

# ANNUAL PROGRESS REPORT 2017-18



**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 4640 kg/ha (2017-18) in Punjab due to adoption of hybrids. In maize 12 OPV's, 14 hybrids, four varieties of sorghum and two varieties of pearl millet have been released so far. Punjab Seed Council approved Maize hybrids; YH 1898, FH-949 & FH-1046 and Maize OPVs; Malka 2016, Sorghum OPV; YS-16 and Pearl Millet OPV; YBS-98 for general cultivation during the year 2015-16. Presently nine (9) maize hybrids, two maize OPVs and one elite sorghum hybrid are in progress and most of them are in National Uniform Yield Trials and under DUS studies. Two maize hybrids and one sorghum hybrid are ready for spot examination in the next year. 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 2016-17 and 2017-18 is given below. During the year 2017-2018, total 191.45 mm rainfall was received in comparison to previous 2016-2017 out of which 154.35 was received only in July 2017, September 2017 and June 2018. During fiscal year 2016-17 total 286.1 mm rainfall was received out of which only 247 mm rainfall was received in July, August 2016 and June 2017. Smog was prevalence in November 2017, which badly affected maize and millets crops plant growth by causing suffocation.

Sr. No.	Month	Average temperature °C				Rainfall (mm)	
		Maximum		Minimum		(2016-17)	(2017-18)
		(2016-17)	(2017-18)	(2016-17)	(2017-18)		
1	July	39.20	40.58	28.58	28.45	92.30	25.70
2	August	39.09	39.67	27.09	27.93	75.00	9.00
3	September	37.25	38.43	23.90	23.76	1.00	74.00
4	October	34.71	37.52	18.55	19.77	-	-
5	November	27.10	27.51	12.40	12.88	-	2.20
6	December	26.39	27.45	9.00	7.21	-	7.60
7	January	20.19	24.16	6.51	5.41	8.00	-
8	February	26.89	26.48	9.50	8.89	4.00	-
9	March	32.29	34.54	14.12	16.29	1.00	10.80
10	April	40.33	40.26	21.53	20.56	8.50	3.50
11	May	41.90	41.60	25.81	23.00	16.60	4.00
12	June	40.13	40.63	26.50	26.60	79.70	54.65
<b>Total Rainfall</b>						<b>286.1</b>	<b>191.45</b>

# YUSAFWALA - SAHIWAL (HEADQUARTER)

## MAIZE (*Zea mays* L)

### HYBRID MAIZE (YELLOW)

#### KHARIF 2017

#### Germplasm Maintenance

##### 1.1 Maintenance of Inbred Lines

Six hundred thirty eight (638) elite families of thirty two (32) inbred lines were sown ear to row for maintenance during Kharif-2017. The material was sown in such a way that after every two lines, one line was kept fallow to reduce the chance of foreign pollen contamination during hand pollination and to facilitate the breeding work. All these lines were maintained by self-pollination and harvested for next cycle of maintenance and purification considering their true to type behavior and other desirable parameters. Data regarding root anthocyanin, leaf sheath anthocyanin, margin serration, leaf margin wave, sheath hairs, leaf senescence, fertility of anthers, pollen shedding, anther color, pollen color, glumes color and silk color were also recorded for all the lines separately.

##### 1.2 Maintenance of Pre Elite inbred lines/families

Three hundred eleven (311) pre-elite families, including dent derivatives and flint derivatives which have achieved the status of purity were merged into Pre-Elite inbred lines, were sown ear to row for maintenance and purification through hand pollination. Harvesting of all the lines has been completed. Seed preparation of the inbred lines is in progress for sowing in Spring-2018.

##### 1.3 Stalk rot Inoculation (*Fusarium verticillioides*) and Selection of resistant germplasm

All Elite, Pre-Elite inbred lines 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 2<sup>nd</sup> or 3<sup>rd</sup> 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

### 2.1 Isolation No. 1

Nineteen (19) promising female inbred lines with one male (Y-36) were sown on 1kanal in colony area for constitution of new single cross maize hybrids. These new single crosses will be evaluated in Spring-2018. Off-type plants were rouged out. Plants were harvested to collect seed for future use. Seed was preserved in seed house. The seed weight of whole isolation was seven and half (7.5) kg.

### 2.2 Isolation No. 2

Seed increase of promising inbred line (DR-56) was sown in colony area. Off-type plants were rouged out. Plants were harvested to collect seed for future use. Seed was preserved in seed house. The seed weight of whole isolation was 4.25 kg

### 2.3 Isolation No. 3

Seed increase of promising inbred line (Y-36) was sown at seed house to obtain enough seed for using in hybrid crosses. Off-type plants were rouged out. Plants were harvested to collect seed for future use. The seed weight of whole isolation was 9.25 kg.

### 2.4 Isolation No. 4

Seed increase of promising inbred line (Y-222) was sown in office area. Off-type plants were rouged out. Plants were harvested to collect seed for future use in crossing program. Seed was preserved in seed house. The seed weight of whole isolation was seventeen and half (17.5) kg.

### 2.5 Isolation No. 5

Thirteen promising inbred lines as female with one (Y-36) as male on an area of 1kanal for constitution of new single cross maize hybrids were sown in Sq. No. 27. These new single crosses will be evaluated in Spring-2018. After harvesting and threshing the weight received of the whole isolation was 41.30 kg.

### 2.6 Isolation No. 6

Seed increase of promising inbred line (DR-73) was sown in seed house. Off-type plants were rouged out. Plants were harvested to collect seed for future use. Seed was preserved in seed house. The weight of whole isolation was half 0.50 kg.

### 2.7 Isolation No. 7

Seed production of CIMMYT allotted hybrid (Z-827-2) in tunnel 1 was sown with ratio of 1:3. Off-type plants were rouged out. Plants were harvested to collect seed for future use. Seed was preserved in seed house. The weight of whole isolation was 14.30 kg.

## 3 Hybrid Evaluation

### Replicated Yield Trials

#### 3.1 Preliminary Hybrid Maize Yield Trial No. 1. Kharif-2017

This trial was comprised of twenty six (26) including approved and commercial hybrids as check. The trial was sown in randomized complete block design with two replications. Plot size was kept 4 m x 0.75 m x 1. The data regarding various parameters are presented in the following table.

**Table 1: Results of Preliminary Hybrid Maize Yield Trial No. 1 in Khraif-2017**

Sr. No.	Hybrid	Yield kgs/Ha	Stand Count	50% Tasseling	50% Silking	Plant Height	Ear Height	Plants Harvest	Ear Harvest
1	YH-5427	10206 a	19	51	54	185	100	19	20
2	YH-5535	10025 ab	19	50	53	183	103	19	19
3	YH-5411	9143 a...c	19	52	55	173	83	19	19
4	31R88©	9040 ad	20	51	54	230	110	20	20
5	YH-5410	8982 a...d	19	50	53	185	103	19	20
6	YH-5533	8962 a...d	19	51	54	203	100	19	19
7	YH-5415	8507 a...e	19	52	55	190	100	19	19
8	YH-5439	8460 a...e	19	50	53	180	105	19	19

9	FH-1046	8431 a...e	19	51	54	198	110	19	20
10	YH-5421	8242 b...e	18	51	54	185	110	18	19
11	YH-1898	8203 c...e	19	51	54	200	110	19	20
12	DK 6714©	8146 c...e	19	52	55	238	128	19	19
13	YH-5390	8139 c...e	18	52	55	208	103	18	18
14	YH-5412	8016 c...f	19	51	54	180	100	19	19
15	YH-5555	7789 c...f	20	51	54	185	98	19	20
16	YH-5421	7677 c...f	20	50	53	180	108	19	20
17	YH-5394	7601 c...f	19	50	53	193	115	19	19
18	YH-5539	7535 c...f	20	53	56	165	93	19	20
19	YH-5421	7495 c...g	19	49	52	183	105	19	19
20	YH-5417	7307 d...g	19	51	54	188	95	19	19
21	YH-5395	7227 d...g	19	51	54	185	108	19	20
22	YH-5556	6911 e...g	20	52	55	188	113	19	20
23	YH-5423	6767 e...g	19	51	54	173	100	19	19
24	YH-5439	6290 fg	19	49	52	173	85	18	19
25	YH-5556	6254 fg	19	52	55	180	113	19	19
26	YH-5423	5685 g	19	50	53	178	105	18	20
<b>CV%</b>		11.08	4.69	1.77	1.72	5.75	8.95	4.5	4.93
<b>LSD (5%)</b>		1817.8	NS	1.84	NS	22.33	19.12	NS	NS

It is evident from the results presented in the Table 1 which revealed significant differences among hybrids for yield, days to tasseling, plant height and ear height. Local promising hybrid YH-5427 remained at top position by giving 10206 kg/ha followed by local hybrid YH-5535 (10025 kg/ha) and YH-5411 (9143 kg/ha). YH-5421, YH-5439 seemed to be early maturing by taking 52 days to complete its fifty percent silking that portrayed as early maturing hybrid. Hybrid DK-6714 showed maximum plant height (238cm) while YH-5539 showed minimum plant height (165 cm). Local hybrid YH-5411 showed lowest cob bearing (83cm) while DK-6714 showed highest cob bearing (128 cm). Non-significant results were found for stand count, 50% silking, plant harvest and ear harvest which depicted lack of sufficient variation for these characters.

### 3.2 Preliminary Hybrid Maize Yield Trial No. 2, Kharif -2017.

This trial was comprised of twenty six (26) entries including approved and commercial hybrids as check. The trial was sown in randomized complete block design with two replications. Plot size was kept 4 m x 0.75 m x 1. The data regarding various parameters are presented in the following table

**Table 2: Results of Preliminary Hybrid Maize Yield Trial No. 2 in Khraif-2017**

Sr. No.	Hybrid	Yield (kgs/ha)	Stand Count	50% Tasseling	50% Silking	Plant Ht.	Ear Ht.	Plant Harvest	Ear Harvest
1	YH-5552	11636 a	19	51	54	220	105	19	19
2	DK-6714	11534 a	18	54	57	253	125	18	18

	©								
3	SD-626	8886 b	20	51	54	243	138	20	20
4	FH-1046	8788 bc	19	54	57	198	120	19	19
5	31R88	8362 bcd	19	51	54	230	108	19	19
6	YH-5213	8313 bcd	19	51	54	218	120	19	19
7	YH-5521	8188 b...e	19	52	55	220	108	19	19
8	YH-5545	8129 b...e	19	53	56	198	105	19	19
9	YH-5557	7572 b...f	19	54	57	200	103	19	19
10	NK-6621	7533 b...f	18	55	58	220	118	18	19
11	YH-5415	7065 b...g	20	50	53	215	113	20	20
12	YH-5490	6747 b...g	20	51	54	203	108	20	20
13	YH-5440	6687 b...h	19	54	57	210	95	19	19
14	YH-5543	6544 b...h	19	52	55	193	103	19	19
15	YH-5552	6510 c...h	18	52	55	203	100	18	19
16	YH-1898	6419 d...h	19	52	55	208	118	19	19
17	YH-5558	6285 d...h	18	53	56	210	103	18	20
18	YH-5560	6241 d...h	19	51	54	188	98	19	19
19	YH-5559	6192 d...h	19	53	56	205	113	19	19
20	YH-5561	5846 e...i	18	50	53	205	95	18	19
21	YH-5133	5370 f...j	19	54	57	225	115	19	19
22	YH-5544	5295 f...j	18	50	53	208	108	18	19
23	YH-5397	4833 g...j	19	54	57	175	108	19	19
24	YH-5554	4328 hij	18	50	52	178	90	18	18
25	YH-5534	3603 ij	19	54	57	153	90	19	20
26	YH-5397	3307 j	18	51	54	168	90	18	18
<b>LSD (5%)</b>		2362	NS	2.72	2.91	21.3	17.19	NS	NS
<b>CV%</b>		16.55	4.17	2.55	2.58	5.06	7.78	4.17	3.86

It is evident from the results presented in the Table 2 that significant differences were found among hybrids for all characters under study except stand count, plant harvest and cob harvest which suggested that selection could be beneficial for traits due to existence of significant variation. Local hybrid YH-5552 and multinational check DK-6714 (C) remained at 1<sup>st</sup>, 2<sup>nd</sup> positions by giving 11636, 11534 kg/ha yields, respectively. YH-5554 seemed to be early maturing by taking 52 days to complete its fifty percent silks while hybrid NK-6621 was late maturing by taking 58 days to silks. DK-6714 showed maximum plant height (253 cm). Non-significant differences were shown by stand count, plant harvest and ear harvest.

### 3.3 Demonstration-1: Local Maize Hybrid in Comparison To Commercial Hybrids.

This trial was comprised of twelve (12) entries including approved and commercial hybrids as check. The trial was sown in strips. Plot size was kept 4mx0.75mx9. The data regarding various parameters are presented in the following table.



**Table 3: Results of Local Maize Hybrids in Comparison to Commercial Hybrids Trial 1 (10 Rows/Hybrid) in Kharif-2017**

Sr. No	Hybrid Code	Grain Yield Kg/ha	Stand Count	50% Tasseling	50% Silking	Plant Height	Cob Height	Plant Harvest	Cob harvest
1	DK6714	8730	197	53	56	238	118	194	204
2	YH-5427	7745	189	47	50	170	80	187	209
3	YH-1898	7716	199	51	54	202	103	199	206
4	YH-5421	7512	197	47	50	180	97	195	204
5	31R88	7496	203	49	52	225	88	201	210
6	YH-5397	7247	190	49	53	168	88	190	205
7	YH-5521	6770	200	47	51	226	98	198	207
8	FH-1046	6719	189	51	54	205	112	187	196
9	YH-5394	6644	196	50	53	185	105	194	207
10	DDR41× Y-36	6603	205	48	51	202	88	203	212
11	YH-5140	6339	198	54	57	175	95	197	205
12	YH-5534	5758	200	51	54	160	77	195	207

The results of 10 rows trial for kharif-17 season presented in Table 3, illustrates that local promising hybrid YH-5427 and promising hybrid YH-1898 out yielded all prominent commercial hybrids except check DK-671 (8730 kg/ha) giving 7745 kg/ha & 7716 kg/ha, respectively. YH 5427 and YH 5421 seemed to be early maturing by taking 50 days to complete its fifty percent silks while YH-5140 was late maturing taking 57 days to silks. Hybrid DK-6714 showed maximum cob height (118 cm). Commercial hybrid DK-6714 showed maximum plant height (238 cm).

### 3.4 Demonstration-2: Local Maize hybrid in comparison to commercial hybrids.

This trial was comprised of twenty seven (27) entries including approved and commercial hybrids as check. The trial was sown in strips. Plot size was kept 4m x 0.75m x 9. The data regarding various parameters are presented in the following table.

**Table 4: Results of Local Maize Hybrids in Comparison to Commercial Hybrids Trial 2 (4 Rows/Hybrid) in Kharif-2017**

Sr. No	Hybrid Code	Grain Yield (Kg/ha)	Stand Count	50% Tasseling	50% Silking	Plant Ht.	Cob Ht.	Plant Harvested	Cob harvested
1	YH-5521	10640	76	49	52	215	103	76	78
2	Dk-6714	10557	80	52	55	245	125	80	80
3	YH-5427	9286	80	49	52	188	100	79	82
4	SD-626	8683	77	52	55	235	118	77	79
5	NT-6621	8553	78	53	56	225	102	78	79
6	YH-5553	8401	75	47	50	180	80	75	77
7	YH-1898	8245	75	51	54	207	100	75	79
8	CS2Y10	8159	79	50	53	215	98	78	79
9	YH-5552	8027	78	51	54	216	110	78	80

10	FH-1046	8021	79	51	54	205	116	79	80
11	YH-5541	7993	79	52	55	200	107	79	82
12	YH-5545	7964	79	48	51	186	103	79	78
13	YH-5535	7756	73	50	53	202	103	73	75
14	YH-5533	7358	79	50	53	205	104	79	80
15	YH-5421	7334	76	50	53	185	108	76	80
16	Yh-5394	7097	74	50	53	182	106	74	78
17	YH-5390	7008	78	52	55	190	97	78	81
18	YH-5554	6998	78	47	50	170	85	78	79
19	YH-5555	6973	78	51	54	210	97	78	80
20	31R88	6972	81	51	54	215	91	80	84
21	YH-5397	6840	73	52	55	175	92	73	75
22	YH-5551	6513	74	52	55	200	107	74	79
23	YH-5140	6365	76	51	54	196	104	76	80
24	YH-5411	5513	73	49	53	187	91	73	75
25	YH-5543	4989	76	49	52	158	78	76	77
26	YH-5539	4927	76	52	55	165	83	76	78
27	YH-5534	4822	74	52	55	169	78	74	74

The results of four rows trial for kharif-2017 season presented in Table 4 showed that hybrid YH-5521 out yielded all other entries by giving 10640 kg/ha followed by check Dk-6714 (10557 kg/ha) and promising hybrid YH-5427 (9286 kg/ha). YH-5553 and YH-5554 seemed to be early maturing by taking 50 days to complete its fifty percent silks while NT-6621 was late maturing taking 56 days to silks. Dk-6714 obtained maximum plant height (245 cm) while YH-5543 remained at the bottom with 158 cm.

### 3.5 National Uniform Maize Hybrid Yield Trial Kharif 2017

This trial was comprised of eighty three (83) entries. It was sown in Alpha Lattice design with three replications by keeping plot size of 4m x 0.75m x 2. The data were recorded regarding various parameters which are presented in the following table.

**Table 5: Results of National Uniform Maize Yield Trial Kharif-2017**

Sr. No.	Hybrid Code	Grain Yield kg/ha	Plant Hrv.	Cob Hrv.	Days to tassel	Days to silk	Plant Ht. (cm)	Cob Ht. (cm)	Stand count
1	9067	9248 a	38	38	53	55	248	119	37
2	9066	9085 ab	37	38	55	58	262	139	37
3	ST-1387	8953 a...c	35	36	50	53	243	125	36
4	IS-5448	8752 a...d	36	36	57	59	236	115	36
5	IS-7628	8742 a...e	36	37	54	56	237	128	36
6	SB-13	8658 a...f	36	37	54	56	233	129	36
7	SB-6082	8653 a...g	37	38	53	55	261	120	38
8	VGR-323	8623 a...g	36	37	53	55	228	119	36
9	TG-YM-925	8527 a...h	37	37	51	54	242	128	37

10	TG-YM-945	8492 a...h	38	38	52	55	233	117	38
11	49 M 53	8401 a...i	36	37	52	55	236	114	36
12	49 M 17	8372 a...j	37	38	52	54	262	124	37
13	IS-5456	8361 a...j	35	36	52	55	214	111	35
14	SB-9674	8308 a...k	36	38	51	54	211	115	37
15	PQ-8148 (DK9919)	8283 a...k	37	37	52	54	226	118	37
16	DK-9531	8279 a...l	35	36	52	54	235	129	36
17	DK-9914	8278 a...l	37	38	51	54	237	133	37
18	AA-9435	8268 a...l	36	37	52	55	227	124	36
19	70 M 70	8236 a...m	37	37	57	59	257	116	38
20	77 M 86	8212 a...m	35	35	50	53	224	93	35
21	JS-707	8205 a...m	38	38	52	55	245	127	38
22	Ag-4040	8176 a...m	35	36	52	55	223	125	35
23	YH-1898 (Check)	8127 a...m	38	39	50	53	214	119	38
24	CM-107	8113 a...n	37	37	51	54	238	129	37
25	MS-449	8082 a...n	35	37	54	56	246	138	36
26	7786	8040 a...n	37	39	52	55	213	110	38
27	AM-6655	8021 a...n	36	38	57	60	220	111	36
28	2141	7981 a...n	36	36	55	58	233	127	36
29	TMZ-03	7980 a...n	37	38	55	57	246	135	37
30	696	7952 a...o	37	38	53	57	248	130	37
31	HP-989	7936 a...o	37	39	51	56	207	103	38
32	20R52	7920 a...o	34	36	51	54	225	125	34
33	2271	7897 a...p	35	37	52	55	234	129	35
34	3377	7864 a...q	36	38	51	54	212	107	37
35	2468	7838 a...q	35	36	49	52	220	112	35
36	3366	7784 a...r	36	38	51	54	233	130	36
37	3399	7757 a...r	36	37	51	54	228	130	36
38	KATONE	7739 a...r	36	38	50	53	234	121	37
39	KEGROSS	7737 a...r	37	38	50	53	219	102	37
40	KONTIKOS	7649 b...r	34	35	50	53	237	132	34
41	NEELUM 22AR16	7643 b...r	37	38	50	53	226	127	37
42	MA-101	7573 b...s	36	37	53	56	233	125	37
43	RS-6464	7533 c...t	36	36	52	54	230	114	36
44	RS-7677	7514 c...t	35	37	52	55	236	128	35
45	RS-936	7496 c...t	37	37	53	55	239	122	37
46	8287	7454 c...t	36	37	56	58	212	116	38
47	YAM-133A	7434 c...t	36	37	57	60	247	125	36
48	YAM-134B	7389 d...t	34	36	51	54	223	100	34
49	YAM-135C	7369 d...t	37	39	51	54	209	105	38
50	419	7369 d...t	36	37	53	56	227	121	36
51	797	7341 d...t	36	38	59	61	205	94	36

52	DS-403	7331 d...t	35	38	53	56	215	100	35
53	MDS-809	7326 d...t	37	37	53	55	228	125	37
54	MDS-810	7299 d...t	36	37	52	54	241	134	36
55	S-7750	7295 d...t	35	36	53	55	221	118	36
56	PSHY-0402	7286 d...t	38	38	54	56	231	115	38
57	PSHY-7613	7279 d...t	35	36	51	54	242	112	36
58	PSHY-7608	7238 d...t	36	36	52	55	255	128	36
59	PSHY-7604	7214 e...t	36	37	51	54	245	111	37
60	YH-5140	7174 f...t	36	37	54	56	231	120	36
61	YH-5394	7170 f...t	36	37	53	55	192	103	36
62	FH-793	7143 f...t	36	36	51	54	190	104	36
63	FH-1292	7123 g...t	36	37	54	56	236	118	36
64	FH-988	7027 h...t	36	36	53	56	192	98	36
65	FH-1036	6917 i...t	35	35	53	56	233	127	35
66	FH-922	6912 i...t	39	39	52	54	240	130	39
67	FS-999	6860 j...t	36	36	52	55	236	134	36
68	25W87	6854 j...t	35	37	53	56	224	105	36
69	625	6847 j...t	37	37	51	54	208	108	37
70	SD.17S22	6846 j...t	35	36	53	56	200	99	35
71	SD.17S23	6840 j...t	37	37	54	57	237	133	37
72	SD.17S24	6782 k...t	36	38	52	54	239	107	36
73	SD.3233	6747 l...t	37	38	52	55	225	109	37
74	SD.3392 (Green Cob)	6718 m...t	38	38	58	60	226	121	38
75	52S62	6580 n...t	36	37	51	54	182	95	35
76	62S55	6418 o...t	36	37	53	55	237	121	36
77	747	6363 p...t	36	37	51	54	204	112	36
78	786	6360 q...t	35	36	52	55	191	98	37
79	G-3	6360q...t	37	38	53	56	207	113	37
80	Rustam-I	6276 r...t	37	37	52	56	229	114	37
81	P-4040	6107st	36	37	53	55	229	107	36
82	P-3522	6066st	35	35	53	56	198	88	35
83	5015	6006 t	35	35	48	52	222	117	35
<b>CV%</b>		12.53	3.73	4	4	3	3	5	8
<b>LSD (5%)</b>		1534.7	2.17	2.14	2.87	2.98	20	15.89	NS

The results of National Uniform Maize Yield Trial displayed in Table 5 disclosed statistically significant differences among hybrids included in the trial for all the characters studied except for stand count. Hybrid 9067 gained maximum grain yield (9248 kg/ha) followed by 9066 (9084 kg/ha) and ST-1387 (8953 kg/ha). Hybrid 5015 took minimum days to silking (51 days) followed by 2468 (52 days). These entries would be used as early maturing hybrid. For cob height, hybrid 9066 showed highest value (139 cm) while P3522 achieved lowest value (88 cm). Entries with lower cob and plant height are beneficial for breeding of lodging resistance hybrids. Non-significant differences were showed by ear harvest.

## **SPRING 2018**

### **Germplasm Maintenance**

#### **1 Maintenance of Inbred Lines**

Seven hundred ninety six (796) elite families of 61 inbred lines were sown ear to row for maintenance during spring-2018. The material was sown in such a way that after every two lines, one line was kept fallow to reduce the chance of foreign pollen contamination during hand pollination and to facilitate the breeding work. All these lines were maintained by self-pollination and harvested to retain their purification considering their true to type behavior and other desirable parameters. Numbers of 50% days to tasseling and silking were recorded to maintain inbred classes based on maturity. After gaining maturity, these self-pollinated lines were harvested and stored for using in next season.

#### **2 Maintenance of Pre Elite Inbred Lines/Families**

One hundred fifty one (151) pre-elite families of 29 inbred lines were sown ear to row during spring-2018 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**

Two hundred sixty two (262) elite families including dent and flint derivative lines were sown ear to row during spring-2018 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.

#### **2.2 Germplasm Enhancement**

##### **2.2.1 Screening of Maize Germplasm and Hybrids Tolerant to Stalk Rot**

Self-pollinated plants of seven hundred ninety six (796) elite, one hundred fifty one (151) pre-elite families and two hundred sixty two (262) elite families including dent and flint derivatives were inoculated with stalk rot fungus carrier toothpicks at second node from the base. At harvesting stems of self-pollinated plants were torn apart with the help of scalpel to see the penetration of pathogen below or above the point of insertion of tooth picks. The scoring for tolerant to susceptible was made on the basis of Hooker's Scale. The plants showing no infection and infection within node was selected as tolerant and moderate tolerant lines respectively. In case of infection reached to the second internode, the plant was declared susceptible and rejected from the line in the field.

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

### **3 Development of Heat Resilient Maize Inbred Lines and Hybrids under Natural Conditions**

During spring-2018 fifty inbred lines and fifty hybrids were sown for screening against high temperature on 22-03-2018. At flowering the temperatures remained above 40°C. At harvesting twenty lines and thirty hybrids were selected based on their performance under high temperature. The seed was kept for next cycle of planting and selection under high temperature.

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

#### **4.1 Hybrid Constitution.**

##### **4.1.1 Isolation No.1**

Sixty five (65) elite inbred lines were used as female with Y-36 as male were sown in office area on 31-01-2018 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 in kharif-2018. The best performing single crosses will be selected. After harvesting, seed weight was eighty three (83) kg.

##### **4.1.2 Isolation No.2**

Sixty one (61) elite inbred lines were used as female with Y-27 as male were sown in Sq. No 24 on 31-01-2018 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 in kharif-2018. The best performing single crosses will be selected. After harvesting, seed weight was ninety (90) kg.

##### **4.1.3 Isolation No.3**

Forty two (42) elite inbred lines were used as female with P-222 as male were sown in seed house on 13-02-2018 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-2018. The best performing single crosses will be selected. After harvesting, seed weight was two and half (2.5) kg.

### **5 Seed Increase of Inbred Lines in Isolation Blocks**

#### **5.1 Isolation No.1**

DR-35 was planted in tunnel No.1 for Maintenance / Seed increase on 13-01-2018. The plastic sheets were used to avoid pollen contamination. Off-type plants were rouged out to avoid contamination. At harvesting, fifteen (15) kg seed was obtained.

#### **5.2 Isolation No.2**

DR-56 was planted in tunnel No.2 for maintenance / seed increase on 12-01-2018. The plastic sheets were used to avoid pollen contamination. Off-type plants were rouged out to avoid contamination. At harvesting, seven and a half (7.50) kg seed was obtained.

#### **5.3 Isolation No.3**

DR-135 was planted in tunnel No.3 for maintenance / seed increase on 12-01-2018. The plastic sheets were used to avoid pollen contamination. Off-type plants were rouged out to avoid contamination. At harvesting, one and half (1.50) kg seed was obtained.

#### 5.4 Isolation No.4

PLP-23 was planted in tunnel No.4 for Maintenance / Seed increase on 12-01-2018. The plastic sheets were used to avoid foreign pollen contamination. Off-type plants were rouged out to avoid contamination. At harvesting, Two (2) kg seed was obtained.

#### 5.5 Isolation No.5

DDR-29 female line was sown for Maintenance / Seed increase in office area on 31-01-2018. Off-type plants were rouged out to avoid foreign pollen contamination. At harvesting, only three hundred (300) gram seed was obtained as seed setting was very poor due to seasonal harsh climatic condition.

#### 5.6 Isolation No.6

SL-7 female line was sown for Maintenance / Seed increase in office area on 31-01-2018. Off-type plants were rouged out to avoid contamination. At harvesting, twelve (12) kg seed was obtained.

#### 5.7 Isolation No.7

DR-72 female line was sown for Maintenance / Seed increase in seed house on 26-02-2018. Off-type plants were rouged out to avoid contamination. At harvesting, one and half (1.50) kg seed was obtained.

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

#### 6.1 Preliminary Maize Hybrid Yield Trial No. 1 Spring-2018

This trial was comprised of twenty (20) including approved and commercial hybrids as check.. The trial was sown in randomized complete block design with two replications. Plot size was kept 4m x 0.75mx1. The data regarding various parameters are presented in the following table.

**Table 6: Results of Preliminary Maize Hybrid Yield Trial No. 1 Spring-2018**

Sr. No.	Hybrid	Grain Yield kg/ha	Stand Count	50% Tasseling	50% Silking	Plant Height (cm)	Ear Height (cm)	Plants Harvest	Ear Harvest
1	YH-5532	8015 a	18	67	69	190	108	17	19
2	YH-1898	7749 ab	18	70	72	195	123	17	19
3	FH-1046	7742 a.c	18	70	72	188	118	17	19
4	FH-949	7646 a.c	17	69	71	200	113	16	18
5	P-1543	7486 a.c	19	64	66	203	95	18	20
6	YH-5482	7432 a.c	20	68	70	198	103	19	21
7	YH-5562	6688 a.c	19	67	69	193	105	18	20
8	YH-5547	6520 a.c	19	66	68	198	108	18	20
9	YH-5541	6413 a.c	20	68	70	180	105	19	21
10	YH-5564	6338 a.c	17	69	71	188	115	16	18
11	YH-5491	6308 a.c	19	68	70	198	103	18	20
12	YH-5537	6282 a.c	19	68	70	188	108	18	20
13	YH-5521	6280 a.c	19	65	67	193	105	19	21
14	YH-5563	6246 a.c	19	68	70	188	100	18	20
15	YH-5565	5992 bc	19	65	67	193	103	18	20

16	YH-5555	5933 bc	17	69	71	188	115	16	18
17	YH-5140	5810 bc	19	67	69	183	105	18	20
18	YH-5550	5182 c	17	68	70	210	115	16	18
19	YH-5543	5085 c	19	68	70	183	103	18	20
20	YH-5543	4725 c	17	65	67	183	108	16	18
<b>CV%</b>		16.09	4.05	2.19	2.13	6.85	10.71	4.75	4.49
<b>LSD (5%)</b>		2217.4	1.49	3.11	3.11	22.49	19.69	1.66	1.76

The results of Preliminary Maize Hybrid Yield Trial No. 1 are illustrated in Table 6 reveal significant differences among hybrid for all the characters studied in this trial. It is clear from the results that YH-5532 gave maximum grain yield (8015 kg/ha) followed by check YH-1898 (7749 kg/ha). P-1543 seemed to be early maturing by taking 66 days to complete its fifty percent silks while YH-1898 was late maturing taking 71.5 days to silks. YH-5550 showed maximum plant height (210 cm) while YH-5541 showed minimum plant height (180 cm). Many local hybrids showed mid to low cob bearing characteristic which is desirable in developing lodging resistant hybrids. P-1543 showed low cob bearing (95 cm) while YH-1898 showed high cob bearing (122 cm).

## 6.2 Preliminary Maize Hybrid Yield Trial No. 2 Spring-2018

This trial was comprised of twenty six (26) entries including approved and commercial hybrids as check. The trial was sown in randomized complete block design with two replications. Plot size was kept 4m x 0.75mx1. The data regarding various parameters are presented in the following table.

**Table 7: Results of Preliminary Maize Hybrid Yield Trial No. 2 Spring-2018**

Sr. No.	Hybrid	Grain Yield kg/ha	Stand Count	50% Tasseling	50% Silking	Plant Height (cm)	Ear Height (cm)	Plants Harvest	Ear Harvest
1	YH-5569	10319 a	19	62	64	158	90	19	21
2	YH-5404	9583 ab	20	61	63	155	83	20	22
3	YH-5575	9131 abc	19	62	64	178	100	19	21
4	YH-5566	9039 a...d	19	61	64	153	85	19	21
5	YH-5397-2	8549 a...d	20	60	63	158	93	20	22
6	YH-5568	8444 a...d	19	63	65	155	88	19	21
7	YH-5570	8443 a...e	18	59	61	163	90	18	20
8	YH-5574	8392 a...e	19	64	66	145	95	19	21
9	P-1543 ©	8078 b...e	19	60	63	173	90	19	21
10	YH-5397	7495 b...e	18	60	63	160	98	18	20
11	YH-5397-3	7407 b...f	19	63	66	148	83	19	21
12	YH-5572	7262 b...f	19	62	65	163	90	19	21
13	YH-5567	7228 b...f	19	60	63	170	100	19	21
14	YH-5390	7154 b...f	20	59	61	160	95	20	22
15	YH-5571	6988 b...f	20	61	64	173	93	20	22
16	YH-5555	6878 b...f	19	59	63	168	95	19	21
17	YH-5423	6758 b...f	19	61	64	160	90	19	21
18	YH-5554	6503 b...f	19	58	60	143	83	19	21



19	YH-5535	6324 b...f	19	63	66	145	85	19	21
20	YH-1898©	6323 c...f	19	57	60	155	73	19	21
21	YH-5415	6229 c...f	20	61	64	150	93	20	22
22	YH-5423-2	5868 c...f	19	62	65	150	80	19	21
23	FH-1046©	5556 d...f	19	61	63	160	88	19	21
24	YH-5534	5497 ef	19	62	64	150	80	19	21
25	YH-5556	5433 f	20	63	65	140	85	20	22
26	YH-5573	4336 f	19	63	65	140	75	19	21
<b>CV%</b>		14.6	4.26	3.37	3.18	6.96	10.03	4.26	3.85
<b>LSD (5%)</b>		2187	NS	NS	NS	NS	NS	NS	NS

The results presented in Table 7 showed statistically significant differences among hybrids in mean grain yield. It is evident that local hybrid YH-5569 (10319 kg/ha) out yielded all prominent commercial check hybrids i.e. P-1543©, YH-1898© and FH-1046© gave 8078 kg/ha, 6323 kg/ha & 5556 kg/ha respectively. YH-5554 seemed to be early maturing by taking 60 days to complete its fifty percent silks while hybrids YH-5574 & YH-5535 were late maturing taking 66 days to silks. YH-5575 showed maximum plant height (177 cm) while YH-5573 showed minimum plant height (139 cm). Local hybrid YH-1898 showed low cob bearing (72 cm) while YH-5567 showed high cob bearing (100 cm). All the characters excluding grain yield showed non-significant results.

### 6.3 Micro Plot Hybrid Maize Yield Trial No.01 Spring 2018

This trial was **comprised** of twenty six (26) entries including approved and commercial hybrids as check. The trial was sown in randomized complete block design with two replications. Plot size was kept 4m x 0.75m x 2. The data regarding various parameters are presented in the following table.

**Table 8: Results of Micro Plot Hybrid Maize Yield Trial No.01 Spring 2018**

Sr. No.	Hybrid	Grain yield kg/ha	stand count	50% Tasseling	50% Silking	Plant Height (cm)	Ear Height (cm)	Plants Harvest	Ear Harvest
1	FH 1046	10921 a	38	73	76	165	95	36	40
2	YH 5535	9779 ab	38	67	69	160	90	36	40
3	YH 5482	9459 a...c	38	68	71	195	115	36	40
4	YH 5421	9447 a...c	39	69	72	138	83	37	41
5	YH 5427	8663 b...d	38	73	75	160	90	36	40
6	YH 5555	8651 b...d	38	70	73	170	95	36	40
7	FH 949	8149 b...e	37	72	74	165	88	35	39
8	YH 5421	8029 b...e	37	69	71	153	90	35	39
9	YH 5415	7978 c...e	37	69	71	163	100	35	39
10	P 9108	7860 c...e	38	68	70	180	88	36	40
11	YH 5410	7852 c...e	38	66	68	155	95	36	40
12	YH 5439	7815 c...f	38	71	73	148	95	36	40
13	YH 5411	7739 c...f	38	69	71	148	85	36	40
14	YH 5417	7707 c...f	38	69	71	148	83	36	40
15	YH 5213	7703 c...f	38	69	71	183	95	36	40

16	P 1543	7375 d...g	39	64	66	178	88	37	41
17	YH 5394	7258 d...g	38	70	72	153	88	36	40
18	YH 1898	7108 d...g	37	71	73	160	90	35	39
19	YH 5390	7016 d...g	38	68	70	148	78	36	40
20	YH 5439	7016 d...g	38	67	69	158	93	36	40
21	YH 5556	6988 d...i	37	69	71	143	83	35	39
22	YH 5534	6489 e...i	37	70	72	120	73	35	39
23	YH 5423	6071 f...i	37	67	69	130	78	35	39
24	YH 5556	5615 g...i	37	71	73	130	75	35	39
25	YH 5397	5541 hi	37	69	72	145	83	35	39
26	YH 5539	<b>5241 i</b>	38	71	73	118	60	36	40
CV%		11.19	1.76	2	3	2	9	11	2
LSD (5%)		1768.8	NS	3.68	3.52	27	18.99	NS	NS

The results presented in Table 8, show that all the hybrids expressed statistically significant differences in grain yield, days to tasseling, silking, plant height and ear height. It is observable that YH 5535 (9779 kg/h) out yielded all prominent commercial hybrids i.e. P 9108 (7860 kg/h), P 1543 (7375 kg/h) used as check except FH 1046 (10921 kg/h). P 1543 seemed to be early maturing by taking 66 days to complete its fifty percent silks followed by local hybrid YH 5410 that taken 68 days to silks. Local hybrid YH 5482 showed maximum plant height (195 cm) while YH 5539 showed minimum plant height (118 cm). Local hybrids YH 5539 showed the lowest (60 cm) while YH 5482 showed the highest (115 cm) cob bearing.

#### 6.4 Micro Plot Hybrid Maize Yield Trial No.02 Spring-2018

This trial was comprised of twenty six (26) entries including approved and commercial hybrids as check. The trial was sown in randomized complete block design with two replications. Plot size was kept 4m x 0.75m x 2. The data regarding various parameters are presented in the following table.

**Table 9: Results of Micro Plot Hybrids Maize Yield Trial No. 02 Spring-2018**

Sr. No.	Hybrid	Grain Yield kg/ha	Stand Count	50% Tasseling	50% Silking	Plant Height (cm)	Ear Height (cm)	Plants Harvest	Ear Harvest
1	FH 1046	<b>10161 a</b>	39	71	73	175	103	36	40
2	YH 5552	10100 ab	37	71	73	178	98	34	38
3	FH 949	9497 abc	38	72	74	195	108	35	39
4	YH 1898	8904 a...d	38	71	73	178	98	35	39
5	YH 5558	8830 a...e	38	68	70	165	90	35	39
6	YH 5557	8739 a...f	39	72	74	170	88	36	40
7	YH 5133	8609 a...f	38	70	72	188	95	35	39
8	P 9108	8589 a...f	38	67	69	198	83	35	39
9	YH 5464	8210 b...g	39	69	71	153	73	36	40
10	P 1543	8201 b...g	38	65	67	190	83	35	39
11	YH 5561	8189 b...g	38	68	70	158	83	35	39
12	YH 5554	8103 c...h	38	67	69	153	80	35	39

13	YH 5545	7706 c...h	39	67	69	160	88	36	40
14	YH 5421	7423 d...i	38	69	71	163	103	35	39
15	YH 5552	7404 d...i	39	69	71	163	75	36	40
16	YH 5567	7352 d...i	38	69	71	155	85	35	39
17	YH 5397	7237 d...i	39	68	70	148	83	36	40
18	YH 5415	7039 d...i	38	66	68	168	90	35	39
19	YH 5140	6975 e...i	39	69	71	153	80	36	40
20	YH 5567	6857 f.i	38	69	71	170	90	35	39
21	YH 5521	6448 g.i	38	68	70	173	98	35	39
22	YH 5544	6393 g.i	38	68	70	158	88	35	39
23	YH 5543	6240 hi	38	67	69	150	93	35	39
24	YH 5490	6208 hi	39	69	71	163	80	36	40
25	YH 5563	5728 i	38	69	71	150	78	35	39
26	YH 5423	5595 i	38	68	70	135	78	35	39
CV%		12	2.6	1.18	1.14	6.02	10.95	2.83	2.51
LSD (5%)		1908.5	NS	1.6595	1.6595	20.526	NS	NS	NS

The results presented in Table 9 show that all the hybrids have statistically significant differences in grain yield, days to tasseling, silking and plant height. It is obvious that FH-1046 give higher yield (10161 kg/ha) followed by YH-5552 (10100 kg/ha). P 1543 seemed to be early maturing by taking 67 days to complete its fifty percent silks followed by local hybrid YH 5415 that taken 68 days to silks. Local hybrid P 9108 showed maximum plant height (197 cm) while YH 5423 showed minimum plant height (135 cm). Local hybrid YH 5464 showed low (73 cm) while FH 949 high (108 cm) cob bearing.

## 6.5 Demonstration (Demo-01) of Local Maize Hybrids in Comparison to Commercial Hybrids under Normal Conditions Spring-2018

This trial was comprised of fourteen (14) entries including approved and commercial hybrids as check. The trial was sown in randomized complete block design with two replications. Plot size was kept 4m x 075 m x 4. The data regarding various parameters are presented in the following table.

**Table 10: Results of (Demo-01) of Local Maize Hybrids in Comparison to Commercial Hybrids under Normal Conditions Spring-2018**

Sr. No.	Hybrid	Yield kgs/Ha	Stand Count	50% Tasseling	50% Silking	Plant Height (cm)	Ear Height (cm)	Plants Harvest	Ear Harvest
1	YH-5404	9911	76	67	70	166	88	73	77
2	FH-949	9908	77	71	74	191	113	74	78
3	FH-1046	9836	77	71	74	176	110	74	78
4	DK-9108	9321	75	64	68	191	98	72	76
5	YH-1898	9218	78	73	70	179	109	75	79
6	P-1543	9194	77	61	64	188	95	74	78
7	YH-5482	9132	76	67	70	212	107	73	77
8	YH-5543	8908	77	63	66	164	90	74	78

9	FH-793	8822	77	72	75	175	103	74	78
10	YH-5423	8616	77	65	68	154	91	74	78
11	YH-5550	8490	78	68	72	193	100	75	79
12	YH-5427	8412	75	67	65	159	90	72	76
13	YH-5532	8227	79	69	72	180	100	76	80
14	YH-5140	6802	76	71	73	163	89	73	77
CV%		16.34	1.74	4.01	4.27	9.8	7.31	1.82	1.72
LSD (5%)		NS	NS	5.85	6.44	NS	15.55	NS	2.89

The results presented in Table 10 exhibit that all the hybrids expressed statistically significant differences for days to tasseling, silking and ear height & harvest. It is obvious that YH-15404 out yielded all prominent commercial hybrids included in the trial by giving 9910.5 kg/ha followed by the FH-949 with 9908 kg/ha. P-1543 seemed to be early maturing by taking 64 days to complete its fifty percent silks while local hybrid FH-793 was late maturing taking 75 days to silks. YH-5482 showed maximum plant height (211 cm) while YH-5423 showed minimum plant height (154 cm).

#### 6.6 Demonstration (Demo-02) of Local Maize Hybrids in Comparison to Commercial Hybrids under Normal Conditions Spring-2018

This trial was comprised of forty nine (49) including approved and commercial hybrids as check. The trial was sown in strip design. Plot size was kept 4m x 075 m x4. The data regarding various parameters are presented in the following Table 11.

**Table 11: Results (Demo-02) of Local Maize Hybrids in Comparison to Commercial Hybrids under Normal Conditions Spring-2018**

Sr. No.	Hybrid Code	Grain Yield kg/ha	Stand Count	50% Tasseling	50% Silking	Plant Height (cm)	Cob Height (cm)	Plant Harvested	Cob Harvested
1	YH-5575	11715	74	66	70	185	80	71	76
2	CS-5808	11165	75	66	68	180	75	72	77
3	YH-5415	10954	78	71	74	157	105	75	80
4	TG-46B90	10952	75	64	67	216	100	72	77
5	FH-949	10252	78	71	74	190	97	75	80
6	YH-5550	9810	76	69	73	170	100	73	78
7	TG-1701	9724	75	64	67	207	95	72	77
8	FH-793	9671	77	73	77	170	100	74	79
9	YH-5555	9437	77	72	74	175	95	74	79
10	DK-9108	9386	77	62	65	200	105	74	79
11	YH-5558	9053	76	71	74	165	85	73	78
12	FH-1046	9046	76	70	73	180	105	73	78
13	YH-5491	9007	77	60	63	170	85	74	79
14	YH-1898	8968	68	73	76	175	100	65	70
15	YH-5537	8890	75	66	69	175	90	72	77
16	YH-5534	8849	78	67	70	145	80	75	80

17	P-1543	8782	76	59	62	200	100	73	78
18	YH-5482	8637	77	66	69	175	100	74	79
19	YH-5521	8390	76	61	63	160	88	73	78
20	YH-5421-1	8292	76	64	67	148	75	73	78
21	YH-5567	8202	77	65	68	160	80	74	79
22	YH-5554	8176	78	66	69	146	82	75	80
23	YH-5541	8066	75	72	75	172	85	72	77
24	YH-5547	8042	75	59	62	185	105	72	77
25	YH-5490	7965	78	63	66	173	90	75	80
26	YH-5411	7959	78	69	71	150	80	75	80
27	YH-5564	7833	76	63	66	180	90	73	78
28	YH-5421	7723	77	71	74	160	95	74	79
29	YH-5532	7684	77	63	65	155	80	74	79
30	YH-5545	7602	78	61	64	164	100	75	80
31	YH-5390	7569	75	64	67	155	85	72	77
32	YH-5556	7349	76	59	62	170	90	73	78
33	YH-5397	7331	76	62	65	155	80	73	78
34	YH-5543	7153	77	65	68	167	87	74	79
35	YH-5553	7131	79	65	69	166	80	76	81
36	YH-5574	7123	75	65	69	220	140	72	77
37	YH-5535	7006	77	64	67	154	82	74	79
38	YH-5521	6919	76	68	70	184	73	73	78
39	YH-5398	6829	76	62	65	160	75	73	78
40	YH-5563	6739	77	61	64	175	88	74	79
41	YH-5565	6681	76	59	62	178	88	73	78
42	YH-5394	6652	77	69	72	160	90	74	79
43	YH-5562	6429	74	61	64	188	160	71	76
44	YH-5423	6340	75	61	65	140	75	72	77
45	YH-5490	5754	76	71	75	152	65	73	78
46	YH-5539	5142	79	68	72	129	65	76	81

It is evident from the results presented in Table 11 that YH-5575 out yielded all the hybrids included in this experiment by giving 11715kg/ha followed by the CS-5808 (11165 kg/ha). P-1543 & YH-5547 seemed to be early maturing by taking 62 days to complete its fifty percent silks while local hybrid FH-793 was late maturing taking 77 days to silks. YH-5574 gained maximum plant height (220 cm) while YH-5539 minimum (129 cm).

### **6.7 National Uniform Maize Yield Trial-01 Spring-2018**

This trial was planted with 55 entries having plot size of 5mx.75m x2 with three replications. The data regarding various parameters are presented in table 12.

**Table 12: Results of National Uniform Maize Yield Trial-01 Spring-2018**

Sr. No.	Hybrid	Grain Yield kg/ha	Stand Count	Days to 50% Tasseling	Days to 50% Silking	Plant Height (cm)	Ear Height (cm)	Plants Harvest	Ear Harvest
1	NK-7720	11537 a	37	66	69	204	108	34	39
2	YH-5427	11371 ab	40	70	72	176	98	39	42
3	AAS-9633	11351 ab	38	66	69	200	119	35	39
4	DK-7024	10812 a...c	37	66	69	189	95	34	40
5	YH-5532	10589 a...d	39	66	68	173	98	38	41
6	TG-1801	10474 a...e	38	66	69	214	111	35	39
7	P-1429 (C)	10425 a...e	38	66	69	191	98	35	39
8	J-7330	10302 a...f	37	64	67	172	82	34	39
9	FH-1292	10274 a...g	39	71	73	194	117	37	40
10	YH-5482	10148 a...h	39	66	69	181	102	39	41
11	22W33	10059 a...i	39	70	72	188	98	36	40
12	NQ-6612	10014 a...j	37	66	69	169	96	34	41
13	GW-3363	9842 b...k	40	66	69	194	88	37	42
14	NK-7750	9832 b...k	38	66	68	202	113	35	39
15	P 2088	9620 c...l	38	65	68	198	94	35	41
16	FH-985	9550 c...m	38	66	69	195	120	35	40
17	P 1470	9530 c...m	38	67	70	195	93	35	39
18	K-2061	9456 c...n	39	61	64	174	83	36	40
19	PL-5854	9441 c...n	38	64	66	191	108	35	39
20	PS-2867	9349 c...n	39	64	67	177	106	36	41
21	33570	9323 c...n	38	65	68	193	100	35	39
22	YH-5543	9318 d...n	39	67	70	160	97	36	42
23	YH-5423	9192 d...o	39	65	67	147	89	39	40
24	TG-1701	9134 d...p	39	67	70	200	106	36	39
25	YH-5550	9094 d...q	39	67	70	182	101	37	39
26	J-7440	9073 d...q	38	67	70	197	83	35	39
27	SWM 711	9045 d...q	38	66	69	171	87	35	40
28	AAS-9435	8963 e...q	39	65	68	186	116	36	40
29	P 1690	8947 e...q	37	64	66	186	98	34	39
30	9033	8795 f...r	38	65	68	182	87	35	41
31	27D65	8758 f...r	37	66	69	192	101	34	40
32	YH-5404	8733 g...r	39	67	70	184	100	38	40
33	SS-7350	8680 h...r	38	65	68	188	98	35	41
34	25S32	8638 h...r	39	64	67	200	103	36	41
35	SWM 717	8566 i...r	37	66	69	175	95	34	39
36	P 1611	8509 j...r	39	64	67	177	82	36	41
37	9086	8445 k...r	37	66	69	193	108	34	38
38	GW-3436	8428 k...r	39	66	69	193	87	36	40
39	SWM 659	8425 k...r	39	66	69	189	108	36	40
40	KQS-YHM4	8396 k...r	38	65	68	190	107	35	39

41	PB-PRO A-2017	8386 k...r	38	67	70	207	116	35	39
42	37D55	8305 k...r	39	70	72	163	102	36	40
43	Kontigos	8303 k...r	37	66	68	186	91	34	38
44	FH-922	8297 k...r	38	65	68	177	109	35	40
45	YHM-112B	8257 l...r	38	65	67	177	94	35	39
46	YH-5140	8224 l...r	38	66	69	167	104	36	39
47	YHM-111A	8207 l...r	37	64	67	182	103	34	38
48	33-S-15	8094 l...r	38	65	67	165	95	35	40
49	CS-5808 (C)	8059 m...r	37	66	69	181	89	34	38
50	2236	7938 n...r	38	66	68	180	88	35	40
51	YH-1898 (C)	7935 n...r	37	70	72	168	102	35	39
52	CS-5800	7751 o...r	37	66	68	176	97	34	38
53	Nagina-2	7615 p...r	39	66	68	165	89	36	41
54	9082	7563 qr	38	67	69	178	97	35	39
55	9034	7382 r	39	66	69	183	86	36	41
CV%		10.5	3.1	2.43	2.47	6.12	8.53	3.73	4.38
LSD (5%)		1546.6	NS	2.59	2.75	18.22	13.66	2.14	NS

The results Exhibited in Table 12 clearly express that all the hybrids tested in this experiment statistically differed significantly for grain yield, days to tasseling, days to silking, plant height, ear height and plant harvest. Hybrid NK-7720 gave maximum yield (11537 kg/ha) followed by YH-5427 (11317 kg/ha) and AAS-9633 (11351 kg/ha). These hybrids would be recommended as high yielder. K-2061 showed minimum days to silking (64 days) followed by PL-5854 (66 days). For breeding short duration hybrids, these entries would prove beneficial. TG-1808 showed maximum plant height (214cm) while YH-5423 showed minimum plant height (147cm). Hybrids J-7330 and P-1611 showed minimum ear height (82cm) followed by K-2061 (83cm). Entries with lower ear height would be proved beneficial for breeding for lodging resistant hybrids. Non-significant results showed by stand count and ear harvest.

## 6.8 National Uniform Maize Yield Trial-02 Spring-2018

This trial was planted with 21 entries having plot size of 5m x 7.5m x 2 with three replications. The data regarding various parameters are presented in the following table 13.

**Table 13: Results of National Uniform Maize Yield Trial-02 Spring-2018**

Sr. No.	Hybrid	Grain Yield kg/ha	Stand Count	50% Tasseling	50% Silking	Plant Height (cm)	Ear Height (cm)	Plants Harvest	Ear Harvest
1	CS-5800 (C)	10118 a	38	69	71	183	88	35	42
2	P-1443	9674 ab	38	62	65	193	97	35	42
3	DM-88	9576 abc	38	68	70	203	108	35	40
4	NK-7213	9433 abc	38	63	66	179	92	35	41
5	H-18109	8974 a...d	39	65	68	192	93	36	41
6	DM-100	8911 a...d	37	70	72	158	77	34	43
7	DM-70	8823 a...d	39	68	71	199	110	36	43
8	P-1602	8747 a...d	37	65	67	193	92	34	40

9	AJ-9880	8523 a...d	38	69	72	191	107	35	39
10	AJ-6930	8431 a...d	38	69	72	205	123	35	39
11	75 M75	8377 a...d	38	63	66	191	100	35	39
12	P 1565	8305 a...d	36	63	66	168	85	33	38
13	PSHY-7608	8188 a...d	39	64	67	151	83	36	43
14	HY-1898 (C)	8182 a...d	38	67	70	181	89	35	39
15	GMH52	8156 a...d	38	69	72	178	88	35	39
16	PSH-0402	8091 a...d	40	67	69	185	97	37	41
17	PSHY-0404	7567 a...d	37	65	68	165	88	34	39
18	PSHY-0408	7514 b...d	37	67	70	140	81	34	38
19	NK-6503	7400 bcd	38	66	69	175	74	35	40
20	NK-7953	7016 cd	38	62	65	174	81	35	40
21	AJ-17	6802 d	38	66	69	185	100	35	39
CV%		18.46	3.03	3.32	3.24	7.88	13.41	3.29	4.17
LSD (5%)		2565.5	NS	3.62	3.67	23.46	20.58	NS	2.77

The results regarding NUMYTT -2 are presented in Table 13, which reveal that all the hybrids expressed statistically significant differences among their mean values for grain yield, days to tasseling, silking, plant and ear heights and ear harvest. CS-5800 gave maximum grain yield (10118 kg/ha) followed by P-1443 (9674 kg/ha) and DM-88 (9576 kg/ha) while AJ-17 remained at the bottom by producing 6802 kg grains /ha only. P-1443 and NK-7953 showed minimum (65) days to silking followed by NK-7213`with 66 days. For breeding short duration hybrids, these entries would prove good. AJ-6930 showed maximum plant height (205 cm) while PSHY-0408 showed minimum plant height (140 cm). NK-6503 showed minimum ear height (74 cm) followed by DM-100 (77 cm). Hybrids with lower ear height May be lodging resistant. Non-significant results for stand count and plant harvest show the accuracy of the experiment conducted.

## 7 Hybrid Evaluation under High Temperature

### Replicated Yield Trials

#### 7.1 Preliminary Maize Hybrid Yield Trial-01 under High Temperature Spring-2018

This trial was comprised of twenty (20) entries including approved along with commercial hybrids for comparison. The trial was sown in RCBD with two replications on 22-3-2018. Plot size was kept 4m x 075 m x 1. The data regarding various parameters are presented in the following table 14.

**Table 14: Results of Preliminary Maize Hybrid Yield Trial-01 under High Temperature Spring-2018**

Sr. No.	Hybrid	Grain Yield kg/ha	Stand Count	50% Tasseling	50% Silking	Plant Height (cm)	Ear Height (cm)	Plants Harvest	Ear Harvest
1	YH-1898©	10626 a	19	63	66	173	93	18	20
2	FH-1046©	9624 ab	19	63	65	168	100	18	19
3	FH-949	9432 ab	18	62	64	183	100	17	19



4	YH-5532	8958 abc	18	62	64	170	95	17	19
5	P-1543	8786 abc	19	56	59	173	75	18	20
6	YH-5482	8318 abc	18	60	63	178	93	17	21
7	YH-5565	8052 abc	19	58	62	173	78	18	22
8	YH-5547	8034 abc	19	59	61	190	95	18	21
9	YH-5564	7990 abc	20	63	65	170	95	19	20
10	YH-5491	7496 abc	17	61	64	178	90	16	20
11	YH-5563	7427 abc	19	60	63	173	78	18	20
12	YH-5562	7307 abc	17	62	62	170	83	16	19
13	YH-5555	7299 abc	19	63	65	185	103	18	20
14	YH-5537	7107 abc	18	61	64	165	88	17	20
15	YH-5550	6912 bc	18	63	65	183	98	17	19
16	YH-5521	6829 bc	18	59	62	170	83	17	19
17	YH-5541	6703 bc	17	62	65	170	93	16	18
18	YH-5140	6510 bc	18	61	63	165	95	17	20
19	YH-5543	6367 bc	19	57	60	160	85	18	20
20	YH-5538	5537 c	18	59	62	170	85	17	19
CV%		11.23	6.07	2.09	1.54	3.97	6.17	6.85	5.91
LSD (5%)		1825.6	NS	2.65	2.03	14.38	11.61	NS	NS

The results presented in Table 14 express that there were statistically significant differences among hybrids included in this trial for grain yield, days to tasseling, days to silking, plant and ear heights. Hybrid-1898 produced maximum grain yield (10626 kg/ha) followed by approved hybrid FH-1046 (9624 kg/ha) and FH-949 (9432 kg/ha) while YH-5538 remained at the bottom by yielding 5537 kg/ha grains. Hybrid P-1543 showed minimum days to silking (59 days) followed by YH-5543 (60 days). It showed that parents of these entries will be beneficial for breeding short duration hybrids. YH-5547 showed maximum plant height (190 cm) while YH-5543 showed minimum plant height (160 cm). P-1543 showed minimum ear height (75 cm) followed by hybrid YH-5565 (78 cm). Hybrid, with low ear height will prove to be lodging resistant. Results for stand count, plant and ear harvest were non-significant which show the efficacy of the trial being conducted.

## 7.2 Preliminary Maize Hybrid Yield Trial-02 under High Temperature Spring-2018

This trial was comprised of twenty six (26) entries including approved and commercial hybrids for comparison. The trial was sown in RCBD with two replications on 22-3-2018. Plot size was kept 4m x 075 m x 1. The data regarding various parameters are presented in the following table.

**Table 15: Results of Preliminary Maize Hybrid Yield Trial-02 under High Temperature Spring-2018**

Sr. No.	Hybrid	Grain Yield kg/ha	Stand Count	50% Tasseling	50% Silking	Plant Height (cm)	Ear Height (cm)	Plants Harvest	Ear Harvest
1	YH-5554	10108 a	18	60	62	148	88	17	19
2	YH-1898©	8284 ab	19	62	65	180	100	18	19
3	YH-5390	8070 ab	19	59	62	163	88	18	21
4	FH-1046©	7753 ab	18	62	64	180	105	17	20

5	YH-5567	7730 ab	19	60	62	163	98	18	20
6	YH-5423	7673 ab	18	61	63	168	83	16	18
7	YH-5415	7585 ab	17	64	66	155	88	16	18
8	YH-5556	7412 ab	19	58	61	150	83	18	20
9	YH-5570	7403 ab	17	59	62	153	85	16	18
10	YH-5571	7219 ab	19	61	63	155	73	18	20
11	YH-5397	7212 ab	19	61	64	153	93	18	20
12	YH-5397-3	7192 ab	19	61	64	153	80	19	21
13	YH-5555	7185 ab	19	63	65	165	90	17	17
14	YH-5535	7093 ab	17	57	60	160	83	16	18
15	YH-5566	7049 ab	19	58	61	153	78	18	22
16	YH-5572	6867 b	18	62	64	158	88	17	19
17	YH-5574	6670 b	18	62	64	183	108	17	19
18	YH-5423-2	6522 b	18	60	62	145	78	17	19
19	YH-5534	6265 b	18	62	64	148	88	17	19
20	YH-5404	6186 b	18	62	64	145	90	17	19
21	YH-5575	6009 b	19	64	67	175	88	18	20
22	YH-5569	5907 b	19	62	65	148	88	18	20
23	YH-5568	5606 b	18	59	62	155	73	17	19
24	YH-5573	5460 b	18	62	65	155	88	17	19
25	YH-5397-2	5445 b	19	61	64	145	78	18	19
26	P-1543©	5374 b	18	57	60	163	73	17	19
CV%		10.72	6.07	2.12	2.27	8.01	9.61	6.09	6.66
LSD (5%)		1539.9	NS	2.65	2.95	NS	17.1	NS	NS

The results presented in the above table 15 expose that all there were statistically significant differences among hybrids for the traits of grain yield, days to tasseling, silking and ear height. It is evident that YH-5554 was the top yielding hybrid with 10108 kg/ha grains followed by the check YH-1898 by giving 8284 kg/ha. YH-5535 & P-1543 seemed to be early maturing by taking 60 days to complete its fifty percent silks while local hybrid YH-5575 was late maturing taking 67 days to silks. Local hybrid YH-5574 got maximum plant height (182 cm) while YH-5404 & YH-5397-2 obtained minimum plant height (145 cm). Non-significant results for stand count, plant height, plant harvest and ear height.

### 7.3 Micro Plot Maize Hybrid Yield Trial-01 under High Temperature Spring-2018

This trial was comprised of twenty six (26) entries including entries including approved along with commercial hybrids for comparison. The trial was sown in RCBD with two replications on 22-3-2018 .Plot size was kept 4m x 0.75 m x 1. The data regarding various parameters are presented in the following table.

**Table 16: Results of Micro Plot Maize Hybrid Yield Trial-01 under High Temperature Spring-2018**

Sr. No.	Hybrid	Grain Yield kg/ha	Stand Count	50% Tasseling	50% Silking	Plant Height (cm)	Ear Height (cm)	Plants Harvest	Ear Harvest
1	YH 5421	10319 a	19	62	64	158	90	19	21

2	YH 5394	9583 ab	20	61	63	155	83	20	22
3	FH 1046©	9131 ab	19	62	64	178	100	19	21
4	YH 5417	9039 ab	19	61	64	153	85	19	21
5	YH 5482	8549 abc	20	60	63	158	93	20	22
6	YH 5555	8444 abc	19	63	65	155	88	19	21
7	YH 5421	8443 abc	18	59	61	163	90	18	20
8	YH 1898 ©	8392 abc	19	64	66	145	95	19	21
9	P 9108	8078 abc	19	60	63	173	90	19	21
10	YH 5427	7495 abc	18	60	63	160	98	18	20
11	YH 5411	7407 abc	19	63	66	148	83	19	21
12	YH 5213	7262 abc	19	62	65	163	90	19	21
13	YH 5556	7228 abc	19	60	63	170	100	19	21
14	YH 5535	7154 abc	20	59	61	160	95	20	22
15	YH 5397	6988 abc	20	61	64	173	93	20	22
16	YH 5390	6878 abc	19	59	63	168	95	19	21
17	YH 5439	6758 abc	19	61	64	160	90	19	21
18	YH 5410	6503 abc	19	58	60	143	83	19	21
19	YH 5539	6324 abc	19	63	66	145	85	19	21
20	P 1543	6323 abc	19	57	60	155	73	19	21
21	YH 5415	6229 abc	20	61	64	150	93	20	22
22	YH 5439	5868 bc	19	62	65	150	80	19	21
23	FH 949	5556 bc	19	61	63	160	88	19	21
24	YH 5423	5497 bc	19	62	64	150	80	19	21
25	YH 5556	5433 bc	20	63	65	140	85	20	22
26	YH 5534	4336 c	19	63	65	140	75	19	21
CV%		14.6	4.26	3.37	3.18	6.96	10.03	4.26	3.85
LSD (5%)		2187	NS	NS	NS	NS	NS	NS	NS

The results presented in Table 16 perk up that all the hybrids expressed non-significant results for the all characters studied except grain yield. It is evident that YH-5421 out yielded all prominent commercial hybrids giving 10319 kg/ha, followed by the YH 5394 giving 9583 kg/ha. Both the hybrids out-yielded over commercial hybrid FH-1046 (9131 kg/ha). YH 5410 and P 1543 seemed to be early maturing by taking 60 days to complete its fifty percent silks. Commercial hybrid FH 1046 showed maximum plant height (177.5 cm) while YH 5534 minimum i.e. 139 cm.

#### 7.4 Micro Plot Maize Hybrid Yield Trial-02 under High Temperature Spring-2018

This trial was comprised of twenty six (26) entries including approved and commercial hybrids as check. The trial was sown in RCBD with two replications on 22-3-2018 .Plot size was kept 4m x 075 m x1. The data regarding various parameters are presented in Table 17.

**Table 17: Results of Micro Plot Maize Hybrid Yield Trial-02 under High Temperature Spring-2018**

Sr. No.	Hybrid	Grain Yield kg/Ha	Stand Count	50% Tasseling	50% Silking	Plant Height (cm)	Ear Height (cm)	Plants Harvest	Ear Harvest
1	YH 5552	11117 a	18	62	64.5	175	90	17	19
2	FH 1046©	10321 ab	17.5	59	62	170	85	16.5	18.5
3	P 9108©	10070 a.c	18	60	63	165	87.5	17	19
4	YH 5521	9649 a..d	17.5	60.5	62.5	167.5	95	16.5	18.5
5	YH 1898©	8614 a...e	19	60	62.5	160	90	18	20
6	YH 5421	8272 a...e	18	60	63	155	77.5	17	19
7	YH 5397	8178 a...e	17.5	58	61	167.5	90	16.5	18.5
8	YH 5558	8174 a...e	18.5	59.5	62	187.5	97.5	17.5	19.5
9	YH 5561	8100 a...e	18	61	63	127.5	70	17	19
10	YH 5557	7987 a...e	17	61	63.5	175	95	16	18
11	YH 5567	7707 a...e	19.5	59.5	62	177.5	85	18.5	20.5
12	YH 5543	7395 a...e	19	61	63	170	95	18	20
13	YH 5554	7317 b..e	17.5	61.5	64	167.5	90	16.5	18.5
14	YH 5140	7079 b..e	19	61	63.5	170	85	18	20
15	YH 5545	6942 b..e	17.5	59	61.5	165	80	16.5	18.5
16	FH 949	6905 b..e	18.5	59.5	62	177.5	82.5	17.5	19.5
17	YH 5464	6551 c.e	18.5	61	63	157.5	85	17.5	19.5
18	YH 5552	6267 de	18	61	63.5	177.5	92.5	17	19
19	YH 5133	6133 de	17.5	61	63.5	152.5	67.5	16.5	18.5
20	YH 5490	6077 de	18	61	63.5	167.5	82.5	17	19
21	YH 5423	5927 de	18	61	64	170	105	17	19
22	YH 5563	5553 e	17.5	61.5	64.5	152.5	81.5	16	17.5
23	YH 5544	5456 e	17.5	61	63	182.5	97.5	16.5	18.5
24	P 1543	5247 e	17.5	61.5	63.5	157.5	90	16.5	18.5
25	YH 5567	5126 e	18.5	61.5	64	157.5	82.5	17.5	19.5
26	YH 5415	5120 e	17	61	64	165	85	16	18
CV%		12.48	6.57	2.81	2.62	8.73	13.13	6.92	6.23
LSD (5%)		1890.5	NS	NS	NS	NS	NS	NS	NS

It is evident from the results presented in Table 17 that the hybrids expressed statistically significant differences for only grain yield. It is apparent from the results that YH 5552 out yielded all prominent commercial hybrids giving 11117 kg/ha, followed by the commercial hybrid FH 1046 giving 10321 kg/ha. YH 5397 seemed to be early maturing by taking 61 days to complete its fifty percent silks while local hybrid YH 5552 was late maturing taking 65 days to silks. Local hybrid YH 5558 showed maximum plant height (187 cm) while YH-5480 showed minimum plant height (127 cm). Non-significant results showed by all characters except grain yield.

## 7.5 Demonstration of Local Maize Hybrids In Comparison To Commercial Hybrids under High Temperature Spring-2018

This trial was comprised of fourteen (14) hybrids. The trial was sown in strip on 22-3-2018. Plot size was kept 4m x 075 m x6. The data regarding various parameters are presented in the following table.

**Table 18: Demonstration Trail, 6 Rows in Spring-2018**

Sr. No	Hybrid Code	Grain Yield kg /ha	Stand Count	50% Tasseling	50% Silking	Plant Height (cm)	Cob Height (cm)	Plant Harvested	Cob harvested
1	YH-5532	9460	109	57	60	170	85	108	111
2	P-1543	8475	110	61	63	165	90	109	112
3	YH-5543	8137	112	61	63	165	100	111	114
4	YH-5550	7985	108	62	64	170	105	107	110
5	YH-1898	7929	113	60	63	155	100	112	115
6	FH-793	7381	113	62	64	150	90	112	115
7	FH-949	7304	111	61	64	160	90	110	113
8	YH-5482	7181	112	57	60	155	90	111	114
9	YH-5427	6981	109	63	66	160	100	108	111
10	YH-5404	6846	113	61	63	155	90	112	115
11	YH-5140	6631	111	57	60	180	95	110	112
12	FH-1046	6495	112	62	64	180	100	111	114
13	DK-9108	5826	108	61	63	155	80	107	110
14	YH-5423	5685	110	63	66	145	90	109	112

The data of non-replicated trial presented in the above Table 18 showed performance of 14 hybrids for different characters. It is clear from the results that YH-5532 out yielded by giving 9460 kg/ha, followed by the P-1543 giving 8475 kg/ha. YH-5482 & YH-5532 seemed to be early maturing by taking 60 days to complete its fifty percent silks while local hybrid YH-5423 & YH-5427 were late maturing taking 66 days to silks. FH-1046 and YH-5140 obtained maximum plant height (180 cm) while YH-5423 minimum (145 cm).

### On-Farm Yield Trial Spring-2018

Nine local and multinational hybrids were sown on different farmer fields to evaluate their yield potential under ADP project in spring-2018.

**Table 19: Yield Results of On-form Yield Trial Spring-2018 (Grain Yield kg/ha)**

Location/ Hybrids	YH-5482	FH-1046	DK-9108	YH-1898	FH-949	FH-793	YH-5394	P-1543	YH-5140
Samundri	9518	9098	8456	8670	8500	7345	7645	8045	7160
Kamalia	9940	9125	9030	8100	9378	7810	7915	8737	6910
Arifwala	10120	9470	8960	9423	9125	8100	7534	7048	7335
Depalpur	9480	9940	9470	9580	9150	8525	7680	7650	7046
TT singh	9730	8637	9150	8590	9067	7956	7610	7068	6297
Khanewal	9860	9358	8664	9340	8166	8015	8852	6900	6100
Khiddar Wala	11804	12262	12032	12390	12828	11349	9845	12483	10960
Sargodha	11623	14112	11962	12046	13089	12969	9900	11956	10657
Maghi sultan, Distt. Jhang	8931	13482	12027	11396	12075	8723	9348	10150	9066
Chak No. 254	10261	12496	12917	11279	11721	11509	10233	11956	10768

<b>JB, Jhang</b>									
<b>Mamun kanjan</b>	10534	13150	11147	12697	12386	12648	12083	9670	10671
<b>Mean</b>	<b>10164</b>	<b>11012</b>	<b>10347</b>	<b>10319</b>	<b>10499</b>	<b>9541</b>	<b>8968</b>	<b>9242</b>	<b>8452</b>

It is evident from the results presented in Table 19 that hybrid FH-949 produces higher yield (10499 kg/ha) followed by DK-9108 (10347 kg/ha), YH-5482 (10164 kg/ha) and YH-1898 (10319 kg/ha). The lowest yield was given by YH-5140 (8452 kg/ha), YH-5394 (8968 kg/ha) and multinational hybrid P-1543 (9242 kg/ha). So, these high yielder hybrids would be recommended to farmers for general cultivation.

## **HYBRID MAIZE (WHITE)**

### **KHARIF 2018**

#### **Derivation of Inbred Families**

One hundred & forty three (143) derivative families of different generations were sown in ear to row fashion during kharif, 2017 for derivation of inbred lines through hand pollination. At maturity, self-pollinated plants were harvested in each family, separately, and seed of 131 families was collected / added for further derivation and selection cycles.

#### **Maintenance of Inbred Lines**

During kharif 2017, 95 inbr0065d lines were sown in ear to row fashion for maintenance through hand-pollination. Sixty seven (67) inbred lines were finally selected and maintained while 27, newly derived inbred lines, were also added in maintenance which resulted in 94 inbred lines.

### **SPRING 2018**

#### **1. Derivation of Inbred Families**

During Spring-2018, 131 derivative families were sown in ear to row fashion for derivation of inbred lines. Undesirable lines and plants were rejected at various stages and selected plants were self-pollinated manually. At maturity, only self-pollinated plants of desirable lines were harvested in each family, separately, and seed of 123 derivative families was collected / added for further derivation and selection cycles

#### **2. Maintenance of Inbred Lines**

During spring 2018, 94 inbred lines were sown for maintenance and undesirable lines and plants were rejected at various stages and only desirable lines and plants were self-pollinated manually. At maturity, self-pollinated plants were harvested in each family, separately, and seed of 67 inbred lines was collected / added for further derivation and selection cycles.

## **OPV MAIZE:**

### **MAIZE (YELLOW)**

#### **KHARIF 2017**

##### **1. Improvement of Open Pollinated Variety YY-15**

Seed from previous year crop was sown in an isolation of 1 kanal during kharif 2017. Open pollination was allowed. Selection was made on the basis of plant height, stem girth, cob length and cob placement at 8<sup>th</sup> node with medium tassel. Cobs were collected from the selected plants and seed was kept for next sowing season after table selection.

## Improvement and Maintenance of Yusafwala Pool-50

Seed received from Spring 2016 was mixed and sown in isolation of 1 kanal during Kharif 2017. Open pollination was allowed and selection was made on the basis of plant height, stem girth, light tassel, cob length and lodging resistance. 200 cobs were selected. 100 cobs were kept for sowing in next season after table selection.

### 2. Adaptability / National Uniform Maize Varietal Yield Trial, Kharif 2017

The trial comprising of 11 entries received from National Coordinator (Cereal System), Pakistan Agriculture Research Council with the instructions and data sheet. Data regarding different traits were recorded at different growth stages / physiological and analyzed statistically.

**Table 20: Means of Grain Yield (kg/ha) of Maize OPV Entries Evaluated in National Uniform Yield Trials conducted during Kharif-2017**

Sr. No	Name of Varieties	NARC	SINDH	FSD	MMRI	Average
						(kg/ha)
1	YY-15	7237	4835	5465	1556	<b>4773</b>
2	POP-8003	5643	5828	5476	1767	<b>4679</b>
3	MMRI-Yellow (C)	6646	5224	3853	1752	<b>4369</b>
4	Pearl (C)	6006	4577	4538	1649	<b>4193</b>
5	YW-786	4879	5353	4496	1603	<b>4083</b>
6	POP-2011W	5163	4879	4346	1365	<b>3938</b>
7	CZP-132001	3933	4447	4204	1739	<b>3581</b>
8	POP-2507	2633	5569	3811	2259	<b>3568</b>
9	NARC-Sweet16	3572	5396	2681	2200	<b>3546</b>
10	POP-201122	3403	5975	2697	1789	<b>3466</b>
11	POP-8310	3755	5051	1537	1631	<b>2993</b>
	Mean	4806	5194	3919	1755	<b>3926</b>
	C V (%)	34.08	6.67	41.5	28.1	<b>14.8</b>
	LSD (0.05%)	2790	855	NS	NS	<b>990</b>

The results presented in Table 20 revealed that OPV YY-15 stood first and POP-8003 was second by giving grain yield 4773 and 4679 kg/ha respectively followed by MMRI-Yellow (Check) which showed 4369 kg/ha.

## POPCORN AND SWEET CORN

### Micro Plot Maize Yield Trial (Pop & Sweet Corn) Kharif, 2017

The trial comprised of five entries (Pop & Sweet Corn) was sown on 04-08-2017 in RCB design with three replications. Data regarding different traits were recorded at different growth stages / physiological maturity and analyzed statistically. Results are summarized below on mean basis.

**Table 21: Results of Micro Plot Maize Yield Trial (Pop & Sweet Corn) Kharif, 2017**

Rank No.	Entries	Grain Yield (kg/ha)	Days to 50 % silk	Height. (cm)	
				Plant	Cob
1	YSC-15	4091	50	204	95
2	SWEET CORN	3799	56	226	115
3	YPC-14	3291	56	230	116

4	WHITE POPC	2591	59	208	107
5	POPOCORN	1970	59	225	111
	CV %	18.93	2.6	7.0	8.5
	LSD (0.05)	1677.7	4.0	NS	NS

Above results presented in table 21 showed that maximum grain yield i.e. 4091 kg/ha was produced by promising line YSC-15 followed by Sweet Corn (Swat) with grain yield of 3798 kg/ha while minimum grain yield of 1969 kg/ha was recorded for Pop Corn (Swat). YPC-14 got the maximum plant height of 229 cm whereas YSC-15 attained the minimum plant height of 204 cm. YSC-15 showed low level bearing by attaining 95 cm cob height while YPC-14 showed the highest bearing of 115 cm.

### 1. Spot Examination of (OPV) YY-15

Seed received from selected cobs during Kharif-2017 was sown during Spring-18 for spot examination at MMRI, Yusafwala and Potato Research Institute, Sahiwal in an isolation of 2 kanal each in comparison to check MMRI Yellow. Expert Sub-Committee visited the isolations of YY-15 and recommended it for approval.

### 2. Improvement and Maintenance of Yusafwala Pool-50

Seed received from best selected cobs during Kharif-2017 was sown in an isolation of 1.5 kanal during Spring-18. Population was allowed to open pollinate. Best plants were selected on the basis of plant height, stem girth, cob length, cob placement at 8<sup>th</sup> node and lodging resistance. Seed was collected from selected cobs and bulked for next season crop.

### 3. Adaptability / National Uniform Maize Varietal Yield Trial, Spring 2018

The trial comprising of 13 entries received from National Coordinator (Cereal System), Pakistan Agriculture Research Council with the instructions and data sheet. Data regarding different traits were recorded at different growth stages / physiological and analyzed statistically.

**Table 22: Means of Grain Yield (kg/ha) of Maize OPV Entries Evaluated in National Uniform Yield Trials conducted during Spring-2018**

Sr.#	Varieties	Field Weight (kg/ha)	Grain Yield (kg/ha)	Moisture (%)
1	YY-15	8.00	7825	22.23
2	CZP-132001M	7.00	6904	21.63
3	YW-786	6.67	6626	21.07
4	PSC-2011W	6.33	6300	21.00
5	PEARL (Check)	5.67	5667	20.60
6	MMRI YELLOW (C)	5.67	5622	21.20
7	PSC-V 8003	5.33	5262	21.60
8	PSC-2011Y	5.33	5214	22.27
9	HAQ NAWAZ GOLD(C)	5.00	4978	20.93
10	TP1217	4.67	4546	22.53
11	TP1221	4.33	4243	22.17
12	132001N	4.00	4018	20.27



The results revealed that YY-15 stood first followed by CZP-132001M was second by giving grain yield 7825 and 6904 kg / ha respectively followed by entry 1 which showed 6625.67 kg / ha yields.

## POPCORN AND SWEET CORN

### Micro Plot Maize Yield Trial (Pop & Sweet Corn) Spring, 2018

The trial comprising of four Pop Corn entries was sown on **19-02-2018** in RCB design with three replications. Data regarding different traits were recorded at different growth stages / physiological maturity and analyzed statistically. Results are summarized below on mean basis.

**Table 23: Results of Micro Plot Maize Yield Trial (Pop & Sweet Corn) spring, 2018**

Rank No.	Entries	Grain Yield (kg/ha)	Days to 50 % silk	Plant	Cob
				Height (cm)	
1	YSC-15	4436a	61	206	103
2	YPC-14	4368a	64	209	114
3	POPOCORN (Swat)	3193b	66	225	115
4	SWEET CORN (Swat)	2966b	64	227	113
CV %		7.73	3.77	2.64	7.96
LSD (0.05)		817.7	NS	16.2	NS

The result presented in table 23 reveal that promising line YSC-15 was at top with grain yield of 4436 kg/ha followed by YPC-14 with grain yield of 4368kg/ha while Sweet Corn (Swat) gave the minimum grain yield of 2966kg/ha. Sweet Corn (Swat) got the maximum plant height of 227 cm whereas YSC-15 attained the minimum plant height of 206cm. YSC-15 showed low level bearing by attaining 103cm cob height while Popcorn (Swat) showed the highest bearing of 115cm.

## WHITE Maize OPVs

### KHARIF 2017

#### 1. Micro Plot Maize Yield Trial (OPVs)

The trial comprised of nine entries was sown on 04-08-2017 in RCB design with three replications. Data regarding different traits were recorded at different growth stages/physiological maturity and analyzed statistically. Results are summarized table below:

**Table 24: Results of Micro Plot Maize Yield Trial (OPVs) Kharif, 2017**

Rank No.	Entries	Grain Yield (kg/ha)	Days to 50 % silk	Plant ht. (cm)	Cob ht. (cm)
1	YY-15	6808.6 a	55.6	240.6	113
2	YW-787	6002 a	52.6	228.3	124
3	MMRI YELLO	5874.5 a	53.6	208.0	97
4	YW-786	5770 ab	53.0	221.3	117
5	CZP-132001	5474.7 ab	53.0	205.0	105
6	PEARL	5464.7 ab	52.3	218.6	110
7	SADAF	4156 bc	52.0	207.6	106
8	agaiti-85	2933 c	45.6	150.0	62

	<b>CV %</b>	1636.2	1.64	6.8	9.4
	<b>LSD (0.05)</b>	10.70	2.4	41.5	28.4

The results Presented in table 24 expose that promising line YY-15 got 1<sup>st</sup> position by producing grain yield of 6808 kg/ha followed by YW-787 with 6002 kg/ha while Agaiti-85 produced the minimum i.e. 2933 kg/ha. YY-15 attained the maximum plant height of 240 cm whereas Agaiti-85 attained the minimum plant height of 150 cm. Agaiti-85 showed low level bearing with 62 cm cob height while YW-787 showed the highest bearing of 124 cm.

## **SPRING-2018**

### **Micro Plot Maize Yield Trial (OPVs)**

The trial comprising of eight entries was sown on 19-02-2018 in RCB design with three replications. Data regarding different traits were recorded at different growth stages/physiological maturity and analyzed statistically. Results are summarized below in tabulated form on mean basis.

**Table 25: Results of Micro Plot Maize Yield Trial (OPVs) Spring, 2018**

<b>Rank No.</b>	<b>Entries</b>	<b>Grain Yield (kg/ha)</b>	<b>Days to 50 % silk</b>	<b>Plant ht. (cm)</b>	<b>Cob ht. (cm)</b>
1	YW-788	7922	65	230	121
2	MMRI Yellow	7527	66	218	120
3	CZP-132001	7381	65	206	107
4	YY-15	7073	67	246	136
5	YW-786	6181	65	228	118
6	Pearl	5477	63	220	119
7	Agaiti-85	5098	55	170	85
8	YW-787	4627	65	207	104
	CV	12.7	2.0	8.0	9.3
	LSD	2354.2	3.7	49.7	34.3

The above given results in Table 25 reveal that promising line YW-788 ranked first with grain yield of 7922 kg/ha and MMRI Yellow was at 2<sup>nd</sup> position (7527 kg/ha) whereas minimum grain yield (4627kg/ha) was given by YW-787. YY-15 attained the maximum plant height of 246cm whereas Agaiti-85 attained the minimum plant height of 130 cm. Agaiti-85 showed low level bearing with 85 cm cob height while YY-15 showed the highest bearing of 136cm.

## **PARB PROJECTS:**

### **PARB PROJECT 900:**

#### **Kharif 2017**

The inducer lines of maize were imported from Mexico and planted in field for acclimatization in February, 2018 along with 25 F<sub>1</sub> and three OPVs. The date of silking and tasseling were recorded for checking synchronization for the purpose of pollination of inducer lines with the source material. The data are presented as under in Table 29:

**Table 26: Data of Inducer lines and Source Population during Kharif 2017**

<b>Inducer Lines planting on 26-02-2018 (Imported from Mexico)</b>						
<b>Plot No.</b>	<b>Pedigree</b>	<b>Count Stand</b>	<b>Days to Silking</b>	<b>Days to Tasseling</b>	<b>Plant ht. (cm)</b>	<b>Ear ht. (cm)</b>
1	CIM2GTAIL-P1	40	58	61	58	32
2	CIM2GTAIL-P2	50	60	64	60	36
<b>Hybrids sown on 15-02-18</b>						
<b>Plot No.</b>	<b>Pedigree</b>	<b>Count Stand</b>	<b>Days to Silking</b>	<b>Days to tasseling</b>	<b>Plant Ht. (cm)</b>	<b>Ear ht. (cm)</b>
1	YH5482	44	65	67	185	85
2	YH5532	46	67	68	210	120
3	YH5543	42	64	66	185	105
4	YH5567	44	69	68	170	90
5	YH5423	39	69	71	223	105
6	YH5415	45	70	69	220	135
7	YH5404	32	69	67	190	85
8	YH5537	47	69	66	180	105
9	YH5547	38	64	66	185	85
10	YH5550	34	69	71	225	120
11	YH5555	37	70	72	160	85
12	YH5564	36	69	72	200	125
13	YH5566	45	68	71	175	85
14	YH5563	45	65	67	195	115
15	YH5427	39	65	67	185	105
16	NK8711	43	58	60	200	100
17	SB9617	45	65	67	195	95
18	CS5808	48	65	67	210	100
19	SB9663	45	65	68	220	115
20	P1543	46	58	61	200	105
21	P9108	47	64	66	230	100
22	FH949	42	70	72	210	115
23	FH1046	49	70	72	240	140
24	FH793	50	69	71	235	150
25	YS1898	48	70	72	105	105
<b>OPVs sowing on 15-02-18</b>						
<b>Plot No.</b>	<b>pedigree</b>	<b>Count Stand</b>	<b>Days to Silking</b>	<b>Days to Tasseling</b>	<b>Plant Ht. (cm)</b>	<b>Ear ht. (cm)</b>
1	MMRI Yellow	66	67	71	250	110
2	YY 15	154	68	71	240	115
	CZP13001	41	58	61	240	110

**Spring 2018**

The inducer lines were imported again planted in field for acclimatization in second season in August, 2018 along with 40F<sub>1</sub>, 24F<sub>2</sub> and three OPVs. Their date of silking and tasseling were recorded for checking synchronization for the purpose of pollination of inducer lines with the source material. The data is given below:

**Table 27: Data of Inducer lines and Source Population during spring 2018**

<b>Inducers sown on 02-08-2018</b>						
<b>Plot No.</b>	<b>Pedigree</b>	<b>Count Stand</b>	<b>Days to Silking</b>	<b>Days to Tasseling</b>	<b>Plant Ht. (cm)</b>	<b>Ear ht. (cm)</b>
1	CIM2GTAIL-P1	40	58	61	58	32
2	CIM2GTAIL-P2	50	60	64	60	36
<b>F1 (source population) sown on 02-08-2018</b>						
<b>Plot No.</b>	<b>pedigree</b>	<b>Count Stand</b>	<b>Days to Silking</b>	<b>Days to tasseling</b>	<b>Plant Ht. (cm)</b>	<b>Ear ht. (cm)</b>
1	YH5397	44	65	67	185	85
2	YH5482	46	67	68	210	120
3	YH5415	42	64	66	185	105
4	YH5534	44	69	68	170	90
5	YH5567	39	69	71	223	105
6	YH5398	45	70	69	220	135
7	YH5423	32	69	67	190	85
8	YH5390	47	69	66	180	105
9	YH5556	38	64	66	185	85
10	YH5555	34	69	71	225	120
11	YH5421	37	70	72	160	85
12	YH5558	36	69	72	200	125
13	YH5490	45	68	71	175	85
14	YH5554	45	65	67	195	115
15	YH5539	39	65	67	185	105
16	YH5553	43	58	60	200	100
17	YH5545	45	65	67	195	95
18	YH5411	48	65	67	210	100
19	YH5421-1	45	65	68	220	115
20	YH5394	46	58	61	200	105
21	YH5535	47	64	66	230	100
22	YH5550	42	70	72	210	115
23	YH5537	49	70	72	240	140
24	YH5562	50	69	71	235	150
25	YH5564	44	65	67	185	85
26	YH5565	46	67	68	210	120
27	YH5563	42	64	66	185	105
28	YH5543	44	69	68	170	90
29	YH5521	39	69	71	223	105
30	YH5491	45	70	69	220	135
31	YH5547	32	69	67	190	85
32	YH5541	47	69	66	180	105
33	YH5521	38	64	66	185	85

34	YH5552	34	69	71	225	120
35	YH5490	37	70	72	160	85
36	FH949	36	69	72	200	125
37	FH1046	45	68	71	175	85
38	FH793	45	65	67	195	115
39	YH1898	39	65	67	185	105
40	DK9108	43	58	60	200	100
<b>F2 (source population) sowing on 02-08-2018</b>						
<b>Plot No.</b>	<b>pedigree</b>	<b>Count Stand</b>	<b>Days to Silking</b>	<b>Days to tasseling</b>	<b>Plant Ht. (cm)</b>	<b>Ear ht. (cm)</b>
1	YH4357	44	65	67	185	85
2	YH5553	46	67	68	210	120
3	YH5415	42	64	66	185	105
4	CS5808	44	69	68	170	90
5	YH5532	39	69	71	223	105
6	YH5482	45	70	69	220	135
7	YH5404	32	69	67	190	85
8	YH5566	47	69	66	180	105
9	NK8711	38	64	66	185	85
10	YH5423	34	69	71	225	120
11	YH5564	37	70	72	160	85
12	YH1098	36	69	72	200	125
13	YH5404	45	68	71	175	85
14	YH5567	45	65	67	195	115
15	YH5550	39	65	67	185	105
16	FH949	43	58	60	200	100
17	YH5547	45	65	67	195	95
18	DK9108	48	65	67	210	100
19	YH5555	45	65	68	220	115
20	YH5427	46	58	61	200	105
21	SB9617	47	64	66	230	100
22	FH743	42	70	72	210	115
23	FH1046	49	70	72	240	140
24	SB9663	50	69	71	235	150

#### **PARB PROJECT 904**

30 potential hybrids and 50 inbred lines have been sown in start of (February) Spring 2018 for seed increase with aim to perform quality analysis and hybridization program. More than 250 g seed of each inbred line was produced and hybrids were between the ranges of 1-2 kg each.

# **SORGHUM**

## **KHARIF 2017**

### **1. MAINTENANCE OF BREEDING MATERIAL.**

#### **i. Gene Pool**

One hundred and thirty (130) sorghum collections including 50 varieties imported from PGRI, Islamabad having diversified characteristics was planted in strips with 5 m x 1.5 m plot size. Five true to type plants were selected and covered their panicles before anthesis to avoid foreign pollen contamination so that true to type seed of whole germplasm could be produced. Four entries from PGRI, Islamabad and three from MMRI, Yusafwala were rejected due to disease susceptibility. All the remaining selected / covered plants were harvested for further maintenance.

#### **ii. Cytoplasmic Male Sterile (A) Lines.**

Fourteen 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. All the “A” lines were maintained with their counterpart “B” lines.

#### **iii. Fertility Restorer Lines**

Twenty six fertility restorer (R) lines were planted for maintenance in strips with 5m x 1.5 m 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 program.

### **2. BREEDING**

#### **i. Hybrids Constitution: (CMS × Restorers)**

Thirty Three (33) (CMS x R) crosses were constituted (26 in isolation and 7 by hand) during Kharif 2017 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 3 kg seed of YSH-95 was produced.

#### **ii. Sorghum × Sudan Grass Crosses**

12 CMS (A) lines were planted with Sudan grass for sorghum × Sudan grass in isolation and ten crosses were constituted for planting in Spring 2018.

#### **iii. Filial Generations:**

Ten F<sub>3</sub> families were selected from F<sub>2</sub> of Lasani in Kharif 2017. Twenty F<sub>3</sub> families were planted, phenotypically superior plants from families were selected and 6 F<sub>4</sub> generations were harvested for raising their next filial generation. Seven F<sub>5</sub> families were planted and eight entries were selected based on their head length and brix value.

#### iv. Mutated Lines

67 Mutated selected lines from Kharif 2016 were planted and 49 entries were selected based on their head length and brix value for sowing in Kharif 2018.

#### v. Head to Row Families:

Head to row selection blocks were sown for maintenance, purification and improvement of approved / promising varieties. True to type plants were selected from uniform and disease free rows. The number of heads selected from each variety is given below in Table 28

**Table 28: Number of Heads of Each Variety**

Sr. No.	Variety	No. of Selected Heads	Status
1	YSS-98	76	Approved
2	YS-16	120	Approved

#### Evaluation

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

#### i. Sorghum Hybrid Yield Trial 1, Kharif 2017.

Eighteen (18) (CMS x R) hybrids were tested including two checks YS-16 and Lasani (Private company hybrid). The trial was laid out according to RCB design with three replications having plot size of 5m x 1.5m. Data regarding grain yield and other important plant characteristics were recorded and presented below in Table 29.

**Table 29: Results of Sorghum Hybrid Yield Trial 1, Kharif 2017.**

Sr. No.	Entry	Grain Yield (kg/ha)	Plant Stand	Brix Value	Stalk Yield (kg/ha)	Flag Leaf Area (cm <sup>2</sup> )	Days to 50% Anth.	Plant ht. (cm)
1	YSH-95	3617 a	22.7	10.8	25556	222	73	201
2	YSH-138	3367 ab	21.7	11.2	17372	205	71	208
3	YSH-128	3197 abc	26.3	9.9	16049	153	86	181
4	Lasani ©	2733 bcd	25.7	9.2	21667	241	74	207
5	YSH-139	2601 cd	24.9	14.9	15887	165	70	223
6	YSH-132	2441 cde	21.8	13.2	13883	237	73	198
7	YSH-136	2317 def	19.0	11.0	22135	208	73	182
8	YS-16©	2311 def	24.0	11.2	20000	254	79	238
9	YSH-131	2150 def	21.7	6.5	12778	229	72	154
10	YSH-115	2022 d...g	22.0	12.8	25185	292	79	202
11	YSH-75	1894 d...g	23.7	14.3	18611	180	74	188
12	YSH-117	1850 e...h	20.3	13.0	23538	271	76	208
13	YSH-118	1844 e...h	24.0	11.4	17778	205	74	197
14	YSH-125	1750 e...h	21.3	10.5	10278	284	70	154
15	YSH-46	1655 e...h	18.3	15.3	17485	263	77	205
16	YSH-126	1583 fgh	21.7	17.8	21733	334	75	181
17	YSH-135	1322 gh	17.3	9.8	16667	219	74	153
18	YSH-73	1111 h	19.0	18.9	19392	262	79	172
Range		1111-3617	17.3-	6.5-	10278-	153-334	70-86	153-

C.V.%	20.46	26.3 15.78	18.9 16.2 6	25556 19.81	18.67	4.01	238 8.54
LSD @ 5%	250	NS	2.75	4982	67.70	4.38	29.63

It is evident from the above Table 29 that YSH-95 gave significantly higher yield (3617 kg/ha) followed by YSH-138 with 3367 kg/ha in comparison to check Lasani which yielded 2733.33 kg/ha at MMRI, Yusafwala site. YSH-95, YSH-138 and YSH-128 are statistically at par. Maximum stalk yield of 25556 kg/ha was produced by YSH-61 followed by YSH-115 with 25185 kg/ha. Plant height ranged from 153 to 238 cm and days to 50% anthesis from 70 to 86.

## ii. Sorghum Hybrid Yield Trial 2, Kharif 2017.

This trial was comprised of twelve (12) (CMS x R) hybrids including three checks YS-16, YSS-98 and Lasani (Private company hybrid). The trial was laid out according to RCB design with three replications having plot size of 5m x 1.5m. Data regarding grain yield and other important plant traits were recorded and presented below in Table 30.

**Table 30: Results of Sorghum Hybrid Yield Trial 2, Kharif 2017.**

Sr. No.	Entry	Grain Yield (kg/ha)	Plant Stand	Brix Value	Stalk Yield (kg/ha)	Flag Leaf Area (cm <sup>2</sup> )	Days to 50% Anth.	Plant ht. (cm)
1	YSH-129	4000a	31	9.5	24167	213	62	180
2	YSH-137	3392ab	20	7.4	14167	221	65	173
3	YSH-130	2988ab	27	14.5	16667	244	61	170
4	YS-16©	2600bc	25	15.0	28750	278	79	220
5	YSH-140	2533bcd	23	13.4	13750	157	63	163
6	YSH-141	2513bcd	21	12.8	23333	272	77	250
7	YSS-98©	2054bcd	22	10.9	18750	200	72	173
8	YSH-123	1825cd	27	11.0	15833	233	73	164
9	YSH-134	1825cd	21	9.7	13750	190	75	190
10	Lasani©	1675cd	23	15.3	16333	274	76	215
11	YSH-124	1579de	27	6.9	17083	305	74	168
12	YSH-61	550e	20	14.8	20000	171	84	164
Range		550-4000	14-31	14-31	13750-28750	157-305	61-84	163-250
C.V.%		20.80	13.80	12.23	18.18	18.39	1.79	7.51
LSD @ 5%		1043.9	NS	3.16	7421.6	93.024	2.83	30.67

It is evident from the above Table 30 that YSH-129 gave significantly higher yield (4000 kg/ha) followed by YSH-137 with yield of 3392 kg/ha in comparison to check YS-16 which yielded 2600 kg/ha. YSH-129, YSH-137 and YSH-130 were statistically at par. Maximum stalk yield of 28750 kg/ha was produced by check YS-16 followed by YSH-141 (23333 kg/ha). Plant height ranged from 164 to 250 cm and 50% anthesis ranged from 61 to 84 days.



### iii. Sorghum Varietal Yield Trial, Kharif 2017.

The trial was comprised of eight varieties including two check varieties i.e. 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 traits were recorded. The data are presented below in Table 31.

**Table 31: Results of Sorghum Varietal Yield Trial, Kharif 2017**

Sr. No.	Entry	Grain Yield (kg/ha)	Plant Stand	Brix Value	Stalk Yield (kg/ha)	Flag Leaf Area (Cm <sup>2</sup> )	Days to 50% Anth.	Plant ht. (cm.)
1	YSS-10	4556a	25	7.3	29445	232	77	287
2	YSS-42	4422a	26	6.0	26270	156	75	203
3	YSS-23	3503b	27	16.3	32222	213	80	373
4	YS-16©	3353bc	27	14.3	21111	317	79	233
5	YSS-18	2769bc	19	7.9	13003	195	76	150
6	YSS-17	2667bc	21	13.0	13056	260	76	215
7	YSS-31	2483c	25	11.5	17193	282	72	178
8	YSS-25	161d	20	10.3	13296	193	86	192
	Range	1611-4556	19-27	60-16	13003-32222	153-317	72-86	150-373
	C.V.%	15.66	15.84	12.30	16.51	16.95	1.42	7.41
	LSD @ 5%	869.47	NS	2.33	5983.6	68.52	1.93	29.70

Statistical analysis of the data presented in Table 31 reveal differences among hybrid were statistically significant for all the traits studies except for plant stand which indicates the efficacy of the trial conducted. YSS-10 and YSS-42 were statistically at par, both gave significantly higher yields (4556 and 4422 kg/ha) at MMRI in comparison to check YS-16 (3353 kg/ha) and other entries tested. Maximum stalk yield of 32222 kg/ha was produced by YSS-23 followed by YSS-10 (29445 kg/ha) and check YS-16 (21111 kg/ha). Plant height ranged from 150 cm to 373 cm and days to 50% anthesis from 72 to 86.

### iv. Genetic Studies Yield Trial

Twenty two (22) gene pool entries were tested including two checks YS-16 and Lasani (Private company hybrid). The trial was laid out according to RCB design with three replications having plot size of 5m x 1.5m. Data regarding grain yield and other important plant characteristics were recorded and presented as under in Table 32.

**Table 32: Results of Sorghum Genetic Studies Yield Trial, Kharif 2017.**

Sr. No.	Entry	Grain Yield (kg/ha)	Plant Stand	Brix Value	Stalk Yield (kg/ha)	Flag Leaf Area (Cm <sup>2</sup> )	Days to 50% Anth.	Plant ht. (cm.)
1	Pak-SS-III	2972a	24	5.7	20252	205	73	223
2	YSS-17	2888a	23	11.7	17026	188	71	242
3	YSS-12	2799ab	28	8.4	18260	228	70	145
4	YSS-16 (Red)	2776abc	19	17.6	13268	198	72	180
5	YSS-7	2622abc	26	4.8	18729	293	73	210
6	Lasani ©	2622abc	24	9.0	16533	258	74	212
7	YSS-41	2605abc	21	14.9	16134	366	74	238
8	YSS-37	2502a-d	26	10.5	17127	209	72	163
9	YSS-10 (Red)	2484a-d	25	3.9	17595	256	73	225

10	YSS-10 (Creamy)	2398a-d	25	9.4	18870	156	72	202
11	YSS-40	2367a-d	26	2.1	18009	223	72	252
12	YSS-38	2187a-e	21	3.4	17248	204	70	235
13	YS-16©	2140a-e	24	11.0	17632	227	78	240
14	YSS-39	1943-e	24	14.3	16444	256	74	198
15	YSS-13	1801b-e	25	3.3	15232	166	72	227
16	YSS-19	1722cde	18	14.9	12056	173	73	137
17	YSS-33	1679cde	23	15.6	15459	290	73	188
18	YSS-16 (Chalky)	1533cde	18	12.9	12587	207	71	180
19	YSS-25	1485de	14	0.0	9042	241	75	197
20	YSS-6	1201e	17	17.7	10625	200	69	160
21	YSS-16 (Red)	782e	15	12.6	10312	203	69	180
22	YSS-16 (Creamy)	732e	16	18.7	20312	297	74	160
Range		731-2972	14-26	0-18.7	9042-20312	156-366	69-78	137-252
C.V.%		22.25	16.18	26.97	21.64	27.89	2.52	14.43
LSD @ 5%		731	NS	3.30	3964	74.84	2.43	33.75

It is evident from the above Table 32 that Pak-SS III gave significantly higher yields (2971kg/ha) followed by YSS-17 with 2882 kg/ha in comparison to check Lasani yield which was 2622 kg/ha. Maximum stalk yield of 20312 kg/ha was produced by YSS-16 (Chalky) followed by Pak-SS III (20252 kg/ha). Plant height ranged from 138 to 252 cm and days to 50% anthesis from 69 to 78.

#### National Uniform Yield Trial Kharif 2017

Seven varieties/hybrids were evaluated in this 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 given below in Table 33.

**Table 33: National Uniform Yield Trial, Kharif 2017**

Sr. No.	Entry	Grain Yield (kg/ha)	Stalk Yield (kg/ha)	Days to 50% Anth.	Days to Maturity	Plant Height (cm)
1	Bolder	4944a	28833	74	126	202
2	Supreme F <sub>1</sub>	3945a	49500	72	126	358
3	Lasani	3927a	34500	71	124	223
4	OMEGA F <sub>1</sub>	3261a	36667	72	126	228
5	R3636	3234a	13333	69	123	135
6	TGS-01	3057a	21667	75	127	177
7	W3535	2862a	18833	78	125	148
Range		2862-4944	18833-28833	69.3-77.7	69.3-77.7	123.3-126.7
C.V.%		25.5	22.91	2.80	0.65	9.02
LSD @ 5%		NS	11836	3.6	1.5	33.8

The above results given in the table revealed that Bolder gave highest yield (4944 kg/ha) followed by Supreme F<sub>1</sub> (3945 kg/ha). Maximum stalk yield was obtained by Supreme F<sub>1</sub> (49500 kg/ha). Statistically all the entries were at par.

## **Germplasm Enhancement:**

The genetic diversity in local sorghum germplasm is less than the required. It should be more diverse. For this purpose, ICRISAT, India was contacted and 104 entries (31 CMS A+B lines, 18 restorers and 26 pure lines) were imported for sowing in Kharif 2018.

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

### **1. BREEDING:**

#### **1.1 Maintenance of Gene Pool**

Sixteen (17) gene pool lines were planted on 02-08-2017. Each entry was sown in two row strip of 4 meter length. One row was kept vacant between two lines to facilitate the breeding work at flowering. The row to row distance was 75 cm and plant to plant distance was 20 cm. At the time of flowering three plants were selected from each line and three to six heads were covered with butter paper bags before emergence of stigmas for self-pollination. After maturity the self-pollinated heads of each line were harvested separately on 13-11-2017, sundried, threshed and seed was stored for future use. .

#### **1.2 Maintenance of Cytoplasmic Male Sterile Lines**

Eight cytoplasmic male sterile (A) lines and twenty three cytoplasmic male fertile (B) lines were planted on 02-8-2017 in two row strips of 4 meter length with row spacing 75 cm and plant spacing 20 cm. One row was kept vacant between two lines to facilitate the breeding work at flowering. At the time of flowering 3 plants were selected from each A & B line and 3-6 heads were covered with butter paper bags before emergence of stigmas for maintenance and self-pollination, respectively. After maturity the heads of each line were harvested separately on 13-11-2017, sundried and threshed. Reasonable seed was collected, which was stored.

#### **1.3 Maintenance of Fertility Restorer Lines**

Twenty five (25) fertility restorer lines were planted on 02-8-2017 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 14-11-2017, sundried and threshed. Reasonable seed was collected, which was stored.

#### **1.4 Derivation of Fertility Restorer Lines**

Five S<sub>2</sub>, six S<sub>3</sub> and twenty S<sub>4</sub> fertility restorer derivative lines were sown in two row strips of 4 meter length for derivation on 02-8-2017. 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 14-11-2017, sundried and threshed. Four derivative lines were added to fertility restorer lines. Reasonable seed was procured and stored for future use.

## 1.5 Constitution of Pearl Millet Hybrids.

During kharif 2017, Twenty Four (24) 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.

## 2. EVALUATION:

### 2.1 Pearl Millet Varietal Yield Trial, Kharif-2017

The trial was comprised of ten varieties including check variety (18-BY) sown in randomized complete block design with three replications on 02-08-2017. 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 15-11-2018 Data were recorded for grain yield and various other agronomic traits some of which are presented in the following table 34:-

**Table 34: 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
1	YBS-89	2260	18.22	327	55	3.28	39
2	YBS-93	2131	17.78	323	60	3.01	37
3	18-BY (C)	2028	17.56	380	63	3.28	35
4	YBS-94	2019	18.00	308	58	3.24	31
5	YBS-83	1638	16.00	308	58	2.73	34
6	YBS-98	1620	22.00	302	55	3.07	35
7	YBS-92	1444	20.00	300	55	2.77	34
8	YBS-70	1377	17.33	340	63	2.55	32
9	YBR-5	1158	10.89	313	54	2.58	29
10	YBS-95	--	--	--	--	--	--
<b>CV%</b>		15.38	176.35	4.3	18.89	17.90	7.0
<b>Cd1</b>		413.5	74.99	21.27	17.48	0.82	3.70

The results presented in Table 34 reveal that YBS-89 produced maximum grain yield of 2260 kg/ha followed by YBS-93 and 18-BY Check with grain yield of 2131 and 2028 kg/ha respectively. YBS-95 did not germinated, while YBR-5 remained at the bottom with grain yield of 1158 kg/ha.

### 2.3 Adaptability/ National Uniform Pearl Millet Hybrid Yield Trial Kharif-2017

The trial comprising of eleven entries was received from the National Coordinator of MSM, NARC, Islamabad, sown on 27-08-2017 in RCB 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 20-12-2017 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 35:-

**Table 35: 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	86M90	2133	11.6	223	50	2.997	67
2	TMLT-02	1773	12.9	218	53	3.078	70
3	HM-535	1629	15.6	225	51	2.668	69

4	TLMT-01	1504	14.7	225	51	2.642	70
5	55 S 85	1429	13.3	213	51	2.633	62
6	TMLT-02	1318	16.6	228	51	2.278	67
7	14RBS-01	1282	15.6	255	51	1.753	66
8	YBS-98	1178	11.6	231	51	1.712	70
9	14 RBS-01	1142	13.3	241	52	1.640	59
10	YBS-95	1119	16.4	230	53	1.813	66
11	HS-888	0	0	0	0	0	0
CV%		14.44	12.67	4.57	3.14	16.15	8.82
Cd1		324.36	2.77	16.21	2.51	0.365	9.07

The results presented in Table 35 indicate that 86M90 gave maximum grain yield of 2133 kg/ha followed by TMLT-02 (1773 kg/ha) while HS-888 was not germinated.

## AGRONOMY

### Kharif 2017

#### i) Determination of Optimum Plant Spacing for Maize (Hybrids)

Trials were conducted during autumn 2017 following RCB design with four replications to determine effect of plant spacing on grain yield of maize hybrid YH-5140. Data concerning crop stand, days to 50% silking, plant height, cob height and grain yield were recorded, compiled and statistically analyzed.

**Table 40: Determination of Optimum Plant Spacing for Maize (Hybrids)**

Treatment	Plant Height (cm)	Cob Height (cm)	Days to 50% Tasseling	Days to 50% Silking	Nos. of Cobs/ha	Moisture %	Grain Yield (kg/ha)
5 inch	202	115	50.75	53.75a	83980 a	28.0	6923a
6 inch	197	114	49.75	52.00b	67513 b	27.7	6533b
7 inch	197	116	50.00	52.75ab	67925 b	28.9	6281b
8 inch	196	111	49.50	52.25b	60515 c	27.9	6550b
9 inch	194	115	49.75	52.50b	68748 b	28.2	6375b
LSD 0.05	NS	NS	NS	1.15	3215	NS	275.9

The results presented in the above table show that different plant population levels significantly affected the days to 50% silking, No. of cobs/ha, and grain yield. However plant height, cob height and days to 50% tasseling were not affected by different plant populations. In Kharif-2017 maximum grain yield (6923 kg/ha) was recorded at 5 inch plant spacing (106666 plants ha<sup>-1</sup>) while all other plant spacing's produced statistically similar grain yield but lower than T<sub>1</sub> (5 inch plant spacing). Plants at 5 inches and 7 inches spacing were the latest to reach the 50% silking stage.

#### ii) Effect of Different Planting Methods on Grain Yield of Maize (OPV) YW-786

During kharif 2017 trial was conducted following RCB design with four replications keeping plot size 5 × 5.25m. Data regarding the plant stand, days to 50% silking, plant height, cob height and grain yield were recorded and analyzed statistically, which are presented in Table 41.

**Table 41: Effect of Different Planting Methods on Grain Yield of Maize (OPV) YW-786**

Treatment	Stand count per ha	Plant Height (cm)	Cob Height (cm)	Days to 50% Silking	Nos. of Cobs /ha	Moisture %	Grain Yield (kg/ha)
4 ft bed	60592 a	233	125	56	60025 a	26.0	8672 a
3.5 ft bed	57633 b	229	125	56	50238 c	26.5	8155 b
3 ft bed	57862 b	226	120	58	51735 b	26.7	7720 b
Ridge	57280 b	233	125	55	51548 bc	26.8	9155a
LSD <sub>0.05</sub>	1497	NS	NS	NS	1493	NS	486.2

The results presented in the above Table 41 disclose that T<sub>1</sub> {Ridge Sowing R-R (30") sowing on one side} produced significantly the highest grain yield (9155 kg/ha) of maize OPV YW-786, which is statistically at par with T<sub>4</sub> {Bed Sowing B-B (48") both side} by producing 8672 kg/ha. Whereas T<sub>2</sub> {Bed Sowing B-B (3ft) both side produced minimum yield of 7720 kg/ha. Greatest number of cobs was recorded from 4 ft bed while number of cobs from 3.5ft beds was lowest. However the effect of treatments on plant height, cob height and days to 50% silking was not significant.

### iii) Effect of Optimum Plant Spacing on Grain Yield of Promising Pearl Millet Variety (YBS-95)

In Kharif 2017, trial was laid out in RCB design with four replications keeping plot size 5 × 3 m to determine grain yield of YBS-95 as affected by different plant populations. Data regarding crop stand, days to 50% anthesis, plant height, number of tillers per plant, and grain yield were recorded, analyzed and presented in the below Table 42.

**Table 42: Effect of Optimum Plant Spacing on Grain Yield of Promising Pearl Millet Variety (YBS-95)**

Treatment	Stand count (ha <sup>-1</sup> )	Plant height (cm)	Days to 50% anthesis	No. of nodes plant <sup>-1</sup>	No. of Tillers plant <sup>-1</sup>	Grain yield (kg/acre)
8 inches	60000 a	259	53	11.1b	2.8 bc	3610
9 inches	53333 b	258	51	11.3 ab	2.7c	3483
10 inches	48333 c	261	51	11.3 ab	3.0 b	3820
11 inches	41666 d	258	53	11.8 a	2.9 bc	3663
12 inches	38333 d	260	51	11.8 a	3.5 a	3590
LSD 0.05	4850	NS	NS	0.56	0.27	NS

The results depicted in Table 42 reveal that different plant densities of pearl millet under study significantly affected stand count, No. of nodes/tiller, No. of tillers/plant however grain yield remained non-significant. Though maximum (non-significantly) grain yield of 3820 kg/ha was recorded when plants were sown at 10 inches spacing followed by at 11 inches spacing with grain yield of 3663 kg/ha. Maximum number of tillers (3.5 / plant) was recorded when pearl millet was sown at 12 inches.

### iv) Determination of Optimum Plant Spacing for Sorghum Hybrid

The experiment was laid out during Kharif 2017 in RCB design with four replications. Plot size was kept 5 × 3m to determine grain yield of sorghum hybrid YSH-95 as affected by different plant population levels. The data were recorded for various important characters along with grain yield, analyzed and are presented below in Table 43.

v) **Table 43: Determination of Optimum Plant Spacing for Sorghum Hybrid**

Treatment	Stand count (ha <sup>-1</sup> )	Plant height (cm)	Days to anthesis	No. of heads /ha	Total head weight (kg/ha)	Grain yield (kg/ha)
5 inches	86667 a	173.5 c	71.25	52500ab	5908c	4321bc
6 inches	71250 b	183.5 ab	70.50	56250a	7579a	5404a
7 inches	58750 c	188.8 a	70.50	51250bc	6231bc	4671b
8 inches	53333 cd	186.5 a	72.50	47083c	6267b	3575d
9 inches	47500 d	177.3 bc	72.0	47917bc	6327b	417c
LSD <sub>0.05</sub>	7467.9	8.32	NS	4872	329.57	358

The results indicates that plant population levels significantly affected the stand count plant height, No. of heads, total head weight and grain yield. Highest stand count was observed at 5 inches plant spacing that decreased significantly with increase in plant spacing. Tallest plants were observed when plants were sown at 5 inch spacing while shortest plants were observed in 9 inch spacing. However, effect of plant spacing on days to anthesis remained non-significant. Maximum grain yield (5404 kg/ha) was recorded at 6 inch plant spacing followed by at 7 inch plant spacing (4671 kg/ha). However least yield (3575 kg/ha) was recorded at 8 inch plant spacing.

### SPRING 2018

#### i. Determination of Optimum Plant Spacing's for Maize (Hybrids)

Two maize hybrids YH-5482 and FH-1292 were planted at 5, 6, 7, 8 and 9 inches plant spacing on 75 cm ridges under split plot arrangement in 3 m × 4 m plot size replicated thrice.

**Table 44: Determination of Optimum Plant Spacing's for Maize (Hybrids) (Continue...)**

spacing	Cob Height			Cobs ha <sup>-1</sup>		
	YH-5482	FH-1292	Mean	YH-5482	FH-1292	Mean
<b>5 inch</b>	120.5	126.5	123.8	81667	81667	81666a
<b>6 inch</b>	122.8	125.4	124.1	77778	68889	73333b
<b>7 inch</b>	117.8	124.9	121.4	68889	65556	67222bc
<b>8 inch</b>	120.9	126.8	123.8	67222	56667	61944c
<b>9 inch</b>	122.2	123.7	123	56667	59444	58055c
<b>Mean</b>	120.8 b	125.45a		70444	66444	
<b>LSD</b>	Hybrids = 1.15 Spacing = NS Interaction = NS			Hybrids = NS Spacing = 8104.1 Interaction = NS		

**Table 44: Determination of Optimum Plant Spacing's for Maize (Hybrids)**

Spacing	Fresh weight (kg/ha)			Grain Yield (kg/acre)		
	YH-5482	YH-5482	Mean	FH-1292	YH-5482	Mean
<b>5 inch</b>	17017	14392	15704	14392	11606	10915 A
<b>6 inch</b>	16864	13853	15358	13853	11464	10291 B
<b>7 inch</b>	14778	16017	15397	16017	10140	10397 B
<b>8 inch</b>	15611	14844	15228	14844	10834	10353 B
<b>9 inch</b>	15300	15022	15161	15022	10259	10220 B
<b>Mean</b>	15914	14826		14826	10009	
<b>LSD</b>	Hybrids = NS Spacing = NS			Hybrids = NS Spacing = 505.87		

Interaction = 1. Within hybrid = 672.39 2. Across hybrid = 1274.4	Interaction = NS
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The results presented in Table 44 reveal that hybrids differed for cob height as FH 1292 bore cobs at higher compared to YH-5482. However impact of plant spacing was NS. Cobs ha<sup>-1</sup> remained unaffected of hybrids however higher (P<0.05) number of cobs were recorded at 5 inch space and gradually decreased as plant spacing increased. Similarly hybrids did not vary for grain yield / acre however effect of spacing was significant (P<0.05). Higher grain yield of 10915 kg/acre was recorded at 5 inch space while grain yield at 6, 7, 8, 9 inch space remained same. Interactive effect (plant spacing × hybrid) was NS on grain yield.

### ii. Determination of Optimum Plant Spacing for Maize (OPV)

Maize OPV ‘YY-15’ was planted at 5, 6, 7, 8 and 9 inches plant spacing on 75 cm ridges under RCBD arrangement in 3 m × 4 m plot size replicated thrice.

**Table 45: Determination of Optimum Plant Spacing for Maize (OPV)**

Treatment	Stand count (ha <sup>-1</sup> )	Tasseling (days)	Silking (days)	Cob height (cm)	Plant height (cm)	No. of cobs/ha	Fresh weight (kg/ha)	Grain yield (kg/ha)
5	74722 a	66.3 c	68.3	140.3	249.4	60556 a	9719b	7680 c
6	62500 b	66.3 c	68.7	138.3	250.3	55556 ab	10347ab	7883 bc
7	59722 bc	66.7 bc	69.0	134.0	251.7	53889 ab	10939a	8669 a
8	55556 c	67.3 a	69.3	130.1	267.5	48889 bc	10244b	8412 ab
9	49167d	67.0 ab	69.0	126.7	262.1	44444 c	9900b	7809 bc
LSD <sub>0.05</sub>	4848.8	0.64	NS	NS	NS	7600.8	640	705.9

The results presented in Table 45 reveal that effect of plant spacing on stand count and days to 50% tasseling, No. of cobs /ha fresh weight and grain yield respectively. More stand count was observed at 5 inches and gradually decreased with increased plant spacing. Plants at 8 and 9 inches reached to 50% tasseling later compared to other plant spacing. Maximum number of cobs was obtained at 5 inch plant spacing that was statistically similar to that of 6 and 7inch. While minimum were recorded at 9 inch. Maximum grain yield was obtained at 7 inch spacing which was statistically similar to that of at 8 inch and minimum grain yield was recorded at 5 and 9 inch plant spacing.

### iii. Effect of Different Planting Methods on Grain Yield of Maize (OPV)

Maize OPV ‘YW-786’ was planted under different plant methods viz. 1) 2.5feet wide ridges 2) 3 feet wide beds 3) 3.5 feet wide beds 4) 4feet wide beds under RCBD arrangement replicated thrice keeping the plant population nearly constant across the sowing methods (30000 plants/acre).

**Table 46: Determination of Optimum Plant Spacing for Maize (OPV)**

Treatment	Stand count (acre)	Tasseling (days)	Silking (days)	Cob height (cm)	Plant height (cm)	No. of cobs/ha	Fresh weight (kg/acre)	Grain yield (kg/ha)
Ridge (2.5ft)	28048c	66.75	69	141a	262a	22667b	11394a	9008a
3 ft bed	36944a	67.00	70	118bc	255a	26612a	11964a	9374a
3.5 ft bed	34762b	67.25	70	113c	243b	24313ab	9404b	7304b



4 ft bed	36792a	66.75	69.25	120b	253a	26354a	8765b	7056b
LSD0.05	1512.6	NS	NS	6.27	8.8	3417	863.5	1564.5

The results presented in the above table 46 reveal that maximum stand was recorded at 3 feet wide beds which was not different from 4 feet wide beds. However stand count was lower at ridges. Days to 50% tasseling and silking remained non-significant. Maximum cob and plant height was recorded at ridge sowing and lowest plant and cob height was observed at 3.5 feet wide beds. Maximum No. of cobs was obtained from 3 feet wide beds though it was statistically not different from 4 feet and 3.5 feet wide beds. Maximum grain yield was obtained at 3 feet wide beds which was statistically similar to ridge sowing while grain yield was lowest from 4 feet wide beds.

**i. Determination of Optimum Plant Spacing's for OPVs of Sweet and Pop Corn**

Pop-corn (YPC-14) and sweet corn (YSC-15) was planted at 5, 6, 7, 8 and 9 inches plant spacing on 75 cm ridges under split plot arrangement in 3 m × 4 m plot size replicated thrice. Result suggest that effect of hybrid, spacing and their interactive effect was NS. However effect of plant spacing on cobs /ha was significant. Maximum number of cobs were obtained from 5 and 6 inch jointly that lowered gradually with increase in plant spacing. Maximum grain yield was recorded when YSC-15 was sown at 6 inch space that was not different from that obtained at 5 inch while lowest was observed at 8 inch sowing. Maximum grain yield of YPC-14 was obtained at 7 inch while lowest was recorded at 5 inch.

**Table 47: Determination of Optimum Plant Spacing's for OPVs of Sweet and Pop Corn**

(Continue...)

	Cob Height			Cobs ha-1		
	YSC	YPC	Mean	YSC	YPC	Mean
5"	122.07	127.4	124.7	88333	80556	84444 A
6"	124.13	129.0	126.6	82222	86667	84444 A
7"	126.33	133.4	129.8	73889	75000	74444 B
8"	121.20	128.4	124.8	66667	72222	69444 BC
9"	125.53	125.7	125.6	60000	71111	65555 C
Mean	123.85	128.8		74222	77111	
LSD	Hybrids = NS Spacing = NS Interaction = NS			Hybrids = NS Spacing = 7963.8 Interaction = NS		

**Table 47: Determination of Optimum Plant Spacing's for OPVs of Sweet and Pop Corn**

	Fresh weight (kg/ha)			Grain Yield (k/ha)		
	YSC	YPC	Mean	YSC	YPC	Mean
5"	9361a	8250d	8806b	6973a	6126	6550a
6"	9369a	9250ab	9310a	7008a	6662	6835a
7"	8722bcd	9281ab	9001ab	6375	6894	6635a
8"	7197e	8978abc	8088c	5292	6692	5992b
9"	7125e	8689cd	7907c	5318	6524	5921b
Mean	8355.0b	8889.4a		6193 b	6579.8a	
LSD	Hybrids = 441.52 Spacing = 346.83 Interaction = 1. Within hybrid = 491 2. Across hybrid = 589			Hybrids = 81.126 Spacing = 294.80 Interaction = Within varieties = 416.92 Across varieties = 379.42		

**A) Agronomic Studies under Drip Irrigation System at Water Management Research Farm, Renala Khurd, Okara**

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

The experiment comprised of four sowing geometries viz. T<sub>1</sub>) sowing on one side of 75cm apart ridges with plant spacing of 20cm, T<sub>2</sub>) sowing on both sides of 90 cm wide beds with plant spacing of 32.5 cm, T<sub>3</sub>) sowing on both sides of 105 cm wide beds with plant spacing of 28.75cm and T<sub>4</sub>) sowing on both sides of 120 cm wide beds with plant spacing of 25 cm was sown on 21-08-2018 to evaluate under drip irrigation. The said treatments were planted in randomized complete block design with four replications. Net plot size was of 5.25 m × 4 m for treatment 1 and 3 while 5.4m × 4 m for treatment 2 and 4.8m × 4m for treatment 4 for data collection. .

**Table 48: Effect of Different Planting Geometries on Grain Yield of Maize Hybrid under Drip Irrigation.**

Treatment	Stand count	Germination %	Plant Height (%)	Cob Height (cm)	Days to Silking	No. of Cobs	Grain Yield (kg/ha)
T <sub>1</sub>	23048 b	86.4b	195.3ab	84.8b	55.5	21714a	4537c
T <sub>2</sub>	25926 a	95.2a	188.5b	95.0ab	54.8	21714a	5256b
T <sub>3</sub>	25143ab	94.9a	198.5ab	98.0a	54.3	21667a	6005a
T <sub>4</sub>	25000ab	84.5b	213.8a	96.8a	55.0	17333b	5733ab
LSD <sub>0.05</sub>	2194.7	7.96	23.12	11.7	NS	2709.2	526.4

The results presented in Table 48 reveal that that T<sub>3</sub> (sowing on both sides of 105 cm spaced beds with 28.75 cm plant spacing) is more suitable planting geometry for maize under drip irrigation system that produced grain yield of 6005 kg/ha. It may further be concluded that ridge sowing is less efficient planting method compared to bed planting under drip irrigation system that produced only 4537 kg/ha grain yield

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

Experiment was conducted in autumn-2017 and spring-2018. Treatment consists of four fertilizer level of 83-33-83 kg/ha. Treatments are viz. 1) 100% recommended, 2) 75% recommendation, 3)50 % of recommendation and 4) 25% of the recommendation. Crop was sown on 75 cm wide ridges while sowing was done on one side of the ridge with plant spacing of 20 cm. Treatments were laid in randomized complete block design with four replication. Gross plot size of 14m × 4m was maintained, however net plot size of 5.25 m × 4 m was allotted for data collection.

**Table 49: Efficient Use of Fertilizers to Obtain Higher Grain Yield of Maize Hybrid under Drip Irrigation**

(Continue...)

Treatment	Ear length (cm)		Rows ear <sup>-1</sup>		Grains row <sup>-1</sup>		1000-grain weight (g)	
	Autumn	Spring	Autumn	Spring	Autumn	Spring	Autumn	Spring
100%	16.9	16.14a	16.9	17.9a	31.8	29.29a	258.7 a	269.57c
75%	17.6	15.53b	17.4	17.2ab	32.8	27.90b	258.4 a	287.24a
50%	18.4	15.14b	17.0	16.5bc	33.9	27.52b	255.7 a	274.20bc
25%	17.1	13.86c	17.1	15.9c	33.2	22.65c	246.2 b	285.14ab
LSD <sub>0.05</sub>	NS	0.4268	NS	1.0325	NS	1.2544	6.39	

Means not followed by the same letter within a column are significantly different according to LSD test at P = 0.05.

**Table 49: Efficient Use of Fertilizers to Obtain Higher Grain Yield of Maize Hybrid under Drip Irrigation**

Treatment	Fresh ear weight (kg/ha)		Grain yield (kg/ha)		Starch %		Oil %		Protein %	
	Autumn	Spring	Autumn	Spring	Autumn	Spring	Autumn	Spring	Autumn	Spring
100%	8739	18480a	5963a	12735a	53.4	52.2a	4.11a	4.1	11.1a	11.7ab
75%	8635	18275 a	5916a	12177a	53.9	50.2b	4.02ab	4.6	10.63b	12.2a
50%	8237	15494b	5548b	10103b	54.1	50.4b	4.00 ab	4.1	10.3bc	11.2b
25%	8363	14058b	5501b	8905c	53.0	48.7c	3.86b	4.5	10.1 c	11.6b
LSD <sub>0.05</sub>	NS	1457.6	140.9	825.85	NS	1.45	0.16	NS	0.33	0.536

Means not followed by the same letter within a column are significantly different according to LSD test at P = 0.05.

The results presented in Table 49 revealed that in both the seasons, treatments with 100% and 75% of recommended fertilizer produced the highest but similar grain yield of 596 kg/ha (100%) and 5916 kg/ha (75%) in autumn and 12735 kg/ha (75%) and 12177 kg/ha (75%) in spring. This suggests that 25% of fertilizers can be saved under drip irrigation system without economic yield loss

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

This Experiment was conducted in autumn-2017 and spring-2018. Treatments consists of four MAD levels viz. 1) 15% MAD, 2) 30% MAD, 3) 45% MAD and 4) 60% MAD. Crop was sown on 75 cm wide ridges while sowing was done on one side of the ridge with plant spacing of 20 cm. Treatments were laid in randomized complete block design with four replication. Gross plot size of 14m × 4m was maintained, however net plot size of 5.25 m × 4 m was allotted for data collection.

**Table 50: Estimation of optimum management allowed deficit (MAD) under drip irrigation for hybrid maize**

(Continue...)

Treatment	Ear length (cm)		Rows ear <sup>-1</sup>		Grains row <sup>-1</sup>		1000-grain weight (g)		Number of ears (m <sup>2</sup> )	
	Autumn	Spring	Autumn	Spring	Autumn	Spring	Autumn	Spring	Autumn	Spring
15% MAD	17.50	16.7a	17.0	17.4a	32.5	29.3a	251a	303a	5.9a	9.1
30% MAD	17.40	16.4a	17.1	15.9b	32.9	27.1b	250a	288b	5.5b	9.3
45% MAD	17.1	15.5b	17.1	15.5b	32.9	27.4b	244ab	278b	5.4b	9.1
60% MAD	16.99	14.6c	17.4	16.3b	31.9	24.8c	242b	289b	5.2b	8.9
LSD <sub>0.05</sub>	NS	0.76	NS	1.07	NS	1.83	7.29	15.7	0.34	NS

MAD= Management allowable depletion.

Means not followed by the same letter within a column are significantly different according to LSD test at P = 0.05.

**Table 50: Estimation of optimum management allowed deficit (MAD) under drip irrigation for hybrid maize**

(Continue.....)

Treatment	Fresh ear weight (kg/ha)		Grain yield (kg/ha)		Starch %		Oil %		Protein %	
	Autumn	Spring	Autumn	Spring	Autumn	Spring	Autumn	Spring	Autumn	Spring
15% MAD	9600a	18183a	6465a	12199a	52.8b	50.6a	4.09a	4.28ab	10.9	11.9
30% MAD	9448a	16257b	6530a	11002ab	54.4a	50.9a	3.90b	4.30ab	10.9	12.1
45% MAD	8978a	14688c	6093a	9822b	53.2ab	50.6a	4.11a	4.05b	11.0	12.1
60% MAD	7905b	11999d	5400b	8054 c	52.9b	47.4b	4.06a	4.58a	11.3	12.4
LSD <sub>0.05</sub>	630	985.72	502.5	1230.2	1.49	3.07	0.15	0.31	NS	NS

MAD= Management allowable depletion

Means not followed by the same letter within a column are significantly different according to LSD test at P = 0.05.

The results presented in Table 50 revealed that maize grain yield did not varied significantly among first three MAD levels (15%, 30% and 45% MAD levels) in autumn season while in spring season soil moisture depletion beyond 30% lowered the grain yield significantly. However lowest grain yield of 5400 kg/ha and 8054 kg/ha in autumn and spring seasons respectively, was recorded at 60% MAD level. These results suggest that under drip irrigation system, maize crop may be irrigated upto 45% MAD in autumn season while upto 30% in spring season level without serious yield loss.

## PLANT PATHOLOGY

### 1. Testing of Stalk Rot (*Fusarium moniliforme*) Intensity in Maize Hybrids by Artificial Inoculation during Kharif-2017.

The trial comprised of five (5) maize hybrids i.e. YH-5421, YH-5427, YH-5533, YH-5534 and YH-5394. It was sown on 21-08-2017 in RCB design with four replications. Plot size was kept 4m x 2.25m. At silking stage, five (5) plants per plot were inoculated with infected tooth picks. After one month of inoculation, each inoculated plant was torn apart by a scalpel and disease reaction was recorded with the help of Hooker's disease rating scale. The data were recorded and presented in the following table.

**Table 51: Results of Stalk Rot Intensity in Maize Hybrids by Artificial Inoculation Kharif-2017.**

Name of maize hybrids	Infection %age of inoculated internode	Hooker's disease rating Scale (1-10)	Reaction
-	1-25	1	Highly resistant
YH-5421, YH-5394	26-50	2	Resistant
YH-5427, YH-5533, YH-5534	<b>51-75</b>	3	Moderately Resistant
-	76-100	4	Moderately susceptible

The data presented in the above table reveal that maize hybrids YH-5421 and YH-5394 are resistant against stalk rot while maize hybrids YH-5427, YH-5533 and YH-5534 are moderately resistant against stalk rot.

### 2. Testing of Seed Dressing Fungicides against Seedling Blight in Maize during Kharif-2017 (Hybrid=YH-1898).

The trial was comprised of five (5) treatments i.e. Topsin-M 70 WP, Protocol 50 WP, Nanok 25 SC, Polyram DF70 and control. It was sown in RCB design with four replications on 21-08-2017. Plot size was kept 4m x 2.25m. Data regarding plant stand count, seedling blight attack %age, and grain yield were recorded which are presented in the following table 52:

**Table 52: Results of Testing of Seed Dressing Fungicides against Seedling Blight in Maize**

Sr. #	Treatments	Plant Stand	Seedling blight %age	Grain Yield (kg/ha)
1	Topsin-M 70 WP	59	0.83	6966
2	Protocol 50 WP	59	1.69	6508

3	Nanok 25 SC	57	2.57	6349
4	Polyram DF70	59	2.92	5894
5	Control	59	5.85	5405
	C.V %age	3.35	28.91	8.31
	LSD @ 5 %	NS	1.23	796

The data presented in above Table 52 reveal that Topsin-M 70WP gave the best control against seedling blight showing minimum seedling blight attack % age (0.83) with grain yield of 6966 kg/ha followed by Protocol 50WP showing seedling blight attack % age (1.69) with grain yield 6508 kg/ha.

### 3. Screening of Different Maize Germplasms Against Stalk Rot (*Fusarium moniliforme*) Kharif 2017

At silking stage, all the maize germplasms planted with in the Institute during kharif 2017 were artificially inoculated with stalk rot pathogen by infected toothpicks method at second internode of plants from soil level. Four weeks after inoculation disease intensity was recorded with the help of hooker's disease rating scale (1-10).

Following number of 1111 plots of different germplasms were screened out against stalk rot. The data were collected and after compilation are presented in the table below

**Table 53: Screening of Different Maize Germplasm against Stalk Rot during Kharif 2017**

Reaction/Scale	Demonstration Trial	PYT-1	PYT-2	NUMY Trials	EIB Lines	PEIB Lines
<b>No. of Plots</b>	<b>27</b>	<b>26</b>	<b>26</b>	<b>83</b>	<b>638</b>	<b>311</b>
Highly Resistant	00	00	00	00	00	00
Resistant	06	10	10	22	101	63
Moderately-resistant	20	13	15	49	222	155
Moderately-susceptible	01	03	01	12	138	87
Susceptible	00	00	00	0	67	0
Highly-susceptible	00	00	00	00	01	0
No germination	0	0	0	0	109	6

The data regarding maize germplasms screened out against stalk rot are presented in table 53 which reveal that in **Demonstration Trial** total 27 plots were screened out against stalk rot, there was no highly resistant plot, 6 plots were resistant, 20 plots were found moderately resistant, 1 plots were moderately susceptible, no plots were susceptible, no plots were found highly susceptible and there was no germination in zero plots. In PYT-1, total 26 plots were screened out against stalk rot, there was no highly resistant plot, 10 plots were resistant, 13 plots were found moderately resistant, 3 plots were moderately susceptible, no plots were susceptible, no plots were found highly susceptible and there was no germination in zero plots. In PYT-2, total 26 plots were screened out, there was no highly resistant plot, 10 plots were resistant, 15 plots found moderately resistant were, while one plot was moderately susceptible, no plots were susceptible, no plots were found highly susceptible and there was no germination in zero plots. In NUMY trial, total 83 plots were screened out, there was no highly resistant plot, 22 plots were resistant, 49 plots were found moderately resistant, 12

plots were moderately susceptible, no plots were susceptible, no plots were found highly susceptible and there was no germination in zero plots. In EIB lines, total 638 plots were screened out, there was no highly resistant plot, 101 plots were resistant, 222 plots were found moderately resistant, 138 plots were moderately susceptible, 67 plots were susceptible, 1 plot was found highly susceptible and there was no germination in 109 plots. In PEIB lines, total 311 plots were screened out, there was no highly resistant plot, 63 plots were resistant, 155 plots were found moderately resistant, 87 plots were moderately susceptible, no plots were susceptible, no plots were found highly susceptible and there was no germination in 6 plots.

#### 4. Testing of Stalk Rot Intensity in Maize Hybrids by Artificial Inoculation during Spring-2018

The trial comprised of five (5) maize hybrids i.e. YH-5421, YH-5427, YH-5533, YH-5534 and YH-5394 was sown in RCB design with four replications on 19-02-2018. Plot size was kept 4m x 2.25m. At silking stage, 5 plants/plot were inoculated with infected tooth picks. After one month of inoculation, each inoculated plant was torn apart by a scalpel and disease reaction was recorded with the help of Hooker's disease rating scale.

**Table 54: Results of Stalk Rot Intensity in Maize Hybrids by Artificial Inoculation Spring-2018**

Name of maize hybrids	Infection %age of inoculated internode	Scale	Reaction
-	1-25	1	Highly resistant
-	26-50	2	Resistant
YH-5421, YH-5394, YH-5427, YH-5533, YH-5534	51-75	3	Moderately Resistant
-	76-100	4	Moderately susceptible

The data presented in Table 54 reveal that maize hybrids YH-5421, YH-5427, YH-5533, YH-5534 and YH-5394 are moderately resistant against stalk rot.

#### 5. Testing of Seed Dressing Fungicides against Seedling Blight in Maize Spring-2018 (Hybrid=YH-1898).

The trial was comprised of five (5) treatments i.e. Topsin-M 70 WP, Protocol 50 WP, Nanok 25 SC, Polyram DF70 and control was sown in RCB design on 19-02-2018. The plot size was kept 4m x 2.25m. Data regarding plant stand count, seedling blight attack %age, and grain yield were recorded which are presented in the following table 53:

**Table 55: Results of Testing of Seed Dressing Fungicides against Seedling Blight in Maize**

Sr. #	Treatments	Plant Stand	Seedling blight %age	Grain Yield (kg/ha)
1	Topsin-M 70 WP	60	1.67	9286
2	Nanok 25 SC	60	3.75	8872
3	Protocol 50 WP	60	3.33	8539
4	Polyram DF70	60	4.58	8292
5	Control	60	9.58	7970
	C.V %age	-	32.71	3.38
	LSD @ 5 %	NS	2.31	447

The data presented in the above table 55 revealed that Topsin-M 70WP gave the best control against seedling blight showing minimum seedling blight attack % age (1.67) with grain yield 9286 kg/ha followed by Protocol 50WP showing seedling blight attack % age (3.333) with grain yield 8539 kg/ha.

## 6. Screening Of Different Maize Germplasm Against Stalk Rot during Spring 2018

At silking stage, all the planted maize germplasm were inoculated with stalk rot pathogen by infected toothpicks method at second internodes of plants from soil level. Four weeks after inoculation disease intensity was recorded with the help of hooker's disease rating scale (1-10).

Following number of 1420 plots of different germplasms were screened out against stalk rot during Spring-2018.

**Table 56: Screening of Different Maize Germplasm against Stalk Rot during Sp-2018.**

Reaction/Scale	EIB Lines	PIEB Lines	Derivations	Demonstration trial-1	Demonstration trial-2	PYT-1	PYT-2	MPMYT-1	MPMYT-2	NUMYT-A	NUMYT-B
(Plots)	796	151	262	14	23	20	26	26	26	55	21
Highly Resistant	00	00	00	00	00	00	00	00	00	00	00
Resistant	10	04	03	00	00	00	00	00	00	00	00
Moderately resistant	268	40	109	08	05	07	09	11	05	27	12
Moderately susceptible	498	102	138	06	18	13	17	15	21	28	09
Susceptible	13	01	00	00	00	00	00	00	00	00	00
Highly susceptible	00	00	00	00	00	00	00	00	00	00	00
No germination	07	04	12	00	00	00	00	00	00	00	00

The data regarding maize germplasms screened out against stalk rot are presented in table 56 which reveal that in EIB lines, total 796 plots were screened out against stalk rot. The data revealed that there was no highly resistant plot, 10 plots were resistant, 268 plots were found moderately resistant, 498 plots were moderately susceptible, 13 plots were susceptible, no plots were found highly susceptible and there was no germination in 7 plots. In PIEB lines, 151 plots were screened out, no highly resistant plot, 4 plots were resistant, 40 plots were found moderately resistant, 102 plots were moderately susceptible, 1 plot was susceptible, no plots were found highly susceptible and there was no germination in 4 plots. In derivations, 262 plots were screened out, no highly resistant plot, 3 plots were resistant, 109 plots were found moderately resistant, 138 plots were moderately susceptible, no plot was susceptible, no plots were found highly susceptible and there was no germination in 12 plots. In demonstration trial-1, total 14 plots were screened out against stalk rot. The data revealed that was no highly resistant plot, no plots were resistant, 8 plots were found moderately resistant, 6 plots were moderately susceptible, no plots were susceptible, no plots were found highly susceptible and there was no germination in zero plots. In demonstration trial-2, total 23 plots were screened out, no highly resistant plot, no plots were resistant, 5 plots were found moderately resistant, 18 plots were moderately susceptible, no plots were susceptible, no plots were found highly susceptible and there was no germination in zero plots. In PYT-1, total 20 plots were screened out, no highly resistant plot, no plots were

resistant, 7 plots were found moderately resistant, 13 plots were moderately susceptible, no plots were susceptible, no plots were found highly susceptible and there was no germination in zero plots. In PYT-2, total 26 plots were screened out, no highly resistant plot, no plots were resistant, 9 plots were found moderately resistant, 17 plots were moderately susceptible, no plots were susceptible, no plots were found highly susceptible and there was no germination in zero plots. In MPMYT-1, total 26 plots were screened out, no highly resistant plot, no plots were resistant, 11 plots were found moderately resistant, 15 plots were moderately susceptible, no plots were susceptible, no plots were found highly susceptible and there was no germination in zero plots. In MPMYT-2, total 26 plots were screened out, no highly resistant plot, no plots were resistant, 5 plots were found moderately resistant, 21 plots were moderately susceptible, no plots were susceptible, no plots were found highly susceptible and there was no germination in zero plots. In NUMYT-A, total 55 plots were screened out, no highly resistant plot, no plots were resistant, 27 plots were found moderately resistant, 28 plots were moderately susceptible, no plots were susceptible, no plots were found highly susceptible and there was no germination in zero plots. While in NUMYT-B, total 21 plots were screened out and found that there were no highly resistant plot, no resistant plots, 12 moderately resistant plots, 9 moderately susceptible plots, no susceptible plots, no highly susceptible plots and zero plots of no germination

## ENTOMOLOGY

### 1. Testing of different Spray able Insecticides against Shoofly and Maize Stem Borer during Kharif-2017 (Hybrid=YH-1898)

The trial comprised of five (5) treatments i.e. Tri super 40 EC, Trizone 40 EC, Lamcin 2.5 EC, Jatara 10 EC and control. It was conducted according to RCBD with plot size 4mx2.25m in four replications. It was sown on 21-08-2017. Data regarding plant stand count, shootfly infestation %age, maize borer infestation % age and grain yield were recorded which are presented in the following table:

**Table 57: Results of different Spray able Insecticides against Shoofly and Maize Borer.**

Sr. #	Treatments	Plant Stand	Shoot fly infestation %age	Maize borer infestation %age	Grain Yield (kg/ha)
1	Tri super 40 EC	60	1.24	0.83	7030
2	Trizone 40 EC	59	1.67	0.84	6777
3	Jatara 10 EC	60	2.91	2.07	6586
4	Lamcin 2.5 EC	60	2.49	2.49	6313
5	Control	60	6.24	7.91	5666
	C.V %age	0.75	32.69	52.45	5.15
	LSD @ 5%	NS	1.46	2.28	513

The data presented in above Table 57 expressed that Tri Super 40EC gave the best control against shootfly expressing minimum shootfly infestation %age (1.24) followed by Trizone 40EC expressing shootfly infestation %age (1.67) whereas Tri Super 40EC gave the best control of maize stem borer expressing the maize borer infestation %age (0.83) followed by Trizone 40EC showing maize stem borer infestation %age (0.84). As far as the yield is concerned, Tri Super 40EC produced the maximum yield (7030 kg/ha) followed by Trizone 40EC which produced the yield (6777 kg/ha).

### 2. Testing of Seed Dressing Insecticides against Shootfly during Spring 2018 (YH-1898)



The trial was comprised of five (5) treatments i.e. Trunk 20SC, Parlor 20SC, Marine 20SC, Confidor 70WS and control. It was sown in randomized complete block design with four replications on 19-02-2018. The plot size was kept 4m x 2.25m. Data regarding plant stand count, shoot fly infestation %age and grain yield were recorded which are presented in the following table 58.

**Table 58: Results of Testing of Seed Dressing Insecticides against Shoot Fly.**

Sr. No.	Treatments	Plant Stand	Shoot Fly Infestation %age	Grain Yield (kg/ha)
1	Marine 20SC	60	0	11247
2	Trunk 20SC	60	0	10964
3	Parlor 20SC	60	0	10600
4	Confidor 70WS	60	1.25	10222
5	Control	60	38.33	8328
	CV %age	-	32.50	2.11
	LSD @ 5%	NS	3.96	334

The data presented in above Table 58 revealed that Marine 20SC, Trunk 20SC and Parlor 20 SC gave the best control against shoot fly showing minimum i.e. *Zero* shoot fly infestation %age with grain yield 11247, 10964 and 10600 kg/ha respectively followed by Confidor 70 WS showing shoot fly infestation %age (1.25) with grain yield 10222 kg/ha.

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

The relative attraction efficacy of two wavelengths of light i.e. self-made bulbs of ultraviolet and orange color were studied and daily counts of insect pests of maize were noted from 11-04-2018 to 27-04-2018 simultaneously in the adjacent fields and each trap was 100 meter apart. It was observed that from 10 to 20 of moon dates its light interferes the attraction of insect pests of corn significantly. Data are given in the following Table 59.

**Table 59: Population of Insect Pests Captured in Light Traps along with Metrological Data**

Dates	Light colors	Stem borers	Aphids	Army-worms	Cob/earworms	Shoot fly	Max °C	Min °C	Relative Humidity %	
									1700 Hrs	800 Hrs
Apr-11	Ultraviolet	6	20	6	0	0	37	21	65	36
	Orange	6	143	18	2	0				
Apr-12	Ultraviolet	15	72	65	2	0	39	20	60	36
	Orange	1	25	0	0	0				
Apr-13	Ultraviolet	29	57	38	7	0	40	19	53	36
	Orange	4	9	7	1	0				
Apr-14	Ultraviolet	5	12	33	8	0	41	20	68	36
	Orange	10	24	25	4	0				
Apr-15	Ultraviolet	26	13	33	4	0	41	21	68	36
	Orange	6	6	4	2	0				
Apr-16	Ultraviolet	31	104	21	3	0	39	21	68	52
	Orange	10	0	11	0	0				

Apr-17	Ultraviolet	18	15	50	9	0	38	21	61	61					
	Orange	0	0	1	0	0									
Apr-18	Ultraviolet	16	38	57	26	0	39	19	58	36					
	Orange	4	4	23	0	0									
Apr-19	Ultraviolet	79	332	155	13	0	39	22	45	45					
	Orange	4	2	1	0	0									
Apr-20	Ultraviolet	60	17	72	6	0	37	19	42	34					
	Orange	1	0	3	0	0									
Apr-21	Ultraviolet	Light traps network problems					36	20	44	29					
	Orange														
Apr-22	Ultraviolet						37	20	42	29					
	Orange														
Apr-23	Ultraviolet						39	19	44	29					
	Orange														
Apr-24	Ultraviolet						44	19	33	24					
	Orange														
Apr-25	Ultraviolet						2	0	22	6	0	46	21	33	23
	Orange						0	0	3	0	0				
Apr-26	Ultraviolet	0	0	25	1	0	46	21	35	23					
	Orange	0	0	0	0	0									
Apr-27	Ultraviolet	0	0	33	2	0	46	21	35	32					
	Orange	0	0	0	0	0									

The bulbs of ultra violet wavelength gave significant difference regarding capture of insects/night in comparison to yellow wavelength as given in the above table.

## 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 as detailed below:

**Table 60: Seed Production of Maize OPVs**

Sr. No.	Name of Crop Variety	BNS (kg)	Pre-basic (kg)	Basic (kg)	Certified (kg)
<b>Maize Kharif, 2017</b>					
1.	Pearl	53.0	1350.0	-	5750.0
2.	YW-786	10.0	-	-	-
3.	YSC-15	1.5	-	-	-
4.	YPC-14	2.0	-	-	-
5.	MMRI Yellow	2.8	55		
6.	Agaiti 85	2.0			
7.	Agaiti 2002	1.6			

8.	Sahiwal 2002	2.5			
9.	Golden	1.5			
10.	Akbar	3.2			
11.	Sultan	2.5			
12.	Neelum	2.3			
<b>Maize Spring, 2018</b>					
1.	Pearl	50	3200	-	-
2.	YW-786	1.0	-	-	-
3.	YSC-15	2.0	-	-	-
4.	CZP-132001	3.0	-	-	-
5.	Pool-50	8.0			
6.	YY-15	8.0	34		

## 2. HYBRID MAIZE

### i. Maintenance of Female Parental Line (Y22)

Female parental line Y-22 was planted in isolation on an area of 20 kanal during kharif 2017 and spring 2018. Total Produce of Y-22 was 152 kg during Kharif 2017 and 1650 kg spring during 2018.

### ii. Maintenance of Male Parental Line (Y27)

Male parental line Y-27 was maintained on an area of 8 kanal during kharif 2017, after harvesting and threshing 333 kg were procured, while during spring 2018 it was sown about an area of 8.8 kanal in hybrid seed production block with 4:1 Female and male ratio. The selection for uniform and healthy plants/cobs was made and resultantly 80 kg was procured.

### iii. Hybrid Seed Production

Under hybrid seed production program, female parental lines (Y-22) was sown along with male (Y-27) with 4:1 ratio on an area of 32 kanal during kharif 2017. Total produce of YH-1898 hybrid procured was 1120 kg during this season production was low due to heavy rain and unfavorable environmental affect. The same parental combination (Y-22 & Y27 in 4:1 ratio) was sown on an area of 35.2 kanal during spring 2018 and 2760 kg seed was produced.

**Table 61: Seed Production during Kharif 2017 and Spring 2018**

Material	Kharif 2017		Spring 2018	
	Area (kanal)	Produce (kg)	Area (kanal)	Produce (kg)
YH-1898	32	1120	35.5	2760
Y-27	8	333	8.8	80
Y-22	20	152	20	1650
MMRI YELLOW	1	55	-	-
Project 904 50 inbred Lines 30 hybrids	-	-	4	Each inbred lines > 250 g Each Hybrids 1-2 kg

## 3. Sorghum

The following quantity of breeder & basic seed of approved and promising varieties (YSS-98 and YS-16) was produced in Kharif 2017 (Table 62).

**Table 62: Seed Production of Sorghum Varieties**

Variety	Quantity (kg)	
	Breeder	Pre-basic
YS-16	15	1278
YSS-98	05	4089

#### 4. Pearl Millet

Seed of following varieties/promising lines was multiplied in kharif 2017 for future use

**Table 63: Seed Production of Pearl Millet Varieties**

Sr. No.	Name of Variety/Line	Category		Weight (kg)
1.	YBS-98	-	Basic	913
		BNS	-	1.5
2.	18-BY		Basic	344
3.	YBS-89	-	-	2.4
4.	YBR-5	BNS	-	1.3
5.	YBS-92	BNS	-	1.4
6.	YBS-93	BNS	-	3.6
7.	YBS-94	BNS	-	2.4
8.	YBS-95	BNS	-	2.0
9.	14 RBS-01	BNS	-	3.4
10	14 RBS-02	BNS	-	2.8
11.	14 RBS-05	BNS	-	2.4
12.	Mixture Seed			1064

#### ADVISORY SERVICES (FARMERS & OTHERS):

Two (02) TV talks, forty four (44) radio talks were delivered to farmers about the maize, sorghum and pearl millet. 15 Urdu articles for guidance to farmers were published in *Zarat Nama*. 02 farmer's days with more than 100 participants each were conducted during 2017-18. Training was conducted for Agriculture Officers on maize production technology. A seminar was held at MMRI, Yusafwala for Capacity Building of Private Seed Companies regarding seed production of Maize, Sorghum, Pearl Millet & SSG hybrids

#### FOREIGN COLLABORATIONS:

Two projects of maize (Agriculture Innovation Program, AIP and Heat Tolerant Maize for South Asia, HTMA) are successfully going on. A letter of intent was signed between MMRI, Yusafwala, Sahiwal, Pakistan and Bavarian State Research Center for Agriculture (LfL) Institute of Agronomy and Plant Breeding (IPZ), Am Gereuth 4, 85354 Freising, Germany for evaluation of inducer lines in different climates. Worthy Director (Dr. Muhammad Arshad) along with one scientist (Dr. Waseem Akbar) visited Dubai and Thailand to attend meeting regarding "Mapping of maize mega environments of "South Asia" organized by CIMMYT. Worthy Director visited Nepal to attend meeting regarding "Planning Meeting of Heat Stress Tolerant Maize for South Asia" organized by CIMMYT. Worthy Director visited Mexico for participation in "4<sup>th</sup> Latin American Cereal International Conference" organized by CIMMYT. A scientist (Aamer Mumtaz) visited Sri Lanka to

attend conference “Forum on Strengthening Food Safety Standards” organized by APO, Japan. A scientist (Mr. Aamir Hussain) successfully completed two weeks training at the office of CIMMYT, Uganda regarding “Maize Breeders Course for stress Tolerant Maize for Africa (STMA)” organized by CIMMYT.

## STATIONS AND SUB-STATIONS

### MAIZE RESEARCH STATION, FAISALABAD

#### Season and Its Effects:

During July 2017 to -June-2018, 300.7 mm rainfall was received. High rainfall received in the month of July, 2017 and June 2018. Dense smog spread during months of November and December that affected maize crop yield in Punjab. The detail of average maximum and minimum temperature and rainfall received during July 2017 to June 2018 is as follows:-

**Table 64: Metrological Data of MRS, Faisalabad**

Sr. No.	Month/Year	Average Temperature (c°)		Rainfall (mm)
		Maximum	Minimum	
1	July, 2017	37.4	27.5	111.0
2	August, 2017	39.4	28.7	-
3	September, 2017	36.9	23.4	19.0
4	October, 2017	35.1	18.6	-
5	November, 2017	24.4	10.9	1.1
6	December, 2017	23.4	5.4	3.8
7	January, 2018	21.5	4.0	-
8	February, 2018	25.1	9.0	7.2
9	March, 2018	30.9	15.4	12.4
10	April, 2018	36.3	21.2	11.4
11	May, 2018	39.4	24.5	12.0
12	June, 2018	39.0	26.8	122.8

#### RESEARCH WORK DONE:

##### Kharif 2017

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

**Table 65: Gene Pool Entries of Maize at MRS, Faisalabad**

Sr. No	Entries	Planted	Harvested
1	Inbred lines	210	201
2	Inbreeding generations.		
	S <sub>1</sub>	60	50
	S <sub>2</sub>	28	20
	S <sub>3</sub>	69	41
	S <sub>4</sub>	55	29
	S <sub>5</sub>	17	15

	S <sub>6</sub>	22	20
	S <sub>7</sub>	39	33
	<b>Total</b>	<b>290</b>	<b>208</b>

## YIELD TRIALS:

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

### A. Hybrid Maize Macro Yield Trials (Kharif 2017)

#### I. Hybrid Maize Macro Yield Trial No. 1:(kharif 2017)

This trial was comprised of nine single cross hybrids including two commercial hybrids as check was sown on 09-08-2017. The trial was laid out in RCB design with three replications. The plot size was kept 5m x 3m. Standard agronomic and plant protection measures were carried out in the crop. The harvesting was done on 27-11-2017. Data regarding different agronomic traits were recorded and hybrids with good performance were selected for on farm testing. The data are given in Table 66.

**Table 66: Results of Hybrid Maize Macro Yield Trial No. 1 (Kharif 2017)**

Rank No.	Entry	Grain yield kg/ha	Days to 50% tassell.	Days to 50% silk	Plant Height cm	Cob Height cm	No. of plants harv.	No. of cobs harv.
1	FH-922	8613a	48	50	196	102	94	94
2	FH-1046	8510ab	52	54	198	104	82	82
3	FH-949	8336ab	49	51	187	103	92	92
4	FH-1012	8256ab	52	54	197	102	96	96
5	DK-6789 ( C)	8176ab	53	55	215	104	92	92
6	HIC-339 (C)	8127ab	54	56	205	104	81	81
7	FH-1042	7926ab	52	54	192	110	97	97
8	FH-1231	7803b	55	58	173	91	89	89
9	FH-929	6738c	49	51	195	100	90	90
	CV%	5.27	2.53	2.63	3.65	4.81	8.31	8.31
	LSD 5%	346.77	1.06	1.14	5.81	4.01	-	-

Data presented in the Table 66 reveals that local hybrid FH-922 showing grain yield 8613 kg/ha is at the top position. Other local hybrids FH-1046, FH-949, FH-1012 and FH-1042 showing grain yield 8510 kg/ha, 8336 kg/ha, 8256 kg/ha and 7926 kg/ha respectively, are at par with top yielding local hybrid and two commercial checks DK-6789 (8287 kg/ha) and HIC-339 (8127 kg/ha). Significant differences were observed for days to 50% tasseling and silking also. Local hybrid FH-1231 took the maximum days for 50% tasseling (55) and silking (58). Local hybrid FH-1231 attained the minimum plant height of 173 cm while, commercial check DK-6789 attained the maximum (215 cm). Number of plants per plot and cobs harvested were also statistically significantly different.

#### II. Hybrid Maize Macro Yield Trial No. 2: (Kharif 2017)

Twelve entries including two hybrids as check were included in this trial. The trial was sown on 09-08-2017 in RCB design with three replications. The plot size was kept 5m x 2.25m. Standard agronomic and plant protection measures were carried out in the experiment. The harvesting was done on 27-11-2017. Data regarding different characters were recorded and results are presented in Table 67.

**Table 67: Results of Hybrid Maize Macro Yield Trial No. 2 (Kharif 2017)**

Rank No.	Entry	Grain yield (kg/ha)	Days to 50% tassel	Days to 50% silk	Plant Height cm	Cob Height cm	No. of plants harv.	No. of cobs harv.
1	FH-950	9881a	53	55	195	104	32	32
2	HIC-339 (C)	9823ab	54	57	210	110	62	62
3	FH-1137	9818ab	54	56	189	102	19	19
4	FH-1125	9779ab	46	49	196	99	60	60
5	FH-1166	9621abc	52	54	202	101	55	55
6	FH-932	9490abc	53	55	194	97	61	61
7	FH-1114	8771bcd	57	59	178	93	60	60
8	FH-1250	8613cd	53	55	193	92	47	47
9	DK-6789(C)	8546cd	52	54	208	100	71	71
10	FH-1276	8289d	53	55	184	104	68	68
11	FH-1201	8233d	54	56	173	106	71	71
12	FH-1275	7761d	52	54	181	98	66	66
	CV%	7.09	1.23	1.48	8.39	3.51	10.34	10.34
	LSD 5%	524.03	0.53	0.66	-	2.88	4.72	4.72

The results presented in the Table 67 show that significant differences due to hybrids were present in this trial. Local hybrid FH-950 gave maximum grain yield (9881 kg/ha). Other local hybrids FH-1137, FH-1125, FH-1166 and FH-932 with grain yield 9823, 9818, 9779, 9621 and 9490 kg/ha respectively, are at par with the top yielding local hybrid FH-950 and commercial check HIC-339 (9823 kg/ha). Differences in days to 50% tasseling and silking were also significant. Local hybrid FH-1114 took the maximum days to 50% tasseling (57) and silking (59). Results for plant height and cob height were also showing statistically significant differences. The commercial check HIC-339 attained maximum plant height of 210 cm. Number of plants per plot and cobs harvested were also showing statistically significant differences.

## **B. Hybrid Maize Micro Yield Trials(Kharif 2017)**

### **I. Hybrid Maize Micro Yield Trials No.1: (Kharif 2017)**

Two sets of this trial were sown each with seventeen entries including two commercial hybrids as check on 09-08-2017. The trial was laid out in RCB design with three replications. Two rows of five meter length for each entry were planted. For all the entries standard agronomic and plant protection measures were carried out in the experiment. The harvesting was done on 27-11-2017. Data regarding different traits along with grain yield were recorded and are presented in Table 68.

**Table 68: Results of Hybrid Maize Micro Yield Trial-1 (Kharif 2017)**

Rank No.	Entry	Grain yield (kg/ha)	Days to 50% tassel	Days to 50% silk	Plant Height cm	Cob Height cm	No. of plants harv.	No. of cobs harv.
1	FH-1278	8235a	54	55	195	105	29	29
2	FH-1210	7923ab	49	51	192	93	50	50
3	DK-6789 ( C)	7887ab	52	54	207	105	45	45
4	HIC-339 ( C)	7399abc	56	58	192	100	42	42
5	FH-1206	7271abc	50	52	201	102	46	46
6	FH-1290	7163a-d	52	54	214	114	49	49
7	FH1248	7144a-d	59	61	200	103	22	22
8	FH-1243	6997a-e	54	57	204	104	25	25
9	FH-1260	6805b-f	54	56	180	99	45	45
10	FH-985	6467c-g	48	51	167	82	48	48
11	FH-1252	6409c-g	55	57	169	95	48	48
12	FH-1241	6100c-g	52	54	194	94	52	52
13	FH-1287	5839d-g	53	55	205	100	44	44
14	FH-1261	5672efg	51	53	174	95	50	50
15	FH-1247	5453fgh	54	55	199	101	39	39
16	FH-1266	5189gh	52	54	176	99	44	44
17	FH-1280	4102h	54	57	157	87	40	40
	C. V.%	10.14	1.84	2.43	5.36	6.31	10.39	10.39
	LSD 5%	668.33	0.97	1.33	10.16	6.03	4.37	4.37

The results presented in Table 68 reveal statistically significant differences due to hybrids for grain yield in this trial. Local hybrid FH-1278 gave maximum grain yield of 8235 kg/ha. Other local hybrids FH-1206 (7271 kg/ha), FH-1290 (7163kg/ha), FH-1248 (7144 kg/ha) and FH-1243 (6997 kg/ha) are at par with the top yielding local hybrid along with two commercial checks DK-6789 and HIC-339 with grain yield 7887 kg/ha and 7399 kg/ha, respectively. Significant differences were also observed for days to 50% tasseling and silking. The minimum number of days to 50% tasseling (48) was observed for local hybrid FH-985. Differences in plant height and cob height were also significant. The maximum plant height (214 cm) was shown by FH-1290 while the minimum plant height (157 cm) was observed for local hybrid FH-1280. Number of plants per plot and cobs harvested were also statistically showing significant differences.

## II. Hybrid Maize Micro Yield Trial No.2: (Kharif 2017)

**Table 69: Results of Hybrid Maize Micro Yield Trial-2 (Kharif 2017)**

Rank No.	Entry	Grain Yield (kg/ha)	Days to 50% tassel	Days to 50% silk	Plant Height cm	Cob Height cm	No. of plants harv.	No. of cobs harv.
1	FH-1341	7981a	53	55	212	105	44	44
2	FH-1312	7729ab	48	50	183	96	46	46
3	FH-1337	7559ab	52	54	196	115	47	47
4	FH-1360	7484ab	54	56	210	105	48	48
5	DK-6789 ( C)	7347ab	52	54	207	106	48	48
6	HIC-339 ( C)	6888abc	54	56	210	115	44	44



7	FH-1344	6880abc	53	55	185	94	47	47
8	FH-1295	6699abc	47	49	169	85	45	45
9	FH-1319	6470a-d	49	51	200	105	39	39
10	FH-1322	6321bcd	50	52	211	116	40	40
11	FH-1365	6191bcd	54	57	182	93	47	47
12	FH-1366	5277cde	54	56	180	95	43	43
13	FH-1352	5003def	54	56	191	99	45	45
14	FH-1330	4507ef	50	52	188	100	33	33
15	FH-1362	4413ef	52	54	175	80	32	32
16	FH-1304	3504fg	53	55	166	97	22	22
17	FH-1303	1972g	49	51	170	95	10	10
	C. V.%	12.95	1.18	1.22	3.30	4.56	9.90	9.90
	LSD 5%	778.90	0.60	0.65	6.26	4.55	3.93	3.93

The results presented in Table 69 reveal statistically significant differences due to hybrids for grain yield in this trial. Local hybrid FH-1341 gave grain yield of 7981 kg/ha and remained at the top position while, the two commercial checks DK-6789 and HIC-339 with grain yield 7347 kg/ha and 6888 kg/ha, respectively are also at par with the top yielding local hybrid. Significant differences were also observed for days to 50% tasseling and silking. Differences in plant height and cob height were also significant. The maximum plant height (212 cm) was shown by FH-1341 while, the minimum plant height (166 cm) was observed for the local hybrid FH-1304. Statistically significant differences were also observed for number of plants per plot and cobs harvested.

### C. Hybrid Maize Preliminary Yield Trials (Kharif 2017)

#### I. Hybrid Maize Preliminary Yield Trial No. 1 (Kharif 2017)

Five sets of this trial were sown on 09-08-2017 with twenty nine entries each including two commercial hybrids as check. The trial was laid out in RCB design with three replications. One row of five meters length for each entry was planted. Standard agronomic and plant protection measures were carried out in the crop. The harvesting was done on 28-11-2017. Data regarding different traits are recorded and elite hybrids were selected for further evaluation. The data are given in the following table.

**Table 70: Results of Hybrid Maize Preliminary Yield Trial-1 (Kharif 2017)**

Rank No.	Entry	Grain yield (kg/ha)	Days to 50% tassel	Days to 50% silk	Plant Height cm	Cob Height cm	No. of plants harv.	No. of cobs harv.
1	HIC-339 (C)	9643a	53	57	200	99	22	22
2	FH-1394	9144ab	53	56	198	92	25	25
3	FH-1372	9029ab	51	54	192	90	21	21
4	FH-1391	8820abc	51	56	196	95	19	19
5	FH-1377	8627a-d	53	56	184	84	23	23
6	FH-1374	8390a-e	52	53	200	99	23	23
7	FH-1370	8296a-e	53	56	178	82	12	12
8	FH-1390	7992a-f	53	56	189	94	22	22
9	FH-1393	7984a-f	53	56	198	99	22	22
10	FH-1373	7961a-f	51	55	189	95	25	25

11	FH-1392	7701a-g	53	55	192	94	16	16
12	FH-1369	7621a-g	52	55	173	94	20	20
13	FH-1381	7328b-g	52	55	181	90	17	17
14	FH-1376	7301b-g	51	55	183	89	11	11
15	FH-1383	7280b-g	52	55	192	92	21	21
16	FH-1382	7182b-h	50	53	173	92	21	21
17	FH-1387	7155b-h	53	57	200	100	27	27
18	DK-6789 ( C)	7083b-h	53	57	199	102	21	21
19	FH-1351	6885b-h	50	55	206	99	27	27
20	FH-1379	6678c-h	52	54	170	81	19	19
21	FH-1378	6590c-h	51	53	169	71	11	11
22	FH-1389	6466d-h	50	56	198	88	26	26
23	FH-1375	6459d-h	49	53	193	98	22	22
24	FH-1384	6396d-h	50	55	197	94	25	25
25	FH-1385	6240e-h	52	55	206	89	24	24
26	FH-1386	5923fgh	53	56	190	90	25	25
27	FH-1388	5570ghi	52	56	206	96	23	23
28	FH-1380	496hi	50	53	181	89	16	16
29	FH-1311	3607i	53	56	179	83	15	15
	CV%	15.54	1.20	2.14	4.87	6.84	13.02	12.38
	LSD 5%	1126.8	0.61	1.17	9.24	6.24	2.66	2.52

The data presented in Table 70 reveal statistically significant differences among hybrids in grain yield kg/ha among entries included in this trial. The commercial check HIC-339 with grain yields 9643 kg/ha remained at the top position. The local hybrids FH-1394, FH-1372, FH-1391, FH-1377 and 1374 were at par with the top yielding commercial check. Results for No. of days to 50% tasseling and 50% silking also showed statistically significant differences. Local hybrid FH-1375 showed earliness taking minimum days to complete 50% tasseling (49) and 50% silking (53). Significant differences were observed for plant height and cob height. Local hybrid FH-1378 attained minimum plant height (169 cm). Mid to low bearing trend was observed in most of the local hybrids which will be helpful in developing lodging resistant hybrids. Results for No. of plants harvested and No. of cobs harvested were also showing significant differences.

## II. Hybrid Maize Preliminary Yield Trial No. 2 (Kharif 2017)

**Table 71: Results of Hybrid Maize Preliminary Yield Trial-2 (Kharif 2017)**

Rank No.	Entry	Grain yield (kg/ha)	Days to 50% tassel	Days to 50% silk	Plant Height cm	Cob Height cm	No. of plants harv.	No. of cobs/ plot harv.
1	FH-1397	9619a	55	57	193	94	26	26
2	FH-1414	9252ab	53	55	203	89	25	25
3	FH-1396	9072ab	53	57	192	89	26	26
4	FH-1424	8892abc	50	53	187	85	25	25
5	FH-1398	8787a-d	53	56	187	85	26	26
6	FH-1421	8771a-d	52	55	175	86	25	25
7	FH-1419	8290a-e	52	54	192	84	26	26
8	FH-1409	8256a-f	53	55	202	101	24	24
9	FH-1418	8189a-g	50	54	190	96	26	26
10	HIC-339 (C)	8119a-g	53	56	200	103	25	25
11	FH-1420	8039a-g	52	55	183	83	27	27
12	FH-1402	7814b-h	50	56	208	101	27	27
13	FH-1400	7333c-i	53	56	193	92	27	27

14	FH1408	7320c-i	52	55	198	97	25	25
15	FH-1410	7251c-i	53	55	202	87	27	27
16	FH-1417	7134d-i	51	54	178	86	24	24
17	FH-1416	7099ef-i	54	56	180	81	25	25
18	FH-1403	7042e-j	50	53	203	100	23	23
19	FH-1422	6991e-j	50	54	176	88	25	25
20	FH-1412	6941e-j	53	56	171	86	22	22
21	FH-1415	6935e-j	51	55	167	74	23	23
22	FH-1401	6604f-k	52	55	197	96	26	26
23	FH-1399	6596f-k	53	55	193	88	15	15
24	DK-6789 (C)	6545g-k	53	55	202	100	22	22
25	FH-1404	6541g-k	52	56	171	78	28	28
26	FH-1405	6256h-k	52	56	198	101	18	18
27	FH-1431	6072ijk	53	56	181	83	24	24
28	FH-1411	5421jk	53	55	170	85	23	23
29	FH-1413	5003k	50	53	177	87	23	23
	CV%	10.87	1.65	1.35	4.97	10.24	9.03	9.03
	LSD 5%	810.57	0.85	0.74	9.35	-	2.18	2.18

Statistical analysis of data presented in above table reveal that local hybrid FH-1397 out yielded all the hybrids with yield 9619 kg/ha followed by FH-1414 (9252 kg/ha), FH-1396 (9072 kg/ha) and FH-1424 (8892 kg/ha). Local hybrids FH-1398, FH-1421, FH-1419, FH-1409 and FH-1418 were also statistically higher yielder than the commercial check hybrid HIC-339 (8119 kg/ha). Days to 50% tasseling and 50% silking were also showing statistically significant differences. FH-1416 took the maximum days to complete 50% tasseling (54) and 50% silking (56) respectively. Significant differences were observed for plant height and cob height. Maximum plant height was attained by FH-1402 (208 cm) while FH-1415 attained minimum plant height (167 cm). Mid to low cob bearing trend was observed in most of the hybrids. Number of plants and cobs harvested per plot were also showing statistically significant differences.

### III. Hybrid Maize Preliminary Yield Trial No. 3 (Kharif 2017)

**Table 72: Results of Hybrid Maize Preliminary Yield Trial-3 (Kharif 2017).**

Rank No.	Entry	Grain yield (kg/ha)	Days to 50% tassel	Days to 50% silk	Plant Height cm	Cob Height cm	No. of plants harv.	No. of cobs/ plot harv.
1	FH-1447	8501a	54	55	195	90	27	27
2	FH-1204	8341ab	50	53	191	90	25	25
3	FH-1430	8319ab	51	55	193	96	25	25
4	DK-6789(C)	7826abc	53	56	193	91	23	23
5	FH-1427	7489a-d	51	55	200	100	27	27
6	FH-1436	7180a-e	49	55	185	84	24	24
7	FH-1433	7134a-e	51	54	203	92	25	25
8	FH-1425	7055a-e	51	53	196	91	23	23
9	FH-1439	7053a-e	50	54	212	107	24	24
10	FH-1434	6931a-e	53	55	206	89	26	26
11	FH-1449	6906a-e	51	55	211	101	25	25
12	FH-1210	6759a-e	50	54	187	87	24	24
13	FH-1429	6670a-e	50	55	203	98	21	21
14	FH-1432	6636b-e	51	55	182	85	20	20
15	FH-1426	6582b-e	50	54	192	93	21	21

16	FH-1428	6394cde	50	56	200	92	23	23
17	FH-1438	6387cde	52	56	193	92	18	18
18	FH-1442	6356cde	52	55	190	92	25	25
19	HIC-339 (C)	6340cde	56	58	189	94	21	21
20	FH-1448	6047cde	50	53	194	92	22	22
21	FH-1431	6038cde	51	54	206	92	20	20
22	FH-1446	5952de	49	53	191	88	20	20
23	FH-1440	5862de	52	55	180	86	24	24
24	FH-1444	5712de	50	55	178	77	24	24
25	FH-1435	5538e	50	57	175	82	23	23
26	FH-1441	5522e	51	55	174	89	25	25
27	FH-1443	5452e	51	55	174	81	24	24
28	FH-1423	2468f	54	57	162	84	17	17
29	FH-1244	1859f	50	54	172	84	5	5
	CV%	14.05	1.87	1.79	5.57	9.46	14.38	14.39
	LSD 5%	897.90	0.95	0.98	10.60	-	3.19	3.19

Statistical analysis of data presented in above table reveal that local hybrid FH-1447 out yielded all the hybrids with grain yield 8501 kg/ha followed by FH-1204 (8341 kg/ha) and FH-1430 (8319 kg/ha). One commercial check DK-6789 (7826 kg/ha) is at fourth position and other HIC-339 (6340 kg/ha) at nineteenth position. Days to 50% tasseling and 50% silking were also showing statistically significant differences. Significant differences were observed for plant height and cob height. Maximum plant height was attained by FH-1449 (211 cm) while FH-1244 attained minimum plant height (172 cm). Mid to low cob bearing was observed with maximum cob height (107 cm) of local hybrid FH-1439 and minimum cob height (77 cm) of the local hybrid FH-1444 was observed. Number of plants and cobs harvested per plot were also showing statistically significant differences.

#### IV. Hybrid Maize Preliminary Yield Trial No. 4 (Kharif 2017)

**Table 73: Results of Hybrid Maize Preliminary Yield Trial-4 (Kharif 2017).**

Rank No.	Entry	Grain yield (kg/ha)	Days to 50% tassel	Days to 50% silk	Plant Height cm	Cob Height cm	No. of plants harv.	No. of cobs/plot harv.
1	FH-1458	13903a	51	53	178	108	22	22
2	DK-6789 (C)	10763ab	52	56	204	106	22	22
3	FH-1474	10273abc	55	56	191	105	29	29
4	FH-1269	10056bc	52	54	195	116	24	24
5	FH-1454	9649bc	56	58	175	93	21	21
6	HIC-339 (C)	9071bcd	54	56	194	105	24	24
7	FH-1463	9045b-e	52	54	189	112	26	26
8	FH-1451	8892b-f	50	52	169	94	27	27
9	FH-1473	8443b-g	53	56	224	115	21	21
10	FH-1461	8395b-g	52	54	174	102	23	23
11	FH-1455	8367b-g	56	58	183	108	17	17
12	FH-1450	8299b-g	51	53	163	86	25	25
13	FH-1471	8036b-h	52	54	193	101	22	22
14	FH-1465	7847b-i	53	55	185	105	25	25
15	FH-1459	7714b-i	52	54	182	88	21	21
16	FH-1457	7624b-i	51	53	168	93	20	20

17	FH-1460	7553b-i	55	57	174	99	22	22
18	FH-1472	7542b-i	51	54	184	105	22	22
19	FH-1452	7435b-i	51	53	174	83	22	22
20	FH-1470	6772c-i	51	54	161	86	22	22
21	FH-1453	6659c-i	53	55	175	82	18	18
22	FH-1274	5590d-i	51	53	182	108	14	14
23	FH-1466-1	5334d-i	54	57	181	97	21	21
24	FH-1469	5261e-i	55	57	171	94	19	19
25	FH-1467	5097f-i	55	57	173	93	20	20
26	FH-1462	4763ghi	58	60	158	91	21	21
27	FH-1466-2	4389hi	52	54	180	93	16	16
28	FH-1468	4203i	55	57	162	93	16	16
29	FH-1456	0	28	29	175	80	1	1
	CV%	23.91	0.90	1.38	1.37	1.74	14.50	14.50
	LSD 5%	1852.6	0.47	0.75	2.46	1.70	3.10	3.10

Statistical analysis of data presented in Table 73 reveal that local hybrid FH-1458 out yielded all the hybrids with yield 13903 kg/ha followed by commercial hybrid DK-6789 (10763 kg/ha). Local hybrids FH-1474 has also shown good performance and is at par with the top yielding local hybrid. Days to 50% tasseling and 50% silking were also showing statistically significant differences. Significant differences were observed for plant height and cob height. Maximum plant height was attained by FH-1473 (224 cm) while FH-1470 attained minimum plant height (161 cm). Mid to low cob bearing was observed with maximum cob height (116 cm) of local hybrid FH-1269 and minimum cob height (80 cm) of the local hybrid FH-1456 was observed. Number of plants and cobs harvested per plot were also showing statistically significant difference.

#### V. Hybrid Maize Preliminary Yield Trial No. 5 (Kharif 2017)

**Table 74: Results of Hybrid Maize Preliminary Yield Trial-5 (Kharif 2017).**

Rank No.	Entry	Grain Yield (kg/ha)	Days to 50% Tassel	Days to 50% Silk	Plant Height (cm)	Cob Height (cm)	No. of plants Harv.	No. of cobs/ plot Harv.
1	FH-1477	8208a	52	54	183	86	24	24
2	FH-1503	7741ab	53	56	206	101	24	24
3	DK-6789 (C)	7517ab	52	54	210	106	22	22
4	FH-1492	7435abc	54	56	192	110	22	22
5	FH-1493	7403abc	55	57	207	122	22	22
6	FH-1496	6962a-d	54	56	186	84	23	23
7	FH-1484	6960a-d	52	54	172	92	22	22
8	FH-1498	6822a-d	51	53	210	106	21	21
9	FH-1485	6672a-e	53	55	190	86	23	23
10	FH-1497	6581a-e	53	55	184	91	22	22
11	HIC-339 (C)	6560a-e	54	56	204	116	19	19
12	FH-1494	6547a-e	53	55	192	105	28	28
13	FH-1481	6365a-e	54	56	195	93	19	19
14	FH-1479	6343a-e	52	54	162	92	22	22
15	FH-1487	6200a-e	54	56	193	105	22	22
16	FH-1482	5880b-e	52	54	180	87	21	21
17	FH-1488	5838bcde	51	53	194	116	22	22
18	FH-1495	5763bcde	54	56	190	116	18	18
19	FH-1480	5435cdef	54	55	185	94	22	22

20	FH-1490	5273def	51	53	201	98	20	20
21	FH-1501	5234def	58	55	192	94	24	24
22	FH-1491	5221def	52	54	185	92	21	21
23	FH-1502	5008def	52	56	193	106	21	21
24	FH-1489	4957def	51	53	180	92	22	22
25	FH-1483	4665ef	54	56	181	105	16	16
26	FH-1500	4653ef	54	54	203	101	23	23
27	FH-1478	3437fg	56	58	147	73	21	21
28	FH-1486	2377g	51	53	164	89	9	9
	CV%	16.53	1.58	1.28	0.39	1.17	16.24	16.24
	LSD 5%	992.08	0.83	0.68	0.73	1.68	-	-

Statistically analyzed of data presented in Table 74 reveal that local hybrid FH-1477 out yielded all the hybrids with yield 8208 kg/ha followed by FH-1503 (7741 kg/ha) and commercial check DK-6789 (7517 kg/ha). Local hybrids FH-1492 and FH-1493 have also shown good performance. Days to 50% tasseling and 50% silking were also showing statistically significant differences. Significant differences were observed for plant height and cob height. Minimum plant height was attained by FH-1478 (147 cm). Mid to low cob bearing was observed with maximum cob height (122 cm) of local hybrid FH-1493 and minimum cob height (73 cm) of the local hybrid FH-1478 was observed. Number of plants and cobs harvested per plot were also showing statistically significant differences.

#### D. National Uniform Hybrid Maize Yield Trial (Kharif 2017)

This trial was sown with eighty three entries on 10-08-2017 laid out in RCB design with three replications. Two rows of five meters length for each entry were planted. Standard agronomic and plant protection measures were carried out in the experiment. Harvesting was done on 29-11-2017. 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 (Yellow) Yield (Kharif 2017).**

Rank No.	Entry	Grain yield (kg/ha)	Days to 50% tassel	Days to 50% silk	Plant Height cm	Cob Height cm	No. of plants harv.
1	KATONE	9755	52	55	197	100	38
2	MDS-810	9690	52	55	217	125	54
3	FH-1036	9626	51	54	198	108	65
4	DK-9531	9563	53	56	214	119	16
5	FH-922	9459	48	51	204	119	66
6	FH-988	9432	52	55	198	87	64
7	3399	9330	52	55	197	104	37
8	3366	9276	53	55	197	107	36
9	PQ-8148 (DK9919)	9261	51	54	227	123	15
10	FH-1292	9206	51	54	194	112	63
11	MDS-809	8842	53	56	228	116	53
12	2468	8603	51	55	216	114	35
13	70 M 70	8084	49	52	217	118	19
14	SB-13	8040	50	52	204	117	6
15	747	8024	52	55	203	112	77
16	IS-5448	7895	49	52	209	109	4
17	KEGROSS	7752	51	54	189	106	39
18	DS-403	7727	53	56	228	131	52
19	52S62	7724	49	52	192	111	75
20	VGR-323	7664	48	51	207	120	8

21	FH-793	7652	50	53	188	92	62
22	9067	7601	54	57	182	108	1
23	G-3	7597	49	52	224	127	79
24	YAM-133A	7534	51	54	201	113	47
25	DK-9914	7500	52	55	221	117	17
26	SD.17S22	7376	50	53	199	110	70
27	Ag-4040	7375	52	55	216	119	22
28	IS-5456	7372	52	55	213	115	13
29	TG-YM-925	7273	50	53	212	120	9
30	S-7750	7044	50	53	224	119	55
31	SD.17S24	7026	53	56	205	123	72
32	20R52	6934	54	57	204	113	32
33	RS-7677	6916	51	54	218	114	44
34	419	6912	51	54	224	126	50
35	SB-9674	6907	51	54	212	121	14
36	3377	6878	51	53	193	109	34
37	77 M 86	6855	50	53	215	121	20
38	KONTIKOS	6847	54	56	192	108	40
39	YAM-135C	6703	51	54	193	108	49
40	MS-449	6699	51	54	214	116	25
41	49 M 17	6573	52	55	206	113	12
42	YH-5394	6555	47	50	183	101	61
43	2141	6525	52	55	201	108	28
44	CM-107	6463	53	56	212	114	24
45	PSHY-7608	6399	48	50	194	106	58
46	IS-7628	6398	48	51	209	116	5
47	YH-5140	6386	50	54	197	117	60
48	YH-1898 (Check)	6378	51	54	205	114	23
49	AA-9435	6329	51	54	212	117	18
50	P-3522	6300	52	55	219	116	82
51	ST-1387	6269	49	52	211	109	3
52	YAM-134B	6245	50	53	207	108	48
53	SD.17S23	6234	54	57	208	114	71
54	TG-YM-945	6147	50	52	214	114	10
55	2271	6008	52	54	192	112	33
56	NEELUM 22AR16	5952	48	51	201	104	41
57	25W87	5857	54	57	207	118	68
58	9066	5832	53	53	192	100	2
59	8287	5783	52	55	210	115	46
60	AM-6655	5757	51	54	214	127	27
61	HP-989	5589	53	56	193	108	31
62	JS-707	5525	51	54	217	119	21
63	FS-999	5496	47	50	195	113	67
64	TMZ-03	5491	52	54	205	115	29
65	62S55	5489	54	57	199	102	76
66	RS-6464	5488	51	54	206	110	43
67	625	5434	49	52	208	114	69
68	MA-101	5415	50	52	210	114	42
69	49 M 53	5402	52	55	205	109	11
70	PSHY-7604	5369	50	53	199	114	59
71	7786	5366	51	54	208	120	26
72	PSHY-7613	5345	52	55	196	103	57
73	SD.3233	5274	54	57	205	109	73
74	696	5208	51	54	203	111	30
75	5015	5191	52	55	197	104	83

76	P-4040	5057	51	54	218	119	81
77	SD.3392 (Green Cob)	4936	47	50	194	108	74
78	786	4901	57	60	205	114	78
79	Rustam-I	4757	51	54	204	113	80
80	PSHY-0402	4435	51	54	183	103	56
81	SB-6082	3984	48	51	197		7
82	RS-936	3768	52	55	201	100	45
83	797	3553	53	56	202	112	51
	CV%	<b>20.23</b>	<b>0.41</b>	<b>0.83</b>	<b>6.38</b>	<b>8.04</b>	<b>20.23</b>
	LSD 5%	<b>2196</b>	<b>0.34</b>	<b>0.72</b>	<b>21.1</b>	<b>14.6</b>	<b>2196</b>

The results presented in Table 75 are regarding trial conducted at Faisalabad location. Data revealed that statistically significant differences exist for grain yield kg/ha among entries included in this trial. The variety “KATONE” with grain yield 9755 kg/ha out yielded all other entries included, while the 797 was lower yielder giving 3553 kg/ha at this location.

#### E. National Uniform Hybrid Maize (White) Yield Trial (Kharif 2017)

This trial was comprised of forty one entries sown in RCB design with three replications on 10-08-2017. The plot size was kept 5m x 1.75 m. Standard / uniform agronomic and plant protection measures were carried out in the experiment. Harvesting was done on 29-11-2017. Data regarding different traits were recorded and elite hybrids were selected for further evaluation. The data are given in Table 76.

**Table 76: Results of National Uniform Hybrid Maize Yield Trial (White) (Kharif 2017)**

Rank No.	Entry	Grain Yield (kg/ha)	Days to 50% tassel	Days to 50% silk	Plant Height cm	Cob Height cm
1	70 PLUS	7583	50	52	204	101
2	TG-WM-5006	7218	55	58	204	117
3	P3057	7181	48	50	218	105
4	55w55	6694	50	53	244	107
5	SB-571	6603	53	55	215	106
6	DK8514	6362	52	54	210	116
7	SB-989	6206	53	55	190	93
8	2036	6164	54	56	202	128
9	P3265	5880	50	52	214	112
10	PSHW-6635	5871	50	52	207	106
11	PSHW-6636	5798	49	52	219	104
12	S-6444	5777	55	58	212	140
13	33W86	5739	49	51	134	110
14	SB-3942	5714	53	55	192	103
15	DK8515	5669	52	54	211	103
16	PSHW-2324	5662	49	51	186	104
17	CM-203	5610	54	56	203	104
18	P3258	5586	54	56	205	103
19	S-624	5349	55	57	184	113
20	<b>F-NARC (Check)</b>	5312	55	57	159	89
21	S-5944	5179	54	56	191	116



22	PSHW-5173	5112	49	52	197	78
23	PSHW-2321	5100	48	50	165	98
24	TARA-WM-2244	5040	51	53	201	105
25	CM-101	4997	52	54	194	94
26	999	4991	55	57	203	98
27	888W	4947	50	52	204	102
28	9077W	4782	51	53	202	96
29	RS-15W	4758	51	53	197	88
30	Kohistan White	4725	49	51	192	108
31	S-514	4655	51	53	240	115
32	SB-292	4622	54	56	206	115
33	P1659	4581	55	57	184	67
34	555W	4326	53	55	201	99
35	J.P.L White	4218	53	55	209	104
36	CS-2Y20	3761	49	51	208	112
37	CM-100	3522	54	56	209	96
38	30W35	3056	54	56	199	101
39	PSHW-0306	2902	47	49	196	90
40	CS-250	2862	52	54	210	109
41	SHEERO	2110	53	56	187	99
	CV%	29.67	4.47	4.48	5.51	2.12
	LSD 5%	N.S	N.S	N.S	N.S	N.S

Table 76 contains analyzed data of the trial at Faisalabad location which reveals that statistically non-significant differences exist for grain yield kg/ha among entries included in this trial. The variety 70 PLUS with grain yield 7583 kg/ha out yielded all other entries included, while the SHEERO was lower yielder giving 2110 kg/ha at this location.

#### F. National Uniform Varietal (OPV) Maize Yield Trial (Kharif 2017)

This trial was comprised of eleven entries sown on 10-08-2017 in RCB design with three replications. The plot size was kept 5m x1.75. Standard / uniform agronomic and plant protection measures were carried out in the experiment. Harvesting was done on 29-11-2017. Data regarding different traits were recorded and elite hybrids were selected for further evaluation. The data are given in Table 77.

**Table 77: Results of National Uniform Varietal Maize Yield (Kharif 2017), Faisalabad.**

Rank No.	Entry	Grain yield (kg/ha)	Days to 50% tassel	Days to 50% silk	Plant Height cm	Cob Height cm
1	POP-8003	5476	51	53	204	105
2	YY-15	5465	51	53	193	110
3	PEARL (check)	4538	47	48	142	111
4	YW-786	4496	48	50	181	91
5	POP-2011W	4346	48	50	175	106

6	CZP-132001	4204	51	53	190	96
7	MMRI-Yellow (check)	3853	49	51	202	101
8	POP2507	3811	53	55	191	98
9	POP-2011Y	2697	50	52	191	93
10	NARC-Sweet 16	2681	49	51	178	100
11	POP-8310	1537	53	56	170	92
	CV%	41.5	3.97	3.89	15.35	12.53
	LSD 5%	N.S	3.78	3.43	N.S	N.S

The above results are given in Table 77 after analysis of data of the trial conducted at Faisalabad location which show that statistically non-significant differences exist for grain yield kg/ha among entries included in this trial. The variety POP-8003 of this station was top yielder with grain yield 5476 kg/ha while, variety POP-8310 was lower yielder giving 1537 kg/ha at this location.

#### G. National Uniform Varietal (Sweet Corn) Maize Yield Trial (Kharif 2017)

This trial was comprised of four entries laid out in RCB design with three replications on 10-08-2017. The plot size was kept 5m x1.75. Standard / uniform agronomic and plant protection measures were carried out in the experiment.. Harvesting was done on 29-11-2016. Data regarding different traits were recorded and elite hybrids were selected for further evaluation. The data are given in following Table 78.

**Table 78: Results of National Uniform Varietal (Sweet corn) Maize Yield (Kharif 2017)**

Rank No.	Entry	Grain yield (kg/ha)	Days to 50% tassel	Days to 50% silk	Plant Height cm	Cob Height cm
1	YSC-15 (Sweet Corn)	2955	48	50	213	125
2	Local Swat Sweet Corn (Check)	2908	46	48	203	117
3	Local Swat Pop Corn (Check)	2799	56	58	147	81
4	NARC-Sweet 16	2681	49	51	178	100
5	YPC-14(Pop Corn)	1780	48	50	214	115
	CV%	21.20	4.16	4.14	4.51	8.44
	LSD 5%	N.S	3.86	4	16.19	17.06

Table 76 contains analyzed data of the trial at Faisalabad location which reveals that statistically non-significant differences exist for grain yield kg/ha among entries included in this trial. The variety YSC-15 (Sweet Corn)with grain yield 2955 kg/ha out yielded all other

entries included, while the variety YPC-14(Pop Corn) was lower yielder giving 1780 kg/ha at this location.

### On-farm Trial of approved/promising Hybrids/ OPV

**Table 79: On-farm Trial of approved/promising Hybrids/ OPV**

Sr. No.	Entry	Locations					
		Chak 254 JB, Jhang	Mauza Gilmala, Jhang	Chak No. 555, Mamun- kanjan	Fodder Research Institute Sargodha	18 Kot Bahadur, Hazari	Average Grain Yield
		<b>Grain Yield (kg/ha)</b>					
1	DK-6789	8512	10801	10908	12816	10608	10729
2	HIC-339	10188	9837	10641	11517	9572	10351
3	FH-949	8847	8035	10350	12341	10258	9966
4	FH-1046	11628	10764	11100	14640	12169	12060
5	DTC00101	9960	9950	9431	10093	9810	9849
6	DTC00102	10086	9682	9876	10052	10066	9952

### SPRING 2018:

Thirteen (13) different yield trials of hybrids were sown for evaluation.

#### 1. Hybrid Maize Macro Yield Trial No. 1 (Spring 2018)

A trial comprised of nine single cross hybrids including two commercial and two local hybrids as checks were sown on 12-02-2018 according to RCB design with three replications. The plot size was kept 5m x 3m. The harvesting was done on 21-06-2018. Data regarding different agronomic traits were recorded and hybrids showing good performances were selected for on farm testing. The data are given in the following Table 80.

**Table 80: Results of Hybrid Maize Macro Yield Trial No. 1 (Spring 2018)**

Sr. No.	Entry	Grain yield kg/ha	Days to 50% tassel.	Days to 50% silk	Plant Height cm	Cob Height cm	No. of plants harv.	No. of cobs harv.
1	FH-1012	10342a	72	75	177	84	89	89
2	FH-922	8590ab	73	75	171	82	81	81
3	FH-1046 (C )	8523ab	74	76	178	87	80	80
4	FH-950	8344b	72	74	182	100	89	89
5	FH-793	7667bc	74	76	156	75	82	82
6	FH-988	7238bc	75	77	186	93	75	75
7	FH-949 (C )	6898bc	74	76	173	87	82	82
8	CS-5808 (C )	6864bc	72	75	178	83	77	77
9	NK-8441 (C )	6435c	72	74	160	72	77	77
	CV%	13.97	0.46	0.26	4.04	6.17	8.28	8.28
	LSD 5%	1904.8	0.57	0.33	5.72	9.06	10.52	10.52

The data after analysis presented in the above Table 80 reveal statistically significant differences in grain yield due to hybrids. The hybrid FH-1012 gave maximum grain yield of 10342 kg/ha followed by local hybrid FH-922 (8590 kg/ha). The local hybrid FH-922 was at par with the local check FH-1046 (8523 kg/ha) while higher yielder than one local check hybrid FH-949 (6898 kg/ha) and two commercial checks CS-5808 (6864 kg/ha) NK-8441

(6435 kg/ha). One other local hybrid FH-988 (7238 kg/ha) was at par with the commercial hybrids CS-5808 and NK-8441. Significant differences were observed for days to 50% tasseling and silking. Local hybrid FH-988 took the maximum days for 50% tasseling (75) and silking (77). Local hybrid FH-988 attained the maximum plant height of 186 cm, with cob height of 93 cm. The local hybrid FH-793 showed minimum plant height i.e. 156 cm while its cob height was 75 cm. Most of the hybrids exhibited mid to low cob bearing character. Number of plants per plot and cobs harvested were also showing statistically significant differences.

## 2. Hybrid Maize Macro Yield Trial No.2 (Spring 2018)

This trial was comprised of twelve single cross hybrids including two commercial and two local hybrids as checks was laid out according to RCB design with three replications on 12-02-2018. The plot size was kept 5m x 2.25m. The harvesting was done on 21-06-2018. Data regarding different agronomic traits were recorded and hybrids with good performances were selected for on farm testing. The data are presented in the Table 81.

**Table 81: Results of Hybrid Maize Macro Yield Trial No. 2 (Spring 2018).**

Sr. No.	Entry	Grain Yield kg/ha	Days to 50% tassel	Days to 50% silk	Plant Height (cm)	Cob Height (cm)	No. of plants harv.	No. of cobs harv.
1	FH-949 (C )	8788a	76	78	176	89	70	70
2	FH-1166	8780ab	73	75	182	104	55	55
3	FH-929	8220bc	76	78	165	83	69	69
4	CS-5808 (C )	8038c	72	75	173	78	71	71
5	FH-1046 (C )	7737cd	76	78	152	78	64	64
6	FH-1117	7716de	73	75	160	88	61	61
7	FH-932	7666e	74	76	156	84	68	68
8	FH-1125	7190ef	74	75	163	89	70	70
9	FH-1114	6716ef	78	81	149	70	56	56
10	FH-1210	6392ef	73	74	163	79	55	55
11	NK-8441 (C )	6069ef	73	75	160	76	59	59
12	FH-1137	5366f	75	77	167	87	55	55
	CV%	15.22	0.68	0.89	6.17	10.81	14.65	14.65
	LSD 5%	222.2	0.85	1.15	17.10	15.34	15.95	15.95

The data presented in above Table 81 reveal that the differences in mean grain yields among hybrid were significant. The local check hybrid FH-949 gave the maximum grain yield of 8788 kg/ha followed by the local hybrid FH-1166 (8788 kg/ha) which was at par with the top yielding local check and showing significantly higher yielder than two commercial checks CS-5808 (8038 kg/ha), NK-8441 (C) and local check FH-1046 (7737 kg/ha). Differences in days to 50% tasseling and silking were also significant. The local hybrid FH-1114 took the maximum 78 days to 50% tasseling and 81 days to 50% silking. Local hybrid FH-1166 attained maximum plant height of 182 cm while its cob height remained 104 cm. The local hybrid FH-1114 attained the minimum plant height 149 cm with a cob height of 70 cm. Low to mid cob bearing trend was apparent in most of the hybrids. Number of plants per plot and cobs harvested were also showing statistically significant differences.

### 3. Hybrid Maize Micro Yield Trials (Spring 2018)

This trial comprised of four sets each containing seventeen single cross hybrids including two commercial and two local hybrids as check. They were sown on 12-02-2018, laid out according to RCB design with two replications. The plot size was kept 5m x 1.5m. The harvesting was done on 21-06-2018. 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 82 to 86.

**Table 82: Results of Hybrid Maize Micro Yield Trial-1 (Spring 2018)**

Sr. No.	Entry	Grain yield kg/ha	Days to 50% tassel	Days to 50% silk	Plant Height cm	Cob Height cm	No. of plants harv.	No. of cobs harv.
1	FH-1290	9182a	70	72	196	95	46	46
2	FH-1201	8286ab	71	73	180	96	45	45
3	FH-1269	7904b	74	77	161	84	39	39
4	FH-1046 (C )	7582b	77	79	171	100	49	49
5	FH-1352	6900c	72	74	181	91	45	45
6	CS-5808 (C )	6732c	75	78	163	82	44	45
7	FH-1287	6605c	77	78	194	99	39	39
8	FH-1206	6380cd	70	72	167	91	42	42
9	FH-1322	6334de	73	75	156	91	42	42
10	FH-1360	6317de	71	73	183	84	43	44
11	FH-1241	6263e	72	74	168	87	45	45
12	NK-8441 (C )	5767e	74	77	143	74	40	40
13	FH-1275	5685f	71	74	131	62	41	41
14	FH-985	5096f	73	76	154	82	37	36
15	FH-1280	4681g	74	76	134	66	41	41
16	FH-1303	4670h	75	77	118	57	42	43
17	FH-949 (C )	4096i	75	77	151	74	28	28
	CV%	17.56	1.23	1.12	0.97	2.22	11.98	11.98
	LSD 5%	3203.1	1.91	1.80	3.13	3.89	N.s	N.s

The data presented in Table 82 reveal that differences in mean grain yields among hybrids were statistically significant. Local hybrid FH-1290 gave the maximum grain yield of 9182 kg/ha followed by the local hybrid FH-1201 (8286 kg/ha). The local hybrid FH-1269 (7904 kg/ha) remained at third position and significantly higher yielder than commercial check CS-5808 (7582 kg/ha) and NK-8441 (6732 kg/ha). Significant differences were observed for days to 50% tasseling and silking. The minimum number of days to 50% tasseling (70) was observed for two local hybrids FH-1290 and FH-1206 while their days to 50% silking remained 72 days which were also the lowest. Differences in plant height and cob height were also significant. Mid cob bearing and a bit higher than the middle was observed in most of the hybrids. The maximum plant height (196 cm) was shown by local hybrid FH-1290 while the minimum plant height (118 cm) was observed for local hybrid FH-1303 with a cob height of 57 cm which was also the lowest. Number of plants per plot and cobs harvested were showing statistically non-significant differences.

**Table 83: Results of Hybrid Maize Micro Yield Trial-2 (Spring 2018).**

Sr. No.	Entry	Grain yield (kg/ha)	Days to 50% tassel	Days to 50% silk	Plant Height cm	Cob Height cm	No. of plants harv.	No. of cobs harv.
1	FH-1392	9687a	74	76	167	92	45	45
2	FH-1390	8096b	71	73	164	84	43	43

3	FH-1386	7187b	71	73	157	74	49	49
4	FH-1375	7166bc	73	75	163	82	47	47
5	FH-1379	7029bc	71	73	180	99	46	46
6	FH-1385	7014cd	75	78	187	91	45	45
7	FH-1046(C )	6965de	72	74	182	90	42	42
8	FH-949 (C )	6916de	71	73	160	88	36	36
9	CS-5808(C )	6564ef	74	76	154	73	43	43
10	FH-1391	6349ef	74	77	170	78	36	36
11	FH-1374	6322fg	73	75	170	85	43	43
12	FH-1377	5642gh	71	73	173	97	45	45
13	FH-1384	5616gh	74	76	153	73	46	46
14	FH-1370	4881h	71	73	167	84	43	43
15	FH-1382	4477i	73	75	167	90	42	42
16	FH-1387	4416i	74	77	182	89	46	46
17	NK-8441 (C )	4038i	73	75	148	65	30	30
	CV%	16.28	0.59	0.32	1.12	2.39	10.24	10.24
	LSD 5%	2552.2	0.89	0.49	3.96	4.25	9.22	9.22

The data presented in the Table 83 reveal that there were significant differences in mean grain yields among hybrid varieties. Local hybrids FH-1392 gave the maximum grain yield of 9687 kg/ha followed by FH-1390 (8096 kg/ha), FH-1386 (7187 kg/ha), FH-1375 (7166 kg/ha), FH-1379 (7029 kg/ha) and FH-1385 (7014 kg/ha) were significantly higher yielder than the local and commercial check hybrids FH-1046 (6965 kg/ha), FH-949 (6916 kg/ha), CS-5808 (6564 kg/ha) and NK-8441 (4038 kg/ha) which gave the lowest yield. Mid to high cob bearing trend was observed in most of the hybrids. Differences in plant height and cob height were also significant. The maximum plant height (187 cm) was shown by FH-1385 with a cob height of 91 cm. The minimum plant height (148 cm) was observed for the commercial check NK-8441 with a cob height of 65 cm. statistically significant differences were also observed for number of plants per plot and cobs harvested.

**Table 84: Results of Hybrid Maize Micro Yield Trial-3 (Spring 2018)**

Sr. No.	Entry	Grain yield kg/ha	Days to 50% tassel	Days to 50% silk	Plant Height cm	Cob Height cm	No. of plants harv.	No. of cobs harv.
1	FH-1412	8515a	74	76	162	83	44	44
2	FH-1046(C )	8018ab	77	79	172	82	44	44
3	FH-1409	7775ab	74	77	176	87	43	43
4	FH-1396	7644abc	71	73	172	86	43	43
5	FH-1400	7567a-d	72	74	172	73	43	43
6	FH-1419	7493a-e	70	72	159	74	47	47
7	FH-1411	7047b-f	71	74	171	92	42	42
8	FH-1430	7014b-f	71	73	191	99	40	40
9	FH-1418	6987b-f	77	78	163	82	46	46
10	CS-5808(C)	6601c-f	75	78	163	69	43	43
11	FH-1398	6528def	70	72	173	74	41	41
12	FH-1427	6490ef	72	74	163	82	40	40
13	FH-1420	6051fg	75	77	183	102	44	44
14	FH-1424	5432gh	73	75	173	82	43	43
15	FH-1393	5063gh	73	76	142	72	25	25
16	NK-8441 (C)	4937h	74	77	171	74	39	39
17	FH-949(C)	4872h	75	77	171	83	31	31
	CV%	7.38	0.80	1.05	1.18	1.05	9.26	9.26
	LSD 5%	1050	2.86	1.83	1.83	1.67	8.02	8.02

The data presented in Table 84 reveal that differences in mean grain yields among hybrids were statistically significant. Local hybrid FH-1412 gave the maximum grain yield of 8515 kg/ha followed by the local check FH-1046 (8018 kg/ha). Other local hybrids FH-1409 (7775 kg/ha), FH-1396 (7644 kg/ha), FH-1400 (7567 kg/ha) and FH-1419 (7493 kg/ha) which were at par with the top yielding hybrid and significantly higher yielder than the commercial check hybrids CS-5808, NK-8441 and local hybrid FH-949 with respective yield 6601 kg/ha, 4937 kg/ha and 4872 kg/ha. Significant differences were also observed for days to 50% tasseling and silking. The minimum number of days to 50% tasseling (70) and days to 50% silking (72) were observed for two local hybrids FH-1419 and FH-1398. Differences in plant height and cob height were also significant. Mid to low cob bearing trend was observed, in most of the hybrids. The maximum plant height (191 cm) was shown by FH-1430 with a cob height of 99 cm while the minimum plant height (142 cm) was observed for local hybrid FH-1393 with a cob height of 72 cm. Number of plants per plot and cobs harvested were also showing statistically significant differences.

**Table 85: Results of Hybrid Maize Micro Yield Trial-4 (Spring 2018)**

Sr. No.	Entry	Grain Yield kg/ha	Days to 50% tassel	Days to 50% silk	Plant Height cm	Cob Height cm	No. of plants harv.	No. of cobs harv.
1	FH-1472	9650a	74	77	169	95	46	46
2	FH-1471	8976a	71	73	185	93	43	43
3	FH-1457	8243ab	73	75	187	91	43	43
4	FH-1461	7922ab	71	73	172	103	43	43
5	FH-1458	7750ab	74	76	195	93	67	67
6	CS-5808 (C)	7668ab	74	76	167	85	40	40
7	FH-1046 (C)	7417ab	72	74	184	89	40	40
8	FH-1453	7291ab	71	73	143	40	52	52
9	FH-1451	7209abc	73	75	169	94	42	42
10	FH-1443	7182abc	71	73	155	82	45	45
11	FH-1455	6947a-d	71	73	190	100	35	35
12	FH-949 (C)	6632a-d	71	73	133	66	36	36
13	FH-1463	6596a-d	74	77	153	73	51	51
14	NK-8441 (C)	6555a-d	73	75	187	86	37	37
15	FH-1460	6542a-d	75	78	169	87	41	41
16	FH-1360	6280cd	74	76	167	88	45	45
17	FH-1450	6200d	73	75	176	93	43	43
	CV%	13.38	0.24	0.32	0.67	13.49	8.15	8.15
	LSD 5%	1914.2	0.36	0.49	2.43	24.46	7.56	7.56

The data presented in Table 85 reveal the significant differences in mean grain yields among hybrid were observed in the above table. Local hybrid FH-1472 gave the maximum grain yield of 9650 kg/ha followed by FH-1471 (8976 kg/ha). Other local hybrids FH-1457, FH-1461 and FH-1458 (8243 kg/ha, 7922 kg/ha, and 7750 kg/ha respectively) were at par with local check hybrid FH-1046 (7441 kg/ha) and commercial check CS-5808 (7668 kg/ha) while significantly higher yielder than the commercial check hybrid NK-8441 (6555 kg/ha). Mid to high cob bearing trend was observed in most of the hybrids. Differences in plant height and cob height were also significant. The maximum plant height (195 cm) was shown by FH-1458 with the ear height of 93 cm while the minimum plant height (133 cm) was observed for the local check FH-949 with a cob height of 66 cm. The statistically significant differences were also observed for number of plants per plot and cobs harvested.

#### 4. Hybrid Maize Preliminary Yield Trial (Spring 2018)

This trial was comprised of four sets each consisting of thirty single cross hybrids including two commercial and one local hybrid as checks. These were sown on 13-02-2018. The trials were laid out in RCB design with three replications. The plot size was kept 5m x 0.75m. The harvesting was done on 25-06-2018. Data regarding different agronomic traits along with grain yield were recorded and hybrids with good performance were selected for on farm testing. The data are given in given below Tables 86 to 89:

**Table 86: Results of Hybrid Maize Preliminary Yield Trial-1 (Spring 2018).**

Sr. No.	Entry	Grain yield kg/ha	Days to 50% tassels.	Days to 50% silk	Plant Height cm	Cob Height cm	No. of plants harv.	No. of cobs/ plot harv.
1	FH-1571	8306a	70	72	192	94	22	22
2	FH-1569	8251ab	74	76	142	72	26	26
3	FH-1046 (C )	7772abc	70	72	182	101	21	21
4	FH-1584	7489a-d	71	73	193	98	21	21
5	FH-1583	7081a-e	71	73	183	93	23	23
6	FH-1564	7074a-e	71	73	183	113	23	23
7	DK-9108 (C )	7031a-e	73	75	202	92	25	25
8	FH-1565	6663a-f	72	74	174	93	30	30
9	FH-1578	6630a-f	70	72	194	98	23	23
10	FH-1588	6577a-f	69	71	183	93	20	20
11	FH-1563	6577a-f	70	72	174	100	21	21
12	FH-1585	6364a-g	71	73	172	93	22	22
13	FH-1579	6270a-g	68	70	192	110	25	25
14	FH-1570	6138a-g	72	73	191	96	23	23
15	FH-1567	6028a-g	73	75	172	83	23	23
16	FH-1587	5928b-h	69	70	202	98	23	23
17	FH-1574	5769c-h	73	76	182	85	22	22
18	FH-1582	5505c-i	72	74	172	92	15	15
19	FH-1575	5440d-i	69	71	182	82	24	24
20	FH-1586	5277d-i	71	73	185	91	22	22
21	FH-1573	5236d-i	72	74	205	102	19	19
22	FH-1580	5229d-i	70	72	174	82	22	22
23	FH-1581	5094e-i	72	74	163	72	19	19
24	FH-1568	4869e-j	72	74	144	73	21	21
25	NK-8441 (C )	4630f-j	71	73	173	83	18	18
26	FH-1576	4480f-j	73	75	175	84	18	18
27	FH-1572	4060g-j	71	73	209	110	19	19
28	FH-1566	3601hij	73	75	192	102	15	15
29	FH-1577	3256ij	74	76	172	72	15	15
30	FH-1562	2733j	69	71	152	76	11	11
	CV (%)	19.48	0.41	0.33	0.32	0.87	19.42	19.42
	LSD 5%	238.7	0.60	0.50	1.16	1.61	N.s	N.s

The data presented Table 86 show statistically significant differences in grain yield due to hybrids. Local hybrid FH-1571 gave the highest grain yield of 8306 kg/ha followed by FH-1569 (8251 kg/ha) and commercial check FH-1046 (7772 kg/ha). These hybrids along with FH-1584, FH-1583, FH-1564, DK-9108, FH-1565, FH-1578, FH-1588, FH-1563, FH-1585, FH-1579, FH-1570, FH-1567 were at par with the top yielding commercial hybrid. Days to 50% tasseling and 50% silking were showing statistically significant differences. The



maximum days to tasseling (74) and silking (76) were taken by two local hybrids FH-1569 and FH-1577. Significant differences were observed for plant height and cob height. Maximum plant height was attained by FH-1572 (209 cm) with a cob height of 110 cm while FH-1569 attained minimum plant height of 142 cm and cob height of 72 cm. Number of plants and cobs harvested per plot were showing statistically non-significant differences.

**Table 87: Results of Hybrid Maize Preliminary Yield Trial-2 (Spring 2018)**

Sr. No.	Entry	Grain yield kg/ha.	Days to 50% tassel	Days to 50% silk	Plant Height cm	Cob Height cm	No. of plants harv.	No. of cobs/ plot harv.
1	FH-1605	9106a	74	76	151	74	24	24
2	DK-9108 (C)	8856ab	74	76	114	48	23	23
3	FH-1611	8692ab	78	80	160	76	23	23
4	FH-1598	8528ab	73	76	162	74	24	24
5	FH-1600	8506ab	77	79	134	63	19	19
6	FH-1594	8411ab	76	78	189	101	21	21
7	FH-1608	8111abc	73	75	143	70	24	24
8	FH-1609	8015a-d	73	75	153	79	23	23
9	FH-1614	7782a-e	75	77	180	77	24	24
10	FH-1599	7592a-e	74	76	145	73	21	21
11	FH-1603	7452a-e	72	74	147	62	19	19
12	FH-1601	7397a-f	74	76	148	68	24	24
13	FH-1606	7345a-f	75	78	127	62	21	21
14	FH-1604	7299a-f	73	75	142	61	24	24
15	FH-1591	7112a-f	74	76	169	78	19	19
16	FH-1607	7048b-f	76	78	131	65	13	13
17	FH-1592	7005b-f	73	75	182	97	23	23
18	FH-1046 (C)	7004b-f	75	77	150	72	18	18
19	FH-1610	6955b-f	72	74	156	75	23	23
20	FH-1615	6921b-f	75	79	158	79	22	22
21	FH-1602	6916b-f	75	77	146	80	21	21
22	FH-1612	6916b-f	75	79	163	89	20	20
23	FH-1590	6312c-f	72	74	176	91	19	19
24	FH-1595	6104c-g	74	76	156	82	24	24
25	FH-1593	5993d-g	73	75	172	97	18	18
26	FH-1613	5955efg	73	76	175	74	21	21
27	FH-1589	5789efg	72	74	148	77	19	19
28	NK-8441 (C)	5399fg	74	75	143	81	18	18
29	FH-1597	4220gh	74	76	166	91	7	7
30	FH-1596	2633h	75	77	149	80	16	16
	CV (%)	14.06	1.19	0.71	1.60	3.06	16.60	16.60
	LSD 5%	2026.5	1.80	1.11	5.03	4.77	6.88	6.88

The data presented in the Table 87 show statistically significant differences in grain yield among hybrids. Local hybrid FH-1605 gave the highest grain yield of 9106 kg/ha followed by commercial check DK-9108 (8856 kg/ha). The local check FH-1046 (7004 kg/ha) and other commercial check NK-8441 (5399 kg/ha) remained at eighteenth and twenty eighth position. Days to 50% tasseling and 50% silking were showing statistically significant differences. Significant differences were observed for plant height and cob height. Maximum plant height was attained by FH-1594 (189 cm) with a cob height of 101 cm while commercial hybrid DK-9108 attained minimum plant height (114 cm) with a cob height of

48 cm. Number of plants and cobs harvested per plot were also showing statistically significant differences.

**Table 88: Results of Hybrid Maize Preliminary Yield Trial-3 (Spring 2018)**

Sr. No.	Entry	Grain yield kg/ha	Days to 50% tassel	Days to 50% silk	Plant Height cm	Cob Height cm	No. of plants harv.	No. of cobs/ plot harv.
1	FH-1635	9038	73	75	194	98	19	19
2	FH-1625	8316	71	73	151	72	27	27
3	DK-9108 (C )	8189	70	72	192	85	23	23
4	FH-1629	8150	74	76	187	84	26	26
5	FH-1046 (C )	7072	71	73	163	71	22	22
6	FH-1628	6932	71	73	202	102	25	25
7	FH-1617	6878	71	73	173	78	23	23
8	FH-1638	6846	72	74	167	89	26	26
9	FH-1622	6827	69	71	168	93	26	26
10	FH-1639	6821	71	73	182	96	24	24
11	FH-1640	6729	70	72	195	83	27	27
12	FH-1616	6473	70	72	185	84	25	25
13	FH-1624	6472	72	74	154	72	23	23
14	FH-1632	6003	71	73	182	86	23	23
15	NK-8441 (C )	5957	71	73	153	72	26	26
16	FH-1637	5839	72	74	156	84	24	24
17	FH-1623	5688	69	72	192	85	24	24
18	FH-1619	5581	73	75	166	83	22	22
19	FH-1634	5467	72	74	172	83	22	22
20	FH-1631	5414	72	75	184	82	23	23
21	FH-1633	5305	71	73	163	82	22	22
22	FH-1630	4999	72	75	174	82	25	25
23	FH-1626	4731	72	74	182	80	29	29
24	FH-1641	4699	71	73	163	76	4	4
25	FH-1620	4069	74	76	159	74	18	18
26	FH-1642	3965	72	74	172	79	25	25
27	FH-1627	3957	71	73	174	74	22	22
28	FH-1618	3790	69	71	186	74	27	27
29	FH-1621	3773	68	70	183	79	22	22
30	FH-1636	2441	72	74	166	79	27	27
	CV (%)	28.00	0.40	0.45	1.73	1.10	13.13	13.13
	LSD 5%	N.S	0.58	0.67	6.18	1.84	6.22	6.22

The data presented in above Table 88 show statistically non-significant differences in grain yield due to hybrids. Local hybrid FH-1638 gave the highest grain yield of 9038 kg/ha followed by FH-1625 (8316 kg/ha). The two commercial checks DK-9108 (8189 kg/ha), NK-8441 (5957 kg/ha) and one local check FH-1046 (7072 kg/ha) remained at third, fifteenth and fifth position respectively. Days to 50% tasseling and 50% silking were showing statistically significant differences. Significant differences were observed for plant height and cob height. Minimum plant height was attained by FH-1625 (151 cm) with a cob height of 72 cm while FH-1628 attained maximum plant height (202 cm) with a cob height of 102 cm. Number of plants and cobs harvested per plot were also showing statistically significant differences.

**Table 89: Results of Hybrid Maize Preliminary Yield Trial-4 (Spring 2018).**

Rank No.	Entry	Grain yield kg/ha	Days to 50% tassel	Days to 50% silk	Plant Height cm	Cob Height cm	No. of plants harv.	No. of cobs/ plot harv.
1	FH-1662	9038	71	73	182	76	24	24
2	FH-1651	8316	65	69	185	84	24	24
3	DK-9108 (C )	8189	68	70	192	84	23	23
4	FH-1656	8150	70	72	159	73	23	23
5	FH-1652	7072	71	74	161	77	22	22
6	FH-1655	6932	70	72	162	73	23	23
7	FH-1644	6878	71	72	194	101	25	25
8	FH-1665	6846	71	74	192	90	24	24
9	FH-1649	6827	71	74	192	91	24	24
10	FH-1666	6821	73	74	184	86	23	23
11	FH-1667	6729	71	73	174	83	22	22
12	FH-1643	6473	70	72	173	91	23	23
13	FH-1046 (C )	6472	71	73	174	96	19	19
14	FH-1659	6003	71	73	193	98	19	19
15	NK-8441 (C )	5957	68	70	182	84	21	21
16	FH-1664	5839	69	71	189	92	20	20
17	FH-1650	5688	72	73	181	89	22	22
18	FH-1646	5581	71	73	161	83	25	25
19	FH-1661	5467	71	73	199	104	20	20
20	FH-1658	5414	71	73	164	90	21	21
21	FH-1660	5305	68	70	192	85	18	18
22	FH-1657	4999	71	73	181	83	14	14
23	FH-1653	4731	72	74	162	81	23	23
24	FH-949	4699	72	74	183	97	17	17
25	FH-1647	4069	71	73	173	97	19	19
26	CS-5800 (C )	3965	71	73	174	75	18	18
27	FH-1654	3957	73	75	154	74	20	20
28	FH-1645	3790	72	74	183	83	16	16
29	FH-1648	3773	70	73	184	86	14	14
30	FH-1663	2441	68	70	172	82	6	6
	CV (%)	28.00	1.71	1.34	0.89	2.68	21.79	21.76
	LSD 5%	N.S	2.46	1.99	3.25	4.70	N.s	N.s

The data presented in the above Table 89 shows statistically non-significant differences in grain yield due to hybrids. Local hybrid FH-1662 gave the highest grain yield of 9038 kg/ha followed by FH-1651 (8316 kg/ha) and commercial check DK-9108 (8189 kg/ha). Days to 50% tasseling and 50% silking were showing statistically significant differences. The minimum number of days to 50% tasseling (65) and days to 50% silking (69) were observed for the local hybrids FH-1651. Significant differences were observed for plant height and cob height. Maximum plant height was attained by FH-1661 (199 cm) with a cob height of 104 cm while FH-1654 attained minimum plant height (154 cm) with a cob height of 74 cm. Number of plants and cobs harvested per plot were showing statistically non-significant differences.

#### 4. National Uniform Hybrid Maize Yield Trial No. 1 (Spring 2018)

This trial comprised of fifty five (55) entries. Its sowing date was 13-02-2018. 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 23-06-18. Data regarding different traits were recorded and elite hybrids were selected for further evaluation. The data are given in the Table 90.

**Table 90: Results of National Uniform Hybrid Maize (Yellow) Yield (Spring2018)**

Sr. No.	Entry	Grain yield kg/ha.	Days to 50% tassel	Days to 50% silk	Plant Height cm	Cob Height cm
1	DK-7024	10826	70	72	190	98
2	NK-7720	10639	72	72	191	103
3	P-1429 (Check)	9679	71	73	206	108
4	AAS-9633	9395	72	74	197	109
5	P 1690	9279	70	72	169	88
6	Kontigos	9107	70	72	184	103
7	J-7440	9072	71	74	193	98
8	P 1470	8913	70	72	172	90
9	AAS-9435	8818	71	73	205	109
10	NQ-6612	8752	71	73	164	87
11	YH-5532	8565	72	74	177	93
12	9086	8388	71	73	216	115
13	YHM-112B	8335	71	73	188	94
14	27D65	8298	70	72	172	88
15	33570	8276	69	71	160	85
16	PL-5854	8213	71	73	218	119
17	SWM 711	8121	72	74	157	81
18	P 2088	8055	70	73	177	94
19	YH-5482	8039	71	73	193	109
20	TG-1701	7984	72	74	182	93
21	K-2061	7888	71	73	205	103
22	FH-922	7878	70	72	191	99
23	TG-1801	7863	73	75	193	96
24	25S32	7806	71	74	185	95
25	CS-5808 (Check)	7749	71	73	173	94
26	YHM-111A	7668	70	73	150	76
27	FH-985	7565	71	73	160	72
28	2236	7534	69	72	145	75
29	NK-7750	7500	70	72	183	96
30	YH-5427	7458	72	74	182	98
31	FH-1292	7342	70	72	163	84
32	GW-3363	7315	69	71	184	92
33	YH-5140	7284	70	72	167	93
34	9082	7259	72	73	176	93
35	KQS-YHM4	7233	72	74	166	83

36	YH-5404	7197	70	72	182	96
37	Nagina-2	6952	71	74	170	84
38	SS-7350	6852	71	73	169	81
39	37D55	6804	71	73	170	84
40	9033	6716	71	72	181	95
41	PS-2867	6672	73	76	164	88
42	P 1611	6623	70	72	178	92
43	YH-5423	6562	70	72	165	82
44	J-7330	6482	70	72	184	100
45	YH-1898 (Check)	6480	69	71	172	90
46	SWM 717	6381	72	74	180	97
47	33-S-15	6218	67	69	192	95
48	YH-5543	6192	71	73	178	92
49	9034	6163	71	74	169	83
50	GW-3436	6038	68	70	159	87
51	YH-5550	6024	71	73	209	110
52	22W33	5998	71	73	202	107
53	SWM 659	5970	71	73	163	83
54	CS-5800	5293	68	70	186	94
55	PB-PRO A-2017	5016	69	72	198	108
	CV%	<b>20.9</b>	<b>2.54</b>	<b>2.4</b>	<b>14.5</b>	<b>17.3</b>
	LSD 5%	<b>2567</b>	<b>2.9</b>	<b>2.82</b>	<b>N.S</b>	<b>N.S</b>

The data presented in Table 90 reveal that statistically significant differences exist for grain yield kg/ha among entries included in this trial. DK-7024 gave maximum grain yield of 10826 kg/ha followed by NK-7720 (10639kg/ha). PB-PRO A-2017 was lower yielder with grain yield 5016 kg/ha at this station. Statistically significant differences were observed for days to 50% tasseling and 50% silking while but non-significant for plant height and cob height.

##### 5. National Uniform Hybrid Maize Yield Trial Yellow (B) (Spring 2018).

This trial comprising twenty one (21) entries was sown in RCB design with three replications on 23-02-18. 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 23-06-18. Data regarding different traits were recorded and elite hybrids were selected for further evaluation. The data are given in the Table 91.

**Table 91: Results of National Uniform Hybrid Maize Yellow “B” Trial (Spring 2018)**

Rank. No.	Entry	Grain Yield (kg/ha)	Days to 50% tassell.	Days to 50% silk	Plant Height cm	Cob Height cm
1	H 18109	7200	65	68	151	66
2	AJ-6930	6710	66	69	147	69
3	DM-88	6494	69	71	146	70
4	DM-70	6365	66	69	159	71

5	P-1602	6220	68	71	144	66
6	P-1443	6151	68	70	140	67
7	Dm-100	6128	67	71	145	66
8	AJ-9880	5747	69	71	141	64
9	CS-5800 (Check)	5667	69	70	138	63
10	NK -7953	5271	65	68	153	66
11	75 M75	5141	66	68	141	64
12	NK6503	5038	71	70	139	66
13	AJ-17	4808	66	68	133	65
14	PSHY-0408	4737	68	71	141	67
15	NK-7213	4682	66	68	138	66
16	PSH-0402	4577	66	68	145	71
17	P 1565	4557	65	68	163	73
18	HY-1898 (Check)	4335	67	69	150	63
19	GMH52	3760	68	70	145	69
20	PSHY-7608	3519	65	67	144	69
21	PSHY-0404	3274	67	69	147	68
	CV%	<b>29.39</b>	<b>3.71</b>	<b>2.79</b>	<b>11.04</b>	<b>8.93</b>
	LSD 5%	<b>2549</b>	<b>4.1</b>	<b>3.2</b>	<b>26.5</b>	<b>9.9</b>

The data presented in the above Table 91 show non-significant differences for grain yield kg/ha among varieties. The variety H 18109 out yielded with grain yield 7200 kg/ha followed by variety (6710 kg/ha). Variety PSHY-0404 was lower yielder with grain yield 3274 kg/ha. Statistically significant differences were observed for days to complete 50% tasseling, days to 50% silking, Plant height and cob height.

## 6. National Uniform Varietal White (OPV) Maize Yield Trial (Spring 2018)

This trial was sown on 13<sup>th</sup> of February, 2018, with twelve (12) entries. The trial was laid out in RCB design with two replications. The plot size was kept 4m x 1.5m. Standard agronomic and plant protection measures were carried out in the crop. Harvesting of trial was done on 23-06-18. Data regarding different traits were recorded and elite hybrids were selected for further evaluation. The data are given in the Table 92.

**Table 92: Results of National Uniform White (OPV) Maize Yield (Spring 2018)**

Rank. No.	Variety	Grain yield kg/ha	Days to 50% tassel	Days to 50% silk	Plant Height cm	Cob Height cm
1	YY-15	9724	74	76	146	86
2	MMRI-Yellow (Check)	7887	73	75	147	84
3	PSC-2011W	7859	73	75	142	78
4	C2P-132001M	7843	72	74	145	85
5	YW-786	7528	73	75	150	90
6	Peral (Check)	7489	73	75	145	82
7	PSC-V 8003	7040	74	76	161	80
8	Haq Nawaz Gold (Check)	6544	74	76	144	86

9	PSC-2011Y	5831	73	75	143	77
10	TP1217	5407	74	76	144	83
11	TP1221	4691	74	76	143	83
12	132001N	4540	73	76	139	80
	CV%	<b>16</b>	<b>2.74</b>	<b>2.88</b>	<b>8.54</b>	<b>14.35</b>
	LSD 5%	<b>1419</b>	<b>1.86</b>	<b>1.71</b>	<b>10.07</b>	<b>8.9</b>

The data presented in the Table 92 showed non-significant differences for grain yield kg/ha among varieties. The variety YY-15 out yielded with a grain yield of 9724 kg/ha followed by MMRI Yellow (Check) (7887 kg/ha). The variety 132001N was lower yielder with a grain yield of 4540 kg/ha. Statistically significant differences were observed for days to complete 50% tasseling, 50% silking, plant height and cob height.

**a. ADP PROJECT “PROVISION OF ADDITIONAL RESEARCH FACILITIES FOR DEVELOPMENT OF HEAT RESILIENT MAIZE HYBRIDS AT MAIZE AND MILLETS RESEARCH INSTITUTE”**

**A. Screening of Heat Resilient Maize Inbred Lines**

1. For screening against heat stress, one set of maize inbred lines (64) were sown in tunnel under controlled conditions during flowering and pollination stage (Month of May). The temperature was maintained high inside the tunnel to expose the inbred lines to heat stress. Following Avg. weekly temperature data were recorded inside and outside the tunnel:

**Table 93: Tunnel Temperature in May 2018**

Sr. no	Duration	Outside temperature (Avg.)	Inside temperature (Avg.)
1	1 <sup>st</sup> week of May	42° C	44-45° C
2	2 <sup>nd</sup> week of May	34° C	38-42° C
3	3 <sup>rd</sup> week of May	38° C	42-44° C
4	4 <sup>th</sup> week of May	46° C	47-48° C

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

**Table 94: Best Performing Inbred Lines**

Tolerance level	Seed setting %	Inbred lines
Resistant	100	-
Moderately resistant	Above 75	-
Tolerant	Above 50	F-447, F-448, F-450, F-459, F-464, F-465, F-467, F-468, F-469, F-476, F-477, HTL-5, HTL-6, HTL-7, HTL-9, HTL-10, HTL-11, HTL-12, HTL-14, HTL-16, HTL-17 and HTL-21
Moderately tolerant	20-50	-
Susceptible	Less than 20	Remaining all

## B. Evaluation of Hybrids in Preliminary Yield Trials:

### I. Hybrid Maize Preliminary Yield Trial No. 1 (Spring 2018)

This trial comprised of two sets each consisting of thirty single cross hybrids including two commercial hybrids and one local hybrid as check were sown on 12-02-2018. The trials were laid out in RCB design with three replications. The plot size was kept 5m x 0.75m. The harvesting was done on 25-06-2018. Data regarding different agronomic traits were recorded and hybrids with good performance were selected for on farm testing. The data are given in the Table 93 given below:

**Table 95: Results of Hybrid Maize Preliminary Yield Trial-1 (Spring 2018).**

Sr. No.	Entry	Grain yield kg/ha	Days to 50% tassel	Days to 50% silk	Plant Height cm	Cob Height cm	No. of plants Harv.	No. of Cobs Harv.
1	FH-1046 (C )	10813a	73	74	173	95	25	25
2	FH-1534	10579a	75	79	168	103	25	25
3	FH-1510	7872ab	74	76	175	95	21	21
4	DK-9108 (C )	7664ab	70	71	206	88	20	20
5	FH-1511	6905bc	74	74	161	74	17	17
6	FH-1519	6816bc	72	74	159	77	22	22
7	FH-1517	6396bcd	70	72	166	84	23	23
8	NK-8441 (C )	6285bcd	70	71	178	82	23	23
9	FH-1530	6262bcd	73	75	209	115	19	19
10	FH-1529	6182bcd	77	78	189	98	21	21
11	FH-1518	6100bcd	76	78	176	99	19	19
12	FH-1512	5908bcd	70	72	158	94	18	18
13	FH-1528	5745b-e	74	77	189	107	19	19
14	FH-1520	5547bce	77	78	176	97	20	20
15	FH-1532	5382b-e	73	75	172	94	21	21
16	FH-1522	5167b-e	75	77	159	82	23	23
17	FH-1508	5126b-e	73	74	158	78	23	23
18	FH-1527	5067b-e	75	78	190	95	23	23
19	FH-1521	4864b-e	76	79	162	81	16	16
20	FH-1509	4715bcde	74	77	165	90	18	18
21	FH-1533	4710bcde	74	75	168	98	19	19
22	FH-1523	4587bcde	73	75	160	85	17	17
23	FH-1526	4476bcde	82	85	123	69	15	16
24	FH-1524	4160cde	75	77	159	82	16	16
25	FH-1531	3902cde	73	77	166	85	18	18
26	FH-1525	3454cde	76	77	130	74	17	17
27	FH-1515	3035cde	80	82	121	73	13	13
28	FH-1516	3016de	79	80	117	60	16	16
29	FH-1514	2881de	78	79	80	33	16	16
30	FH-1513	2272e	79	81	147	78	10	10
	CV%	30.51	1.39	1.00	3.13	5.00	19.90	19.88
	LSD 5%	3502.4	2.11	1.56	10.35	8.71	N.s	N.s

The data offered in the above Table 95 show statistically significant differences in grain yield kg/ha among hybrids included in this trial. Local check FH-1046 was the higher grain yielding (10813 kg/ha) hybrid followed by the local hybrids FH-1534 (10579 kg/ha), FH-1510 (7872 kg/ha) and a commercial check DK-9108 (7664 kg/ha). All these hybrids



were at par with the top yielding local check. The results for the number of days to 50% tasseling and 50% silking showed statistically significant differences. Significant differences were observed for plant height and cob height. Local hybrid FH-1530 attained maximum plant height (209 cm) with a cob height of 115 cm. Minimum cob height 115 cm of local hybrid FH-1530 was observed with a plant height of 209 cm. Many local hybrids showed the mid to low cob bearing characteristic which is a desirable character in developing lodging resistant hybrids. Results for the number of plants harvested and the number of cobs harvested show non-significant differences.

**Table 96: Results of Hybrid Maize Preliminary Yield Trial-2 (Spring 2018)**

Sr. No.	Entry	Grain Yield kg/ha	Days to 50% tassel	Days to 50% silk	Plant Height cm	Cob Height cm	No. of plants harv.	No. of Cobs/ plot harv.
1	FH-1557	9778a	67	70	157	75	24	24
2	FH-1558	9089ab	71	72	161	95	23	23
3	FH-1546	8853abc	69	72	155	87	29	29
4	DK-9108 (C)	7621a-d	71	73	156	83	20	20
5	FH-1046 (C)	7536a-d	70	72	167	84	22	22
6	FH-1541	7362a-e	72	75	169	90	31	31
7	FH-1537	7345a-e	70	72	161	84	25	25
8	FH-1561	7054b-f	70	73	174	88	25	25
9	FH-1542	6981b-f	71	73	165	83	24	24
10	FH-1545	6838b-f	71	73	173	79	21	21
11	FH-1552	6799b-f	71	73	160	92	23	23
12	FH-1548	6767b-f	72	75	153	86	21	21
13	FH-1538	6653b-f	70	72	172	92	19	19
14	NK-8441 (C)	6527b-f	70	72	156	79	23	23
15	FH-1549	6514bc-f	70	72	156	73	27	27
16	FH-1554	6408b-g	72	73	150	74	21	21
17	FH-1535	6175c-h	71	73	128	74	19	19
18	FH-1544	6117d-h	70	73	161	78	20	20
19	FH-1547	6080d-h	70	72	154	74	21	21
20	FH-1551	6042d-h	71	73	159	83	22	22
21	FH-1550	5984d-h	71	73	173	93	23	23
22	FH-1555	5793d-h	69	72	152	78	21	21
23	FH-1540	5784d-h	72	74	159	88	19	19
24	FH-1553	5284d-h	69	72	143	75	16	16
25	FH-1559	4934d-h	70	73	160	85	19	19
26	FH-1556	4919d-h	68	71	155	76	22	22
27	FH-1539	4764efgh	71	73	170	95	18	18
28	FH-1536	4412fgh	71	73	161	92	16	16
29	FH-1543	3780gh	71	73	163	85	19	19
	FH-1560	3612h	71	73	171	80	12	12
	CV%	20.72	0.63	1.30	1.97	4.60	20.05	20.05
	LSD 5%	2709.1	0.90	1.92	6.43	7.81	N.s	N.s

The data presented in the above Table 96 shows statistically significant differences in grain yield. Local hybrid FH-1557 gave the highest grain yield of 9778 kg/ha followed by FH-1558 (9089 kg/ha), FH-1546 (8853 kg/ha), commercial check DK-9108 (7621 kg/ha), local check FH-1046 (7536 kg/ha), FH-1541 (7362 kg/ha) and FH-1537 (7345 kg/ha) which were at par with the top yielding hybrid. Days to 50% tasseling and 50% silking were also showing

statistically significant differences. Mid to a bit high cob bearing trend was apparent in most of the hybrid present in the trial. Significant differences were observed for plant height and cob height. Maximum plant height was attained by FH-1561 (174 cm) with a cob height of 88 cm while FH-1535 attained minimum plant height (128 cm) with a cob height of 74 cm. The number of plants and cobs harvested per plot were showing statistically non-significant differences.

### C. ON-FARM TESTING

**Table 97: On Farm Hybrids Evaluation Trial Spring 2018 for heat stress tolerance**

Sr. No.	Hybrids/ Locations	Chak 49 GB Khiddar Wala	Thatti Shahni, Sahiwal, Sargodha	Maghi sultan, Distt. Jhang	Chak No. 254 JB, Jhang	Chak No 555 GB, Mamun kanjan	Grain Yield (kg/ha)
							Average
		<b>Grain Yield (kg/ha)</b>					
1	P-1543	12483	11956	10150	11956	9670	11243
2	DK-9108	12032	11962	12027	12917	11147	12017
3	FH-793	11349	12969	8723	11509	12648	11440
4	FH-949	12828	13089	12075	11721	12386	12420
5	FH-1046	12262	14112	13482	12496	13150	13100
6	YH-5140	10960	10657	9066	10768	10671	10424
7	YH-5394	9845	9900	9348	10233	12083	10282
8	YH-5482	11804	11623	8931	10261	10534	10631
9	YH-1898	12390	12046	11396	11279	12697	11962

### 8. SEED PRODUCTION:

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

**Table 98: Seed Production, Spring-2018, Faisalabad**

Sr. No.	Entry	Seed production (kgs)
1	DTC	730
2	Malka-16	297

## MILLETS RESEARCH STATION, RAWALPINDI

### Season and Its Effect:

Meteorological data of Millets Research Station, Rawalpindi for the financial year 2016-2017 and 2017-2018 are given below. During the year 2017-2018, 1032 .00 mm rain was received compared with 2016-2017 (941.0 mm). Heavy rain and thunder storm on 10.09.2017 caused lodging in Pearl millet crop particularly breeding populations which were affected. Sufficient rains received during the months of February 2018 to June 2018 produced good effect on rabi crops and increased production in the Pothohar region.

**Table 99: Meteorological Data for the Financial Year 2016-17 and 2017-18**

Sr. No.	Month	Temperature ° C				Rainfall (mm)	
		Maximum		Minimum		(2016-17)	(2017-18)
		(2016-17)	(2017-18)	(2016-17)	(2017-18)		
1	July	40	34.6	21.8	20.6	341.9	269.0
2	August	38	37.5	21.5	20.0	128	270.8
3	September	37	36.5	21.5	19.0	4.2	81.6
4	October	36.2	35.7	11.00	11.4	24.5	4.6
5	November	28.9	27.8	6.5	4.5	0.0	31.7
6	December	26.5	24.8	1.5	2.0	0.0	65.4
7	January	23.00	23.0	1.00	16.5	145.7	0.0
8	February	27.5	26.3	5.2	1.5	15.8	69.6
9	March	35.0	35.5	5.5	7.0	16.2	38.7
10	April	39.5	38.0	8.8	10.5	81.0	91.0
11	May	41.7	41.0	16.0	18.5	20.2	84.2
12	June	46.5	43.0	19.0	21.0	163.2	25.0
<b>Total</b>						<b>941.00</b>	<b>1032.00</b>

**RESEARCH WORK DONE:**

Following research work on pearl millet was conducted during the year 2017-18 at Millets Research Station, Rawalpindi.

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

Forty four pearl millet germplasm lines were sown on 19-07-2017 in strip. 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 01-08-2017 to 04-08-2017. Forty two lines were maintained through hand pollination while two lines were discarded due to poor performance. Seed was harvested on 23-10-2017 and retained for future utilization in the breeding program for the development of dual purpose variety.

Twenty successful fresh crosses were made, harvested and seed was retained to raise F<sub>2</sub> population during kharif- 2018. Three superior, phenotypically uniform lines were selected from gene pool for evaluation in micro trial kharif 2018.

**2. Development of Dual Purpose Pearl Millet Variety**

Five breeding populations (F<sub>1</sub> F<sub>2</sub>, S<sub>1</sub>, S<sub>2</sub> and S<sub>3</sub>) were sown during kharif 2017, in strips. Plant to plant and row to row distances were kept as 20 cm and 75 cm respectively. F<sub>1</sub> crosses were selfed and off type plants were roughed out. Phenotypically superior plants selected from F<sub>2</sub> population were self-pollinated, harvested and seed was retained. Phenotypically superior and identical plants from S<sub>1</sub>, S<sub>2</sub> populations were self-pollinated and seed was bulked of each line separately. Three uniform lines from S<sub>1</sub> and S<sub>2</sub> populations

while five superior uniform lines were selected from S<sub>3</sub> Population for evaluation in micro trials. The detail is given in the Table 100 below.

**Table 100: Pearl Millet Populations Studied during Kharif- 2017**

S. No.	Population	Studied	Selected
1	F <sub>1</sub>	20	20
2	F <sub>2</sub>	20	65 single plants
3	S <sub>1</sub>	73	38 lines
4	S <sub>2</sub>	29	12 lines
5	S <sub>3</sub>	20	5 lines

### 3. Pearl Millet Micro Yield Trial -I

The trial, comprising of ten pearl millet genotypes, was sown on 20-07-2017 using Randomized Complete Block Design with three replications. The plot size was kept 5m x 3.75 m with row to row spacing of 75 cm and plant to plant spacing of 20 cm respectively. Gap filling/ thinning was done on 07-08-2017 to ensure required plant population. Harvesting was completed on 17-10-2017. The observations recorded on different plant parameters are summarized in the Table 101 below.

**Table 101: Results of Pearl Millet Micro Yield Trial - I Kharif- 2017.**

R. No.	Varieties	Plants Harvested	Grain Yield (kg/ha)	Days to 50% Flowering	Plants Height (cm)
1.	86M16(Check)	92	3623	52	247
2.	16RBS-10	93	3111	43	265
3.	16RBS-11	91	2949	49	284
4.	16RBS-15	90	2904	53	284
5.	16RBS-12	91	2863	51	277
6.	16RBS-14	91	2070	47	286
7.	16RBS-17	90	1853	40	268
8.	16RBS-13	90	1847	47	264
9.	16RBS-18	91	1620	43	252
10.	16RBS-16	91	1423	39	275
	CV %	3.54	5.11	1.99	1.51
	LSD 1%	7.58	293.18	2.16	9.56

The results presented in Table 101 reveal highly significant genetic differences among genotypes for parameters like grain yield, days to 50% flowering and plant height except plant harvested. The hybrid 86M16 gave maximum grain yield (3623 kg/ha) followed by 16RBS-10 (3111 kg/ha). While the genotype, 16RBS-16 gave minimum yield of 1423 kg/ha.

The genotype 16RBS-16 and 16 RBS-17 took minimum number of days (39 and 40 days) to complete 50% flowering while maximum number of days (53days) was taken by the genotype 16RBS-15. Maximum height of 286 cm was attained by 16RBS-14 while minimum height (247cm) was recorded for the check variety 86M16.

#### 4. Pearl Millet Micro Yield Trial -II

The trial, comprising of ten pearl millet genotypes, was sown on 20-07-2017 using randomized complete block design with three replications. Each plot consisted of four rows of 5 meter length with row to row spacing of 75 cm and plant to plant spacing of 20 cm respectively. Gap filling/ thinning was done on 08-08 2016 to ensure required plant population. Harvesting was completed on 19-10-2016. The observations recorded on different plant parameters are summarized in the Table 102.

**Table 102: Results of Pearl Millet Micro Yield Trial- II, Kharif, 2017.**

R. No.	Varieties	Plants Harvested	Grain Yield (kg/ha)	Days to 50% Flowering	Plant Height (cm)
1.	13RBS-10	89	3444	44	271
2.	16RBS-22	91	2930	56	289
3.	16RBS-23	92	2910	47	244
4.	16RBS-20	92	2904	54	280
5.	16RBS-24	92	2809	43	226
6.	16RBS-26	90	2742	54	241
7.	16RBS-19	90	2231	50	264
8.	16RBS-25	90	2219	48	231
9.	YBS-98	90	2203	53	242
10.	16RBS-21	93	1519	56	268
	CV %	2.74	4.41	1.89	1.80
	LSD 1%	5.85	268.32	2.19	10.81

The results presented in the above table 102 reveal highly significant genetic differences for parameters like grain yield, days to 50% flowering and plant height except plants harvested. The genotype 13RBS-10 gave maximum grain yield (3444 kg/ha) followed by 16RBS-22 (2930 kg/ha). The minimum yield (1519 kg/ha) was recorded for the genotype 16RBS-21.

Maximum number of days (56days) was taken by the genotype 16RBS-21 and 16RBS-22 while minimum number of days (43days) to complete 50% flowering was taken by genotype 16RBS-24. Maximum plant height of 289 cm was attained by 16RBS-22 while minimum height (226cm) was recorded for the genotype 16RBS-24.

#### 5. Pearl Millet Micro Yield Trial –III

The trial, comprising of ten pearl millet genotypes, was sown on 20-07-2017 using Randomized Complete Block Design with three replications. Each plot consisted of four rows of 5 meter length with row to row spacing of 75 cm and plant to plant spacing of 20 cm respectively. Plant population was maintained by thinning and gap filling through transplanting on 10-12 August 2017. Harvesting was completed on 20-10-2017. The observations recorded on different plant parameters are summarized in the Table 103 below.

**Table 103: Results of Pearl Millet Micro Yield Trial- III, kharif, 2017.**

R. No.	Varieties	Plants Harvested	Grain Yield (kg/ha)	Days to 50% Flowering	Plant Height (cm)
1.	86M90	92	3798	53	250
2.	15RBS-01	88	2965	54	282
3.	15RBS-06	84	2890	48	267

4.	15RBS-05	85	2723	42	292
5.	15RBS-02	84	2550	47	265
6.	15RBS-04	88	2533	49	275
7.	15RBS-07	86	2351	51	268
8.	15RBS-03	84	1823	46	271
9.	15RBS-08	84	1777	54	242
10.	15RBS-09	83	1422	57	256
	CV %	3.18	4.69	1.82	2.23
	LSD 1%	6.42	273.42	2.14	13.98

The results depicted in Table 103 reveal highly significant genetic differences for parameters like grain yield, days to 50% flowering, plant height and significant for plants harvested. The check variety, hybrid 86M90 gave maximum grain yield (3798 kg/ha) followed by 15RBS-01 (2965 kg/ha) while genotype 15RBS-09 gave minimum (1422 kg/ha) grain yield.

Maximum number of days (57days) was taken by the genotype 15RBS-09 while minimum number of days (42days) to complete 50% flowering was taken by genotype 15RBS-05. Maximum plant height of 292 cm was attained by 15RBS-05 while minimum height (242cm) was recorded for the genotype 15RBS-08.

## 6. Pearl Millet Varietal Yield Trial

Ten pearl millet genotypes received from Maize and Millets Research Institute, Yusafwala were tested under rain fed conditions for grain yield and other attributes at Millets Research Station Rawalpindi. The experiment was sown on 22-07-2017 according to randomized complete block design with three replications. The plot size was 15m<sup>2</sup> with four rows of 5 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 10-08-2017 to 12.08.2017 which produced good effect on plant growth and population. The harvesting was completed on 24-10-2017. The data of various plant parameters were recorded and the summary of the results is presented in the Table 104.

**Table 104: Results of Pearl Millet Varietal Yield Trial Kharif- 2017**

R. No.	Entries	Plants Harvested	Grain Yield (kg/ha)	Days to 50% Flowering	Plant Height (cm)
1.	YBS-98	89	2700a	50	246
2.	YBS-95	90	2255b	49	241
3.	YBS-94	90	2056bc	49	245
4.	YBR-5	85	2007bc	48	236
5.	YBS-89	88	1878bcd	50	258
6.	YBS-93	87	1844cd	53	245
7.	YBS-83	87	1800cd	50	245
8.	YBS-92	82	1800cd	48	251
9	YBS-70	85	1767cd	52	256
10.	18-BY	88	1511d	51	279
	CV %	3.03	8.65	1.81	2.27
	LSD 1%	6.1951	398.76	2.13	13.363

Analysis of variance of the data presented in Table 104 show highly significant differences among genotypes for, grain yield, days to 50% flowering and plant height characters except plants harvested. Table 104 reveal that genotype. YBS-98 gave maximum grain yield of 2700 kg/ha followed by YBS-95 (2255kg/ha) whereas, minimum grain yield of 1511 kg/ha was produced by 18-BY. Genotype YBR-5 and YBS-92 took minimum number of days (48 days) to complete 50% flowering while genotype YBS-93 took maximum numbers of days i.e. 53 days to complete 50% flowering. Regarding plant height, maximum plant height of 279 cm was recorded for genotype 18- BY followed by YBS- 89 (258 cm) while genotype YBR-5 exhibited minimum plant height (236 cm).

## 7. Adaptability/National Uniform Pearl Millet Yield Trial Kharif 2017

The experiment comprised of eleven pearl millet genotypes, received from National Agricultural Research Centre, Islamabad was sown on 27.07.2017 at Millets Research Station, Rawalpindi, during Kharif 2017. Randomized Complete Block Design with three replications was used to lay out the experiment. Each plot consisted of four rows of 5 meter length spaced at 75 cm. Plant to plant distance was kept as 20 cm. Thinning/transplanting was done from 20-08-2017 which produced good effect on overall plant growth. The experiment was harvested on 18-10-2017 and the data recorded on different plant parameters summarized in Table 105.

**Table 105: Results of Adaptability/National Uniform Pearl Millet Yield Trial Kharif 2017**

R. No.	Varieties	Plants Harvested	Grain Yield (kg/ha)	Days to 50% Flowering	Plant Height (cm)
1.	(HM-535)	92	3418a	46	231
2.	YBS-98	88	2958b	47	216
3.	14RBS-01	81	2850bc	45	236
4.	86M90	80	2797bc	43	229
5.	14RBS-05	85	2636cd	45	216
6.	YBS-95	80	2636cd	46	225
7.	86-M-16	79	2560d	48	225
8	TMLT-01	82	2540d	46	221
9	TMLT-02	79	2057e	50	227
10	55S-85	78	1923e	46	233
11	HS-888	82	1663f	47	233
CV %		2.00	3.84	2.97	2.01
LSD 1%		3.8238	227.66	3.1	10.579

The results presented in the Table 105 that analysis of variance show highly significant differences among all the genotypes for plants harvested, grain yield, days to 50% flowering and plant height characters. The results presented in this table reveal that hybrid HM-535 gave maximum grain yield of 3418 kg/ha followed by the check variety YBS-98 (2958 kg/ha), whereas, hybrid HS-888, produced minimum grain yield (1663 kg/ha). Hybrid 86M9 took minimum number of days (43 days) to complete 50% flowering while genotype TMLT-02 took maximum number of days i.e. 50 days to complete 50% flowering. Regarding plant height, maximum plant height of 236 cm was recorded for genotype 14RBS-01 followed by

genotypes 55S-85 and HS-888 (233 cm) while genotype YBS-98 exhibited minimum plant height 216 cm.

## 8. Maize On Farm Trials

**Table 106: Results of maize on farm trials Spring-2018**

S. No	Maize Variety	Location	Plot size	Sowing/ Harvesting Dates	Plant Height (cm)	Ear Height (cm)	Days to 50% Silking	Dry Cobs weight (kg)
1	Pearl	Research Farm Garhi Dopatta	25x10 ft.	21/5/2018/ 10-10-2018	210	90	58	34
2	CZP-132001	Research Farm Garhi Dopatta		21/5/2018/ 10-11-2018	200	90	50	25
		Farmer Field Garhi Dopatta		06-10-2018/ 26/10/2018	195	92	50	53

## MAIZE BREEDING SUB STATION, CHHARRAPANI (MURREE)

### RESEARCH WORK DONE:

During the spring crop season 2017, two maize inbred lines (F-308 and F-165) were received from the office of Associate Maize Botanist, Maize Research Station, Faisalabad for constitution of single cross (F-308 x F-165) and seed multiplication of inbred line F-165. Sowing was done on April 12, 2017 in the research area of Maize Breeding Sub- Station, Chharrapani (Murree).

Sowing of maize inbred lines were done with the help of dibbler keeping plant to plant and row to row distance of 23cm and 75cm respectively. Fertilizer was applied @ 142 – 75 N : P kg/ha. Flisto Gold (Pre emergence weedicide) was sprayed after sowing. Virtaco 0.6 granules @ 04 kg / acre against stem borer and insecticide (Actara 25 wg) @ 24 gm / acre against shoot fly was also applied.

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

## SORGHUM RESEARCH SUB-STATION, DERA GHAZI KHAN

### Season and Its Effects

During the year 2017-18, 106.50 mm rainfall was received as compared to the year 2016-17, 65.50 mm rainfall was received. Non availability of Irrigation water during month of July-2017, delayed sowing of trials till the last day of this month. A dry spell during September to December-17, helped in harvesting and threshing of kharif trials-17 at this sub-station.



**Table 107: Metrological Data of DG Khan**

Sr. No.	Month	Average Temperature C*				Rainfall (mm)	
		Maximum		Minimum		2016-17	2017-18
		2016-17	2017-18	2016-17	2017-18		
1	July	39.00	38.22	29.00	28.61	29.00	57.00
2	August	37.00	37.70	28.00	28.41	---	---
3	September	38.00	33.68	27.00	25.87	---	---
4	October	37.80	35.38	26.33	20.67	----	---
5	November	28.50	23.48	13.90	12.80	---	---
6	December	25.43	22.06	10.73	7.54	---	---
7	January	19.29	19.29	07.96	7.96	04.50	4.50
8	February	24.35	24.35	12.22	12.22	02.00	2.00
9	March	29.00	29.00	15.93	15.93	04.00	2.00
10	April	37.56	37.56	22.06	22.06	05.00	5.00
11	May	42.06	42.06	28.23	28.23	---	21.00
12	June	38.00	38.00	28.00	28.00	21.00	15.00
Total rainfall						65.50	106.50

**SORGHUM:****1. Sorghum Varietal Yield Trial**

Eight entries of Sorghum were planted on 31.07.2017 to evaluate the promising lines/varieties for grain yield. The layout was done according to randomized complete block design with three replications in a plot size 5m x 1.5 m. Plant to plant and row to row distances were kept 15cm and 75cm respectively. Standard agronomic and plant protection measures were carried out in the experiment. The harvesting was done on 11.12.2017. The data recorded for different morphological traits are presented in Table 108.

**Table 108: Results of Sorghum Varietal Yield Trial during Kh-2017**

S #	Entry Name	Crop Stand	Grain Yield (kg/ha)	Stalk Yield (kg/ha)	Plant Height (cm)	Days to 50% anthesis
1	YS-16 (check)	42	3378	21444	267	84
2	YSS-25	44	3333	17111	227	86
3	YSS-31	45	3022	17333	199	80
4	YSS-17	42	2889	15889	239	80
5	YSS-10 (Tall)	45	2844	42000	335	80
6	YSS-10	44	2667	19444	263	82
7	YSS-19	43	2444	20000	178	82
8	YSS-23	45	1200	37889	390	86
	CV%	2.65	3.52	2.63	1.52	1.25
	LSD 5%	NS	167.99	1100.4	6.98	1.99

The results presented in Table 108 reveal that differences of means due to genotypes were significant for all traits under study except stand count. Maximum grain yield of 3378

kg/ha was recorded for the entry YS-16(check) while minimum grain yield (1200 kg/ha) was recorded for entry YSS-23. Highest stalk yield was recorded for the variety YSS-10 (Tall) (42000 kg/ha) while minimum stalk yield 15889 kg/ha was observed for YSS-17. Maximum plant height (390 cm) was observed for variety YSS-23 while minimum plant height (178 cm) was observed for YSS-19. Entries YSS-25 and YSS-23 took maximum 86 days to 50% anthesis while entries YSS-31, YSS-17 and YSS-10 (Tall) took minimum 80 days.

## 2. Sorghum Hybrid Yield Trial

This trial was comprised of 16 crosses and two check varieties of Sorghum were planted on 31.07.2017 to evaluate the best hybrid for grain yield. The layout was done according to randomized complete block design with three replications. The plot size was kept 5m x 1.5m. Plant to plant and row to row distances were kept 15cm and 75cm respectively. Standard agronomic and plant protection measures were carried out in the experiment. The harvesting was done on 13.12.2017. The data recorded for different morphological traits are presented in Table 109.

**Table 109: Results of Sorghum Hybrid Yield Trial during Kh-2017**

Sr. No.	Entry Name	Crop Stand	Grain Yield (kg/ha)	Stalk Yield (kg/ha)	Plant Height (cm)	Days to 50% anthesis
1	YSH-95	41	4756	35333	291	82
2	YSH-115	44	4400	30556	231	83
3	Lasani (check)	42	4045	22778	220	81
4	YSH-75	42	3733	30111	261	81
5	YSH-139	39	3333	23222	210	79
6	YS-16 (check)	37	3289	28445	266	84
7	YSH-125	44	2889	17556	188	77
8	YSH-132	37	2845	27778	231	77
9	YSH-117	45	2667	40222	243	87
10	YSH-126	41	2529	27667	182	80
11	YSH-138	39	2489	35445	219	78
12	YSH-118	42	2445	30556	220	83
13	YSH-128	36	2267	25222	185	73
14	YSH-73	36	2000	24445	188	84
15	YSH-46	43	1778	39111	241	83
16	YSH-131	37	1289	31889	166	79
17	YSH-135	37	978	25333	185	80
18	YSH-136	38	978	19444	196	77
	CV%	4.54	8.77	5.04	1.89	1.50
	LSD 5%	---	393.74	2394.2	7.24	2.00

The above given results in Table 109 reveal that differences of means due to genotypes were significant for all traits under study. The maximum grain yield of 4756 kg/ha was produced by entry YSH-95 followed by YSH-115 with grain yield of 4400 kg/ha. Highest stalk yield was recorded for the hybrid YSH-117 (40222 kg/ha) which is followed by the hybrid YSH-46 (39111 kg/ha) while minimum stalk yield was observed for YSH-125 (17556 kg/ha). Maximum plant height was observed for entry YSH-95 (291 cm) while minimum plant height of 166 cm was observed for the hybrid YSH-131. YSH-117 took maximum 87 days to 50% anthesis while YSH-128 took least 73 days for 50 % anthesis.

### 3. Sorghum Genetic Studies Yield Trial

This experiment was comprised of twenty lines/varieties of Sorghum were planted at Sorghum research Sub Station, Dera Ghazi Khan on 31-07-2017 to evaluate the high yielding sorghum lines for utilizing in breeding program. The layout was done according to randomized complete block design with three replications. The plot size was kept 5m x 1.5m. Plant to plant and row to row distances were kept 15cm and 75cm respectively. Uniform/standard agronomic and plant protection measures were carried out in the experiment. The harvesting was done on 12-12-2017. The data recorded for different morphological traits are presented in Table 110.

**Table 110: Results of Sorghum Genetic Studies Yield Trial during Kh-2017**

Sr. No.	Entry Name	Crop Stand	Grain Yield (kg/ha)	Stalk Yield (kg/ha)	Plant Height (cm)	Days to 50% anthesis
1	Lasani ( C)	42	3822	29333	235	82
2	GP-35	41	3555	20889	268	83
3	GP-38	40	3467	15889	278	81
4	GP-22	44	3245	23777	213	79
5	GP-46	40	3200	21000	242	82
6	GP-40	40	3022	19333	229	85
7	GP-45	40	2889	15556	225	80
8	GP-32	44	2800	21000	225	83
9	GP-16	45	2756	17556	245	81
10	GP-01	45	2578	18667	152	81
11	GP-09	41	2578	17889	163	79
12	GP-50	41	2578	23333	252	82
13	GP-13	44	2356	16333	226	81
14	GP-02	46	2311	31444	210	80
15	GP-15	46	1822	27111	250	83
16	GP-21	38	1778	27333	213	79
17	GP-33	43	1689	26556	237	78
18	GP-49	41	1289	29777	290	81
19	GP-34	45	1067	30223	263	86
20	GP-14	38	800	8777	193	80
	CV%-	3.54	8.471	6.398	1.82	1.77
	LSD 5%	NS	347.26	2318.4	6.922	2.381

The above given results in Table 110 reveal that differences of means due to genotypes were significant for all traits under study except stand count. Maximum grain yield of 3822 kg/ha was recorded for line/variety Lasani (check) while minimum grain yield of 800 kg/ha was recorded for GP-14. Highest stalk yield was recorded for GP-02 i.e., 31444 kg/ha while minimum stalk yield was recorded for entry GP-14 (8777 kg/ha). Maximum plant height of 290 cm was observed for GP-49 while minimum plant height of 152 cm was observed for GP-01. The line/variety GP-34 took maximum 86 days to 50% anthesis while GP-33 also took minimum 78 days.

#### 4. National Uniform Sorghum (Grain) Yield Trial.

Seven lines/varieties of Sorghum were planted on 03.08.2017 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 1.8m x 6m. 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 15.12.2017. The data recorded for different morphological traits are presented in Table 111.

**Table 111: Results of National Uniform Sorghum Grain Yield Trial (Kh-2017)**

Sr. No.	Entry Name	Crop Stand	Grain Yield (kg/ha)	Stalk Yield (kg/ha)	Plant Height (cm)	Days to 50% anthesis
1	TGS-01	119	2932	27855	180	76
2	Lasani	121	2654	29012	189	81
3	OMEGA F1	118	2469	14120	168	81
4	R 3636	116	2407	11034	116	70
5	Bolder	115	2238	24923	183	81
6	W 3535	120	1235	13657	125	85
7	Supreme F1	123	494	26697	301	78
	CV%	2.80	12.74	2.98	2.19	1.07
	LSD 5%	NS	467.03	1122.8	7.021	1.503

The above given results in Table 111 reveal that differences of means due to genotypes were significant for all traits under study except stand count. Maximum grain yield of 2932 kg/ha was recorded for line/variety TGS-01 while minimum grain yield of 494 kg/ha was recorded for Supreme F1. Maximum stalk yield was recorded for advance line Lasani i.e., 29012 kg/ha while minimum stalk yield was recorded for entry R3636 i.e. 11034 kg/ha. Maximum plant height of 301 cm was observed for Supreme F1 while minimum plant height of 116 cm was observed for R3636. Entry W3535 took maximum 85 days to 50% anthesis while R3636 took minimum 70 days.

#### 5. National Uniform Sorghum (Fodder) Yield Trial.

This trial was comprised of six lines/varieties of Sorghum were planted on 03-08-2017 to evaluate the promising lines/varieties for green fodder yield. The layout was done according to randomized complete block design with three replications in a plot size 1.8m x 6m. Plant to plant and row to row distances were kept 15cm and 30cm respectively. Standard/uniform agronomic and plant protection measures were carried out in the experiment. The harvesting for Fresh Fodder was done on 15-10-2017. The data recorded for different morphological traits are presented in Table 112.

**Table 112: Results of National Uniform Sorghum Fodder Yield Trial at D. G. Khan (Kh-2017)**

S #	Entry Name	Crop Stand	Green fodder Yield (kg/ha)	Dry Matter Yield (kg/ha)	Plant Height (cm)
1	YS-98	115	44213	8342	236
2	Healthy cow F1	112	42824	6310	267
3	SGD-013-1	115	36417	6506	225
4	SGD-013-2	110	35417	7861	236

5	Sorghum-2011 (C)	114	32562	7047	257
6	F-9706	113	30710	5204	244
	CV%	3.58	3.16	4.34	1.20
	LSD 5%	NS	2125.8	542.98	5.538

The above given results in Table 112 reveal that differences of means due to genotypes were significant for all traits under study. Maximum green fodder yield of 44213 kg/ha was recorded for line/variety YS-98 while minimum green fodder yield of 30710 kg/ha was recorded for F 9706. Highest Dry matter yield was recorded for advance line YS-98 i.e., 8342 kg/ha while minimum dry matter yield was recorded for entry F9706 i.e. 5204 kg/ha. Maximum plant height of 267 cm was observed for Healthy cow F1 while minimum plant height of 225 cm was observed for SGD-013-1.

## 6. Sorghum Gene Pool

Seventy six sorghum cultivars/lines comprising of local and exotic origin were sown on 31.07.2017 in strips having plot size 5m x 1.5m to maintain for breeding program. All entries were maintained by open pollination and guarded plants of each cultivar were harvested on 18.12.2017 and threshed carefully that will be sown for maintenance during Kh-2018.

### PEARL MILLET:

#### 1- Pearl Millet Varietal Yield Trial

Ten lines/varieties of Pearl Millet were planted on 03.08.2017 to evaluate the promising lines/varieties for grain yield. The layout was done according to Randomized Complete Block Design with three replications in a plot size 4m x 3m. Plant to plant and row to row distances were kept 20cm and 75cm respectively. Standard agronomic and plant protection measures were carried out in the experiment. The harvesting was done on 16.11.2017. The data recorded for different morphological traits are presented in Table 113

**Table 113: Results of Pearl Millet Varietal Yield Trial during Kh-2017**

Sr. No.	Entry Name	Crop Stand	Grain Yield (kg/ha)	Stalk Yield (kg/ha)	Plant Height (cm)	Days to 50% anthesis
1	YBS-94	67	1875	18541	227	67
2	YBS-83	67	1667	19583	224	69
3	YBS-93	69	1625	21666	237	71
4	YBS-98 (C)	69	1500	14167	214	68
5	YBS-70	67	1361	17083	266	71
6	YBS-89	70	1083	21806	225	69
7	YBS-92	67	1028	12361	218	65
8	18-BY (C)	62	917	15069	276	74
9	YBS-95	62	861	15277	219	59
10	YBR-5	62	708	14625	219	57
	CV%	3.83	11.07	16.35	1.45	1.84
	LSD 5%	NS	239.80	4677.7	5.78	2.12

The above given results in Table 113 reveal that differences of means among genotypes were significant for all traits under study except stand count. Maximum grain yield of 1875 kg/ha was recorded for YBS-94 which is followed by the entry YBS-83 having grain yield value of 1667kg/ha while minimum grain yield of 708 kg/ha was recorded for YBR-5. Highest stalk yield of 21806 kg/ha was recorded for YBS-89 while minimum stalk yield of 12361kg/ha was recorded for YBS-92. Maximum plant height of 276 cm was observed also for standard variety 18-BY while minimum plant height of 214 cm was observed for YBS-98. YBR-5 took minimum 57 days to 50% anthesis as compared to standard variety 18-BY which took maximum 74 days.

## 2. National Uniform Millet (Grain) Yield Trial

Ten lines/varieties of pearl millet were planted on 03.08.2017 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 3m x 4m. 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 17.11.2017. The data recorded for different morphological traits are presented in Table 114.

**Table 114: Results of National Uniform/Adaptability Millet Grain Yield Kh-2017**

Sr. No.	Entry Name	Crop Stand	Grain Yield (kg/ha)	Stalk Yield (kg/ha)	Plant Height (cm)	Days to 50% anthesis
1	TMLT-01	68	2444	18611	173	64
2	HM 535	56	2306	13333	196	67
3	86 M 90	63	2278	21250	183	65
4	TMLT-02	67	2139	17777	194	64
5	YBS-98 (check)	65	1805	17847	208	63
6	86 M 16	59	1778	14722	174	64
7	14 RBS-05	58	1472	18611	232	67
8	14 RBS-01	52	1417	17777	223	65
9	55 S 85	63	1333	15347	186	68
10	YBS-95	60	1042	14722	222	67
	CV%	3.78	10.63	3.12	1.60	1.69
	LSD 5%	NS	328.45	910.82	5.466	1.89

The results presented in the above Table 114 reveal that differences of means among genotypes were significant for all the traits under study except stand count. Maximum grain yield of 2444 kg/ha was recorded for line/variety TMLT-01 while minimum grain yield of 1042 kg/ha was recorded for YBS-95. Maximum stalk yield was recorded for advance line HM-535 i.e., 21250 kg/ha while minimum stalk yield was recorded for entries 86 M 16 and YBS-95 i.e. 14722 kg/ha for each. Maximum plant height of 232 cm was observed for 14 RBS-05 while minimum plant height of 173 cm was observed for TMLT-01. Entry 55 S 85 took maximum 68 days to 50% anthesis while YBS-98 (check) took least 63 days.

## 2. On-Farm Pearl Millet Yield Trial

Two advance lines and a standard variety YBS-98 of pearl millet were tested at two different locations in D. G. Khan division to evaluate the performance/adaptability of the material on farmer's field in a plot size of one kanal. Plant to plant and row to row distances were kept 20 cm and 75cm respectively. The data recorded for grain yield is presented in Table 115.

**Table 115: Results of On-Farm Pearl Millet Yield Trail at D. G. Khan, Kharif-2017**

Sr. No.	Address of location	Grain yield (kg/ha)		
		YBS-89	YBS-95	YBS-98 (Check)
1	Muhammad Mirza R/O Mouza chak Buzdar Chotti Zareen Distt. D. G. Khan	1265	1106	1344
3	Atta Ullah S/O Rasool Bukhsh Mouza Muhammad Hora,Jampur,Rajanpur.	1186	1027	1284
<b>Average</b>		1225	1066	1314

The above Table 115 shows that the Variety YBS-98 gave maximum grain yield on an average i.e. 1314 kg/ha as compared to rest of the varieties of the trial at two different locations in D.G. Khan Division.

## ADMINISTRATION STAFF POSITION

Sr. No.	Designation of the Post.	Staff in Position	Number of Vacant Post	Total Sanctioned Strength
1	Director	-	01	01
2	Maize Botanist	01	-	01
3	Sorghum Botanist	01	-	01
4	Associate Maize Botanist	01	-	01
5	Associate Millet Botanist	01	-	01
6	Agronomist	-	01	01
7	Assistant Botanist Maize	07	-	07
8	Assistant Botanist Millet	01	-	01
9	Assistant Botanist Sorghum	01	-	01
10	Assistant Agronomist	02	-	02
11	Assistant Entomologist	01	-	01
12	Assistant Agricultural. Chemist	-	01	01
13	Assistant Statistician	-	01	01
14	Assistant Research Officer	17	03	20
15	Superintendent	-	01	01
16	Field Assistant	16	11	27
17	Plant Observer	10	03	13
18	Ministerial Staff	12	03	15
19	Laboratory Assistant	02	01	03
20	Computer Operator	01	-	01
21	Stenographer	01	01	02
22	Foreman	01	-	01
23	Mechanic	01	-	01
24	Driver	05	-	05
25	Electrician	01	-	01
26	Naib Qasid	07	-	07
27	Tube well Operator	05	01	06
28	Beldar	40	06	46
29	Chowkidar	05	01	06
30	Mali	01	-	01
31	Sweeper	01	-	01
32	Cook	01	-	01
<b>Total</b>		<b>143</b>	<b>35</b>	<b>178</b>



## LIST OF RESEARCH STAFF

Sr. No.	Name of Officer	Designation	Qualification
1	Dr. Muhammad Arshad	Maize Botanist	Ph.D.
2	Mr. Muhammad Rafique	Associate Maize Botanist	M. Sc. (Hons) Agri.
3	Dr. Irshad-ul-Haq	Associate Millets Botanist	Ph.D.
4	Mr. Dilbar Hussain	Sorghum Botanist	M. Sc. (Hons) Agri.
5	Malik Riaz Hussain	Assistant Botanist Maize	M. Sc. (Hons) Agri.
6	Mr. Muhammad Hussain Chaudhry	Assistant Botanist Maize	M. Sc. (Hons) Agri.
7	Mr. Muhammad Saeed	Assistant Botanist Maize	M. Sc. (Hons) Agri.
8	Rana Abdul Hamid Khan	Assistant Botanist Maize	M. Sc. (Hons) Agri.
9	Mr. Aamir Hussain	Assistant Botanist Maize	M. Sc. (Hons) Agri.
10	Mr. Ahsan Raza Mahli	Assistant Botanist Maize	M. Sc. (Hons) Agri.
11	Mr. Amjad Khan Tareen	Assistant Entomologist	M. Sc. (Hons) Agri.
12	Mr. Khadim Hussain	Assistant Botanist Maize	M. Sc. (Hons) Agri.
13	Mr. Ehsan-U-Allah	Assistant Botanist Sorghum	M. Sc. (Hons) Agri.
14	Dr. Javaid Iqbal	Assistant Agronomist	Ph.D.
15	Mr. Asrar Mehboob	Assistant Agronomist	M. Sc. (Hons) Agri.
16	Dr. Muhammad Shoaib	Assistant Research Officer	Ph.D.
17	Mr. Shahid Hussain	Assistant Research Officer	M. Sc. (Hons) Agri.
18	Mr. Aamir Ghani	Assistant Research Officer	M. Sc. (Hons) Agri.
19	Mr. Muhammad Shakeel	Assistant Research Officer	M. Sc. (Hons) Agri.
20	Mr. Muhammad Altaf	Assistant Research Officer	M. Sc. (Hons) Agri.
21	Miss. Saeeda Khanum	Assistant Research Officer	M. Sc. (Hons) Agri.
22	Mrs. Zaib-un-Nisa	Assistant Research Officer	M. Sc. (Hons) Agri.
23	Mr. Barkat Ali	Assistant Research Officer	M. Sc. (Hons) Agri.
24	Mr. Naveed Kamal	Assistant Research Officer	M. Sc. (Hons) Agri.
25	Mr. Aamer Mumtaz	Assistant Research Officer	M. Sc. (Hons) Agri.
26	Dr. Waseem Akbar	Assistant Research Officer	Ph.D.
27	Mr. Muhammad Irfan Yousaf	Assistant Research Officer	M. Sc. (Hons) Agri.
28	Mr. Hafiz Mutahir Javed	Assistant Research Officer	M. Sc. (Hons) Agri.
29	Miss Saira Saleem	Assistant Research Officer	M. Sc. (Hons) Agri.
30	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-Sahiwai (Headquarter)	1671.0	Research and Maize Seed Production Farm.
2.	Maize Sub-Station, Chak 86/9-L, Sahiwai.	459.625	Research and Maize Seed Production Farm.
3.	Maize Seed Farm, Chak 1 1/14-L, Iqbalnagar District Sahiwai.	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 Murree	0.781	Development work on maize.

## FINANCIAL STATEMENT

Year	Allocation (Rs.)	Expenditure (Rs.)	Target (Rs.)	Income (Rs.)
2009-2010	33,321,000	32,674,726	3,220,000	2,772,758
2010-2011	45,117,000	44,657,876	4,250,000	2,591,967
2011-2012	53,819,000	52,830,336	2,700,000	2,968,174
2012-2013	64,957,300	65,194,794	2,900,000	5,085,828
2013-2014	72,818,600	70,717,588	6,180,000	5,490,731
2014-2015	71,407,800	69,997,676	6,688,000	7,589,931
2015-2016	78,050,000	77,147,941	5,680,000	8,997,133
2016-2017	93,880,600	92,589,983	10,643,400	11,127,299
2017-2018	96,159,924	95,303,116	10,200,000	11,299,240

Following heads are being operated.

Under Grant No PC-21018-Agriculture-50000 Economic Services

51000 Agriculture & Food

51300 Agriculture Services Extension Services Non-Development

## **PROBLEMS AND BOTTLENECKS**

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

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

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

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

## ABRIDGED REPORT 2017-18



**DR. Muhammad Arshad**  
Director

**MAIZE & MILLETS RESEARCH INSTITUTE, YUSAFWALA (SAHIWAL)**  
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### OVERVIEW

The Institute is located in Yusafwala, Sahiwal district. The research and seed production work of maize was started at 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 pre-basic and basic seed production. Maize Research Sub-Station, Faisalabad was established in 1978 and up graded as Research Station in 1990. Hybrid development program was started in 1994. 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 Pakistan's economy due to its diversified uses as food and feed especially in poultry industry. Per hectare yield of maize has been increased from 1890 kg/ha (2001-02) to 4595 kg/ha (2016-17) in Punjab due to adoption of hybrids. In maize 12 OPV's, 14 hybrids, four varieties of sorghum and two varieties of pearl millet have been released so far. Presently nine (9) maize hybrids, two maize OPVs and one elite sorghum hybrid are being tested in National Uniform Yield Trials and under DUS studies. Spot examination of OPVs of Maize YY-15, YW-786, CZP132001 and YPC-14 will be done during the current year. 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 bill incurred on maize and sorghum seed. Salient features of the research work conducted in 2017-18 are as under:

## **HYBRID MAIZE**

### **Maintenance and Derivation of Yellow Maize Inbred Lines**

At Maize & Millets Research Institute (MMRI), Yusafwala six hundred thirty eight (638) and three hundred eleven (311) in Kharif-2017 while seven hundred and ninety six(796) and one hundred and fifty one(151) inbred families of elite and pre elite inbred lines respectively were sown ear to row in Spring-2018 for maintenance and seed increase by hand . 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, tasselling, stalk rot infestation and other required parameters were recorded for all the lines separately.

Two hundred sixty two (262) derivative families were sown ear to row during spring 2018 for inbreeding through hand pollination. Plants selected on the basis of desirable traits like erect to semi erect leaves, medium to heavy tassel, cob length, low cob placement, strong root anchor and disease tolerance were self-pollinated in all the families.

### **Maintenance and derivation of white maize inbred lines**

Ninety five (95) inbred lines and one hundred & forty three (143) derivative families of different generations were sown in ear to row fashion during kharif-2017 for maintenance and derivation of inbred lines through hand pollination. Sixty seven (67) inbred lines were finally selected and maintained while 27, newly derived inbred lines, were also added in maintenance which resulted in 94 inbred lines.

At maturity, selfed plants were harvested, and seed of 131 families

was collected / added for further derivation and selection cycles.

During Spring-2018, 131 derivative families were sown in ear to row fashion for derivation of inbred lines. At maturity, selfed plants were harvested, and their seed was collected for further derivation and selection cycles

### **Hybrid Constitution**

Development of high yielding maize hybrids tolerant to diseases, insects and temperature is a continuous project. At MMRI, Yusafwala forty five (45) single crosses with three males while one hundred sixty eight (168) single crosses also with three males were constituted in Kharif-2017 and Spring-2018 respectively in isolated blocks through de-tasselling of female lines for evaluation in coming seasons. At MRS, Faisalabad one hundred and eight (108) new single cross hybrids were constituted in two isolations and by hand pollination during kharif-2017.

### **Hybrid Evaluation**

#### **Preliminary Yield Trials**

Objective was to select high yielding newly constituted hybrids. At MMRI, Yusafwala, Fifty two (52) single cross entries were evaluated in two preliminary yield trials along with different commercial checks. The trials were laid out in RCBD with two replications. The observation pertaining to germination %age , days to 50% silking and tasseling, plant height, cob height and yield per plot were recorded and the yield results of the promising hybrids among all entries were also recorded. Local hybrid YH-5535 giving 11534 and 10025 kg/ha respectively during kharif 2017. Similarly during spring 2018 the yield results of the promising

hybrids among all entries were also recorded. Statistically significant differences were also found among hybrids regarding grain yield kg/ha. YH-5482 gave maximum grain yield 11625 kg/ha against check.

**Fig 1: High Yielding Maize Hybrid (YH-5535)**



**Fig 2: High Yielding Maize Hybrid (YH-5421)**

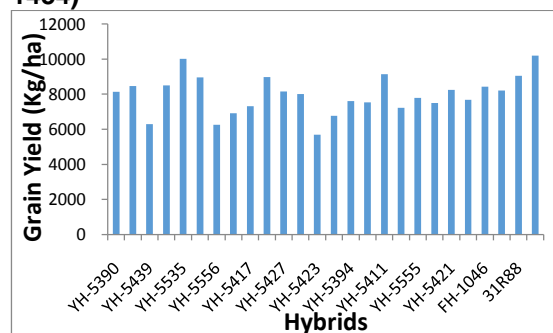
At MRS, Faisalabad, Eighty one (81) single cross hybrids were evaluated in three trials consisting of 27 hybrids each during Kharif-2017. Local hybrids FH-1458, FH-1474, FH-1269 and FH-1454 with grain yield of 13903, 10273, 10056 and 9649 kg/ha respectively were higher yielder than average grain yield of commercial hybrids DK-6789 (8702 kg/ha) and HIC-339 (7324 kg/ha).

One hundred and four (104) single cross hybrids were evaluated in four trials consisting of 26 hybrids each during Spring 2018. Local hybrids FH-1628 (9609 kg/ha), FH-1616 (9280 kg/ha), FH-1618 (9274 kg/ha), FH-1605 (9106 kg/ha), FH-1662 (9038 kg/ha) and FH-1622 (9005 kg/ha) were higher yielder than average grain yield of commercial hybrids DK-9108 (7592) and CS-5800 (3965), NK-8441 (5794) and FH-1046

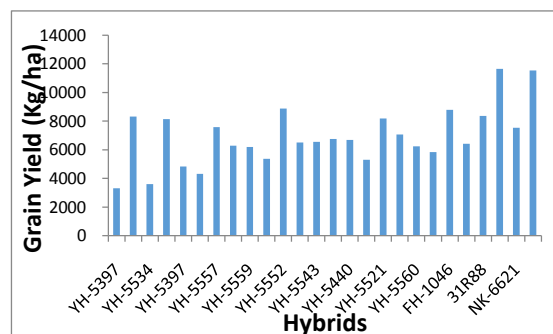
(7356) local check hybrid.



**Fig 3: High Yielding Maize Hybrid (FH-1454)**



**Fig. 5. Preliminary Hybrid Maize Yield Trial 1**



**Fig. 6. Preliminary Hybrid Maize Yield Trial II**

### Micro Yield Trials



**Fig 7: High Yielding Maize Hybrid (YH-5533)**

Objective was to select high yielding single crosses having desirable characteristics. 52 single crosses were sown in RCBD, with 2 replications and two rows of 5m per plot, keeping standard rows and plants spacing and agronomic/plant protection practices during spring 2018 in two micro plot maize yield trails. Statistically significant differences were observed among hybrids regarding grain yield kg/ha. Local hybrid YH-5427 with grain yield 11042 kg/ha was found higher yielder as compared to multinational checks.



At MRS, Faisalabad thirty (30) single cross hybrids were evaluated in two trials consisting of 15 hybrids each during Kharif 2017. Local hybrids FH-1278, FH-1341, FH-1210 and FH-1312 with grain yields 8235, 7981, 7729 and 7329 kg/ha respectively, were found higher yielder as compared to multinational checks DK-6789 (7617 kg/ha) and HIC-339 (7143 kg/ha) on average basis.

Fifty two (30) single cross hybrids were evaluated in four trials consisting of 13 hybrids each during Spring 2018. Local hybrids FH-1290, FH-1392, FH-1412 and FH-1472 with grain yields 9182, 9687, 8641 and 9640 kg/ha respectively, were found higher yielder as compared to multinational checks NK-8441 (4123 kg/ha) and CS-5808 (7334 kg/ha) on average basis.



**Fig 9: High Yielding Maize Hybrid (FH-1278)**



**Fig 10: High Yielding Maize Hybrid (FH-1312)**

### **Macro Yield Trials**

In macro yield trials FH-950, FH-1137 and FH-1125 with respective grain yields 9881, 9818 and 9779 kg/ha were found better yielder than commercial checks HIC-339 (8975 kg/ha) and DK-6789 (8361 kg/ha) on Avg. basis.

During Spring 2018 in macro yield trials FH-1012, FH-1166 and FH-922 with respective grain yields 10342, 8782 and 8589 kg/ha were found better yielder than commercial checks NK-8441 (6433 kg/ha) and CS-5808 (6863 kg/ha) and local check FH-949 (6898) and FH-1046 (8521) on Avg. basis

### **National Uniform Maize Hybrid Yield Trial**

The objective was to check adaptability of different national and multinational maize hybrids in different agro-climatic zones across the country. A trial consisting of 83 hybrids in Kharif, 2017 received from the National Co-coordinator PARC, Islamabad was laid out in Alpha

Lattice design with three replications. Plot size was kept 4mx0.75mx2. The results revealed that hybrid code 49 and 71 exhibited the highest grain yield of 9248 and 9084 kg/ha respectively.

Two trials consisting of 55 and 21 hybrids in spring-18 received from the National Coordinator, PARC, Islamabad was laid out in Alpha Lattice design with three replications. Plot size was kept 4mx2.25m. The results revealed that hybrid codes 53, 19 (Trial 1) and 2, 11 (Trial 2) exhibited the highest grain yield of 12667, 12133, 12500 and 12366 kg/ha respectively.

At MRS, Faisalabad, in National Uniform Yield Trial (Yellow) during kharif 2017, entry No. 54, 16 & 15 with respective yield values 9500, 9447 and 9300 kg/ha were found higher yielder. In NUMYT (White) entries 34 & 40 yielded 9144 and 8809 kg/ha respectively while in varietal trial entry 8 (5378 kg/ha) and 4 (5290 kg/ha) were better yielder and sweet corn variety 4 was showing good yield of 3566 kg/ha.

During Spring 2018, entry No. 14, 7 & 52 with respective yield values 11445, 10177 and 9599 kg/ha were found higher yielder. While in NUMYT (OPV) entries 7, 4 & 10 yielded 5576, 5549 and 5513 kg/ha respectively.



Fig 11: Maize Candidate Hybrid (FH-1137)



Fig 12: Maize Candidate Hybrid (YH-5427)

### Seed Production of Maize Parental Inbred Lines

Promising inbred lines Y-56, Y-36, Y-222, DRL-16, DR-73, and PLP23 were sown in isolated blocks for seed increase in kharif-2017. Similarly, inbred lines DDR-29, SL-7, DR-72, DR35, DR-56, DR-135, and PLp23 were sown in Spring-2018 for seed increase.

### ON GOING ADP PROJECT EVALUATION OF SINGLE CROSSES FOR HEAT TOLERANCE

Objective was to select high yielding temperature tolerant single crosses having desirable characteristics. 46 single crosses were sown late in March, with 2 replications and one row of 5m per plot, keeping standard row to row and plant to plant spacing and agronomic/plant protection practices during spring 2018 in two preliminary maize yield trails. Statistically significant differences were observed among hybrids regarding grain yield kg/ha. Local hybrid YH 5555 with grain yield 9536 kg/ha- was found higher yielder as compared to multinational checks.

Six on-farm demonstration trials of nine maize hybrids were conducted at different locations in Punjab under ADP project. Promising hybrid YH-5482 performed the best under heat conditions and gave yield of 9770 kg/hac.



## MAIZE OPVs

### Improvement of OPV YY-15

Seed from spring 2017 was sown in an isolation of 1 kanal during Kharif 2017 and Spring 2018. Open pollination was allowed. Selection was made on the basis of plant height, stem girth, cob length and cob placement at 8<sup>th</sup> node with medium tassel. Cobs were collected from the selected plants and seed was kept for next sowing season after table selection.

### National Uniform Maize Yield Trial (OPVs)

The trial comprising of 11 entries received from National Coordinator (Cereal System), Pakistan Agriculture Research Council in Kharif 2017 with the instructions and data sheet. The results revealed that entry 2 stood first and entry 5 was second by giving grain yield 7089 and 5976 kg/ha. Respectively, followed by entry 1 which showed 5884 kg/ha yield.



Fig 13: High Yielding Candidate OPV (YY-15)

### Micro Plot Maize Yield Trial (OPVs)

The trial comprising of eight (8) maize OPVs was sown RCB design with three repeats during kharif 2017. Result revealed that promising line YY-15 stood 1<sup>st</sup> position by giving grain yield of 6808 kg/ha followed by YW-787 with grain yield of 6002 kg/ha while Agaiti-85 gave the minimum grain yield of 2933 kg/ha.

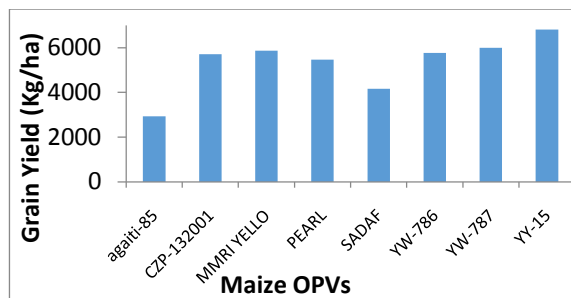


Fig 14: Micro Plot Maize Yield Trial (OPVs) (Yellow and White)

### Seed Production of Maize OPVs

For seed production, Pearl, Pop corn, Sweet Corn, YW-786, YSC-15, YPC-14, were planted in isolation and 53.0 kg (Pearl BNS), 1350 kg (Pearl Pre-basic), 5750 kg (Pearl Certified), 2.0 kg (YPC-14 BNS), 1.5 kg (YSC-15 BNS), 10.0 kg (YW-786 BNS), 390 kg (CZP-132001), 125.0 kg (POP Corn), 140.0 kg (Sweet Corn) and 10.0 kg (Pool-60), seed was produced during Kharif 2017.

### Effect of Plant Spacing on grain yield of hybrid seed production YH-1898

The trial was conducted during Kharif 2017 and Spring 2018. Data regarding grain yield and its components were recorded and statistically analyzed. The data showed that different plant spacing significantly affected grain yield. Maxim grain yield 813.75 kg/ha was obtained on 5" plant spacing, however it was statistically at par with 6" spacing (747.0 kg/ha).

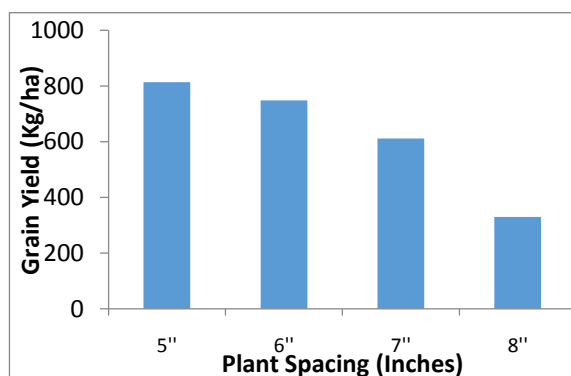
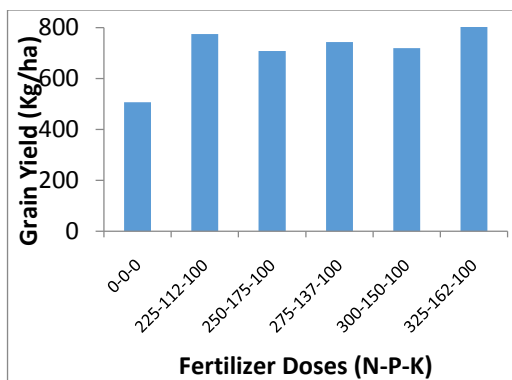


Fig 16: Effect of Plant Spacing on grain yield of hybrid seed production YH-1898

**Effect of different fertilizer levels on grain yield of hybrid seed production YH-1898**

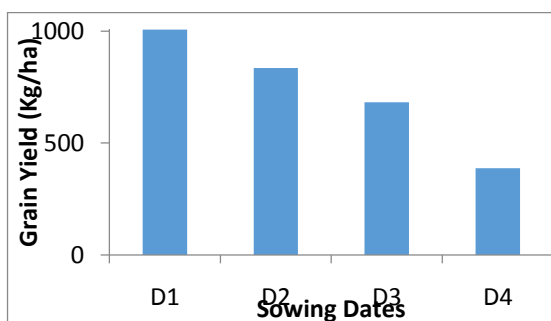
The trial was conducted during Kharif-2017. Maximum grain yield of 808 kg/ha was obtained when NPK @ 325-162-100 kg/ha were applied. Minimum grain yield of 387.5 kg/ha was obtained when no fertilizer was applied in Kharif 2017.



**Fig 17: Effect of different fertilizer levels on grain yield of hybrid seed production YH-1898**

**Effect of sowing date on grain yield of hybrid seed production YH-1898**

The trial was conducted during Kharif-2017. Data regarding grain yield and its components were recorded. Maximum grain yield of 1006.5 kg/ha was obtained when crop planted on 1<sup>st</sup> August (D1). As, the planting delayed with the interval of 10 days the yield continued decreasing. The lowest grain yield of 387.5 kg/ha was obtained when crop was planted on 10<sup>th</sup> September.



**Fig 18: Effect of sowing date on grain yield of hybrid seed production YH-1898**

**SORGHUM**

**Germplasm Maintenance and Hybrids Constitution**

One hundred and twenty six gene pool entries were planted at Yusufwala & seventy six entries were planted at D.G. Khan and 5 plants in each entry were maintained by covering the panicles. Four entries from Yusufwala were rejected due to disease susceptibility. Remaining Sorghum lines were maintained. Fourteen CMS (A) lines with their counterpart (B) lines and twenty six fertility restorer (R) lines were planted at Yusufwala. Thirty one (CMS x R) crosses were constituted (24 in two isolations and 7 by hand). 12 CMS (A) lines were planted with Sudan grass for sorghum x Sudan grass crosses and ten crosses were constituted for planting in spring 2018. Ten F<sub>3</sub> families were selected from F<sub>2</sub> in Kharif 2017. Twenty F<sub>3</sub> families were planted and phenotypically superior plants from families were selected and 6 F<sub>4</sub> generations were harvested for raising their next filial generation. Seven F<sub>5</sub> families were planted and eight entries were selected based on their head length and brix value. 67 mutated entries of M<sub>3</sub> were planted, two CMS lines were identified from them and 45 M<sub>4</sub> entries were selected based on their head length and brix value.

**Evaluation of Hybrids and OPVs**

- (i) Sixteen (CMS x R) hybrids and two checks were tested in a hybrid yield trial at MMRI, Yusufwala and SRSS, D. G. Khan. The results revealed that YSH-138 gave significantly higher yields (3627 kg/ha) followed by YSH-128, (3202 kg/ha) in comparison to check Lasani which was 2725 kg/ha at MMRI, while at SRSS, D. G. Khan, YSH-95 gave significant higher

grain yields 4756 kg/ha followed by YSH-115 (4400 kg/ha).

- (ii) Nine entries with three checks were tested in another trial at MMRI, Yusafwala. The results revealed that YSH-129 gave significantly higher yields (4000 kg/ha) followed by YSH-137 yield 3392 kg/ha in comparison to check YS-16 which yielded 2600 kg/ha.
- (iii) Eight entries were tested in a varietal yield trial at MMRI, Yusafwala and SRSS, D. G. Khan. The results revealed that YSS-10 and YSS-42 gave significantly higher yields (4489 and 4422 kg/ha) at MMRI, while at SRSS, D. G. Khan, YS-16 (check) gave highest grain yields (3378 kg/ha).

### National Uniform Yield Trial

Seven entries were planted in a trial at MMRI, Yusafwala and D.G. Khan. The results revealed that entry 2 gave highest yield (4864 kg/ha) followed by entry 1 (3945 kg/ha) at MMRI and entry TGS-013 gave significantly the highest grain yield of 2932 kg/ha. The entry Lasani proved good stalk yielder having yield value of 29012 kg/ha under local conditions of D.G. Khan.

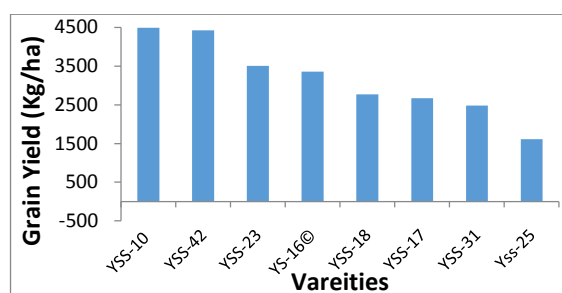


Fig 19: Sorghum Varietal Yield Trial

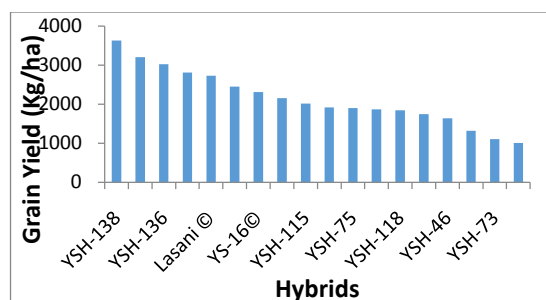


Fig 20: Sorghum Hybrid Yield Trial 1

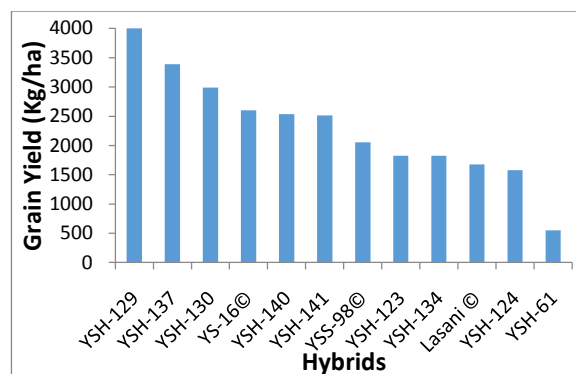


Fig 21: Sorghum Hybrid Yield Trial II



Fig 22: A high yielding sorghum variety YS-16

### Pearl Millet Maintenance of Germplasm / Derivations / Constitutions

Sixteen gene pool entries, eight YCMS (A) lines with respective counterpart (B) lines and fifteen more YCMS B-lines, twenty five YCMP (R) lines, were maintained by hand pollination. Thirty two segregating families were sown for selection of desirable plants/families for derivation of R-lines. Three to four heads in each family were selfed and harvested for planting next generation at MMRI, Sahiwal. At MRS, Rawalpindi, Forty four lines were sown during kharif -2017. Forty two lines were maintained through hand pollination while two lines were discarded due to poor performance. Three superior lines from gene pool were selected for further evaluation in micro trial.

Eight new crosses with non-counterpart B lines were made with A-line to derive new CMS A lines. Twenty Three new crosses were made for the development of new promising high yielding OPVs.



**Fig 23. Maintenance of Pearl millet germplasm**

### **Development of Dual Purpose Pearl Millet Variety**

Sixty five single plants from F<sub>2</sub> populations, thirty eight from S<sub>1</sub> population and twelve lines from S<sub>2</sub> Populations respectively were selected for further evaluation. Eight superior lines were selected from S<sub>3</sub> population.

### **Yield Evaluation**

#### **Pearl Millet Micro Yield Trials**

Three varietal trials comprising nine entries with one check each were evaluated at MRS, Rawalpindi. The result showed that in first trial the check variety, 86M16 gave maximum yield (3623kg/ha) followed by 16RBS-10 (3111kg/ha). While genotype 16RBS-16 gave minimum yield of 1423kg/ha. In second trial Four genotypes viz., 13RBS-10 (3444 kg/ha), 16RBS-22 (2930 kg/ha), 16RBS-23 (2910 kg/ha) and 16RBS-20(2904 kg/ha significantly out yielded the check variety YBS-98 (2203 kg/ha). In third trial, hybrid 86M90 gave maximum yield (3798 kg/ha) followed by 15RBS-01 (2965 kg/ha) and 15RBS-06 (2890 kg/ha).

While 1422 kg/ha yield was recorded for the genotype 15RBS-01.

### **Pearl Millet Varietal Yield Trial**

In pearl millet varietal yield trial, ten varieties were evaluated for yield at Yusafwala, D. G. Khan and MRS, Rawalpindi. The results showed that YBS-89 ranked first by producing grain yield of 2260 kg/ha at MMRI, Yusafwala, YBS-94 ranked first by producing 1875 kg/ ha yield at SRSS, D.G. Khan followed by YBS- 83 with yield of 1667 kg/ha and The check variety YBS-98 gave maximum yield (2700 kg/ha) followed by YBS-95 (2255 kg/ha).

### **National Uniform Pearl Millet Hybrid Yield Trial**

Three sets of a trial comprising of eleven entries were received from the National Coordinator (Cereal System), PARC, Islamabad during kharif 2017. The results revealed that 86M90 out yielded with 1773 kg/ha followed by TMLT01 with 1504 kg/ha at MMRI. Hybrid (HM-535) gave maximum grain yield of 3418 kg/ha followed by YBS-98 (check) (2958kg/ha) and RBS 01 (2850 kg/ha) whereas, hybrid HS-888 produced minimum grain yield (1663 kg/ha) at MRS, Rawalpindi and entry TMLT-01 gave significantly the highest grain yield of 2444 kg/ha followed by HM-535 with yield value of 2306 kg/ha. These entries proved good yielder under conditions of D.G. Khan.

### **Pearl Millet Micro Yield Trial**

- (i) The results showed that Genotype 15RBS-07 gave maximum yield (2882 kg/ha) followed by 15RBS-03 (2164 kg/ha) while check variety YBS-98 gave 1102 kg/ha yield in first trial.
- (ii) The genotype 14RBS-05 gave maximum yield (2326 kg/ha) followed by 14RBS-01 (2189

kg/ha). The yield recorded for check variety YBS-98 was 1575 kg/ha in trial 2.

Seed Production of Maize, Sorghum and Pearl Millet Crop 2017-18			
	Pre Basic	Basic	Total kg
Maize Hybrid	-	-	3780
Maize OPV	5730	2560	8390
Sorghum	444	4500	4944
Pearl Millet	-	1257	1257

### (iii) AGRONOMIC STUDIES

#### Determination of Optimum Plant Spacing for Maize Hybrids

Trials were conducted during kharif 2017 following RCB design with four replications to determine effect of plant spacing on grain yield of maize hybrid YH-5140. In Kharif-17 maximum grain yield (6923 kg/ha) was recorded at 5 inch plant spacing (106666 plants ha<sup>-1</sup>) while all other plant spacings produced statistically similar grain yield but lower than T<sub>1</sub> (5 inch).

#### Effect of Different Planting Methods on Grain Yield of Maize OPV (YW-786)

During kharif 2017 and spring-2018 trial was conducted following RCB design with four replications keeping plot size 5 × 5.25m. Data regarding the plant stand, days to 50% silking, plant height, cob height and grain yield were recorded and analyzed statistically. In Kharif-2017, T<sub>1</sub> {Ridge Sowing R-R (30") sowing on one side} produced significantly highest grain yield (9045 kg/ha) of maize OPV YW-786, which is statistically at par with T<sub>4</sub> {Bed Sowing B-B (48") both side} by producing 8567 kg/ha. Whereas T<sub>2</sub> {Bed Sowing B-B (36") both side} produced minimum yield of 7627

kg/ha. Planting methods also effected the No. of cobs/ha and fresh cob weight significantly. However the effect of treatments on plant height, cob height and days to 50% silking was not significant. In spring 2018, higher grain yield was achieved by T<sub>2</sub> {Bed Sowing B-B (36") which was also statistically equal to T<sub>1</sub> {Ridge Sowing R-R (30")

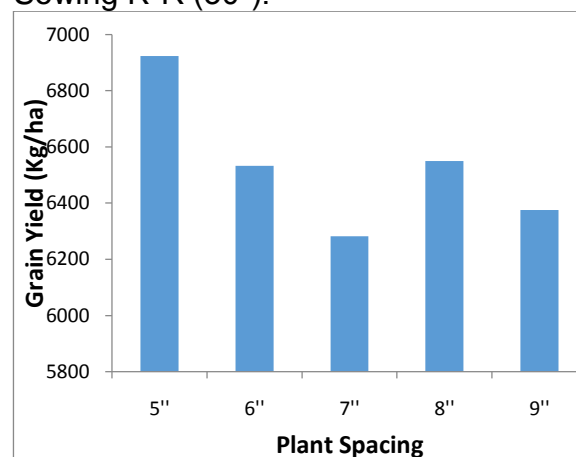


Fig 24: Determination of Optimum Plant Population for Maize Hybrid (YH-5140)

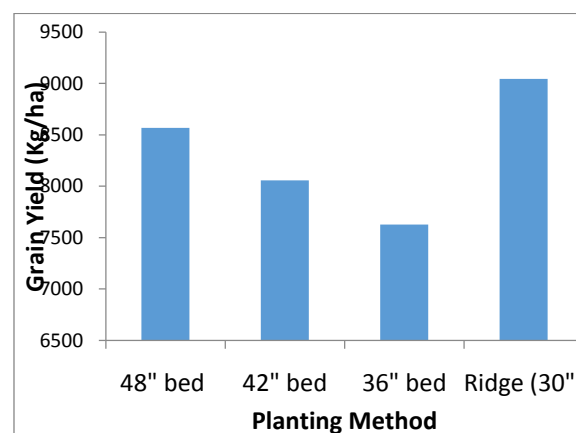


Fig 25: Effect of Different Planting Methods on Grain Yield of Maize (OPV) YW-786

#### Effect of Optimum Plant Spacing on Grain Yield of Promising Pearl Millet Variety (YBS-95)

In kharif 2017, trial was laid out in RCB design with four replications keeping plot size 5 × 3m to determine grain yield of YBS-95 as affected by different plant populations. The results revealed that different plant densities under study significantly

affected No. of nodes/plant, No. of tillers/plant however grain yield remained non-significant of pearl millet variety YBS-95. However maximum grain yield of 3773 kg/ha<sup>-1</sup> was recorded when plants were sown at 10 inches spacing followed by at 11 inches spacing with grain yield of 3619 kg/ha

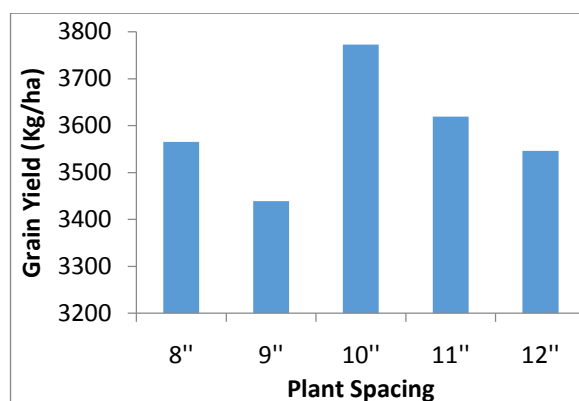


Fig 26: Effect of Optimum Plant Spacing on Grain Yield of Promising Pearl Millet Variety (YBS-95)

#### Determination of Optimum Plant Spacing for Sorghum Hybrid (YSH-95)

During kharif 2017 experiment was laid out under RCB design with four replications keeping plot size 5 × 3m to determine gain yield of sorghum hybrid YSH-95 as affected by different plant population levels. The results indicated that plant population levels significantly affected the plant height, No. of heads, total head weight and grain yield. Tallest plants were observed when plants were sown at 8 inch spacing while shortest plants were observed in 12 inch spacing. Maximum grain yield (5404 kg/ha) was recorded at 9 inch plant spacing followed by at 10 inch plant spacing (4671 kg/ha). However least yield (3575 kg/ha) was recorded at 11 inch plant spacing.

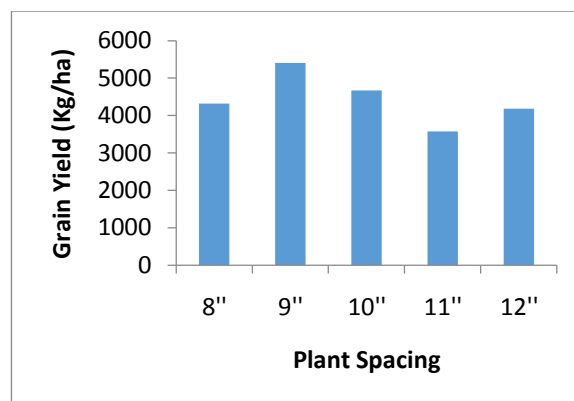


Fig 27: Determination of Optimum Plant Spacing for Sorghum Hybrid (YSH-95)

#### AGRONOMIC STUDIES UNDER DRIP IRRIGATION SYSTEM AT WATER MANAGEMENT RESEARCH FARM, RENALA KHURD, OKARA

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

Four sowing geometries viz. T1) sowing on one side of 75cm apart ridges with plant spacing of 20cm, T2) sowing on both sides of 90 cm wide beds with plant spacing of 32.5 cm, T3) sowing on both sides of 105 cm wide beds with plant spacing of 28.75cm and T4) sowing on both sides of 120 cm wide beds with plant spacing of 25 cm were evaluated under drip irrigation. The experiment was sown on 21-08-2018. Treatments were applied in randomized complete block design with four replications. Net plot size was of 5.25 m × 4 m for treatment 1 and 3 while 5.4m × 4 m for treatment 2 and 4.8m × 4m for treatment 4 for data collection. Results revealed that that T3 (sowing on both sides of 105 cm spaced beds with 28.75 cm plant spacing) is more suitable planting geometry for maize under drip irrigation system that produced grain yield of 6005 kg/ha. It may further be concluded that ridge sowing is less efficient planting method compared to bed planting under drip irrigation system that

produced only 4537 kg/ha grain yield. However in spring season higher grain yield was achieved under 90 cm wide beds which was followed by the grain yield produced by 75 cm spaced ridges

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

Experiment was conducted in autumn-2017 and spring-2018. Treatment consists of four fertilizer level of 83-33-83 kg/ha. Treatments are viz. 1) 100% recommended, 2) 75% recommendation, 3) 50 % of recommendation and 4) 25% of the recommendation. Crop was sown on 75 cm wide ridges while sowing was done on one side of the ridge with plant spacing of 20 cm. Treatments were laid in randomized complete block design with four replication. Gross plot size of 14m x 4m was maintained, however net plot size of 5.25 m x 4 m was allotted for data collection. Results revealed that in both the seasons, treatments with 100% and 75% of recommended fertilizer produced the highest but similar grain yield of 596 kg/ha (100%) and 5916 kg/ha (75%) in autumn and 12735 kg/ha (75%) and 12177 kg/ha (75%) in spring. This suggests that 25% of fertilizers can be saved under drip irrigation system without economic yield loss.



**Fig 28: Drip Irrigation System at Water Management Research Farm, Renala Khurd, Okara**

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

Experiment was conducted in autumn-2017 and spring-2018. Treatments consists of four MAD levels viz. 1) 15% MAD, 2) 30% MAD, 3) 45% MAD and 4) 60% MAD. Crop was sown on 75 cm wide ridges while sowing was done on one side of the ridge with plant spacing of 20 cm. Treatments were laid in randomized complete block design with four replication. Gross plot size of 14m x 4m was maintained, however net plot size of 5.25 m x 4 m was allotted for data collection. Results revealed that maize grain yield did not varied significantly among first three MAD levels (15%, 30% and 45% MAD levels) in autumn season while in spring season soil moisture depletion beyond 30% lowered the grain yield significantly. However lowest grain yield of 5400 kg/ha and 8054 kg/hain autumn and spring, respectively, was recorded at 60% MAD level. These results suggest that under drip irrigation system, maize crop may be irrigated upto 45% MAD in autumn season while upto 30% MAD in spring season without serious yield loss.

### **ENTOMOLOGY**

#### **Testing of spray able insecticides against shootfly and maize borer (Kharif-2017)**

Four insecticides namely Tri Super 40 EC, Trizone 40 EC, Lamcin 2.5 EC and Jatar 10 EC were tested against shootfly and maize borer at recommended doses. The results showed that Tri-Super 40 EC gave the best control against shoot fly showing minimum shootfly infestation %age (1.24) followed by Trizone 40

EC showing shoot fly infestation %age (1.67) whereas Tri-Super 40 EC gave the best control against maize borer showing minimum maize borer infestation %age (0.83) followed by Trizone showing maize borer infestation %age (0.84). As far as the yield is concerned, Tri-Super 40 EC produced maximum yield (7030 kg/ha) followed by Trizone 40 EC which produced the yield (6777 kg/ha).

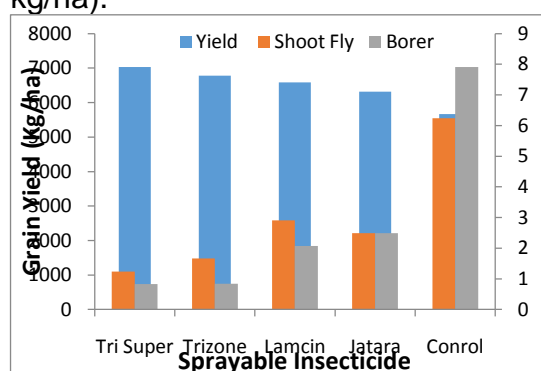


Fig 29: Testing of sprayable insecticides against shootfly and maize borer

## PLANT PATHOLOGY

### Testing of Stalk Rot Intensity in Maize Hybrids by Artificial Inoculation

Five maize hybrids namely YH-5421, YH-5427, YH-5533, YH-5534 and YH-5394 were tested in order to see stalk rot intensity. The experiment was laid out according to RCBD in four replications in Kharif 2017 and Spring 2018. The results showed that maize hybrids YH-5421 and YH-5394 were resistant against stalk rot while maize hybrids YH-5533, YH-5534 and YH-5427 were moderately resistant against stalk rot in Kharif 2017.

### Testing of seed dressing fungicides against seedling blight in maize

Four fungicides namely Topsin-M 70 WP, Protocol 50 WP, Nanok 25 SC and Polyram DF70 were tested against seedling blight at recommended doses. The results

showed that Topsin-M 70 WP gave the best control showing minimum seedling blight attack %age (0.83) with grain yield 6966 kg/ha followed by Protocol 50 WP showing seedling blight attack %age (1.69) with grain yield 6568 kg/ha in Kharif 2017 while in Spring 2018, the results showed that Topsin-M 70 WP gave the best control showing minimum seedling blight attack %age (1.66) with grain yield - kg/ha followed by Protocol 50 WP showing seedling blight attack %age (3.33).

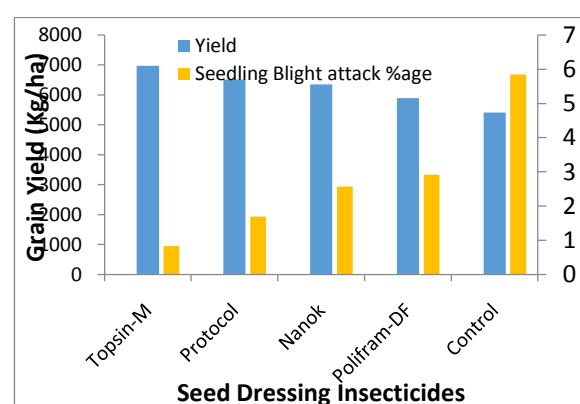


Fig 30: Testing of seed dressing fungicides against seedling blight in maize

### Farmer Advisory Services:

Three (3) TV talks, Thirty Six (36) radio talks were delivered to farmers about the maize, sorghum and pearl millet.

**Foreign Collaborations:** Two projects of maize (Agriculture Innovation Program, AIP and Heat Tolerant Maize for South Asia, HTMA) are successfully going on. Director along with one scientist visited Thailand for participation in "Follow up meeting on mega-environment mapping of maize in South Asia" held on 30-Januray 2018. A scientist successfully participated in APO International Course "Forum on Strengthening Food Safety Standards" held from 05-08 March,



2018 in Colombo, Sri Lanka. The director attended 4<sup>th</sup> Latin America cereal conference at Mexico held from 11-14 March, 2018.

## PUBLICATIONS

1. Aamer Mumtaz, Dilbar Hussain, Muhammad Saeed, Muhammad Arshad, Muhammad Irfan Yousaf and Waseem Akbar. 2017. **Association Studies of Morphological Traits in Grain Sorghum (*Sorghum bicolor* L.)**. Journal of Agriculture and Basic Sciences. 37-43
2. Aamir Ghani, Muhammad Irfan Yousaf, Muhammad Arshad, Khadim Hussain, Shahid Hussain, Mian Tanweer Mukhtar, Aamir Hussain and Saleem ur Rehman. 2017. **YH-1898: A New High Yielding, High Temperature Tolerant Local Yellow Maize (*Zea mays* L) Hybrid**. International Journal of Biology and Biotechnology. 14 (3): 441-449, 2017.
3. Muhammad Irfan Yousaf, Khadim Hussain, Shahid Hussain, Rahil Shahzad, Aamir Ghani, Muhammad Arshad, Aamer Mumtaz and Naeem Akhter. 2017. **Morphometric and phenological characterization of maize (*Zea mays* L.) Germplasm under heat stress**. International Journal of Biology and Biotechnology. 14 (2): 271-278, 2017.
4. Aamer Mumtaz, Hafeez Ahmad Sadaqat, Muhammad Saeed, Muhammad Irfan Yousaf, Aamer Shehzad, Hafiz Ghulam Mohu din Ahmed. 2017. **Genetic behaviour of qualitative and seed yield-related traits in *Brassica rapa***. Zemdirbyste-Agriculture, 104 (2)147–156. (IF 0.65)
5. Muhammad Irfan Yousaf, Khadim Hussain, Shahid Hussain, Aamer Ghani, Muhammad Arshad, Aamer Mumtaz and Rana Abdul Hameed. 2017. **Characterization of indigenous and exotic maize hybrids for grain yield and quality traits under heat stress**. International Journal of Agriculture & Biology, 20(2): 333-337. (IF 0.75)
6. Muhammad Irfan Yousaf, Naeem Akhtar, Aamer Mumtaz, Waseem Akbar, Hafiz Mutther Javeed, Muhammad Husnain Bhatti, Azhar Mehmood. 2017. **Contribution of Spike-Related Traits for Grain Yield in Spring Wheat**. Journal of Agriculture and Basic Sciences. 2 (2): 30-36.
7. Sajjad Hussain Qureshi, Ijaz Rasool Noorka, Muhammad Saeed, Muhammad Javed, Ghulam Murtaza, Muhammad Akbar Ali Shah, Azfar Hussain and Faisal Shahzad. 2017. **Physio-Genetic Studies for Economic Traits in Canola (*Brassica napus*)**. International Journal of Agricultural and Applied Sciences. 9(1): 75-78
8. Muhammad Irshad ul Haq, Muhammad Hussain Chudhary and Muhammad Arshad. 2017. **Evaluation of promising lines of pearl millet in two seasons**. International Journal of Biology and Biotechnology 14 (1): 129-133
9. Muhammad Irshad-ul-Haq, Muhammad Hussain Chaudhary, Abdul Razaq and Muhammad Arshad. 2017. **A High Yielding Pearl Millet Variety "YBS- 98"**. International Journal of Biology and Biotechnology 14 (4): 629-632.
10. Muhammad Rafique, Saira Saleem, Muhammad Altaf, Ahsan Raza Mallhi and Muhammad Arshad.

2018. **FH-949: Heat tolerant Maize Hybrid.** Journal of Agriculture Research 56(1): 7-12

11. Muhammad Rafique, Ahsan Raza Malhi, Muhammad Altaf, Saira Saleem and Khunsa Khakwani. 2018. **Cluster analysis and genetic diversity of maize inbred lines.** International Journal of Agriculture Innovation and Research 6(5): 209-211

12. Khunsa Khakwani, Muhammad Rafique, Ahsan Raza Malhi, Muhammad Altaf, Saira Saleem and Muhammad Arshad. 2018. **Maize ideotype breeding for changing environmental conditions.** 13(11): 512-517

13. Muhammad Shoab, Asrar Mahboob and Muhammad Arshad. 2017. **Yield Responses of irrigated maize to different planting architects in loamy soil of upper Indus basin.** Science Letters (132017039-SL).

14. Amer Mumtaz, Dilbar Hussain, Muhammad Saeed, Muhammad Arshad, Muhammad Irfan Yousaf. 2017. **Estimation of genetic diversity in local sorghum genotypes.** Journal of National Science Foundation of Sri Lanka, 46(3):271-280. (IF 0.40)

### Conferences/Oral/Poster Presentation

Saira Saleem and Muhammad Rafiq. 2018. **Climate Change and Maize Breeding: Challenges and Opportunities.** Poster presentation in 1<sup>st</sup> International and 2<sup>nd</sup> National conference on challenges and opportunities to boost agriculture in changing climate held at College of Agriculture, Bahu din Zakaria

University, Bahadur Sub-Campus Layyah from March 26-28, 2018.

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**Metrological Data Recording at Maize & Millets Research Institute, Yusufwala during 2017-18**

Month/Year	Avg. Maximum Temperature (C°)	Avg. Minimum Temperature (C°)	Humidity %		Rainfall (mm)
			08:00 AM	05:00 PM	
Jul-17	40.58	28.45	63.39	47.16	25.70
Aug-17	39.67	27.93	62.45	43.25	9.00
Sep-17	38.43	23.76	66.80	48.23	74.00
Oct-17	37.52	19.77	71.39	35.45	-
Nov-17	27.51	12.88	84.36	50.13	2.20
Dec-17	27.45	7.21	82.97	65.23	7.60
Jan-18	24.16	5.41	87.12	45.90	-
Feb-18	26.48	8.89	84.62	77.03	-
Mar-18	34.54	16.29	79.35	62.35	10.80
Apr-18	40.26	20.56	69.23	34.03	3.50
May-18	41.60	23.00	49.75	36.87	4.00
Jun-18	40.63	26.60	49.20	42.53	54.65

