybrid FH-1231. Above the mid cob bearing trend was apparent in most of the hybrids. Number of plants per plot and cobs harvested were statistically showing non-significant differences.

4. Hybrid Maize Micro Yield Trial-II (Kharif 2019)

Ten entries including three local hybrid as check were included in this trial. The trial was sown on 06-08-2019 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 03-12-2019. Data regarding different characters were recorded and results are presented in below table:

Table 71: Results of Hybrid Maize Micro Yield Trial-2 (Kharif 2019), Faisalabad

Sr. No.	Hybrid	Yield kg/ha	Stand Cont. (%)	Days to 50% tasseling	Days to 50% silking	Plant Height (cm)	Ear Height (cm)	Plants harvested	Ears harvested
1	FH-1606	9259.1 a	32.5	51	53	187.5	97.5	29.5	32.5
2	E2×F-308	8106.2 a	38.5	54.5	55.5	155	75	31.5	33.5
3	YH-5427(C)	8058.7 a	37	53.5	55	165	77.5	27.5	29.5
4	FH-1046(C)	7775.9 a	35	53	54	165	92.5	28.5	29.5
5	FH-1603	7585.4 ab	30.5	50.5	54.5	172.5	67.5	27.5	28
6	YH-1898(C)	7468.5 ab	34	50.5	53.5	167.5	82.5	27	28
7	FH-1601	7383.5 ab	32	49.5	51.5	170	75	25.5	27.5
8	FH-1619	7305.4 ab	35.5	54	55	162.5	85	31	33

9	FH-1617	5171.9 bc	31	52	53.5	157.5	75	19.5	20
10	FH-1560	4692.4 c	20	52.5	54.5	177.5	87.5	15.5	16
CV %		15.12	11.8	114	NS	NS	8.23	12.8	12.9
CD		2489	8.7	1.3	1.5	23.3	15.2	7.6	8.1

Data presented in the Table 71 reveals the significant differences in mean grain yields due to hybrids. Local hybrids FH-1606 gave the maximum grain yield of 9259.1 kg/ha followed by E2×F-308 (8106.2kg/ha). FH-1603 (7585.4 kg/ha) was significantly higher yielder than the local check hybrids YH-1898 (7468.5). Mid to low cob bearing trend was observed in most of the hybrids. Differences in plant height and days to 50% silking were non-significant. The maximum plant height (187.5 cm) was shown by FH-1606 with a cob height of 97.5 cm. The minimum plant height (155 cm) was observed for local hybrid E2×F-308 with a cob height of 75 cm. statistically significant differences was also observed for number of plants harvested.

5. Hybrid Maize Preliminary Yield Trial (Kharif 2019)

This trial comprised of two sets: one of them consisting of 27 single cross hybrids and remaining two contain 25 cross hybrids including three local hybrids in each set as checks. They were sown on 06-08-2019. 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 25-08-2019. 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 72: Results of Hybrid Maize Preliminary Yield Trial-1 (Kharif 2019), Faisalabad.

Sr. No	Hybrid	Yield kg/ha	Stand Cont. (%)	Days to 50% tasseling	Days to 50% silking	Plant Height (cm)	Ear Height (cm)	Plants harvested	Ears harvested
1	FH-1677	11035 a	19.5	50	52	182.5	92.5	19	20
2	FH-1694	10549 ab	19	50	53	195	97.5	14.5	15.5
3	FH-1693	10377 abc	18.5	50	52	192.5	102.5	17.5	18.5
4	FH-1682	10192 a...d	20	52	54	175	82.5	21	22
5	FH-1685	9982 a...d	19.5	50.5	52	167.5	92.5	16.5	17.5
6	FH-1681	9677 a...e	19	52	54	180	77.5	16	17.5
7	FH-1689	9600 a...f	19.5	50	52	167.5	87.5	17	18
8	FH-1671	9429 a...f	19.5	50.5	52.5	200	105	15.5	17
9	FH-1678	9340 a...f	17.5	51	53	192.5	100	15	16
10	FH-1692	9314 a...f	20	50	51.5	195	105	20	21.5
11	FH-1686	8771 a...g	20	51.5	54	207.5	105	17.5	19.5
12	FH-1688	8668 a...g	20	52.5	54.5	180	87.5	17.5	18
13	FH-1046(C)	8362 a...g	16	50	52	167.5	90	13	14
14	FH-1690	7995 b...g	18	52	54	190	90	17	18
15	FH-1676	7911 b...g	19.5	51.5	53.5	177.5	92.5	14	15.5
16	YH-1898(C)	7715 b...h	20	50.5	52.5	172.5	87.5	13	14

17	YH-5427(C)	7709 b...h	19	50	52	177.5	90	13	14
18	FH-1683	7561 c...h	19	53.5	55.5	147.5	72.5	16.5	17.5
19	FH-1687	7288 d...h	15.5	50	53.5	170	85	15	16
20	FH-1684	6955 e...h	19	50.5	52.5	177.5	90	11.5	12.5
21	FH-1691	6830 e...h	19	51.5	53.5	167.5	90	15.5	16.5
22	FH-1670	6624 fgh	14	52.5	54	177.5	87.5	12.5	13.5
23	FH-1669	6245 ghi	17.5	52.5	54.5	160	80	15	16
24	FH-1675	5842 ghi	13.5	54.5	56.5	155	80	11	11
25	FH-1680	4828 hij	10	53	55	180	85.5	8.5	9.5
26	FH-1679	3507 ij	17.5	55.5	57.5	170	85.5	13	14
27	FH-1673	2730 j	5.5	52.5	54	154.5	78.5	5	5
CV%		18.21	12.2	2.83	2.7	7.42	NS	17.1	16.1
CD		2980	4.4	2.99	2.95	27	21.1	5.1	5.25

The data presented in the Table 72 shows statistically significant differences in grain yield due to hybrids. Local hybrid FH-1677 gave the highest grain yield of 11035 kg/ha followed by FH-1694 (10549 kg/ha). These hybrids along with FH-1693, FH-1682, FH-1685, FH-1681, FH-1689, FH-1671, FH-1678, FH-1692, FH-1686, and FH-1688 were at par with the top yielding local hybrid FH-1046. Days to 50% tasseling and 50% silking were showing statistically significant differences. The maximum days to tasseling (55.5) and silking (57.5) were taken by two local hybrids FH-1679. Significant differences were observed for plant height. Maximum plant height was attained by FH-1686 (207.5 cm) with a cob height of 105 cm while FH-1673 attained minimum plant height of 154.5 cm and cob height of 78.5 cm. Number of plants and cobs harvested per plot were showing statistically non-significant differences.

Table 73: Results of Hybrid Maize Preliminary Yield Trial-2 (Kharif 2019), Faisalabad.

Sr. No	Hybrid	Yield kg/ha	Stand Cont. (%)	Days to 50% tasseling	Days to 50% silking	Plant Height (cm)	Ear Height (cm)	Plants harvested	Ears harvested
1	FH-1704	9728 a	20	51	53	145	87.5	18	19.5
2	FH-1715	9359 ab	16	52.5	54.5	190	82.5	13	14
3	FH-1708	9279 abc	20	51.5	53.5	210	100	20.5	22
4	FH-1716	9174 abc	18.5	51.5	53.5	175	95	14.5	15.5
5	FH-1699	9165 abc	18	50.5	52	200	92.5	15.5	18
6	FH-1696	8957 abc	20	52.5	54.5	207.5	102.5	8.5	10
7	YH-1898(C)	8918 abc	20	51.5	53.5	157.5	75	17	18
8	FH-1713	8688 abc	19	52	54	202.5	95	18	20
9	FH-1717	8271 abc	17.5	53	55	177.5	82.5	15	16
10	FH-1695	7831 a...d	19	50	52	190	80	17	18
11	FH-1703	7612 a...d	19	50	52	200	102.5	18.5	19.5
12	YH-5427(C)	7593 a...d	20	51	53	167.5	85	16	17
13	FH-1711	7503 a...d	19	52	54	175	77.5	20.5	20.5

14	FH-1701	7373 a...d	17.5	54	56	190	90	14.5	15.5
15	FH-1707	7197 a...d	19	50.5	52.5	212.5	110	18	19
16	FH-1698	7181 a...d	19	54	56	200	105	16.5	17.5
17	FH-1710	6988 a...d	19	51	53	145	82.5	18	19
18	FH-1712	6844 a...d	18.5	54	56	185	95	17	18
19	FH-1713	6801 a...d	17.5	50.5	53	187.5	97.5	12	13
20	FH-1700	6393 bcd	13.5	53.5	55.5	205	115	12.5	13.5
21	FH-1046(C)	6234 bcd	13.5	51.5	53.5	195	95	12.5	13
22	FH-1706	6188 bcd	19	50	52	220	100	15.5	16.5
23	FH-1702	6141 cd	17	51	53	187.5	87.5	14.5	15.5
24	FH-1714	4918 d	14	54	56	180	85	11	11.5
25	FH-1709	4707 d	20	52.5	54.5	180	95	18.5	19.5
CV%		NS	NS	2.35	2.2	NS	9.33	NS	NS
CD		3190	4.26	2.5	2.4	44.23	17.8	7.28	7.5

The data presented in the Table 73 shows that six local hybrids were out yielder than top yielding local hybrid YH-1898. Local hybrid FH-1704 gave the highest grain yield of 9728 kg/ha followed by FH-1715 (9359 kg/ha). The local check YH-5427 (7593kg/ha) and FH-1046 (6234 kg/ha) remained at 12th and 21st position. Days to 50% tasseling and plant height were showing statistically non-significant differences while 50% silking and cob height were showing statistically significant differences. Maximum plant height was attained by FH-1706 (220 cm) with a cob height of 100 cm while hybrid FH-1704 attained minimum plant height (145 cm) with a cob height of 87.5 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 forty (140) entries. Its sowing date was 06-08-2019. 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 25-11-2019. Data regarding different traits were recorded and elite hybrids were selected for further evaluation. The data are given in the following table

Table 74: Results of National Uniform Hybrid Maize (Yellow) Yield

Sr. No	Hybrid	Yield kg/ha	Stand Conut (%)	Days to 50% tasseling	Days to 50% silking	Plant Height (cm)	Ear Height (cm)	Plants harvested	Ear Harvested
1	5	11885 a	34	52	56	217	116	32	33
2	15	11503 ab	31	52	55	231	101	30	30
3	58	11132 abc	38	52	56	203	104	35	37
4	71	11128 abc	36	51	57	215	104	34	35
5	27	10903 a...d	35	54	58	200	102	30	31
6	35	10840 a...e	35	54	59	198	105	31	32
7	11	10837 a...e	37	54	58	201	101	31	32

8	113	10669 a...f	35	50	52	180	96	32	34
9	34	10498 a...g	36	51	54	203	112	31	33
10	31	10449 a...h	32	53	58	193	101	29	29
11	100	10345 a...i	34	53	56	205	127	33	33
12	66	10333 a...i	36	54	57	198	112	33	35
13	62	10317 a...j	38	52	56	215	114	33	34
14	6	10285 a...k	36	52	57	196	107	33	34
15	30	10243 a...l	34	50	53	200	105	32	33
16	42	10130 a...m	34	53	56	191	99	32	32
17	7	10067 a...m	32	53	56	205	107	31	31
18	67	9913 a...n	35	54	58	206	96	33	34
19	65	9858 a...o	37	53	56	206	110	34	35
20	10	9831 a...p	33	53	57	205	114	28	28
21	118	9820 a...q	31	55	60	213	111	29	29
22	46	9734 a...r	31	50	55	203	97	29	30
23	98	9711 a...s	33	52	56	203	112	31	31
24	88	9686 a...s	32	52	56	206	118	30	31
25	29	9623 a...t	32	54	58	196	99	30	31
26	87	9547 a...u	35	50	54	206	112	33	34
27	44	9477 a...v	33	51	54	216	106	30	32
28	79	9287 b...w	30	54	57	201	106	29	29
29	39	9234 b...x	32	54	57	180	94	29	30
30	139	9232 b...x	36	52	56	188	91	33	34
31	32	9219 b...x	33	51	54	190	94	32	32
32	89	9203 b...y	33	51	55	215	119	32	32
33	33	9196 b...y	32	53	55	203	102	30	31
34	115	9131 b...z	31	53	56	198	109	29	30
35	68	9100 b...z	31	51	55	205	112	30	30
36	23	9075 b...z	34	51	57	191	92	31	32
37	41	9000 c...a	28	53	53	200	104	27	27
38	61	8994 c...a	32	52	56	200	102	30	31
39	52	8917 c...a	31	51	51	203	101	29	30
40	122	8907 c...b	30	51	54	183	96	29	29
41	26	8689 c...c	27	54	57	196	102	24	24
42	28	8659 d...d	29	53	56	198	106	24	24
43	13	8592 d...d	35	48	51	175	94	29	31
44	54	8505 d...e	36	52	56	190	96	29	31
45	102	8412 e...f	28	51	55	188	97	27	27
46	76	8379 f...f	36	53	57	183	104	35	35
47	73	8306 f...g	32	52	57	203	115	31	31
48	109	8304 f...g	34	54	57	190	79	32	33
49	53	8288 f...g	30	50	53	180	84	28	28
50	21	8286 f...g	30	55	59	203	104	28	29

51	3	8274 f...g	31	53	57	206	116	26	26
52	69	8235 f...g	33	50	56	215	112	28	28
53	16	8216 g...g	31	52	56	205	114	28	29
54	57	8211 g...g	36	50	53	200	97	30	30
55	85	8184 g...g	31	51	56	180	92	29	30
56	36	8115 g...h	27	52	54	196	102	25	25
57	48	8024 h...i	33	52	56	195	112	30	31
58	107	7924 i...j	31	56	60	208	117	29	29
59	86	7873 j...k	27	52	57	195	97	22	22
60	75	7853 k...k	34	54	58	206	111	33	33
61	49	7829 l...k	34	53	57	203	114	28	28
62	2	7811 l...k	36	57	60	198	107	26	26
63	82	7810 l...k	31	52	54	203	112	30	30
64	9	7792 m...k	31	53	57	190	107	25	26
65	99	7719 m...l	29	52	56	196	114	27	28
66	43	7613 n...m	31	54	57	213	123	30	30
67	24	7454 o...n	30	50	53	173	89	29	29
68	101	7427 o...n	27	52	56	205	121	26	26
69	63	7396 p...o	28	52	57	201	107	27	27
70	138	7381 p...p	34	53	57	211	119	31	31
71	83	7379 q...p	31	52	55	196	106	29	30
72	8	7363 r...p	30	53	57	176	96	27	27
73	12	7354 r...p	26	54	57	186	92	23	23
74	38	7321 r...q	28	52	56	190	104	26	26
75	17	7319 r...q	27	53	59	190	97	25	25
76	121	7293 r...q	32	55	58	183	102	27	27
77	117	7264 s...q	24	50	54	195	107	21	21
78	55	7226 t...r	35	52	55	193	109	30	30
79	40	7197 t...r	28	50	52	168	80	27	27
80	72	7190 t...s	35	53	57	185	94	31	31
81	14	7132 u...t	26	53	59	196	99	24	24
82	70	7118 u...u	33	52	55	201	104	27	29
83	92	7104 u...u	27	51	55	191	113	25	26
84	130	7042 v...v	33	52	56	185	96	29	29
85	114	7041 v...v	29	54	57	190	101	27	27
86	74	6975 w...w	29	55	58	191	109	27	27
87	45	6963 w...w	31	52	56	200	104	23	23
88	96	6902 w...x	29	53	56	180	97	27	28
89	50	6875 w...x	25	53	57	193	101	24	24
90	136	6873 w...x	34	51	54	186	84	27	27
91	112	6801 x...y	26	55	59	196	112	23	23
92	81	6764 y...z	26	53	58	206	109	20	20
93	1	6718 z...a	24	55	58	189	109	21	21
94	80	6702 z...a	33	53	56	208	114	29	29
95	56	6609 a...b	29	50	53	210	114	26	26

96	129	6460 b...c	30	50	53	203	99	28	29
97	64	6408 c...c	34	54	58	182	92	27	27
98	37	6246 c...d	31	56	60	190	104	26	26
99	22	6218 d...d	29	50	54	168	94	28	28
100	18	6107 e...d	28	55	60	166	86	25	25
101	111	6102 e...d	24	55	59	203	111	23	23
102	128	6078 e...d	32	51	54	198	92	27	27
103	4	6014 f...d	31	48	51	171	77	26	26
104	77	5865 g...e	33	54	59	178	99	23	23
105	106	5703 h...e	21	55	59	175	96	20	20
106	103	5637 i...e	26	52	55	193	89	25	25
107	126	5599 i...e	24	51	54	176	76	19	19
108	134	5570 j...e	30	50	52	163	77	25	26
109	90	5543 j...e	26	52	56	200	109	24	24
110	91	5543 j...e	29	53	56	163	103	24	24
111	110	5426 k...e	23	55	59	200	114	19	19
112	60	5325 l...e	30	52	54	183	88	26	27
113	132	5277 l...e	30	49	54	198	101	29	29
114	19	5206 m...e	28	53	56	190	93	25	25
115	135	5161 n...e	28	49	52	181	109	27	27
116	94	4958 o...e	26	50	52	191	91	24	24
117	47	4949 o...e	34	50	53	170	84	28	28
118	78	4937 p...e	26	53	58	181	87	18	18
119	51	4896 q...e	25	50	53	176	92	21	21
120	131	4778 r...f	29	50	54	190	92	24	24
121	84	4742 s...f	25	52	56	173	82	22	22
122	104	4714 t...f	23	52	56	183	89	22	22
123	125	4676 u...f	32	53	56	191	86	19	20
124	137	4674 u...f	34	51	55	168	84	27	27
125	124	4599 v...f	31	51	56	186	87	26	26
126	59	4587 w...f	22	52	56	188	79	21	21
127	119	4552 w...f	24	55	57	200	102	19	19
128	127	4475 x...f	24	53	57	190	84	23	23
129	97	4404 y...f	26	46	50	190	81	23	23
130	20	4334 z...f	25	50	55	181	77	23	22
131	95	4285 a...f	24	50	56	193	104	21	21
132	116	4221 b...f	25	50	52	155	86	16	17
133	140	4119 c...f	30	46	50	200	111	24	24
134	133	4053 c...f	26	50	52	166	82	22	22
135	123	3830 def	26	55	59	200	92	25	25
136	108	3821 def	23	57	61	185	92	16	16
137	105	3818 def	26	52	57	170	89	19	19
138	120	3818 def	23	54	56	183	82	20	20
139	25	3469 ef	26	56	60	195	111	20	20
140	93	2427 f	19	52	55	166	89	16	16

CV%	20.55	15.74	2.46	2.55	5.22	7.9	16.92	17.58
CD	2451	7.7	2.1	2.3	16.2	12.8	7.3	7.7

Data presented in Table 74 revealed that statistically significant differences exist for grain yield kg/ha among entries included in this trial. Entry 5 gave maximum grain yield of 11885 kg/ha followed by entry 15 (11503 kg/ha). Entry 93 was lower yielder with grain yield 2427 kg/ha at this station. Entries 140 had taken minimum days to 50% tasseling (46). Entry 15 revealed maximum plant height (231 cm) while entry 18 showed minimum plant height (166 cm). Statistically significant differences were found for all traits.

5. NATIONAL UNIFORM HYBRID MAIZE YIELD TRIAL (WHITE) KHARIF 2019, FAISALABAD.

This trial comprising sixty four (64) entries was sown on 06-08-2019. 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 25-11-2019. Data regarding different traits were recorded and elite hybrids were selected for further evaluation. The data are given in Table 75.

Table 75: Results of National Uniform Hybrid Maize White “B” Trial (Spring 2019), Faisalabad

Sr. No	Hybrid Name/ Entry	Yield (kg/ha)	Stand Co-nut (%)	Days to 50% tes-seling	Days to 50% silk-ing	Plant Height (cm)	Ear Height (cm)	Plants har-vested	Ears har-vested
1	40	9119 a...a	40	49	52	191	111	33	35
2	14	8838 a...b	38	55	57	204	105	30	32
3	43	8760 a...c	40	51	53	201	101	34	37
4	44	8659 a...c	40	52	55	204	114	33	36
5	46	8262 a...d	39	53	55	208	115	30	32
6	53	7662 a...e	39	52	54	214	118	29	31
7	29	7611 a...e	40	53	56	199	103	31	33
8	11	7568 a...f	40	54	57	177	96	30	32
9	7	7341 a...g	40	52	54	183	106	31	32
10	54	7125 a...h	39	54	56	203	113	30	31
11	41	6974 b...i	39	51	54	193	112	30	31
12	22	6915 b...j	37	54	56	199	117	27	28
13	5	6731 c...k	40	49	52	191	96	31	32
14	31	6601 d...l	37	55	58	201	108	26	26
15	55	6535 d...m	39	53	55	206	103	30	30
16	37	6525 d...m	39	52	54	182	108	27	29
17	27	6467 d...m	40	54	56	194	101	28	29
18	20	6438 d...m	38	51	54	190	96	26	28

19	47	6262 d...n	37	52	55	199	115	26	27
20	56	6214 e...n	38	54	56	188	100	27	28
21	35	6114 e...n	37	53	56	188	101	27	27
22	16	6099 e...n	37	55	57	193	101	26	26
23	28	6064 e...o	39	55	57	194	100	29	29
24	24	6012 e...o	39	50	52	201	102	29	29
25	51	5955 e...o	37	53	55	206	120	26	27
26	25	5814 e...p	37	51	54	211	120	26	26
27	30	5779 e...q	39	53	56	189	96	28	29
28	58	5563 f...r	37	55	57	180	110	26	26
29	17	5398 g...s	38	51	53	188	100	26	26
30	9	5392 g...s	39	56	58	211	101	31	28
31	32	5384 g...s	35	56	58	176	100	24	24
32	15	5374 g...s	33	52	54	208	118	22	22
33	48	5372 g...s	36	54	56	221	106	25	25
34	34	5362 g...s	37	52	55	193	108	27	27
35	13	5162 h...s	32	53	55	204	106	20	20
36	49	5054 i...s	34	52	54	201	115	23	23
37	45	4899 j...s	35	52	55	191	103	22	22
38	42	4772 k...s	32	53	55	208	112	21	21
39	1	4708 k...s	33	50	52	173	91	22	23
40	52	4616 l...s	34	53	56	217	109	23	24
41	23	4549 m...s	35	51	53	168	76	24	25
42	39	4549 m...s	34	50	52	191	96	23	24
43	64	4514 m...s	33	55	57	213	103	22	22
44	50	4381 n...t	33	50	52	187	87	23	23
45	10	4370 n...t	33	54	57	168	82	23	23
46	8	4350 n...t	31	53	55	191	96	21	21
47	62	4332 n...t	34	51	53	164	100	24	24
48	18	4024 o...t	31	52	55	194	96	20	20
49	3	3877 p...t	33	54	56	186	105	22	22
50	38	3868 p...t	30	53	55	189	108	20	19
51	4	3836 p...t	32	53	55	184	96	19	19
52	21	3777 p...t	30	52	55	178	90	19	19
53	33	3747 q...t	32	55	58	198	110	20	20
54	36	3746 q...t	32	52	54	188	99	21	22
55	19	3716 r...t	36	51	53	184	88	23	24
56	63	3712 r...t	29	54	56	183	106	19	19
57	61	3699 r...t	31	52	55	188	101	21	20
58	60	3495 s...t	32	51	54	200	106	21	21
59	6	3480 s...t	32	51	54	207	107	21	21

60	26	3433 s...t	32	55	57	191	100	19	20
61	2	3408 s...t	32	52	54	179	93	18	19
62	57	3406 s...t	33	54	57	138	71	22	22
63	12	3389 s...t	29	53	55	174	80	19	19
64	59	2360 t...t	28	52	54	177	80	16	16
CV%		23.3	7	2.51	2.42	6.56	7.15	11.7	11.9
CD		2042	4.1	2.12	2.15	20.3	11.8	4.7	4.88

Data presented in Table 75 showed significant differences for grain yield kg/ha for seven entries. The Entry coded as '40' out yielded with grain yield 9119 kg/ha followed by entry '14' (8838 kg/ha). Entry coded as '59' was the lowest yielder with grain yield 2360 kg/ha. Statistically significant differences were also observed for all other traits.

6. Punjab Agriculture Research Board (PARB) Projects:

1. NUTRITION ENHANCEMENT OF CROPS, FRUITS, VEGETABLES AND THEIR PRODUCTS UNDER CLIMATE CHANGE SCENARIO (PARB NO. 904)

One hundred nineteen (119) single cross hybrids were evaluated for quality parameters.

2. ACCELERATION OF MAIZE BREEDING THROUGH INDUCER LINE MEDIATED DOUBLED HAPLOID INBRED LINES FOR DEVELOPMENT OF CLIMATE SMART HIGH YIELDING MAIZE HYBRIDS (PARB NO.900)

Ten (10) single cross hybrids were used with two (02) inducer lines. Two hundred (200) crosses were made. One thousand (1000) Haploid seeds were developed.

SEED PRODUCTION

Two different isolated blocks of composite variety and hybrid were planted for seed production. Following table indicate the seed quantity produced.

Table 76: Seed Production, Kharif-2019, FAISALABAD

Sr. No.	Entry	Seed production (Kgs)
1	FH-1046 (Hybrid)	180
2	Malka-16 (OPV)	570

SPRING 2019:

Hybrid Evaluation Yield Trials:

Eleven (11) different (8 station and 3 adaptability) yield trials of hybrids were sown for evaluation.

1. Hybrid Maize Macro Yield Trial (Spring 2020)

A trial comprised of sixteen (16) single cross hybrids including one commercial and two local hybrids as checks were sown on 25-02-2020 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 below.

Table 77: Results of Hybrid Maize Macro Yield Trial No. 1 (Spring 2020), 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	Cobs Harvested
1	FH-1603	11716 a	78	68	70.5	202.5	97.5	72	78
2	FH-1606	11263 ab	79	69.5	72.5	210	112.5	69.5	77.5
3	FH-1624	11191 ab	78	71	73.5	195	110	69.5	73.5
4	FH-1745	11101 ab	75.5	72	75	212.5	132.5	53	56
5	FH-1400	10943 ab	79	72.5	75.5	210	127.5	66	68
6	NK-8441 (C)	11227 ab	77	69	72.5	197.5	97.5	66.5	73.5
7	FH-1543	10683 ab	78	67	70	202.5	92.5	71.5	75.5
8	FH-1616	10334 abc	79.5	73	75	200	120	65.5	69.5
9	FH-1046 (C)	9265 a--d	64.5	73	75.5	187.5	110	51.5	55.5
10	FH-1622-2	9173 a--d	77	73	74	187.5	115	62.5	66.5
11	FH-1731	8913 a--d	74	69	71	200	112.5	65	69
12	FH-1406	8881 a--d	76.5	70	73.5	182.5	105	71	75
13	FH-1740	7968 bcd	78.5	72.5	74.5	205	122.5	52	54
14	FH-1377	6789 cd	75	68.5	70.5	177.5	102.5	44	46
15	YH-5427 (C)	6537 d	50.5	72	74	167.5	100	47.5	53.5
16	FH-1779	2871 e	64	75.5	80.5	120	52.5	43	47
	CV%	17.99	6.17	2.14	2.07	7.88	8.46	10.11	10.6
	CD	3566.5	9.73	3.24	3.26	32.08	19.26	13.06	14.66

Data presented in the Table 77 reveals statistically significant differences in grain yield due to hybrids. The hybrid FH-1603 gave maximum grain yield of 11716 kg/ha followed by local hybrid FH-1606 (11263 kg/ha). Local hybrids, FH-1624, FH-1745, FH-1400 and FH-1745 were at par with commercial check hybrid NK-8441 (11227 kg/ha) and while significantly higher grain yielder than other two checks FH-1046 (9265kg/ha) and YH-5427 (6537 kg/ha). Significant differences were observed for days to 50% tasseling and silking. Local hybrid FH-1779 took the maximum days for 50% tasseling (75.5) and silking (80.5). Local hybrid FH-1745 attained the maximum plant height and cob height of 212.5 cm and 132.5 cm respectively. Number of plants harvested and cobs harvested were also showing statistically significant differences.

6. Hybrid Maize Micro Yield Trial No.1 (Spring 2020)

This trial comprised of sixteen (16) single cross hybrids including one commercial and two local hybrids as checks. They were sown on 25-02-2020, laid out according to RCB design with two replications. The plot size was kept 4m x 1.5m. The harvesting was done on 25-06-2020. Data regarding different agronomic traits were recorded and hybrids with good performance were selected for further evaluation. The data are given in the following table.

Table 78: Results of Hybrid Maize Micro Yield Trial-1 (Spring 2020), 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	Cobs Harvested
1	FH-1622-2	11829 a	39.5	73	76	182.5	110	36	38
2	FH-1400	11517 ab	39.5	74.5	78.5	192.5	115	34.5	36.5
3	FH-1428	10786 abc	37	73	75.5	180	97.5	32	34
4	NK-8441 (C)	11499 ab	40	69.5	72	182.5	82.5	36	38
5	FH-1046 (C)	9896 a--d	30.5	73	75	175	100	27.5	29.5
6	FH-1205	9706 a--d	38.5	73	75.5	135	105	34.5	37
7	FH-1677-1	9477 a--d	36	71	74	157.5	87.5	31.5	33
8	FH-1528	9430 a--d	33.5	73.5	76	185	100	32.5	36.5
9	FH-6724	9295 a--d	38	68.5	71	180	85	30	32.5
10	FH-1205-1	9266 a--d	35.5	73	75.5	177.5	97.5	29	31
11	FH-1675	9010 bcd	35	74	77.5	182.5	115	31.5	32.5
12	FH-1453	8907 bcd	34.5	75	77.5	182.5	105	32.5	34.5
13	FH-1337	8175 cd	33	72	74.5	165	85	26	28
14	FH-1677	7813 d	36	71	74	165	87.5	24	26
15	FH-1682	7811 d	35	71	73	160	85	30	31.5
16	YH-5427(C)	7752 d	30.5	73	75	165	95	23.5	25.5
	CV%	NS	7.43	1.87	2.13	NS	10.35	NS	11.17
	CD	2818.8	5.6627	2.886	3.4023	48.913	21.398	7.9347	7.8

Data presented in Table 78 reveals that differences in mean grain yields due to hybrids were statistically non-significant. Local hybrid FH-1622-2 gave the maximum grain yield of 11829 kg/ha followed by the local hybrid FH-1400 (11517 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 (68.5) and silking (71) was observed for local hybrid FH-6724. Differences in plant height were non-significant statistically while significant for cob height. Mid to a bit higher cob was observed in most of the hybrids. The maximum plant height (192.5 cm) was shown by local hybrid FH-1400 while the maximum cob height of 110 cm was observed by FH-1622-2. Number of plants harvested was showing statistically non-significant differences while cobs harvested and stand count were statistically significant.

7. Hybrid Maize Micro Yield Trials No.2 (Spring 2020)

This trial comprised of fourteen (14) single cross hybrids including one commercial and two local hybrids as checks. They were sown on 25-02-2020, laid out according to RCB design with two replications. The plot size was kept 4m x 1.5m. The harvesting was done on 25-06-2020. Data regarding different agronomic traits were recorded and hybrids with good performance were selected for further testing. The data are given in the following tables.

Table 79: Results of Hybrid Maize Micro Yield Trial-2 (Spring 2020), Faisalabad

Sr. No	Hybrid	Yield (kg/ha)	Stand Count	Days to 50% Tassel-ing	Days to 50% Silk-ing	Plant Height (cm)	Ear Height (cm)	Plants Harvested	Cobs Harvested
1	FH-1743-1	12546 a	41.5	69.5	71.5	207.5	115	32.5	34.5
2	FH-1731	11180 ab	40	70	72.5	202.5	110	30	32
3	FH-1046(C)	10458 abc	32.5	73	75	190	115	26	28.5
4	NK-8441(C)	11475 abc	40.5	69	71	180	92.5	33	36
5	FH-1745	9778 a--d	34.5	72.5	74.5	197.5	112.5	27	31.5
6	FH-1720-2	9675 a--d	41.5	73	75	187.5	115	31.5	34.5
7	FH-988	9608 a--d	33	73	75	205	130	24.5	26.5
8	FH-1720-1	9120 bcd	41.5	73	75	185	117.5	34.5	36.5
9	FH-1743-2	8822 bcd	36.5	70.5	72.5	197.5	110	29	31
10	FH-1724-1	8564 bcd	35.5	75	77	170	102.5	26.5	28.5
11	FH-1724-2	7921 cd	38.5	75	78	167.5	110	27.5	28.5
12	FH-1685	7373 d	40.5	73	75	180	112.5	26.5	28.5
13	YH-5427(C)	7345 d	32.5	72	74	165	95	26	28
14	FH-1740	3760 e	40	75	78	160	102.5	20.5	21.5
CV%		15.18	6.21	1.03	0.89	5.79	NS	NS	NS
CD		2988.9	5.0652	1.6054	1.4323	23.178	28.399	7.7066	8.9448

Data presented in the Table 79 reveals the significant differences in mean grain yields due to hybrids. Local hybrids FH-1743-1 gave the maximum grain yield of 12546 kg/ha followed by FH-1731 (11180 kg/ha). Both were higher grain yielder than the local check hybrid FH-1046 (10458 kg/ha) and commercial check hybrid NK-8441 (11475 kg/ha). Differences in plant height were significant while cob height was non-significant. The maximum plant height (207.5 cm) was shown by FH-1744-3 with a cob height of 115 cm. The minimum plant height (160cm) was observed for local hybrid FH-1740 with a cob height of 102.5 cm. Statistically non-significant differences were observed for number of plants harvested and cobs harvested also.

8. Hybrid Maize Preliminary Yield Trials (Spring 2020)

This trial comprised of five sets: four of them consisting of thirty single cross hybrids and remaining one containing twenty (20) single cross hybrids including two local hybrids in each set as checks were sown on 25-02-2020. 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 26-06-2020. Data regarding different agronomic traits were recorded and hybrids with good performance were selected for further testing. The data are given in tables given below:

Table 80: Results of Hybrid Maize Preliminary Yield Trial-1 (Spring 2020), Faisalabad.

Sr. No	Hybrid	Yield (kg/ha)	Stand Count	Days to 50% Tassel-ing	Days to 50% Silking	Plant Height (cm)	Ear Height (cm)	Plants Harvested	Cobs Harvested
1	FH-1906	13309 a	18	72.5	74.5	190	115	17	20.5
2	FH-1867	12538 ab	19.5	74.5	77.5	180	95	18	19

3	FH-1852	12270 abc	17	71.5	75	190	115	15.5	17.5
4	FH-1870	12258 abc	17	75.5	78.5	177.5	100	15.5	17.5
5	FH-1910	12198 abc	18	74.5	77.5	192.5	125	16.5	18
6	FH-1918	11457 a--d	20	73.5	75.5	175	112.5	18.5	19.5
7	FH-1858	11407 a--e	18	70.5	73	182.5	115	13	14.5
8	FH-1868	11300 a--e	19	73.5	77	182.5	107.5	17.5	17.5
9	FH-1914	11281 a--f	20.5	73	74.5	212.5	132.5	16	16
10	FH-1865	11051 a---g	18.5	73.5	77	200	135	17	17
11	FH-1046 (C)	10910a---h	18	73	75	180	117.5	16.5	16.5
12	FH-1847	10533 c---i	20	73.5	76.5	185	117.5	16	17.5
13	FH-1855	10356 c---i	18	76	79.5	187.5	122.5	16.5	17
14	FH-1866	9694 c---j	17	73.5	76	197.5	122.5	16	19
15	FH-1916	9336 d--j	17	70	72.5	185	105	15	16
16	FH-1913	9140 d---j	18	72.5	74.5	195	97.5	14	14.5
17	FH-1543	8661 e---k	19	69	71.5	180	87.5	16	17
18	FH-1908	8543 f---k	19.5	74.5	77	185	125	19	19.5
19	FH-1861	8471 g---l	17.5	71	73	165	107.5	16	17.5
20	FH-1915	8379 g---l	17	69	72	182.5	110	16	16
21	FH-1869	8308 g---l	18.5	77	80	162.5	95	13	14.5
22	FH-1911	8178 h---l	18.5	73.5	75.5	197.5	125	15	16.5
23	FH-1905	7925 i---l	19	75	77	170	110	14	14.5
24	FH-1848	7546 j---m	19.5	72	74.5	180	115	13	14
25	YH-5427 (C)	7287 j--m	14	73	75	175	112.5	11	13
26	FH-1912	7167 j---m	18.5	73	75	182.5	117.5	14	15.5
27	FH-1849	6254 klm	15.5	74	77.5	167.5	100	12	14
28	FH-1907	5918 klm	16	73	75	172.5	97.5	10	11
29	FH-1940	5736 lm	14.5	76	78	172.5	100	12	12.5
30	FH-1856	5157 m	20	75.5	78	162.5	92.5	13	13.5
CV%		14.27	NS	1.21	1.9	NS	NS	NS	NS
CD		2748.4	3.5169	1.8088	2.9418	30.894	32.748	3.123	5.2509

The data presented in the Table 80 shows statistically significant differences in grain yield due to hybrids. Local hybrid FH-1906 gave the highest grain yield of 13309 kg/ha followed by FH-1867 (12538 kg/ha). Other local hybrids FH-1852, FH-1870 and FH-1910 (12270, 12258 and 12198 kg/ha, respectively) also gave significantly higher grain yield than local checks FH-1046 (10910 kg/ha) and FH-5427 (7287 kg/ha). Days to 50% tasseling and 50% silking were showing statistically significant differences. The maximum days to tasseling (77) and silking (80) were taken by local hybrids FH-1869. Non-Significant differences were observed for plant height and cob height. Number of plants and cobs harvested per plot were also showing statistically non-significant differences.

Table 81: Results of Hybrid Maize Preliminary Yield Trial-2 (Spring 2020), Faisalabad.

Sr. No	Hybrid	Yield (kg/ha)	Stand Count	Days to 50% Tassel-ing	Days to 50% Silking	Plant Height (cm)	Ear Height (cm)	Plants Har-vested	Cobs Har-vested
1	FH-1874	12976 a	19	73.5	77	202.5	117.5	17	18.5
2	FH-1880	12851 a	19.5	74	76	182.5	97.5	18.5	19.5
3	FH-1944	12264 ab	20	74	76	210	135	16.5	18.5
4	FH-1945	11835 abc	20.5	72.5	74.5	202.5	127.5	17.5	20
5	FH-1876	11571 a---d	19.5	69.5	72	210	107.5	18	19
6	FH-1872	11559 a---d	20	69.5	72	192.5	112.5	17.5	18.5
7	FH-1046(C)	11556 a---d	16.5	71.5	74	192.5	107.5	15.5	16.5
8	FH-1942	11527 a---d	20.5	73	75.5	215	137.5	18.5	20
9	FH-1948	11306 a---d	20	74.5	78	192.5	120	17.5	20
10	FH-1881	11063 a---e	17.5	72.5	74	205	110	13.5	14.5
11	FH-6724	10798 a---e	19	67.5	70.5	192.5	85	18.5	19.5
12	FH-1878	10723 a---e	20.5	70.5	73	212.5	115	15.5	16.5
13	FH-1948	10690 a---e	20	74.5	77	202.5	127.5	17.5	18.5
14	FH-2020	10520 a---e	20	73	75	205	132.5	15.5	16.5
15	FH-1940	10489 a---e	20	73	75.5	195	127.5	17	18
16	FH-1853	10186 a---e	20.5	70	73	192.5	120	16	17
17	FH-1950	10178 a---e	19	74	76.5	202.5	125	15.5	17.5
18	FH-1951	10031 b---e	19	72	74	177.5	97.5	14.5	15.5
19	FH-1873	9830 b---e	19	73.5	76	144.5	117.5	14	15
20	FH-1875	9787 b---f	20	69.5	72.5	207.5	112.5	17	18
21	FH-1951	9665 b---f	20	72	74.5	187.5	150	16.5	17.5
22	FH-1943	9318 c---f	20	74.5	76.5	190	125	17	18
23	FH-1941	9141 c---f	18.5	73	75	200	120	17.5	18.5
24	FH-1937	9132 c---f	18.5	74	76	172.5	102.5	14	15
25	YH-5427(C)	8908 d---g	17.5	72.5	74	180	102.5	15	16
26	FH-1938	8275 efg	18.5	71.5	73.5	165	85	16.5	17.5
27	FH-1939	6995 fgh	17	75	77.5	160	100	16	17
28	FH-1947	6245 ghi	13	76	79	177.5	122.5	10	11.5
29	FH-1919	4444 hi	13	75	77	170	110	7	8
30	FH-1879	3934 i	19.5	75.5	78	202.5	117.5	10	11
CV%		13.84	7	1.94	2.38	NS	NS	13.32	14.37
CD		2810.8	2.6985	2.8857	3.6612	38.298	31.984	4.2713	4.9664

The data presented in the Table 81 shows statistically significant differences in grain yield due to hybrids. Local hybrid FH-1874 gave the highest grain yield of 12976 kg/ha followed by FH-1880 (12851 kg/ha). The local checks FH-1046 (11556 kg/ha) and YH-5427 (8908 kg/ha) remained at seventh and twenty fifth position. Days to 50% tasseling and 50% silking were showing statistically significant differences. While non-significant differences were observed for plant height and cob height. Local hybrid FH-6784 was earlier with

minimum days to 50% tasseling (67.5) and silking of 70.5. Number of plants and cobs harvested per plot were also showing statistically significant differences.

Table 82: Results of Hybrid Maize Preliminary Yield Trial-3 (Spring 2020), Faisalabad.

Sr. No	Hybrid	Yield (kg/ha)	Stand Count	Days to 50% Tassel-ing	Days to 50% Silking	Plant Height (cm)	Ear Height (cm)	Plants Har-vested	Cobs Har-vested
1	FH-1931	13391 a	19	72	74	182.5	105	18	19
2	FH-1923	13062 ab	21	70	73	195	110	17	18
3	FH-1887	12874 ab	20	72.5	75	205	115	18.5	19.5
4	FH-1920	12313 abc	19.5	70.5	72.5	207.5	120	17	18.5
5	FH-1935	12089 abc	19	72.5	74.5	200	105	17	18
6	FH-1886	11962 a--d	20.5	73	75	190	100	18.5	19.5
7	FH-1954	11857 a---e	19.5	71	73	200	102.5	19	20
8	FH-1928	11832 a---e	19	73	75	185	105	15.5	16.5
9	FH-1046(C)	11815 a---f	17.5	72.5	74.5	190	110	15.5	16.5
10	FH-1882	11254 a---f	18.5	71	73.5	197.5	115	15.5	18
11	FH-1952	11251 a---f	19	72.5	74.5	200	107.5	15.5	16.5
12	FH-1889	11116 a---f	20.5	73	75	202.5	107.5	16.5	17.5
13	FH-1933	11095 a---f	20	71	73.5	195	117.5	18.5	19.5
14	FH-1934	10946 a---g	17.5	72.5	74.5	190	100	14.5	16.5
15	FH-1955	10766 a---g	20.5	72	73.5	195	100	16.5	17.5
16	FNS-1	10670 a---g	20	71.5	73.5	187.5	92.5	17.5	18.5
17	FH-1543	10368 b---g	19.5	69	71	187.5	75	19	20
18	FH-1953	10365 b---g	18.5	69	71	205	112.5	16.5	17.5
19	FH-1921	10304 b---g	17.5	71	73	195	112.5	14.5	15.5
20	FH-1888	10241 b---g	20.5	74	76.5	185	97.5	16.5	17.5
21	FH-1925	9850 b---g	19.5	73	76	177.5	90	15	16
22	FH-1937	9483 b---g	17	72.5	74.5	185	115	14.5	15.5
23	FH-1924	9052 b---h	17.5	69.5	71.5	185	100	15	16
24	FH-1926	8986	19	70.5	73.5	197.5	107.5	17.5	18.5
25	FH-1936	8799 b---g	18.5	70.5	73	172.5	95	16	17
26	FH-1932	8542 c---h	18	73	75	182.5	100	14	15.5
27	YH-5427(C)	8503 c---h	15.5	73.5	75.5	172.5	95	13.5	14.5
28	FH-1930	8480 fg	18	70	72.5	200	112.5	14.5	15.5
30	FH-1927	8134 gh	20.5	72.5	75.5	155	82.5	17	18
31	FH-1929	5416 h	20.5	73.5	77.5	152.5	90	12.5	13.5
CV%		13.79	NS	1.94	1.87	NS	NS	NS	NS

CD	2960.5	2.8268	2.7369	2.9341	34.178	24.071	5.3353	5.8336
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The data presented in Table 82 shows statistically significant differences in grain yield due to hybrids. Local hybrid FH-1931 gave the highest grain yield of 11391 kg/ha followed by FH-1923 (13062 kg/ha). The local check FH-1046 gave 11815 kg/ha and other check YH-5427 gave 8503 kg/ha yield. Days to 50% tasseling and 50% silking were showing statistically significant differences. While non-significant differences were observed for plant height and cob height, Number of plants and cobs harvested per plot.

Table 83: Results of Hybrid Maize Preliminary Yield Trial-4 (Spring 2020), Faisalabad.

Sr. No	Hybrid	Yield (kg/ha)	Stand Count	Days to 50% Tassel-ing	Days to 50% Silking	Plant Height (cm)	Ear Height (cm)	Plants Har-vested	Cobs Har-vested
1	FH-1857	13565 a	17.5	73	75	190	122.5	17	18.5
2	FH-1962	12001 ab	19.5	73.5	75.5	205	125	17.5	18.5
3	FH-1881	11880 abc	19	73	76	185	102.5	17	18
4	FH-1885	11688 a---d	17.5	70.5	72.5	185	110	16.5	18
5	FH-8441	11366 a---e	20	71	73	197.5	92.5	19.5	20.5
6	FH-6724	10961 b---f	18.5	68	70	190	82.5	18.5	19.5
7	FH-1879	10784 b---f	19	72	74.5	182.5	110	14.5	15.5
8	FH-1892	10682 b---f	19.5	72	74.5	210	125	18	19
9	FH-1962	10489 b---g	18	73	76	210	122.5	13.5	14.5
10	FH-1956	10350 b---g	19.5	72.5	74.5	182.5	100	13	14
11	FH-1959	10301 b---g	18.5	73	75.5	185	102.5	16	17
12	FH-1988	9987 b---h	16.5	73	75	202.5	137.5	13.5	14.5
13	FH-1958	9897 b---h	19	73.5	76.5	177.5	90	15	16
14	FH-1946	9733 b---i	18	74	76.5	182.5	112.5	14	15
15	FH-1961	9446 c---i	18.5	71	73.5	197.5	120	11.5	12.5
16	FH-1963	9340 d---i	20	71	73.5	190	92.5	16.5	17.5
17	FH-5427(C)	9191 d---i	16.5	72	73.5	180	110	15	16
18	FH-1850	9126 e---i	15.5	72.5	74.5	185	122.5	12.5	13.5
19	FH-1884	9009 e---i	19	72.5	75.5	182.5	92.5	16.5	17.5
20	FH-1960	8986 efghi	17.5	73	75.5	192.5	117.5	14	15
21	FH-1046(C)	8502 f---i	15.5	73	75	185	112.5	11	12
22	FH-1936	8139 ghi	19.5	72.5	75.5	192.5	120	16	17
23	FH-1883	8055 ghi	17	72	76	135	95	13.5	14.5
24	FH-1862	8017 ghi	8.5	74	77	192.5	107.5	8.5	10.5
25	FH-1903	7785 hi	19	73	75	187.5	117.5	11.5	12.5
26	FH-1860	7677 hi	12	74.5	77	197.5	130	10	11
27	FH-1957	7579 hi	17.5	72	74	175	97.5	15	16
28	FH-1917	7343 i	11.5	74.5	76.5	205	130	11	13
29	FH-1922	7279 i	18	73	75	210	130	12	13
30	FH-1864	1908 j	4	78	80	185	105	4	4
CV%		13.07	9.76	2.26	NS	NS	NS	14.3	14.01

CD	2505.1	3.3902	3.3617	3.8867	35.934	31.753	4.1151	4.3358
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The data presented in the Table 83 shows statistically significant differences in grain yield due to hybrids. Local hybrid FH-1857 gave the highest grain yield of 13565 kg/ha followed by FH-1962 (12001 kg/ha). While the local check FH-1046 gave 9733 kg/ha yield. Days to 50% tasseling were showing statistically significant differences. While non-significant differences were observed for 50% silking, plant height and cob height. Maximum plant height was attained by three local hybrids FH-1892, FH-1962 and FH-1922 (210 cm) with a cob height of 125cm, 122.5cm and 130 cm, respectively. Number of plants and cobs harvested per plot were showing statistically non-significant differences.

Table 84: Results of Hybrid Maize Preliminary Yield Trial-5 (Spring 2020), 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	Cobs Harvested
1	FH-1400-1	13432 a	19	73.5	77	195	120	17.5	19.5
2	FH-8441	11371 ab	19.5	69.5	71.5	177.5	82.5	18.5	20
3	FH-1971	10983 abc	18	71	73	175	132.5	16	18
4	FH-1675	10826 a--d	18.5	75.5	78.5	192.5	125	17	18
5	FH-1046 (C)	10452 a--e	17.5	73.5	75.5	162.5	95	13	14
6	FH-1901	9831 b--f	17.5	73	76	182.5	107.5	13	14
7	FH-1543	9576 bcdef	19	68.5	70	180	77.5	18	19.5
8	FH-1972	9387 bcdef	19	75.5	76.5	175	140	17	18.5
9	FH-1969	9378 bcdef	19.5	72.5	74.5	185	117.5	15	16
10	FH-1967	9271 bcdef	19	71	74	187.5	117.5	15.5	16.5
11	FH-1978	9229 bcdef	16	72	75.5	172.5	92.5	13.5	14.5
12	FH-1896	8945 bcdef	17	68.5	70.5	172.5	82.5	14	15
13	FH-1899	8507 bcdef	19.5	72	74.5	170	92.5	15	16
14	FH-1453	8215 bcdef	16	73.5	76	177.5	100	13	14
15	FH-1976	7723 cdef	18.5	68.5	71	195	112.5	17	18
16	FH-1973	7650 def	19.5	70.5	73	180	110	15.5	16.5
17	FH-1965	7470 ef	14.5	73.5	76.5	160	102.5	12.5	14
18	FH-1975	6692 fg	14.5	73.5	76	167.5	107.5	9.5	10
19	FH-1898	3784 gh	6.5	73	75.5	157.5	92.5	6.5	7.5
20	FH-1983	3293 h	16.5	80	83	165	102.5	10	10.5
	CV%	17.96	10.29	2.25	2.37	NS	NS	13.53	15.37
	CD	3308.2	3.7163	3.4047	3.7225	26.584	42.98 1	4.0631	4.9878

The data presented in the Table 84 shows statistically significant differences in grain yield due to hybrids. Local hybrid FH-1400-1 gave the highest grain yield of 13432 kg/ha followed by local hybrid FH-8441 (11371kg/ha). While the local check FH-1046 gave 10452 kg/ha grain yield. Days to 50% tasseling and 50% silking were showing statistically significant differences. Local hybrid FH-1983 was later taking maximum days to 50% tasseling (80) and days 50% silking (83) while FH-1896 and FH-1976 were earlier with minimum days to 50% tasseling (68.5) and days to 50% silking (70 and 70.5). Plant height and cob height showed

statistically non-significant differences. Number of plants and cobs harvested per plot were also showing statistically non-significant differences.

9. National Uniform Hybrid Maize Yield Trial No. 1 Yellow (Spring 2020)

This trial comprised of eighty-one (81) entries was sown on 25-02-2020. 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 30-06-2020. Data regarding different traits were recorded. The data are given in the following table.

Table 85: Results of National Uniform Hybrid Maize (Yellow) Yield (Spring 2019)

Sr. No	Hybrid Code	Grain Yield/ha	Stand Count	50% Tassel-ing	50% Silk-ing	Plant Ht. (cm)	Ear Ht. (cm)	Plant Har-vested	Ear har-vested
1	12	15232	42	64	66	240	120	40	37
2	8	14262	40	64	67	180	60	37	35
3	33	14248	41	63	65	210	115	36	34
4	42	13904	39	65	68	200	90	34	32
5	18	13613	41	65	68	210	105	34	31
6	69	13550	41	64	66	170	85	38	36
7	3	13528	42	65	68	200	90	35	31
8	40	13486	39	71	73	185	75	36	34
9	44	13462	42	64	67	180	90	39	37
10	48	13297	38	63	65	195	90	41	38
11	28	13228	37	72	74	185	85	34	31
12	81	13164	42	69	71	165	100	46	43
13	24	13149	41	68	70	220	110	34	31
14	66	13148	38	65	68	220	110	34	32
15	60	13098	42	62	64	220	110	38	35
16	49	13081	42	64	65	215	105	38	36
17	27	13066	40	69	71	210	95	36	33
18	68	12975	41	65	67	215	115	44	41
19	37	12873	39	70	72	170	75	35	32
20	80	12822	38	68	70	180	80	39	36
21	31	12782	42	62	64	205	100	38	36
22	61	12779	41	64	66	210	115	35	32
23	54	12768	42	68	69	200	95	35	32
24	67	12734	42	65	68	210	100	36	33
25	70	12715	42	63	65	175	90	40	37
26	76	12637	39	67	68	175	85	35	32
27	73	12604	42	71	73	160	70	38	36
28	78	12596	42	67	69	205	105	40	36
29	62	12554	42	68	70	195	95	38	36
30	46	12498	36	70	72	190	100	35	32
31	75	12487	42	65	68	140	70	41	39
32	20	12388	39	63	65	210	125	35	33
33	77	12343	41	67	69	190	80	40	37

34	25	12321	42	62	64	215	105	40	38
35	56	12181	42	65	67	205	115	38	37
36	58	12169	42	63	65	200	120	36	35
37	23	12064	41	64	66	205	90	38	37
38	6	11961	39	63	65	205	105	35	32
39	15	11870	38	65	68	205	100	35	33
40	5	11798	39	67	69	215	110	33	31
41	39	11462	39	68	70	190	100	31	30
42	63	11327	41	68	70	220	115	34	31
43	57	11325	41	65	67	215	120	36	34
44	43	11313	42	65	68	200	90	37	35
45	34	11245	42	65	67	195	80	36	34
46	19	11223	41	68	70	190	80	38	37
47	32	11102	39	64	66	215	90	35	32
48	4	11014	42	65	68	210	95	36	32
49	14	10964	41	63	65	205	85	38	36
50	30	10925	40	67	69	215	105	28	27
51	11	10861	41	63	65	190	80	38	36
52	51	10646	41	63	65	180	80	34	32
53	7	10486	38	64	67	175	85	31	29
54	72	10381	41	71	73	180	70	34	32
55	79	10285	39	65	68	170	70	35	32
56	55	10145	41	63	66	175	75	36	33
57	74	10028	35	74	76	160	90	31	29
58	47	10020	39	67	69	180	95	35	32
59	38	9937	41	67	69	175	95	35	33
60	65	9933	39	67	69	205	105	33	31
61	22	9897	39	63	65	170	100	35	33
62	52	9860	42	64	66	180	75	31	30
63	36	9775	40	68	70	195	95	35	33
64	71	9721	42	62	64	165	75	38	36
65	59	9616	39	64	66	185	100	28	27
66	21	9408	36	70	72	210	105	34	31
67	1	9338	42	64	67	185	80	39	37
68	26	9255	25	68	70	200	90	29	27
69	29	9115	39	72	74	200	95	28	26
70	53	8986	36	65	67	195	90	38	36
71	9	8912	24	65	68	175	75	21	20
72	2	8780	41	63	65	180	75	34	31
73	64	8687	29	69	71	170	115	32	30
74	45	8385	37	67	69	170	90	33	31
75	13	8338	37	69	71	210	130	22	22
76	50	8309	41	63	66	185	85	31	28
77	17	7878	27	63	65	220	110	23	22
78	35	7473	29	68	70	180	95	23	22
79	10	6991	34	68	70	195	85	30	27
80	16	5070	11	70	72	190	110	13	13

81	41	4904	28	69	71	145	100	21	21
CV%		14.12	10.19	2.93	2.83	5.76	11.92	11.49	11.92
CD %		2098.8	5.96	3.33	3.30	17.16	6.53	6.14	6.53

Data presented in Table 85 revealed that statistically significant differences exist for grain yield kg/ha among entries included in this trial. Entry 12 gave maximum grain yield of 15232 kg/ha followed by entry 8 (14262 kg/ha). Entry 41 was lowest yielder with grain yield 4904 kg/ha at this station. Entries 60, 31, 25 and 81 had taken minimum days to start silking (64). Entry 12 revealed maximum plant height (240cm). Statistically significant differences were found for all traits.

10. National Uniform Hybrid Maize Yield Trial (White), Spring 2020 Faisalabad

This trial also comprising 81 entries was sown on 25-02-2020. 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 30-06-2020. Data regarding different traits were recorded and elite hybrids were selected for further evaluation. The data are given in table below:

Table 86: Results of National Uniform Hybrid Maize White “B” Trial (Spring 2020)

Sr. No	Hy-brid code	Grain yield kg/ha	Stand Count	Days to 50 % Tassel-ing	Days to 50 % Silk-ing	Plant Height (cm)	Ear Height (cm)	No of Cobs	Plant har-vested
1	67	12369	38	64	66	215	105	41	37
2	30	12232	40	65	67	175	100	42	38
3	34	12103	40	67	69	160	80	42	39
4	7	12087	40	65	67	205	90	42	39
5	22	12001	40	68	70	180	90	38	35
6	68	11952	39	64	66	170	100	39	36
7	72	11941	40	68	70	170	85	41	37
8	66	11915	38	63	65	205	100	40	38
9	17	11876	36	67	69	165	80	41	38
10	62	11839	40	68	70	185	90	42	39
11	26	11826	39	63	65	195	80	41	37
12	60	11800	38	68	70	195	90	39	37
13	80	11791	36	68	70	160	75	39	36
14	29	11772	39	65	67	215	90	40	37
15	41	11727	40	67	69	170	105	41	38
16	6	11718	41	68	70	200	100	42	38
17	18	11708	36	65	67	175	115	34	31
18	12	11694	39	65	67	175	85	35	32
19	77	11634	39	68	70	175	70	38	35
20	79	11593	40	65	67	195	100	42	38
21	28	11586	38	64	66	180	100	39	37
22	50	11517	40	65	67	190	90	43	40
23	45	11503	40	64	66	195	85	42	38

24	39	11488	40	68	70	190	80	41	38
25	8	11465	41	63	65	190	110	36	33
26	4	11400	40	68	70	190	100	38	36
27	47	11369	39	64	66	200	80	41	39
28	43	11356	39	68	70	215	90	42	39
29	64	11327	38	69	71	190	95	38	37
30	25	11326	38	68	70	170	70	39	36
31	46	11305	38	64	66	190	100	40	37
32	49	11256	39	65	67	215	120	41	37
33	51	11234	38	67	69	195	115	39	37
34	5	11214	38	70	72	205	75	36	34
35	3	11190	41	65	67	180	90	40	39
36	44	11190	38	67	69	190	100	39	36
37	19	11139	30	67	69	160	75	32	28
38	10	11137	37	65	67	195	105	37	36
39	40	11124	39	69	71	195	95	39	36
40	32	11109	40	68	70	175	90	39	36
41	31	11073	40	68	70	225	105	38	36
42	65	11045	36	68	70	195	100	37	34
43	61	11037	37	68	70	210	105	38	36
44	73	10965	39	69	71	190	90	37	35
45	74	10929	40	73	75	200	100	39	36
46	76	10880	38	69	71	195	105	39	36
47	48	10840	38	63	65	210	110	39	38
48	70	10761	38	68	70	190	85	38	35
49	69	10735	33	72	74	215	105	32	29
50	54	10709	38	67	69	185	85	40	37
51	56	10629	37	69	71	185	90	38	36
52	38	10624	38	68	70	160	80	39	36
53	24	10606	40	68	70	200	85	38	35
54	33	10558	38	69	71	185	75	37	35
55	35	10503	38	68	70	190	90	38	36
56	78	10426	39	68	70	175	85	39	37
57	13	10423	38	63	65	180	90	35	33
58	1	10382	42	65	67	160	75	42	39
59	21	10363	32	67	69	185	90	31	29
60	23	10321	45	69	71	190	80	37	34
61	53	10303	36	68	70	160	70	36	34
62	52	10290	34	67	69	190	85	35	34
63	11	10204	40	65	67	175	70	41	38
64	58	10093	36	71	73	195	100	36	34
65	2	9956	37	68	70	180	100	33	38
66	14	9802	36	65	67	195	100	36	33
67	37	9720	37	72	74	205	90	36	34
68	36	9678	37	70	72	195	95	37	35

69	42	9563	35	68	70	190	90	36	34
70	20	9554	23	67	69	145	70	31	28
71	27	9461	37	64	66	185	90	36	34
72	16	9429	37	68	70	180	80	24	24
73	75	9363	37	68	70	205	95	38	36
74	59	9322	35	70	72	175	95	37	35
75	9	9211	25	65	67	205	95	23	23
76	57	9059	33	70	72	190	90	31	29
77	81	8960	39	67	69	145	70	38	35
78	15	8569	27	68	70	175	85	32	29
79	71	8408	27	69	71	195	100	26	25
80	55	8106	27	67	69	170	80	26	25
81	63	4628	13	67	69	160	80	12	12
CV %		11.08	4.68	0.86	1.22	NS	NS	7.64	6.18
CD		1487.3	2.8527	1.0749	1.5689	6.97	10.86	4.154	3.45

Data presented in Table 86 showed significant differences for grain yield kg/ha for 81 entries. The Entry coded as '67' out yielded with grain yield 12369 kg/ha followed by entry '30' (12232 kg/ha). Entry coded as '63' was lowest yielder with grain yield 4627.6 kg/ha. Statistically non-significant differences were observed for plant height and ear height.

11. National Uniform Varietal (OPV) Maize Yield Trial (Spring 2020), Faisalabad

This trial was sown on 09-04-2020, with twelve (04) entries. The trial was laid out in RCB design with three replications. The plot size was kept 3 m². Standard agronomic and plant protection measures were carried out in the crop. Harvesting of trial was done on 28-07-2020. Data regarding different traits were recorded, and elite hybrids were selected for further evaluation. The data are given in table below.

Table 87: Results of National Uniform White (OPV) Maize Yield (Spring 2020)

Sr. No.	Entry No.	Yield (kg/ha)	Stand Count (%)	Days to 50% tasseling	Days to 50% silking	Plant Height (cm)	Ear Height (cm)	Plants harvested	Ears harvested
1	2	6437a	17	55	57	188	82	15	16
2	4	5700ab	19	52	54	185	90	17	18
3	3	5482ab	19	54	56	183	93	14	15
4	1	4841b	19	53	55	185	92	15	16
CV%		NS	NS	NS	NS	NS	NS	NS	NS
CD		1538	2.9	3.5	3.5	13.6	11.0	4.8	4.4

Data presented in Table 87 showed non-significant differences for grain yield kg/ha due to varieties. The Entry coded as '02' out yielded with a grain yield of 6437 kg/ha followed by '04' (5700 kg/ha). The entry coded as '04' was lower yielder with a grain yield of 4841 kg/ha. Statistically significant differences were observed for all other traits also.

12. ADP Project: Provision of Additional Research Facilities for Development of Heat Resilient Maize Hybrid at MMRI.

A trial of existing local hybrids was conducted at five locations for assessment of their yield vs multinational hybrids. The data recorded are shown in table below.

Table 88: Evaluation of local hybrids VS multinational hybrids (Spring 2020),

Location/ Name of Hybrids	D.O.H	YH- 5427	YH- 5482	DK- 6724	FH- 1046	YH- 1898	NK- 8441	P- 1543
Samundri	14-06-20	11681	10527	10324	11736	10310	9965	9863
Mouza Abu Saeed Chah In- sarian, Chiniot	18-06-20	11865	10935	10745	12058	9827	10347	11126
Tehsil Lalian, Chiniot	13-06-20	10127	9551	9017	9711	9021	9163	9933
Gojra	07-06-20	10241	9920	8791	10365	9671	9102	9307
Khidar Wala	06-06-20	9097	8897	8906	9563	8788	8365	9019
Average		10602	9966	9557	10687	9523	9388	9850

13. PARB PROJECTS

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

In spring 2020, 20 DH maize inbred lines were maintained by selfing.

2. Nutrition enhancement of crops, fruits, vegetables and their products under climate change scenario (PARB No. 904)

During spring 2020, 20 selected maize inbred lines were maintained. Thirty-eight hybrids were evaluated for quality parameters. Results are shown the table below.

Table 89: Quality Analysis of Maize Hybrids

Sr. No	Sample Description	Parameters					
		Mois- ture %	Ash %	Crud e Fat %	Crude Protein %	Crude Fiber %	. Beta Car- otene (Ug/100g)
1	FNH-201	9.58	1.12	4.08	7.89	1.99	242
2	FNH-202	9.29	1.22	3.97	8.23	2.15	229
3	FNH-203	9.76	1.07	4.07	8.66	2.03	229
4	FNH-204	10.15	1.15	4.22	7.88	2.01	248
5	FNH-205	10.63	1.14	3.97	7.79	2.08	280
6	FNH-206	10.21	0.95	4.07	7.70	1.89	223
7	FNH-207	9.42	1.25	3.89	8.58	2.13	242
8	FNH-208	9.40	1.00	4.13	8.31	2.11	234
9	FNH-209	9.62	1.00	4.55	7.70	2.08	218
10	FNH-210	10.41	1.26	4.29	8.84	2.15	245

11	FNH-211	9.52	1.17	3.85	8.40	2.00	245
12	FNH-212	9.38	1.07	4.38	8.05	1.95	286
13	FNH-213	10.45	1.24	4.33	7.96	2.00	224
14	FNH-214	9.77	1.11	4.34	8.58	2.16	239
15	FNH-215	9.65	1.21	4.05	8.23	2.10	228
16	FNH-216	9.68	1.18	3.87	8.14	2.03	249
17	FNH-217	9.66	1.10	4.00	8.31	2.12	253
18	FNH-218	9.79	1.17	3.96	8.05	2.16	276
19	FNH-219	10.00	1.30	4.15	8.05	2.12	238
20	FNH-220	10.29	1.11	3.84	8.14	2.13	227
21	FNH-221	9.52	1.21	4.27	8.31	2.17	238
22	FNH-222	10.53	1.20	4.39	8.66	2.15	230
23	FNH-223	9.09	1.13	3.92	8.75	2.18	254
24	FNH-224	10.29	1.12	4.01	8.23	2.02	246
25	FNH-225	10.05	1.12	4.08	8.14	2.07	249
26	FNH-226	10.00	1.06	4.05	8.05	2.15	272
27	FNH-227	9.70	1.12	4.08	8.23	2.17	232
28	FNH-228	9.77	1.30	4.22	8.66	2.08	249
29	FNH-229	9.76	0.95	4.00	7.53	1.91	250
30	FNH-230	9.64	1.10	4.07	7.61	2.15	254
31	FNH-231	9.30	1.33	4.30	7.53	2.08	281
32	FNH-232	9.19	1.26	4.11	8.14	1.98	262
33	FNH-233	10.54	1.01	4.31	7.96	2.06	237
34	FNH-234	9.88	1.12	3.99	7.79	2.01	266
35	FNH-235	9.59	1.01	4.29	8.23	1.97	224
36	FNH-236	10.72	1.11	3.99	8.84	2.19	255
37	FNH-237	9.14	0.96	4.33	8.49	2.13	288
38	FNH-238	10.59	1.04	4.06	8.75	2.02	234

3. Seed Production:

During spring 2020, 810 kg pre-basic certified seed of maize OPV Malka 2016 was produced.

MILLETS RESEARCH STATION, RAWALPINDI

SEASON AND ITS EFFECT:

Meteorological data of Millets Research Station, Rawalpindi for the financial year 2018-2019 and 2019-2020 are given below. During the year 2019-2020 (1465.8) mm rain was received (up to 30 June 2020) compared with 2018-2019 (1214.00 mm). Heavy rain in July badly affected the germinating Pearl millet crop. Heavy rain in August and September delayed flowering and hence maturity. Severe lodging was also observed in almost all the research trials. Low plant population even after re sowing and transplanting resulted in significant decrease in grain and fodder yield.

Table 90: Meteorological Data for the Financial Year 2018-19 and 2019-20

Sr. No.	Month	Temperature ° C				Rainfall (mm)	
		Maximum		Minimum		(2018-19)	(2019-20)
		(2018-19)	(2019-20)	(2018-19)	(2019-20)		
1	July	40.5	47.0	21.3	23.0	182.5	231.0
2	August	38.0	38.0	19.0	21.0	494.9	325.5
3	September	37.0	37.0	17.5	21.0	34.5	132.0
4	October	31.0	31.0	10.5	14.0	52.0	41.5
5	November	28.0	29.0	5.0	7.0	20.0	53.0
6	December	24.0	24.0	-2.0	1.0	22.0	12.5
7	January	-0.5	20.0	21.0	2.0	121.2	102.0
8	February	1.0	27.0	23.0	3.0	93.2	28.0
9	March	5.0	28.0	32.0	7.0	55.6	214.0
10	April	11.0	33.0	36.0	12.0	52.5	87.5
11	May	42.0	40	16.0	15	66.2	195.1
12	June	42.0	41	19	20	19.2	43.7
Total						1213.8	1465.8

RESEARCH WORK DONE:

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

Pearl Millet**1. Crossing Block of Pearl Millet**

Forty eight pearl millet germplasm lines were sown on 21-07-2019 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 16-08-2019 to 19-08-2019. Forty eight lines were maintained through hand pollination. Seed was harvested on 15-10-2019 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 F₁ population during kharif- 2019.

2. Development of Dual Purpose Pearl Millet Variety

Five breeding populations (F₁, F₂, S₁, S₂ and S₃) were sown in strips on 21.07. 2019. Plant to plant and row to row distances were kept as 20 cm and 75 cm respectively. F₁ crosses were selfed and off type plants were rogued out. Phenotypically superior plants selected from F₂ population were self-pollinated, harvested and seed was retained. Phenotypically superior and identical plants from S₁ and S₂ populations were self-pollinated and seed was bulked for each line separately. Twelve uniform lines from S₂ and S₃ populations were selected for evaluation in micro trials. The detail is given in the table below.

Table 91: Pearl Millet Populations Studied during Kharif- 2019

S. No.	Population	Studied	Selected	Selection for Micro Trial
1	F ₁	20	20	-
2	F ₂	20	38 single plants	-
3	S ₁	25	32 lines	-
4	S ₂	38	25	07 lines
5	S ₃	31	-	05 lines

3. Pearl Millet Micro Yield Trial –I

The trial, comprising of thirteen pearl millet genotypes, was sown on 22-07-2019 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 05-08-2019 to ensure required plant population. Harvesting was completed on 08-10-2019. The observations recorded on different plant parameters are summarized in the table given below.

Table 92: Results of Pearl Millet Micro Yield Trial - I Kharif- 2019 at MRS, RWPindi

R. No.	Varieties	Plants Harvested	Grain Yield (kg/ha)	Stalk Yield (kg/ha)	Days to 50% Flowering	Plant Height (cm)
1.	YBH-278	69	3521a	38000	50	270
2.	86M88	68	3146ab	29333	52	245
3.	18RBS-45	70	3021b	31000	49	242
4.	18RBS-48	68	2733bc	25000	51	241
5.	18RBS-52	70	2489cd	32000	49	258
6.	18RBS-43	68	2417cd	35667	48	260
7.	18RBS-47	69	2409cd	26000	51	227
8.	18RBS-49	69	2337cde	28667	48	241
9.	18RBS-51	67	2283cde	26333	53	242
10.	18RBS-44	67	2219de	27667	50	240
11.	18RBS-42	64	1892ef	26333	50	220
12.	18RBS-46	68	1874ef	28333	48	240
13.	18RBS-50	66	1640f	31667	52	254
CV %		4.60	8.52	9.21	1.26	1.67
LSD 1%		7.12	478.58	6242.60	1.45	9.35

The results presented in Table 92 revealed highly significant genetic differences among genotypes for parameters like grain and fodder yield, days to 50% flowering and plant height except plants harvested. The genotypes, YBH-278 and 86M88 gave maximum grain yield of 3521 kg/ha and 3146 kg/ha respectively followed by 18RBS-45 (3021 kg/ha). While the genotype, 18RBS-50 gave minimum yield of 1640 kg/ha. The genotype YBH-278 gave maximum stalk yield of 38000 kg/ha followed 18RBS-43 (35666 kg/ha).

4. Pearl Millet Micro Yield Trial -II

The trial, comprising of thirteen Pearl millet genotypes, was sown on 22-07-2019 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 08-08 2019 to ensure required plant population. Harvesting was completed on 09-10-2019. The observations recorded on different plant parameters are summarized in the table below:

Table 93: Results of Pearl Millet Micro Yield Trial- II Kharif, 2019 at MRS, RWPindi

R. No.	Entries	Plants Harvested	Grain Yield (kg/ha)	Stalk Yield (kg/ha)	Days to 50% Flowering	Plant Height (cm)
1.	YBH-278	69	3241a	34333	49	264
2.	17RBS-41	67	2811b	30667	49	249
3.	17RBS-36	67	2792bc	34000	51	248
4.	86M88	68	2627bcd	32000	48	240
5.	17RBS-35	67	2549bcd	27333	51	239
6.	17RBS-31	65	2396bcde	31333	52	239
7.	17RBS-38	67	2387cde	32000	48	249
8.	17RBS-37	68	2269def	23667	52	210
9.	17RBS-40	67	2216def	25333	49	238
10.	17RBS-34	66	1983efg	24000	48	200
11.	17RBS-32	68	1952fg	26667	48	210
12.	17RBS-39	68	1866fg	27333	47	237
13.	17RBS-33	67	1730g	25000	48	221
CV %		5.25	7.72	7.54	2.02	1.96
LSD 1%		8.06	417.97	4951.4	2.27	10.50

The results presented in the above Table 93 revealed highly significant genetic differences for all the parameters like grain and stalk yield, days to 50% flowering, plant height and plants harvested. The genotype YBH-278 gave maximum grain and stalk yield of 3241kg/ha and 34333 kg/ha respectively followed by 17 RBS-41 (2811kg/ha & 30667 kg/ha). Two advanced lines excelled the check variety (86M88) 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

Twelve 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 22-07-2019 according to randomized complete block design with three replications. The plot size was 11.25m² with three 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 05-08-19 which produced good effect on plant growth and population. The harvesting was completed on 11-10-2019. The data of various plant parameters were recorded and the summary of the results is presented in the table below:

Table 94: Results of Pearl Millet Varietal Yield Trial Kharif 2019 at MRS, RWPind

R. No.	Entries	Plants Harvested	Grain Yield (kg/ha)	Stalk Yield (kg/ha)	Days to 50% Flowering	Plant Height (cm)
1.	YBS-92	67	3530a	30333	51	241
2.	YBS-89	66	3122a	33000	52	246
3.	YBS-83	67	2325b	29333	53	235
4.	YBH-278	67	2249b	35000	54	238
5.	YBS-94	66	2227b	34667	52	249
6.	YBS-98	67	2166b	33667	54	249
7.	YBS-93	67	2129b	33667	56	250
8.	14RBS-01	66	2066bc	33667	57	245
9	14RBS-02	68	1996bc	35333	57	248
10.	86M88	66	1971bc	34000	55	234
11	14RBS-05	69	1653cd	33000	52	245
12	YBS-95	66	1464d	36000	52	247
CV %		4.21	8.05	6.71	2.71	1.88
LSD 1%		6.49	415.28	5172.2	3.35	10.57

Analysis of variance of the data presented in Table 94 showed highly significant differences among genotypes for grain yield, stalk yield, days to 50% flowering, plant height except plants harvested. Table 5 revealed that genotype YBS-92 gave maximum grain yield of 3530 kg/ha followed by YBS-89 (3122 kg/ha) whereas check variety YBH-278 produced grain yield of 2249 kg/ha. The genotype 14RBS-02 gave maximum stalk yield of 35333 kg/ha followed by YBH-278 (35000 kg/ha). Minimum number of days (51) to 50% flowering was taken by YBS-92 while maximum number of days to 50% flowering was taken by 14RBS-01 and 14RBS-02 (57).

6. Adaptability/National Uniform Millet Hybrid Yield Trial Kharif 2019

The experiment comprised of twenty two pearl millet genotypes, received from National Agricultural Research Centre, Islamabad was sown on 31-08-2019 at Millets Research Station, Rawalpindi, during Kharif 2019. 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. The experiment was harvested on 29-10-2019. The data recorded on different plant parameters were sent to the quarter concerned. Analyses could not be done due to coding of entries. The trial did not performed well due to late sowing and severe lodging because of heavy rains with wind storms in September.

MAIZE BREEDING SUB STATION, CHHARRAPANI (MURREE) HYBRID MAIZE (*Zea mays* L.)

1. Hybrid Constitution

Development of high yielding maize hybrids using temperate maize inbred lines is in process at MBSS, Chharrapani – Murree. Fifteen (15) advance maize derivatives (Elite lines) were sown for single cross constitution with one common male parent. These single crosses will be sown in next spring season 2021 for evaluation.

2. Derivation of Maize Inbred Lines

Four single crosses were sown (source population) for derivation of maize inbred lines by selfing through hand pollination.

3. Maintenance of Maize Inbred Lines

Sixteen (16) advance maize derivatives (Elite lines) were sown for maintenance by hand pollination.

4. Combining Ability Studies:

Constitution of single crosses for combining ability studies in a 5 x 5 diallel crosses using five (5) inbred lines.

Sowing was done on May 04, 2020 in the research area of Maize Breeding Sub- Station, Chharrapani (Murree). Sowing was 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. Pre emergence weedicide (Primextra Gold) was sprayed after sowing. Furadan granules @ 08 Kg / acre against stem borer and insecticide coragen 20% SC @ 50 ml / acre against army worm was also applied.

During the cropping season proper roguing was done to maintain purity of the inbred lines. All the maize breeding material after harvesting in August 2020 will be shifted to the Director, Maize and Millets Research Institute (Sahiwal) for further utilization in maize hybrid development program.

SORGHUM RESEARCH SUB-STATION, DERA GHAZI KHAN

Season and Its Effects

During the year 2019-20, 154.00 mm rainfall was received as compared to the year 2018-19, 87.50 mm rainfall was received. Non availability of Irrigation water delayed the sowing of trials till the last week of July. Heavy rains in August badly affected the germination of the trials and created hindrance in cultural operations and promoted the growth of different weeds as well. Rains, humid & cold weather from October to December-19, promoted the favorable environment for disease & insect pest attack which delayed the maturity and adversely affected the yield of the trials.

Table 95: Summary of Metrological Data at D.G. Khan

Sr. No.	Month	Average Temperature C*				Rainfall (mm)	
		Maximum		Minimum		2018-19	2019-20
		2018-19	2019-20	2018-19	2019-20		
1	July	38.48	39.45	29.38	28.06	5.00	---
2	August	36.83	37.71	28.87	27.48	---	46.00
3	September	34.77	39.95	26.43	29.00	---	---
4	October	33.58	33.23	20.61	19.94	---	38.00
5	November	27.16	25.50	13.13	14.13	---	6.00
6	December	22.10	18.71	7.10	6.97	2.00	3.00
7	January	19.71	16.89	6.13	5.71	---	9.00
8	February	20.54	24.27	8.36	8.26	2.00	2.00
9	March	29.97	23.50	12.45	13.84	9.50	31.00
10	April	34.70	29.73	19.47	18.60	39.00	7.00
11	May	38.90	38.33	24.61	23.50	---	7.00
12	June	40.47	41.66	26.53	30.70	30.00	5.00
Total rainfall						87.50	154.00

SORGHUM

1. Sorghum Varietal Yield Trial, Kharif-2019

Ten entries of Sorghum were planted on 24.07.2019 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 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 18.12.2019. The data recorded for different morphological traits are presented in table below:

Table 96: Results of Sorghum Varietal Yield Trial at D.G. Khan

S #	Entry Name	Crop Stand	Grain Yield (kg/ha)	Stalk Yield (kg/ha)	Plant Height (cm)	Days to 50% anthesis
1	YSS-10	39	3333a	19583	253	98
2	YSS-17	39	3000b	23333	228	98
3	YS-16 c	40	2389c	35695	268	100
4	YSS-41	38	2333c	28889	255	96
5	YSS-18	41	2222cd	25972	162	94
6	YSS-25	40	2167cd	30278	365	110
7	YSS-31	41	2000de	19583	184	95
8	YSS-38	39	1833e	18611	216	90
9	YSS-23	39	1167f	29861	343	101
10	YSS-42	39	1000f	22361	259	109
	CV%	2.65	7.34	2.56	1.59	1.04
	LSD 5%	----	270.18	1118.60	6.91	1.76

The results reveal that differences of means due to genotypes were significant for all traits under study. Maximum grain yield of 3333 kg/ha was recorded for the entry YSS-10 while minimum grain yield (1000 kg/ha) was recorded for entry YSS-42. Highest stalk yield was recorded for the variety YS-16 (35695 kg/ha) while minimum stalk yield 18611 kg/ha was observed for YSS-38. Maximum plant height (365 cm) was observed for variety YSS-25 while minimum plant height (162 cm) was observed for YSS-18. Entry YSS-25 took maximum 110 days to 50% anthesis while entry Yss-38 took minimum 90 days.

2. Sorghum Hybrid Yield Trial, Kharif- 2019

16 crosses and two check varieties of Sorghum were planted on 24.07.2019 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 4m x 1.5m. Plant to plant and row to row distances were kept 15cm and 75cm respectively. Standard agronomic and plant protection measures were carried out in the experiment. The harvesting was done on 23.12.2019. The data recorded for different morphological traits are presented in table below:

Table 97: Results of Sorghum Hybrid Yield Trial at D.G. Khan

S #	Entry Name	Crop Stand	Grain Yield (kg/ha)	Stalk Yield (kg/ha)	Plant Height (cm)	Days to 50% anthesis
1	YSH-132	48	3833a	43195	238	90
2	YSH-153	50	3167b	38333	213	90
3	YSH-139	48	2889bc	30867	212	88
4	YSH-141	49	2667cd	22778	217	81
5	YSH-95	48	2611cde	25694	206	98
6	Lasani	49	2500def	30694	215	100
7	YS-16 c	48	2444def	37500	264	99
8	YSH-131	47	2333efg	43889	188	90
9	YSH-137	48	2222fgh	32778	201	82
10	YSH-142	50	2056ghi	26111	206	80
11	YSH-129	49	2000hi	29306	208	77
12	YSH-152	48	1944hij	20000	210	78
13	YSH-151	50	1889ij	32361	209	90
14	YSH-128	48	1889ij	26250	209	77
15	YSH-130	47	1778ijk	24385	185	77
16	YSH-134	48	1667jk	36528	231	95
17	YSH-148	48	1555k	23056	217	95
18	YSH-138	49	1500k	28611	219	81
	CV%	2.40	7.37	2.24	1.43	1.25
	LSD 5%	----	278.23	1141.50	5.07	1.81

The above Table 97 reveals that differences of means due to genotypes were significant for all traits under study. The maximum grain yield of 3833 kg/ha was produced by hybrid YSH-132 while minimum grain yield (1500 kg/ha) was recorded for YSH-138. Highest stalk yield was also recorded for the hybrid YSH-131 (43889 kg/ha) which is followed by the hybrid YSH-132(43195) kg/ha while minimum stalk yield was observed for YSH-152 (20000 kg/ha). Maximum plant height was observed for entry YS-16 c (264 cm)) while minimum plant height of 185 cm was observed for the hybrid YSH-130. Lasani took maximum 100 days to 50% anthesis while YSH-130 took minimum 77 days for 50 % anthesis.

3. National Uniform Sorghum (Grain) Yield Trial, Kharif-2019

Twelve entries of Sorghum were planted on 20.08.2019 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 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 31.12.2019. The data recorded for different morphological traits are presented in table below:

Table 98: Results of National Uniform Sorghum (Grain) Yield Trial at D. G. Khan

S #	Entry Name	Crop Stand	Grain Yield (kg/ha)	Stalk Yield (kg/ha)	Plant Height (cm)	Days to 50% anthesis
1	YSH-95 (c)	42	2889a	22361	178	81

2	MINTO	42	2111b	17222	209	87
3	YSH-134	43	2055b	21667	168	85
4	RARI.S-22	42	2000bc	17500	187	89
5	YSS-42	41	1945bc	13750	165	85
6	EAGLE	41	1833bc	15000	184	89
7	GS-66	42	1778bcd	12917	152	83
8	SG-87	40	1667cd	13889	233	83
9	NAGINA	41	1445de	20000	194	86
10	LASANI	42	1167e	15417	213	85
11	YSH-132	41	1111e	15556	153	88
12	YSH-151	42	1083e	17916	187	88
	CV %	2.74	12.69	3.07	1.61	4.34
	LSD 5%	----	377.57	880.74	5.06	6.25

The results reveal that differences of means due to genotypes were significant for all traits under study. Maximum grain yield of 2889 kg/ha was recorded for YSH-95 while minimum grain yield of 1083 kg/ha was recorded for YSH-151. Highest stalk yield was recorded for YSH-95 i.e., 22361 kg/ha while minimum stalk yield was recorded for GS-66 i.e. 12917 kg/ha. Maximum plant height of 233 cm was observed for SG-87 while minimum plant height of 152 cm was observed for GS-66. RARI.S-22 took maximum 89 days to 50% anthesis while YSH-95 took minimum 81 days.

4. National Uniform Sorghum (Fodder) Yield Trial, Kharif-2019

Ten lines/varieties of Sorghum were planted on 20.08.2019 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 4m x 3m. 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 08.11.2019. The data recorded for different morphological traits are presented in table below:

Table 99: Results Of National Uniform Sorghum (Fodder) Yield Trial at D.G.Khan

S #	Entry Name	Crop Stand	Green fodder Yield (kg/ha)	Dry Matter Yield (kg/ha)	Plant Height (cm)
1	SANDAL BAR	79	24028a	5417	243
2	No.1572	78	22708b	5208	154
3	Healthy Cow	80	17430c	3542	234
4	FD-3290	80	17153c	5069	225
5	No.80010	81	16667d	3958	239
6	SUPREME	80	16250d	6250	237
7	SUPER-TALL	79	15695e	4514	174
8	YS-16	79	15625e	4167	215
9	Sorghum 2011 (Check)	80	15347e	4583	219
10	FD-786	80	13543f	3958	215
	CV%	1.08	1.51	3.61	1.85
	LSD 5%	----	452.63	288.76	6.83

The results reveal that differences of means due to genotypes were significant for all traits under study. Maximum green fodder yield of 24028 kg/ha was recorded for entry SANDAL BAR while minimum green fodder yield of 13543 kg/ha was recorded for FD-786. Highest dry matter yield was recorded for SUPREME i.e., 6258 kg/ha while minimum dry matter yield was recorded for entry FD-786 & No.80010 i.e., 3958 kg/ha. Maximum plant height of 243 cm was observed for SANDAL BAR while minimum plant height of 154 cm was observed for No.1572.

5. Sorghum Gene Pool

Eighty-one sorghum cultivars/lines comprising of local and exotic origin were sown on 24.07.2019 in strips having plot size 4m x 1.5m to maintain for breeding programme. All entries were maintained by open pollination and guarded plants of each cultivar were harvested on 30.12.2019 and threshed carefully that will be sown for maintenance during KH-20

PEARL MILLET

1- Pearl Millet Varietal Yield Trial, Kharif-2019

Twelve lines/varieties of Pearl Millet were planted on 26.07.2019 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 1.5m. 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 07.11.2019. The data recorded for different morphological traits are presented in table below:

Table 100: Results Of Pearl Millet Varietal Yield Trial at D.G. Khan

S #	Entry Name	Crop Stand	Grain Yield (kg/ha)	Stalk Yield (kg/ha)	Plant Height (cm)	Days to 50% anthesis
1	YBH-278	35	3500a	16667	191	70
2	YBS-89	36	2833b	20600	246	67
3	YBS-94	37	2500bc	13750	241	70
4	14-RBS-02	35	2445c	19306	230	68
5	YBS-83	35	2389c	11250	245	69
6	YBS-98	36	2333c	9583	225	68
7	14-RBS-05	36	2278cd	17083	238	63
8	86-M-88	35	2167cde	10417	186	71
9	YBS-95	37	2000de	11667	243	70
10	YBS-93	36	1945de	15417	230	69
11	14-RBS-01	36	1833e	14306	228	66
12	YBS-92	36	1167f	11250	216	64
	CV%	2.47	8.94	3.26	2.46	1.40
	LSD 5%	----	346.81	765.45	9.43	1.61

The results reveal that differences of means due to genotypes were significant for all traits under study. Maximum grain yield of 3500 kg/ha was recorded for YBH-278 while minimum grain yield of 1167 kg/ha was recorded for YBS-92. Highest stalk yield of 20600 kg/ha was recorded for YBS-89 while minimum stalk yield of 9583 kg/ha was recorded for YBS-98. Maximum plant height of 246 cm was observed for YBS-89 while minimum plant height

of 186 cm was observed for 86-M-88. 86-M-88 took maximum 71 days to 50% anthesis as compared to 14-RBS-05 which took minimum 63 days.

2. National Uniform Millet (Grain) Yield Trial, Kharif-2019

Twenty two lines/varieties of pearl millet were planted on 20.08.2019 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 1.5m. 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 20.12.2019. The data recorded for different morphological traits are presented in table below:

Table 101: Results of National Uniform Millet (Grain) Yield Trial at D.G.Khan

S#	Entry Name	Crop Stand	Grain Yield (kg/ha)	Stalk Yield (kg/ha)	Plant Height (cm)	Days to 50% anthesis
1	86-M-20	35	1722a	9583	143	80
2	Fareed-01	37	1500ab	8333	123	76
3	SD-55S95	35	1444bc	9444	126	74
4	YBS-98 (c)	36	1389bcd	10833	173	69
5	Hercules	37	1333b-e	9861	144	82
6	86-M-38	37	1333b-e	10139	153	77
7	HS-888	37	1278b-f	9583	154	78
8	SD-55S90	37	1278b-f	10000	115	78
9	14RBS-02	36	1222c-g	9583	184	69
10	SHAHENSH AH	37	1167d-h	9028	130	76
11	Shahansha	37	1111e-i	12083	120	76
12	SD-55S20	35	1056f-j	8750	133	80
13	AA-7868	36	1056f-j	8750	129	79
14	MP-24	36	1000g-k	8750	139	81
15	RARI Composit7	36	944h-k	10000	183	80
16	HP-233	36	889i-l	9167	138	79
17	14RBS-05	36	889i-l	10417	172	67
18	14RBS-01	36	833j-m	9861	191	77
19	SM-01	36	833j-m	8333	120	79
20	YBH-278	36	778klm	8333	142	78
21	KQS-HM-3	36	667lm	8750	132	78
22	YBS-89	35	611m	10695	199	68
	CV%	2.82	12.94	4.89	2.92	1.66
	LSD 5%	----	235.79	767.48	7.10	2.09

The results reveal that differences of means due to genotypes were significant for all traits under study. Maximum grain yield of 1722 kg/ha was recorded for line/variety 86M20 while minimum grain yield of 611 kg/ha was recorded for YBS-89. Highest stalk yield was recorded for Shahansha i.e., 12083 kg/ha while minimum stalk yield was recorded for Fareed-01, SM-01 & YBH-278 i.e., 8333 kg/ha. Maximum plant height of 199 cm was observed for YBS-89

while minimum plant height of 115 cm was observed for SD-55S90. Entry Hercules took maximum 82 days to 50% anthesis while 14RBS-05 took minimum 67 days.

3. National Uniform Millet (Fodder) Yield Trial, Kharif-2019

Ten lines/varieties of Sorghum were planted on 20.08.2019 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 4m x 3m. 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 05.11.2019. The data recorded for different morphological traits are presented in table below:

Table 102: Results of National Uniform Millet (Fodder) Yield Trial at D.G. Khan

S #	Entry Name	Crop Stand	Green fodder Yield (kg/ha)	Dry Matter Yield (kg/ha)	Plant Height (cm)
1	FB-792	70	12708a	3056	199
2	YBS-98 (C)	69	9793b	2333	186
3	JAMBO	70	8333c	2250	133
4	Sargodha Bajra-2011 (C)	69	8125c	2250	197
5	BS-2000	70	7986c	2083	168
6	FIGHTER-72	69	7083d	1639	137
7	Composite-11	70	7083d	1667	164
8	Quetta Bajra	70	7083d	1889	169
9	FB-806	71	6875d	1917	169
10	ZS-1199	69	6042e	1472	122
	CV%	1.48	2.58	4.36	2.42
	LSD 5%	----	359.51	153.73	6.82

The results reveal that differences of means due to genotypes were significant for all traits under study. Maximum green fodder yield of 12708 kg/ha was recorded for entry FB-792 while minimum green fodder yield of 6042 kg/ha was recorded for ZS-1199. Highest dry matter yield was recorded for entry FB-792 i.e., 3056 kg/ha while minimum dry matter yield was recorded for entry ZS-1199 i.e., 1472 kg/ha. Maximum plant height of 199 cm was observed for FB-792 while minimum plant height of 122 cm was observed for ZS-1199.

4. On-Farm Pearl Millet Yield Trial, Kharif-2019

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 for each variety. 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 # 8.

Table 103: Results of On-Farm Pearl Millet Yield Trail at D.G. Khan

S. No.	Address of location	Grain yield (kg/ha)		
		YBH-278	YBS-89	YBS-98

1	Qasim Qureshi Sb Mouza Chak Sa-laari D.G.Khan	2076	1937	1759
2	Muhammad Mirza Mouza Chak Buz-dar Kot Chutta D.G.Khan	2016	1838	1661
3	Atta Ullah Mouza Mohammad Hora Jampur D.G.Khan.	1858	1700	1542
Average		1983	1825	1654

This table shows that the Variety YBH-278 gave maximum grain yield on an average i.e. 1983 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	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. Chem-	-	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	04	01	05
25	Electrician	01	-	01
26	Naib Qasid	06	01	07
27	Tube well Operator	05	01	06
28	Beldar	41	05	46
29	Chowkidar	05	01	06
30	Mali	01	-	01
31	Sweeper	01	-	01
32	Cook	01	-	01
Total		143	36	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-Ullah	Assistant Botanist Sor-	M. Sc. (Hons) Agri.
14	Dr. Javed Iqbal	Assistant Agronomist	Ph.D.
15	Mr. Muhammad Siddique	Assistant Botanist Millet	M. Sc. (Hons) Agri.
16	Mr. Abdul Razaq	Assistant Botanist Maize	M. Sc. (Hons) Agri.
17	Dr. Nadeem Iqbal	Assistant Agronomist	Ph.D.
18	Miss. Khansa Khakwani	Assistant Research Officer	M. Sc. (Hons) Agri.
19	Mr. Ghulam Murtaza	Assistant Research Officer	M. Sc. (Hons) Agri.
20	Dr. Muhammad Shoaib	Assistant Research Officer	Ph.D.
21	Mr. Shahid Hussain	Assistant Research Officer	M. Sc. (Hons) Agri.
22	Mr. Aamir Ghani	Assistant Research Officer	M. Sc. (Hons) Agri.
23	Mr. Muhammad Shakeel	Assistant Research Officer	M. Sc. (Hons) Agri.
24	Mrs. Guljana Nazir	Assistant Research Officer	M. Sc. (Hons) Agri.
25	Miss. Saeeda Khanum	Assistant Research Officer	M. Sc. (Hons) Agri.
26	Muhammad Husnain Bhatti	Assistant Research Officer	M. Sc. (Hons) Agri.
27	Mr. Barkat Ali	Assistant Research Officer	M. Sc. (Hons) Agri.
28	Mr. Muhammad Altaf	Assistant Research Officer	M. Sc. (Hons) Agri.
29	Mr. Naveed Kamal	Assistant Research Officer	M. Sc. (Hons) Agri.
30	Mr. Aamer Mumtaz	Assistant Research Officer	M. Sc. (Hons) Agri.
31	Dr. Waseem Akbar	Assistant Research Officer	Ph.D.
32	Mr. Muhammad Irfan Yousaf	Assistant Research Officer	M. Sc. (Hons) Agri.
33	Mr. Hafiz Mutahir Javed	Assistant Research Officer	M. Sc. (Hons) Agri.
34	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-Sahawal (Headquarter)	1671.0	Research and Maize Seed Production Farm.
2.	Maize Sub-Station, Chak 86/9-L, Sahawal.	459.625	Research and Maize Seed Production Farm.
3.	Maize Seed Farm, Chak 1 1/14-L, Iqbalnagar District Sahawal.	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
2018-2019	98,207,335	97,773,690	12,48,5000	12,006,126
2019-2020	103,477,044	102,102,405	11,963,500	12,008,182

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.

MAIZE AND MILLETS RESEARCH INSTITUTES, SAHIWAL

	<p>Dr. Muhammad Arshad Director</p> <p>Tel: +92-40-4301141</p> <p>Cell: +92-333-6568996</p> <p>Email: direc-tormmri@gmail.com</p>	
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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 in 1968-69. 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 livestock. In Punjab due to adoption of hybrids per hectare yield of maize has been increased from 1890 kg/ha (2001-02) to 6309 kg/ha (2018-19). This institute has released 16 OPV's, 16 hybrids of maize, three varieties and one hybrid of sorghum, and two varieties of pearl millets so far. During this year, two maize hybrids (YH-5427, FH-1036), five maize OPV's (Sahiwal Gold, Gohar, POP-1, CIMMYT-PAK, Sweet-I) and one sorghum hybrid (Fakhar-e-Punjab) has been approved by the Punjab Seed Council. Moreover ten (10) maize hybrids, one maize OPV and two sorghum OPV's and one sorghum hybrid are being tested in National Uniform Yield Trials and under DUS studies. These newly approved high yielding hybrids and OPV's will be helpful in self-sufficiency. Quality seed of maize hybrids and OPV's, sorghum and millet varieties will be available at lower cost and also curtail the import bill incurred on import of seed. The research work conducted in 2019-20 and salient achievements are as under:

HYBRID MAIZE (*Zea mays* L.)

Maintenance and Derivation of Yellow Maize Inbred Lines

Five hundred and eight (508) and 490 inbred lines were maintained at Maize & Millets Research Institute, Yusafwala in Kharif 2019 and Spring 2020 respectively 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.

Four hundred thirty (430) and 419 derivative families in Kharif 2019 and Spring 2020 respectively were sown ear to row 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 one hundred and thirty three (133) inbred lines were maintained and two hundred and fifty (250) inbred families' generations were advanced in Kharif-2019. Seventeen (17) new inbred lines were included in gene pool.

Maintenance and Derivation of White Maize Inbred Lines

For maintenance and derivation of inbred lines through hand pollination 49 inbred lines in Kharif 2019 and 55 inbred lines in Spring 2020 were maintained. One hundred & forty one (141) and 114 derivative families of different generations were sown in ear to row fashion during Kharif-2019 and Spring 2020. Selfed plants were harvested at maturity and in Kharif 2019, seed of fifty one (51) inbred lines were finally selected and maintained with inclusion of 4 new inbred lines with inclusion of 164 families for further derivation and selection cycles. In Spring 2020, 120 derivative families were added.

Hybrid Constitution

Development of high yielding maize hybrids tolerant to diseases, insects and temperature is a continuous project. At MMRI, Yusafwala, one hundred twenty-five (125) single crosses were constituted in kharif 2019 and 154 single crosses in Spring 2020 with three males in isolated blocks through detasseling of female lines. Similarly, At MMRI, Yusafwala fifteen new single cross hybrids of white maize were constituted during Spring 2020.

At MRS, Faisalabad Seventy (70) new single cross hybrids were constituted in two isolations and by hand pollination during Kharif-2019.

Hybrid Evaluation

Preliminary Yield Trials

One hundred forty-six (146) single cross hybrids were evaluated in three preliminary yield trials along with different commercial checks at MMRI. Local hybrid YH-5569 (Fig.1) gave maximum grain yield i.e.12167 kg/ha followed by local hybrid YH-5568 by giving 11116 in comparison to checks during Kharif 2019.



Fig 1: YH-5569 a heat resilient elite hybrid selected after evaluation in preliminary yield trial Spring 2019 at MMRI

In Spring 2020, 101 single cross entries were evaluated in four preliminary yield trials along with different commercial checks. Approved local hybrid FH-1046 gave maximum grain yield i.e.13533 kg /ha while following entries were a multinational hybrid and a local hybrid i.e.P-1543 and YH-5757 giving 13299 and 12733 kg/ha respectively during Spring 2020.

At MRS, Faisalabad, fifty two (52) single cross hybrids were evaluated in two trials consisting of 27 and 25 hybrids each during Kharif-2019. Local hybrids FH-1677, FH-1694 and FH-1693 with grain yield of 11035, 10549 and 10377 kg/ha respectively were higher yielder than average grain yield of check hybrids FH-1046 (8362 kg/ha), YH-1898 (8215 kg/ha) and YH-5427 (7709 kg/ha). One best performing hybrid FH-1694 is shown below in Fig.2.



Fig 2: Elite Candidate maize hybrid FH-1694 selected from preliminary yield trials.

While during spring 2020 four trials of 30 hybrids each including three checks were tested at Faisalabad and Sahiwal. Local hybrids FH-1906, FH-1874, FH-1931, FH-1857 and FH-1400-1 with grain yield of 13306, 12976, 13391, 13565 and 13432 kg/ha respectively were higher yielder than average grain yield of check hybrids FH-1046 (8362 kg/ha), YH-1898 (8215 kg/ha) and YH-5427 (7709 kg/ha) at MRS while FH-1912, FH-1950, FH-1928, FH-1850 with grain yield of 13508, 12141, 12870,

12971kg/ha respectively. One best performing hybrid FH-1906 is shown below in Fig.3



Fig 3: FH-1906 hybrid selected after evaluation in preliminary yield trial Spring 2020 at MRS

Micro Yield Trials

At MMRI, sixty (60) single cross hybrids were evaluated in two trials consisting of 30 hybrids each during kharif 2019. Local hybrid YH-5569 gave maximum grain yield 12413 kg/ha followed by local hybrid YH-5568 (Fig. 3) by giving grain yield 11470 kg/ha during kharif 2019. While in Spring 2020, 96 single crosses were sown in RCBD with commercial checks. Local hybrids YH-5421-1, YH-5655 and YH-5657 with grain yield 12466, 11949 & 11883 kg/ha respectively were found higher yielder as compared with multinational checks P-1543 (10641kg/ha) and DK6724 (10566kg/ha).



Fig 4: High yielding elite maize hybrid (YH-5569) selected after evaluation in preliminary yield trial kharif 2019

At MRS, Faisalabad, nineteen (19) single cross hybrids were evaluated in two trials consisting of 9 and 10 hybrids each during Kharif 2019. Local hybrids FH-1453 and FH-922 with grain

yield 10087 and 9854 kg/ha respectively, were found higher yielder as compared to checks FH-1046 (8050 kg/ha), YH-1898 (7412 kg/ha) and YH-5427 (8965 kg/ha).



Fig 5: High yielding elite maize hybrid (FH-1453) selected after evaluation in micro yield trial kharif 2019 at MRS

While thirty (30) single cross hybrids were evaluated in two trials consisting of 14 and 16 hybrids each in micro yield trial during Spring 2020. Local hybrids FH-1622 shown in Fig. 5 and FH-1743 with grain yield 11829 and 12546 kg/ha respectively, were found higher yielder as compared to checks FH-1046 (8050 kg/ha), YH-1898 (7412 kg/ha) and YH-5427 (8965kg/ha).



Fig 6: High yielding elite maize hybrid (YH-1622) selected after evaluation in preliminary yield trial spring 2020

Macro Yield Trials

At MRS, Faisalabad fourteen (14) single cross hybrids were evaluated in two trials during Kharif 2019. FH-1409, FH-1337 and FH-1400

with respective grain yields 7912, 6540 and 6476 kg/ha were found better yielder than check YH-1898 (4378 kg/ha), FH-1046 (5534 kg/ha) and YH-5427 (6423 kg/ha) on average basis.



Fig 7: High yielding promising maize hybrid (FH-1337) selected after evaluation in macro yield trial kharif 2019 at MRS

Whereas during spring 2020 sixteen (16) single cross hybrids were evaluated in a trial. FH-1603 (Fig. 7) with grain yields 11716 kg/ha was found better yielder than check YH-1898 (4378 kg/ha), FH-1046 (9265 kg/ha) and YH-5427 (6537 kg/ha) on average basis.



Fig 8: High yielding promising maize hybrid (FH-1603) selected after evaluation in macro yield trial kharif 2019 at MRS

National Uniform Maize Hybrid Yield Trial

To evaluate different national and multinational maize hybrids for adaptability in different agro-climatic zones across the country, two trial set A & B consisting of 140 & 64 hybrids in Kharif, 2019 received from the National Co-coordinator PARC, Islamabad was laid out at MMRI and MRS, Fsd. The results revealed that Hybrid WS-8955 exhibited the highest grain yield of 8715 followed by MMRI Hybrids YH-5632 exhibited 7610 and MRS. Fsd hybrid gave 6611 kg/ha yield in comparison to check YH-1898

(5185 kg/ha) in set A and in set B Hybrid P-3582 exhibited the highest grain yield of 8207 kg/ha followed by MMRI hybrid YH-5568 (6866 kg/ha) in comparison to check YH-1898 (5957 kg/ha). Candidate hybrids YH-5568 is shown below in Fig-9.



Fig 9: Maize candidate hybrid (YH-5568) under evaluation in NUYT

Whereas two trial set A & B consisting of 81 hybrids in each in Spring 2020 received from the National Co-coordinator PARC, Islamabad was laid out at MMRI and MRS, Fsd. The results revealed that at MMRI Entry 42 and Entry 44 exhibited the highest grain yield of 13295 and 12928 kg/ha respectively and at MRS Hybrid entry 8 exhibited the highest grain yield of 9926.5 and in set B Entry 50 exhibited the highest grain yield of 9639 kg/ha.

PARB PROJECTS

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

In Kharif 2019, colchicine was applied on 759 haploids at MMRI and 660 haploids at MRS, Fsd. Then, they were transferred in green house in peat moss and then into field. Finally, 50 DH were developed at MMRI and 20 at MRS, Fsd. In Spring 2020, 50 DH at MMRI and 20 DH at MRS, Fsd were successfully maintained and multiplied.



Fig 10: Colchicine Treatment to Haploids Seedlings in laboratory of MMRI

Nutrition enhancement of crops, fruits, vegetables and their products under climate change scenario (PARB No. 904 VI)

One Hundred and Forty-Seven (147) single cross hybrids were sown in multi-location replicated trials for Evaluation regarding yield and quality. The seed of these hybrids was sent to biochemistry lab, Fsd for analysis of protein, fat, fiber and ash contents. The ranges of different quality parameters were determined i.e., protein contents (7.54 to 9.01%), fats (3.41 to 4.42%), crude fiber (1.28 to 2.28%) and ash content (0.89 to 1.33%). MNH-84 was found to be best quality hybrid. MNH-89 & MNH-142 also showed promising results. Parental lines of testing 20 hybrids were maintained successfully during Spring 2020.

MAIZE OPVs

Pool-50 & Pool-60

Seed of selected half-sib families was sown in isolation to maximum genetic recombination and finally 150 cobs were selected for evaluation in both seasons Kharif 2019 and Spring 2020. Five OPV varieties were approved by Punjab Seed Council which are shown in figures below.



Fig 11: High Yielding Newly Approved Maize OPV (CIMMYT PAK)



Fig 12: High Yielding Newly Approved Maize OPV (Gohar)



Fig 13: High Yielding Newly Approved Maize OPV (Sahiwal Gold)



Fig 14: High yielding Newly Approved Pop-Corn OPV (Pop-1)



Fig 15: High yielding Newly Approved Sweet-Corn OPV (Sweet-1)

**SORGHUM (*Sorghum bicolor* L.)
Germplasm Maintenance and Hybrids Constitution**

Eighty-four (84) local entries along-with 26 exotic pure lines were planted at Yusufwala and 81 entries were planted at D.G. Khan. Five (5) plants in each entry were maintained by covering the panicles. Three entries from gene pool were rejected due to disease susceptibility, remaining Sorghum lines were maintained. Forty-four (44) CMS (A) lines with their counterpart (B) lines and 31 local fertility restorer (R) lines were planted at Yusufwala. Six CMS lines and three restorers were rejected due to disease susceptibility while remaining were maintained. Sixty eight (CMS x R) crosses were constituted (61 in isolations and 7 by hand). Sixteen F₃ families from F₂, one F₅ family from F₄ and two F₆ families from F₅ were selected during Kharif 2019. 11 entries of M₅ were selected from mutated entries.

The first ever sorghum hybrid of Pakistan “Fakhar e Punjab” was approved by Punjab Seed Council which are shown in figure below.



Fig 16: A high Yielding Newly Approved Sorghum hybrid Fakhar e Punjab

Evaluation of Hybrids and OPVs

Sixteen (16) (CMS x R) hybrids with two checks were tested in a hybrid yield trial at MMRI, Yusufwala and SRSS, D. G. Khan. The results revealed that YSH-132 gave significantly higher yield (3486 kg/ha & 3833 kg/ha) at MMRI and DG Khan respectively followed by YSH-139 (3032 kg/ha) at MMRI and YSH-153 (3167 kg/ha) at DG Khan in comparison to check Fakhar e Punjab (2462 kg/ha, 2611 kg/ha) & Lasani (1912 kg/ha, 2500 kg/ha) at MMRI and DG Khan respectively. Graphical representation of the trial at MMRI is given below in Fig 17.

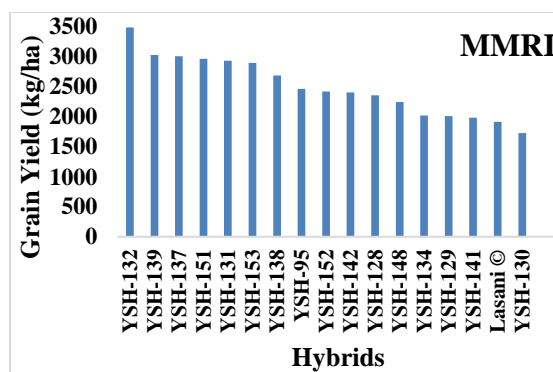


Fig 17. Yield performance of Seventeen (17) sorghum representative hybrids placed in a bar chart on X-axis against grain yield at on Y-axis at MMRI in Kharif 2019

Thirteen (13) hybrids with two checks were tested at MMRI, Yusufwala. The results revealed that YSH-171 (4419 kg/ha) gave significantly higher yields followed by YSH-173 (3573 kg/ha) comparison to check Lasani (1598

kg/ha). Graphical representation of the trial at MMRI is given below in Fig 18.

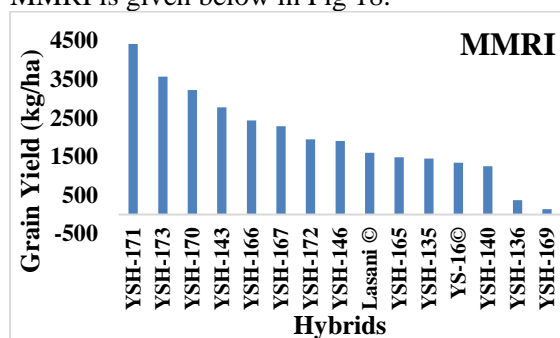


Fig 18. Yield performance of Fifteen (15) sorghum representative hybrids placed in a bar chart on X-axis against grain yield on Y-axis in sorghum hybrid yield trial II & III at MMRI in Kharif 2019

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-17 and YSS-31 gave higher yields (3509 and 2977 kg/ha) followed by YSS-42 (2824 kg/ha) at MMRI in comparison to check YS-16 (2667 kg/ha), while at SRSS, D. G. Khan, YSS-10 and YSS-17 gave significantly higher yields (3333 & 3000 kg/ha) in comparison to check YS-16 (2389 kg/ha). Graphical representation of the trial at MMRI is given below in Fig 19.

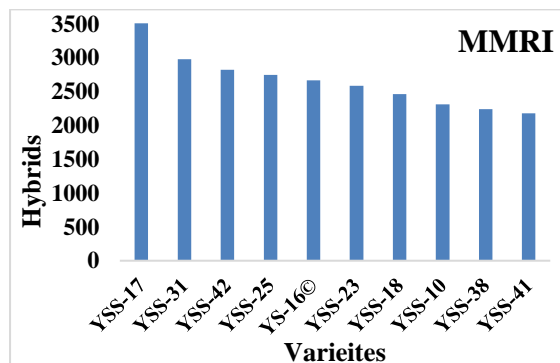


Fig 19. Yield performance of Ten (10) sorghum varieties placed in a bar chart on X-axis against grain yield on Y-axis in a yield trial at MMRI in Kharif 2019.

National Uniform Yield Trial

A trial consisting of 12 entries were planted at MMRI, Yusafwala along with three locations. The results revealed that hybrid YSH-134 gave highest yield (3152 kg/ha) followed by variety YSS-42 (2977 kg/ha) and YSH-132 (2922 kg/ha) in comparison to local check YSH-95 (2858 kg/ha) and commercial check Lasani (2698 kg/ha) on average four location basis.

Pearl Millet (*Pennisetum typhoides*) Maintenance of Germplasm / Derivations / Constitutions

Fifteen gene pool entries, eight YCMS (A) lines with respective counterpart (B) lines and eighteen more YCMS B-lines, twenty-five YCMP (R) lines, were maintained by hand pollination at MMRI and 48 pure lines were maintained and 20 successful crosses were made at MRS, Rawalpindi. Twenty-nine segregating families were sown for selection of desirable plants/families. Three to four heads in each family were selfed and harvested for planting next generation.

Development of new CMS lines, hybrids and dual Purpose Pearl Millet Variety

Five new crosses with non-counterpart B lines were made with A-lines to derive new CMS A lines. Twenty four new crosses were constituted for the development of new promising high yielding hybrids at MMRI.

Thirty-eight (38) single plants from F₂ population, 34 from S₁ population and 25 from S₂ Population respectively were selected for further evaluation during kharif- 2020. Seven superior lines from S₂ and five lines from S₃ population were selected for testing in micro trial during kharif -2020 at MRS, Rawalpindi.

Yield Evaluation

Pearl Millet Varietal Yield Trial

In pearl millet varietal trial, ten varieties and two hybrids were evaluated for yield at Yusafwala, DG Khan and Rawalpindi. The result showed that hybrid YBH-278 gave highest yield (5159 kg/ha) in comparison of commercial check 86M88 (4730 kg/ha) while in varieties YBS-98 ranked first by producing grain yield of 3928 kg/ha followed by 14RBS-01 (3492 kg/ha) at Yusafwala, YBH-278 & YBS-89 gave significantly higher yields (3500 & 2833 kg/ha) at DG Khan and YBS-92 gave maximum yield (3530 kg/ha) followed by YBS-89 (3122 kg/ha) at MRS, Rawalpindi. The graphical representation of the trial at MMRI is given below in Fig 20 and at MRS, Rawalpindi in Fig 21.

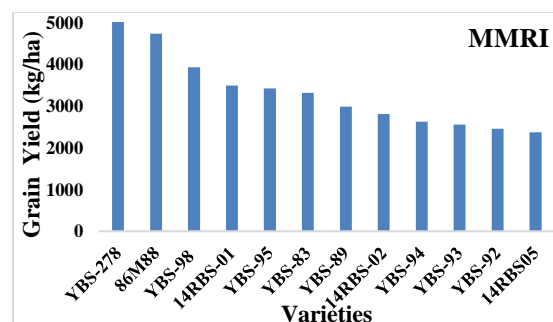


Fig 20. Yield performance of Ten (10) pearl millet varieties with two hybrids were placed in a bar chart on X-axis against grain yield on Y-axis in a yield trial at MMRI in Kharif 2019

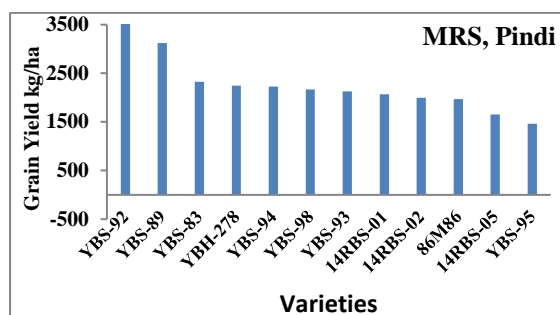


Fig 21. Yield Performance of twelve (12) pearl millet varieties were placed in a bar chart on X-axis against grain yield on Y-axis in a yield trial at MMRI and MRS, Rwp in Kharif 2019.

Pear Millet Micro Hybrid Yield Trials

In pearl millet micro hybrid trial, twenty-eight hybrids were evaluated for yield at Yusufwala. The result showed that YBH-278 ranked first by producing grain yield of 5667 kg/ha followed by 86M88 (5179 kg/ha) at Yusufwala. 22 promising lines were evaluated at MRS, Rawalpindi in two trials, the result showed that hybrid YBH-278 gave maximum yield (3521kg/ha) followed by hybrid 86M88 (3146 kg/ha) and 18RBS-45(3021kg/ha). The graphical representation of the trial at MMRI is given below in Fig 22 and at MRS, Rawalpindi in Fig 23.

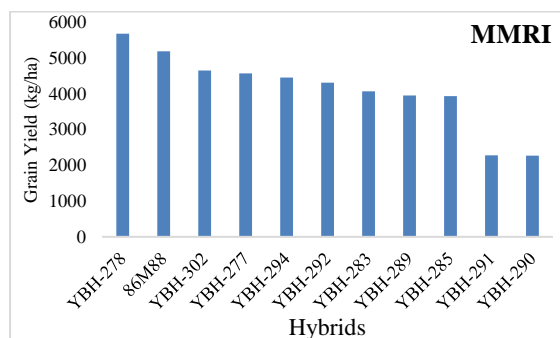


Fig 22. Yield performance of eleven (11) pearl millet varieties were placed in a bar chart on X-axis against grain yield on Y-axis in a yield trial at MMRI in Kharif 2019.

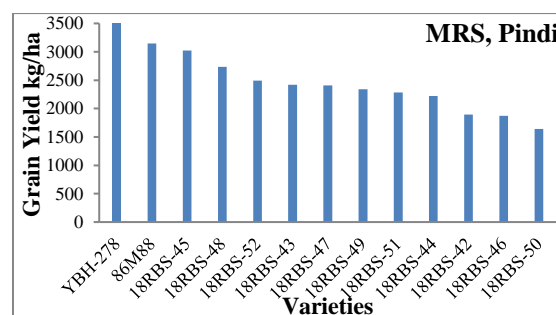


Fig 23. Yield performance of eleven (11) pearl millet varieties were placed in a bar chart on X-axis against grain yield on Y-axis in a yield trial at MRS, RWP in Kharif 2019

Adaptability/National Uniform Pearl Millet Grain Yield Trial

A trial consisting of 22 entries was received from the National Coordinator (MSMF&OC), PARC, Islamabad during kharif 2019. The results revealed that the hybrid YBH-278 gave significantly higher yield (2970 kg/ha) in comparison to check YBS-98 (2411 kg/ha) on average yield basis.

SEED PRODUCTION

Table 1: Seed Production of Maize, Sorghum and Pearl Millet Crop 2019-20

	BNS	Pre-Basic	Total kg
Maize Hybrid	-	-	6465
Maize OPV	38	9736	9774
Sweet Corn	-	-	1376
Pop Corn	-	-	1660
Inbred Line	-	-	1561
Sorghum	49	5096	5145
Pearl Millet	5	2580	2585

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

(i) AGRONOMIC STUDIES (ii) Determination of Optimum Plant Population for Hybrid Maize in Bed Sowing

This trial was conducted in spring 2020 to find out the suitable plant spacing for higher grain yield of hybrid maize sown on 3.5 feet wide furrow-beds. Hybrid used was YH-5427. The results revealed that maximum grain yield (12195kg/ha) was recorded at 20 cm plant spacing that corresponds to 92259 plants/ha though statistically not different from sowing at 22.5 cm spacing with grain yield of 11397 kg/ha while lowest yield of 10126 kg/ha was recorded at 27.5 cm plant spacing. The graphical representation of the trial at MMRI is given below in Fig 24.

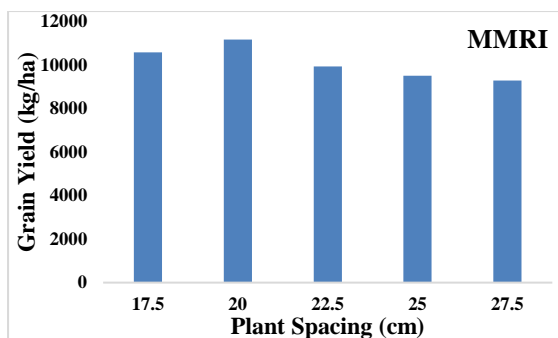


Fig 24. Determination of optimum plant population for hybrid maize in bed sowing. Five plant spacing of YH-1898 placed in a bar chart on X-axis against grain yield on Y-axis at MMRI in Kharif 2019

Optimum plant spacing for hybrid maize on ridge sowing.

This experiment was conducted to find out the suitable plant spacing for higher grain yield of hybrid maize on 75 cm wide ridges in spring 2020. Hybrid used was YH-5395. Layout plan was RCB design with three replications. The results revealed that highest grain yield (9426 kg/ha) was recorded at 12.5 cm plant spacing (103332 plants/ha) followed by 15 cm spacing (9389 kg/ha) and 17.5 cm (9214 kg/ha) while lowest grain yield (8264 kg/ha) was recorded at 22.5 cm plant spacing. The graphical representation of the trial at MMRI is given below in Fig 25.

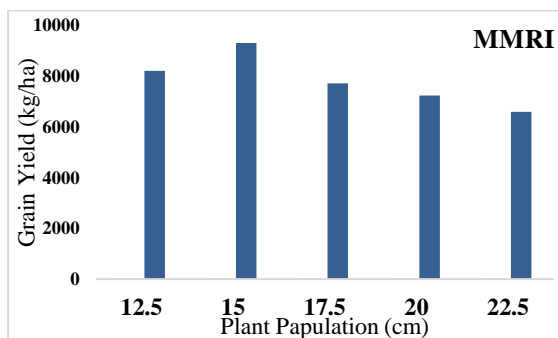


Fig 25. Determination of optimum plant spacing for hybrid maize on ridge sowing. Five plant spacing of YH-1898 placed in a bar chart on X-axis against grain yield on Y-axis at MMRI in Kharif 2019

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

During spring 2020 an experiment was conducted to evaluate the water requirement and yield response of maize hybrid under different planting geometries. Four treatments consisting of maize sowing on both sides of 90 cm, 105 cm and 120 cm wide beds (furrow+bed top) and 75 cm spaced ridges were evaluated. Results

suggest that highest grain yield (10527 kg/ha) was recorded by 105 cm wide beds though statistically not different from 90 cm wide beds (with grain yield of 10375 kg/ha while minimum grain yield (8316 kg/ha) was recorded by 120 cm wide beds. The graphical representation of the trial at MMRI is given below in Fig 26

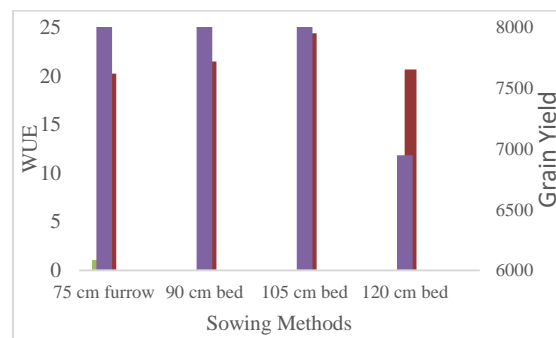


Fig 26. Determination of irrigation water requirement of hybrid maize under different planting geometries. Four geometries were placed in a bar chart on X-axis against Water Use Efficiency (WUE) on primary y-axis and grain yield on secondary Y-axis for maize hybrid at MMRI in Kharif 2019

Evaluation of Different Weedicides for Weed Control in Pearl Millet

During Kharif 2019 different herbicides were evaluated for effective weed control in pearl millet. Results showed that the highest grain yield of 3855 kg/ha was harvested from the plots where Metolachlor + Pendimethaline (96 EC) was applied as pre emergence herbicide @ 450 ml/acre and it was followed by the treatment in application of Metolachlor + Pendimethaline (96 EC) was made as pre emergence herbicide @ 300 ml/acre. Whereas the lowest grain (2510 kg/ha) was recorded in the control treatment where no herbicide application was made.

Evaluation of Different Weedicides for Weed Control in Sorghum

During Kharif 2019 different herbicides were evaluated for better weed control in sorghum crop. Data revealed that maximum grain yield of 5120 kg/ha was achieved with the treatment in which pre emergence application of Metolachlor + Pendimethaline (96 EC) was made at the rate of 450 ml/acre that was followed by the application of Metolachlor + Pendimethaline (96 EC) @ 350 ml/acre that yielded 4570 kg/ha grains. While the lowest grain yield was recorded with the control treatment that gave 2967 kg/ha.

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

The trial was conducted during Kharif 2019. Data regarding grain yield and its components were recorded and statistically analyzed. The data showed that micronutrients zinc and boron applications significantly affected the grain yield of hybrid seed production. Maximum grain yield of 1340 kg/ha was obtained where Zinc (33%) + Boron (11%) @11.25 kg/ha was applied. While the grain yield under control was 1056 kg/ha.

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

The trial was conducted during Kharif 2019. 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 by applying Primextra Gold (800ml/acre pre-emergence) having grain yield 1096 kg/ha over control having grain yield 644 kg/ha.

ENTOMOLOGY

Testing of Sprayable Insecticides against Army Worm and Cob Worm

During Kharif 2019 and Spring 2020, four insecticides namely Marshall 5EC, Match 40EC, Talstar 10EC and Coragen 20SC were tested against army worm and cob worm at recommended doses. The results showed that Coragen 20SC gave the best control against army worm showing minimum army worm infestation (0.86%) with grain yield 7695 kg/ha followed by Talstar 10EC showing army worm infestation (4.99%) with grain yield 7506 kg/ha in Kharif 2019 while in Spring 2020, Marshall 5EC, Match 40EC, Talstar 10EC and Coragen 20SC gave the best control against army worm showing minimum army worm infestation (00.00%). Marshall 5EC gave the best control against cob borer showing cob worm infestation (1.59%) followed by Match 40EC showing cob worm infestation (3.49%). As for as the yield is concerned Marshall 5EC produced 11611 kg per hectare followed by Match 40EC which produced 9144kg per hectare. The graphical representation of the trial at MMRI is given below in Fig 27.

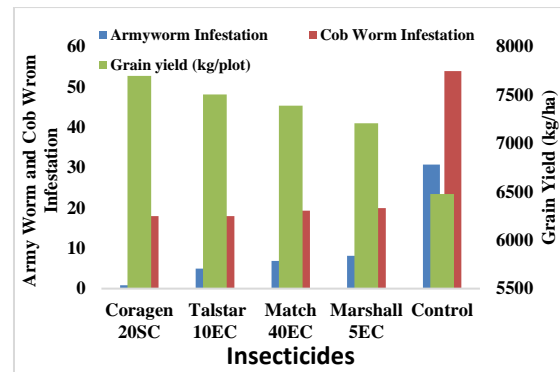


Fig 27: Testing of sprayable insecticides against Army Worm and Cob Worm. Five insecticides and control (without any insecticide application) were placed in a bar chart on X-axis while at Primary Y-axis infestation %age of Army Worm and Cob Worm and at secondary Y-axis grain yield were placed. Grain yield was put on different axis due to a very large difference in data.

To Evaluate the Efficacy of Different Granular Insecticides against *Chilo Partellus* by Soil Application

Four granular insecticides namely Furadan 3G, Virtako 0.6Gr, Regent 80WG and Cartap 4G were tested against *Chilo Partellus* in Kharif 2019 and Spring 2020. The results showed that Regent 80WG gave the best control against *Chilo Partellus* minimum borer infestation (2.35%) and borer infestation reduction (86.34%) with grain yield 7664 kg/ha followed by Furadan 3G showing borer infestation (5.15 %) and borer infestation reduction (61.20 %) with grain yield 6936 kg/ha in Kharif 2019 while in Spring 2020, Regent 80WG gave the best control against *Chilo Partellus* minimum borer infestation (21.76%) and borer infestation reduction (41.82%) with grain yield 9733 kg/ha followed by Virtako 0.6G showing borer infestation (24.52%) and borer infestation reduction (33.71%) with grain yield 9066 kg/hectare.. The graphical representation of the trial at MMRI is given below in Fig 28.

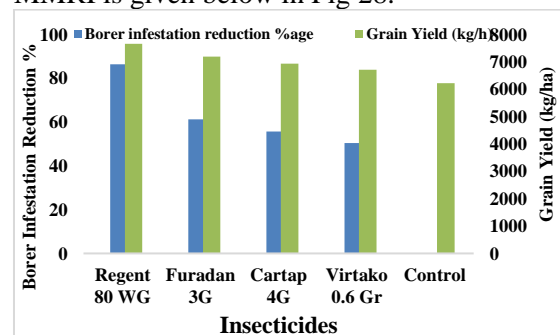


Fig 28. Evaluation of the efficacy of different granular insecticides against *Chilo Partellus* by soil application. Four insecticides and control (without any insecticide application) were placed in a bar chart on X-axis while at Primary Y-axis *Chilo Partellus* infestation reduction % was placed and at secondary Y-axis grain yield was placed. Grain

yield was put on different axis due to a very large difference in data.

To Evaluate the Efficacy of Different Sprayable Insecticide Mixtures against *Chilo Partellus* during Kharif-2019

Four insecticide mixtures namely Belt 48SC+Fipronil 5SC (1:1), Lambda Cyhalothrin 2.5SC+Fipronil 5SC (1:3), Match 50EC+Polytrin C 440EC (3:4) and Decis Super 10EC+Fipronil 5SC were tested against *chilo partellus* in Kharif 2019 and Spring 2020. The results showed that Decis Super 10EC+Fipronil 5SC gave the best control against maize borer showing minimum borer infestation (0.51%) and borer infestation reduction (94.13%) with grain yield 7492 kg/ha followed by 48SC+Fipronil 5SC showing borer infestation (1.84%) and borer infestation reduction (77.95%) with grain yield 7167 kg/ha in Kharif 2019 while in Spring 2020, Decis Super 10EC+Fipronil 5SC gave the best control against maize borer showing minimum borer infestation (16.97%) and borer infestation reduction (45.20%) with grain yield 9966 kg/ha followed by Match 50EC+Polytrin C 440EC (3:4) showing borer infestation (17.55%) and borer infestation reduction (41.87%) with grain yield 9577 kg/ha. The graphical representation of the trial at MMRI is given below in Fig 29.

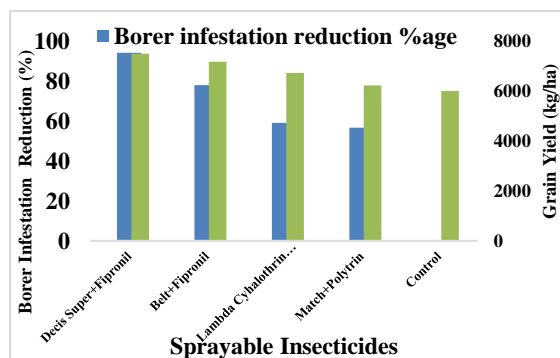


Fig 29. Evaluation of the efficacy of different sprayable insecticides against borer. Four insecticides and control (without any insecticide application) were placed in a bar chart on X-axis while at Primary Y-axis borer infestation reduction % was placed and at secondary Y-axis grain yield was placed. Grain yield was put on different axis due to a very large difference in data.

PLANT PATHOLOGY

Testing of Stalk Rot Intensity in Maize Hybrids by Artificial Inoculation

Ten maize hybrids were tested in order to check stalk rot intensity. The results showed that YH-5559 was resistant against stalk rot of maize, YH-5390, YH-5417, YH-5535, YH-5554, YH-5556 and YH-5593 were moderately resistant against stalk rot and YH-5521, YH-5533 and YH-5545 were moderately susceptible against stalk rot of maize in kharif 2019 while in Spring 2020, YH-5748, YH-5683-2, YH-5632-1, YH-5632-3, YH-5685-2, YH-5762, YH-

5775, YH-5777, YH-5788 and YH-5789 were found moderately susceptible against stalk rot of maize

Testing of Different Fungicides against Stalk Rot of Maize by Treating the Soil at Their Recommended Doses

Four fungicides namely Topsin-M 70WP, Alitte 80WP, Score 250SC and Emesto 24FS were tested against stalk rot of maize. The results showed that in Kharif 2019, Topsin-M 70WP gave the best control against stalk rot showing minimum stalk rot infection (0%) and stalk rot infection reduction (100%) with grain yield (8400 kg/ha) followed by Alitte 80WP showing stalk rot infection (0.43%) and stalk rot infection reduction (92.27%) with grain yield 7603 kg/ha. While in Spring 2020, Alitte 80WP gave the best control against stalk rot showing minimum stalk rot infection (4.13%) and stalk rot infection reduction (64.60%) with grain yield 9166 kg per hectare followed by Score 250SC showing stalk rot infection (5.41%) and stalk rot infection reduction (54.41%) with grain yield 8911 kg per hectare. The graphical representation of the trial at MMRI is given below in Fig 30.

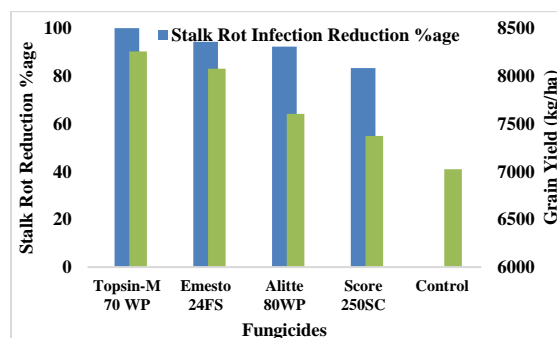


Fig 30: Testing of stalk rot intensity in maize hybrids by artificial inoculation. Four fungicides and control (without any fungicide application) were placed in a bar chart on X-axis while at Primary Y-axis stalk rot infestation %age was placed and at secondary Y-axis grain yield was placed. Grain yield was put on different axis due to a very large difference in data.

Screening of Different Maize Germplasms against Stalk Rot

In Kharif 2019, 286 hybrids, 194 lines (elite and pre elite) and 156 derivative families were screened out against stalk rot. 204 hybrids of NUMYT (SET-I) and NUMYT (SET-2), 82 hybrids of PYT-3, PYT-4, PYT-5. In NUMYT (SET-1) and NUMYT (SET-2), 11 were found resistant, 85 hybrids were found moderately resistant, 104 hybrids were found moderately susceptible and 03 hybrids were found susceptible and 01 was found highly susceptible. In PYT-

3, PYT-4, PYT-5, 01 hybrid was found resistant, 39 hybrids were found moderately resistant, 42 hybrids were found moderately susceptible and no hybrid was found susceptible or highly susceptible. In elite inbred lines, no line was found resistant and 09 lines were found moderately resistant, 142 lines were found moderately susceptible, 18 lines were found susceptible and 07 lines were found highly susceptible. In pre elite inbred lines, no line was found resistant, 18 lines were found moderately susceptible and no line was found highly susceptible. In derivations, no family was found highly resistant, no family was found resistant, 04 families were found moderately resistant, 149 families were found moderately susceptible, 03 families were found susceptible and no family was found highly susceptible.

In Spring 2020, 197 hybrids, 175 lines (elite and pre elite) and 154 derivative families were screened out against stalk rot. In PYT-1, PYT-2, PYT-3, PYT-4, MPMYT-1 and MPMYT-2, two hybrids were found resistant, seven hybrids were found moderately resistant and 121 hybrids were found moderately susceptible, 54 hybrids were found susceptible and 13 hybrids were found highly susceptible. In elite inbred lines, three lines were found resistant, 18 lines were found moderately resistant, 137 lines were found moderately susceptible and no line was found highly susceptible. In pre-elite inbred lines no line was found highly resistant or resistant, 2 lines were found moderately resistant, 13 lines were found moderately susceptible and no line was found susceptible or highly susceptible. In derivations, 01 family was found resistant, 05 families were found moderately resistant 145 families were found moderately susceptible, 02 families were found susceptible and 01 family was found highly susceptible.

Advisory Services:

Three (3) TV talks, Twenty five (25) radio talks were delivered to farmers about the maize, sorghum and pearl millet crops.

One farmer day was conducted on 28.11.2019 for guidance of farmers regarding production technology of maize crop to get higher yield.

A meeting regarding maize in the scenario of Covid-19 was held in the conference room of MMRI, Yusafwala-Sahiwal under the chairmanship of DG Agri-Ext on April 30, 2020.

Capacity building of local seed companies regarding hybrid seed production technology of Maize & Millets crops under agricultural innovation program (AIP) was conducted on June

18, 2020 in the seminar room of MMRI, Yusafwala- Sahiwal

A training regarding “Profitable maize production technology in changing scenario under CIMMYT-LED heat tolerance maize for Asia (HTMA) Project” was conducted on June 24, 2020 in the seminar room of MMRI, Yusafwala- Sahiwal.

PUBLICATIONS

1. Ahmed, M.F. M. Siddique, N. Kamal, and N. Ahmad. 2019. Sugarcane Flowering at Sugarcane Breeding Sub Station (SBSS), Murree. Haya: The Saudi Journal of Life Sciences, 4(6): 206-212
2. Akbar, W. M. A. Akhtar, G. Murtaza, A. Hussain, H. M. Javed, M. Arshad and M. A. Maqbool. 2019. Mungbean Yellow Mosaic Disease and its Management. Journal of Agriculture and Basic Sciences, 4 (1): 34-44
3. Haq, M. I. U., M. Siddique, S. Khanum and N. Kamal. 2019. Genetic analysis of different biometric characters in pearl millet. Int. J. Biol. Biotech., 16(1): 137-139.
4. Haq, M. I. U., S. Khanum, M. Siddique and N. Kamal. 2020. Diallel studies for different attributes in pearl millet. Int. J. Biol. Biotech., 17(2):347- 350.
5. Hussain, D., A. Mumtaz, M. Saeed, M. Arshad, M. I. Yousaf and A. Ghani. 2019. YS-16: A high yielding dual purpose sorghum variety. Agrica, 8(1): 45-56
6. Hussain, D., A. Mumtaz, M. Saeed, M. Arshad, M.I. Ullah, M.I. Yousaf, A. Ghani, J. Iqbal, A. Mahboob. 2020. Fakhar e Punjab (YSH-95): A High-Yielding Dual-Purpose Indigenous Sorghum Hybrid. International Journal of Botany Studies, 5(2): 06-12.
7. M.I. Khokhar, A. Razzaq, J. Iqbal, M. J. Anwar, M. Z. Iqbal and S. Rehman. 2019. Choice of maize genotypes affects wheat haploid seed and success of embryo rescue. RADS Journal of Biological Research and Applied Sciences. 10(1): 1-5
8. Mumtaz, A., D. Hussain, M. Saeed, M. Arshad and M.I. Yousaf. 2019. Stability and adaptability of sorghum hybrids elucidated with genotype–environment interaction biplots. Turkish Journal Of Field Crops, 24(2), 155-163
9. Sarwar, N., A. Wasaya, S. Saliq, A. Reham, O. Farooq, K. Mubeen, M. Shehzad, M. Usman Zahoor, A. Ghani . 2019. Use of

Natural Nitrogen Stabilizers to Improve Nitrogen use Efficiency and Wheat Crop Yield. *Cercetări Agronomice în Moldova*, 2(178):107-115

10. Shehzad, A., M.I. Yousaf, A. Ghani, K. Hussain, S. Hussain and M. Arshad. 2019. Genetic analysis and combining ability studies for morpho-phenological and grain yield traits in spring maize (*Zea mays* L.). *International Journal of Biology and Biotechnology*, 16(4): 925-931.
11. Siddique, M. S. Khanum, M. Irshad-ul-Haq and N. Kamal. 2019. Heterosis and combining ability studies in pearl millet. *International Journal of Biology and Biotechnology*, 16 (3): 805-809
12. Vinayan M.T., P.H. Zaidi, K. Seetharam, M.A Alam, S. Ahmed, K.B. Koirala, M. Arshad, P. Kuchanur, A. Patil and S. S. Mandal. 2019. Environmental variables contributing to differential performance of tropical maize hybrids across heat stress environments in South Asia. *Australian Journal of Crop Science*, 13(06): 828-836
13. Yousaf MI, Hussain K, Hussain S, Ghani A, Shehzad AI, Mumtaz A, Arshad M, Mehmood A, Khalid MU, Akhtar N, Bhatti MH. 2019. Seasonal influence, heat unit accumulation and heat use efficiency in relation to maize grain yield in Pakistan. *Maydica* 64(3): 1-9.

URDU ARTICLES IN ZARAT NAMA

1. *Mosmi maki ki kasht* (1st July, 2019)
2. *Mosmi maki ki jari botian aur insdad* (15th July, 2019)
3. *Maki ka lye aab pasha ki ahmiat o zaroorat* (1st August, 2019)
4. *Mosmi maki ki fasal ka lye khadon ka istmal* (15th August, 2019)
5. *Maki ko mahfooz tareeqa sa zakheera krna* (1st November, 2019)
6. *Bharia maki ki padawari technology* (1st January, 2020)
7. *Bharia Maki ka lye zameen ka intkhab aur tareeqa kasht* (15th January, 2020)
8. *Bharia maki ki fasal sa jari botian ki talfi* (1st February, 2020)
9. *Bharia maki ki zayada paidawar ka lye sfarshat* (15th February, 2020)
10. *Phool ana pr bharia makai ki daikh bhaal* (15 March, 2020)

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Metrological Data Recording at Maize & Millets Research Institute, Yusafwala during 2019-20

