INT. J. BIOL. BIOTECH., 17 (3): 561-570, 2020.

YH-5427: A HIGHLY PRODUCTIVE, HEAT TOLERANT, STALK ROT AND LODGING RESISTANCE, YELLOW MAIZE HYBRID OF PUNJAB, PAKISTAN

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ABSTRACT

The new single cross maize hybrid YH-5427 is high yielding and high resistance against heat which developed at Maize & Millets Research Institute Yusafwala Sahiwal. The rise in temperature at pollination stage during May (40 C to 46 C) in spring planting maize is the main threat of yield loss, so there was need to develop such local hybrids which can tolerate against very high temperature without any yield loss. YH-5427 is also insect, lodging and stalk rot resistant. On station yield trial during Spring 2015 YH-5427 gave very high grain yield 13500 Kg/ha over check hybrid NK-8441 (10560 Kg/ha) in Preliminary Yield Trial. This hybrid was evaluated under different agro-climatic zones of Pakistan during 2017 to 2019 in National / Adaptability Uniform Maize Yield Trials. In Spring 2017, it stood first (out of 06 entries), in spring 2018 stood first (out of 55 entries) in Kharif 2018 stood first (out of 100 entries) and in spring 2019 stood first (out of 110 entries) with an average grain yields of (7141 Kg/ha, 9396 Kg/ha, 8669 and 8604 Kg/ha) respectively over local approved check hybrid YH-1898 with grain yields (5442 Kg/ha, 8555 Kg/ha, 6995 Kg/ha and 7172 kg/ha respectively). On Farm trials at different farmers' fields throughout various locations in Punjab, YH-5427 attained maximum grain yield of 12301 kg/ha at Mamu Kanjan in spring 2018 and 12003 Kg/ha at Arifwala in Spring 2019. This hybrid was also sown in last week of March and tested at very high temperature at pollination stage during Spring 2018 and YH-5427 gave very high yield over all local approved and multinational hybrids (13077 Kg/ha). This hybrid having high number of rows (16-20) per cob, long dented grain with thin pith and high shelling %age (90%). YH-5427 is equally good in Autumn season with an additional character of early maturing in Autumn (10 to 15 days early than multinational hybrids) with good yield that is best suitable for potato growing areas This new hybrid has approved by Punjab Seed Council in 52th meeting with the acknowledgement of its high resistance against heat and lodging for general cultivation in Punjab. It has the potential to replace high priced multinational commercial hybrids of spring season presently under cultivation in Punjab, Pakistan.

Key words: *Zea mays* L., Heterosis, Yellow hybrid, YH-5427, Temperature Resilient, Maize.

INTRODUCTION

Maize is the third most important cereal crop in Pakistan after Wheat and Rice. It is highest grain yielder cereal crop and is also knonwn as 4F crop due to its trmoundous utilization as food, feed, fodder and fuel purpose around the world. It contributes towards global food security because of its highest grain yield potential in several drought and heat-prone countries of Asia, Africa and Latin America, where thousand of millions of people directly depends upon maize crop for their food. Among cereals, maize offeres immense opporutnities to address food, feed, fodder and nutritional security (Premlatha and Kalamani, 2010). Research achievements in the recent past and their faster adoption on large scale have stimulated higher growth rate in maize production than any other cereals. In near past, annual production growth rate in maize was much higher in Asia over global average, reflecting tremendous potentional for innovations in maize to have greater impact on livelihood of small landholding farmers in Asia. Maize grain has high nutritional value as it contains 9.87% (protein), 2.17-4.43 (fat), 2.10- 26.70% (fiber) and 44.60- 69.60% (carbohydrate), 11.6-20% moisture and 1.10-2.95% (ash) (Sule Enyisi, 2014).

Maize crop is also called "the other gold" due to its diversified industrial consumption. As a higher per acre productivity , it can provide subsistense to large number of persons. Food energy yielded by maize is estimated at about 6.9 million callories per hectare which is significantly higher than wheat (3.7 million) and rice (4.9 million) (Annonymus, 2010). Exploitation of hybrid vigor in corn has gained much significance in view of incredible increase in its yield. However, there is a continuous need to develop new hybrids having better yield, quality and tolerance to abiotic stresses. Wynne *et al.* (1970) has reported significant increase in yield and yield contributing traits of F1 hybrids over parents. A varying degree of Heterosis was estimated for plant height, ear height, ear length, ear diameter, 1000- grain weight & grain yield over the parents (Muraya *et al.*, 2006). Heterosis was significant and positive for ear length, rows per ear, kernels per row and grain yield as observed by Muraya *et al.*

(2006) and Singh *et al*. (2002). Tollenaar and Lee (2006) reported that in heterosis, the increase in kernel number is much greater relative to increase in dry matter accumulation during the grain filling period. High level of significance in variance of parents vs hybrids clearly indicate the existence of significant level of average heterosis in hybrid. Carena and Wicks (2006) detected an elite maize population hybrid that averaged 28.2 % high parent heterosis. Castellanos *et al*. (2009) reported the single crosses expressed a 37 % high parent heterosis on average. Premlatha and Kalamani (2010) studied that significant differences among parents and crosses revealed the choice of exploitation of heterosis for plant height, cob height and grain yield per plant.

Increase in per hectare yield of maize in Pakistan is mainly due to adoption of hybrid seed sold by Multinational Seed Companies. However, per acre yield of maize in Pakistan is far behind from major maize producing countries like United State (10.73 metric tons/ha), Canada (9.36 metric tons/ha), Argentina (8.20 metric tons/ha), Turkey (8.73 metric tons/ha) and China (5.81 metric tons/ha) (USDA, 2016). So, there is an immense need of improved cultivars that are not only higher in production but also possess tolerance to adverse climatic conditions like increase in temperature during current climate change sonaerio. The new hybrid YH-5427 is a full season high yielding spring yellow maize single cross hybrid and equally good for Kharif season specially potato growing areas due to its early maturity character. It is tolerant to high temperature and resistant to lodging. In addition to being very high temperature tolerant, it also stays green at maturity; hence its stalk can be used as fodder after harvesting. It was developed at Maize and Millets Research Institute, Yusafwala, Sahiwal by crossing of two well adapted locally developed heat tolerant inbred lines. This hybrid was evaluated in different yield trials at various locations in preliminary, advanced, multi-location National Uniform Maize Yield Trials and On-Farm large scale trials from 2015to 2019.

MATERIALS AND METHODS

Maize and Millets Research Institute Yusafwala Sahiwal has established its' own gene pool by deriving inbred lines from local and exotic material. The derivation of these lines was started since 1988. Due to changing climatic conditions towards high temperature it was necessary to develop local parent material which can face the harsh climate of Punjab and give high yield even in high temperature without any loss in yield. The derivation of parent lines of this hybrid was started in 2008. The new hybrid YH -5427 was developed at Maize and Millets Research Institute Yusafwala Sahiwal by crossing of two locally derived parent lines P222 ♀ and Y27♂ in spring, 2015. This promising hybrid was included in preliminary, micro and macro plot yield trials from 2015 to 2019, where it out yielded against different local approved and Multinational checks. Due to its best performance, it was then evaluated in National Uniform Hybrid Maize Yield Trial conducted by National Agriculture Research Centre (NARC), Islamabad from Spring 2017 to spring 2019. The experiments were laid out in RCBD with three replications on ten different locations in Punjab, Pakistan. The new hybrid YH-5427 was further evaluated in station yield trials and at farmer's fields, this hybrid performed very well at different locations in Punjab. Agronomic, Pathological and entomological studies were conducted during 2016-2018 and data were recorded to compare it with existing check hybrids (Local approved and multinational). Analysis of variance (ANOVA) and post-hoq analysis was done according to Steel *et al*. (1973) to compute differences between different hybrids. Furthermore, biplot analysis was also carried out to compare maize hybrids along with grain yield and associated traits (Sneath and Sokal, 1973).

RESULTS

Yield Performance

YH-5427 has been tested in preliminary yield trials, Micro plot yield trials, Macro plot yield trials and different agro climatic zones of Pakistan from Spring 2015 to Spring 2019. The data of station and out-station yield trials is given below:

(1) Station Yield Trials

The results (Table 1) showed that the new Hybrid YH-5427 performed better in all yield trials by giving 2.58 to 19.41 percent higher average grain yield than different multinational check hybrids. On an average new hybrid YH-5427 produced (10599 Kg/ha) grain yield which is 10.21 percent higher than check hybrids (9471 kg/ha).

Table 1. Yield performance of YH-5427 in different Yield trials conducted during Spring / Kharif seasons (2015 to 2019) at MMRI Yusafwala Sahiwal.

Sr.	Name of Trial	Entries	Year	Checks	Grain Yield (Kg/ha)		% increase over Check
					Checks	YH-5427	
1	Preliminary Yield Trial	30	Spring-2015	NK-8441	10560	13500	19.41
2	Preliminary Yield Trial	60	Kharif-2015	NK-6621	7866	9065	10.78
3	Micro plot Yield Trial	32	Spring-2017	DK-6724	10187	11065	4.48
4	Macro plot Yield Trial	40	Spring-2018	NK-8711	10276	10651	3.51
5	Macro plot Yield Trial	30	Kharif-2018	YH-1898	8917	9276	2.58
6	Macro plot Yield Trial	40	Spring-2019	YH-1898	9017	10034	5.58
Average					**9471**	**10599**	**14.21**

(2) OUT STATION YIELD TRIALS

(a) On Farm Research Trials at Farmer's Field

These On- Farm research trials were conducted at different locations throughout in Punjab at different farmer's fields including new hybrid YH-5427 and different Multinational and Local Hybrids as Checks.

(i) On Farm Trial spring 2018

On- Farm research trial was conducted at six different locations throughout Punjab at different farmer's fields during Spring 2018. The data showed that hybrid YH-5427 showed its worth and gave average grain yield of (11012 kg/ha) than check hybrids during Spring 2018. The new Hybrid YH-5427 gave 6.47% and 7.32% more grain yield over checks, YH-1898 and P-1543, respectively (Table 2).

(ii) On Farm Trial Spring, 2019

On- Farm research trial was conducted at seven different locations in Punjab at different farmer's fields during spring 2019. The new hybrid YH-5427 was on 1st position and gave average grain yield of (10787 Kg/ha) over check hybrids local and multinationals as shown in Table 3. The new hybrid gave 1.2% and 2.23%, 4.23% and 5.18% more grain yield over check hybrids, JPL-1908, Nk-8441, P-1543 and YH-1898, respectively.

Table 2. Yield performance of YH-5427 in (Kg/ha) on-farm yield trial during Spring-2018.

Sr. No.	Location	YH-5427	YH-1898	P-1543
1	Sahiwal	9689	8677	8069
2	Pakpattan	8661	8939	7956
3	Arifwala	8745	8626	8226
4	Okara	9723	8909	9987
5	Khanewal	11028	10233	10517
6	Mamu Kanjan	12301	11360	11745
Mean		**11012**	**9968**	**9445**
Increase over check		**0**	**-6.46%**	**-7.32%**

Table 3. Yield performance of YH-5427 in on-farm yield trial during Spring-2019.

Sr. No	Location	YH-5427	YH-1898	P-1543	NK-8441	JPL-1908
1	Sahiwal	10,658	9,223	11,082	10,370	10,235
2	Kameer	10,833	9,540	11,264	11,066	10,450
3	Kamalia	9,184	8,019	10,237	10,563	9,219
4	Arifwala	12,003	11,123	11,685	10,800	10,459
5	Samundri	10,745	9,843	11,048	11,257	9,753
6	Khanewal	10,645	10,791	8,533	10,685	10,846
7	Tandinwala	9,067	8,611	6,579	10,032	12,391
Average Yield		**10,787**	**9,678**	**9759**	**10,181**	**10,540**
Increase Over Check			**-5.18%**	**-4.72%**	**-2.23%**	**-1.2%**

(b) Adaptability/National Uniform Hybrid Maize Yield Trials

These trials were conducted consecutively for two seasons during Spring 2017, Spring 2018, Kharif 2018 and spring 2019 by Coordinator Maize, Sorghum & Millets (MSM) and Coordinator National Agriculture Research Centre (NARC), Islamabad at different locations throughout Pakistan.

(i) Adaptability / National Uniform Maize Hybrids Yield Trial Spring 2017

Six entries of different maize hybrids were included from all over the Pakistan; it was conducted at five different locations in Pakistan during spring 2017. It is clear from above table that the hybrid YH-5427 exhibited average grain yield of 7141 kg/ha, which was 31% higher than check hybrid, Fakhar e NARC (Table 4).

Table 4. Adaptability / National Uniform Maize Hybrids Yield Trial Spring-2017 including six entries over five locations in Punjab.

Grain Yield (kg/ha)				
Location	**YH-5427**	**Fakhar e NARC**	**CV %**	**LSD**
Yusafwala	10812	6847	28	5472
Faisalabad	1899	753	52	NS
Kissan Seed	8130	7943	9.6	2266
Monsanto	6550	6267	9.5	NS
Syngenta	8312	5401	5.9	1161
Average	**7141**	**5442**	**-**	**-**
% increase / decrease	**-**	**-31%**	**-**	**-**

(iii) Adaptability / National Uniform Maize Hybrids Yield Trial Spring 2018

Fifty-five entries of different maize hybrids were included from all over the Pakistan; it was conducted at seven different locations in Pakistan during spring 2018. The results revealed that promising maize hybrid YH-5427 exhibited average grain yield of 9396 kg/ha, which was 8.39% higher than check hybrid (YH-1898) (Table 5).

Table 5. Adaptability / National Uniform Maize Hybrids Yield Trial Spring-2018 including 55 entries over seven locations in Punjab.

Grain Yield (kg/ha)				
Location	**YH-5427**	**YH-1898 (C)**	**CV %**	**LSD**
Arifwala	5570	7593	25.6	2480
Vehari	10243	8743	14.0	1927
Yusafwala	12045	9057	10.2	1586
Manga Mandi	9053	8665	9.94	1487
Pakpattan	12097	10098	9.6	1644
Mianchannu	9304	10049	11.9	1540
Faisalabad	7458	6480	20.9	2567
Average	**9396**	**8669**		
% increase / decrease	**-**	**-8.39%**	**-**	**-**

(iv) Adaptability / National Uniform Maize Hybrids Yield Trial Kharif 2018.

One Hundred entries of different maize hybrids were included from all over the Pakistan; it was conducted at seven different locations in Pakistan during Kharif 2018. The results revealed that promising maize hybrid YH-5427 displayed average grain yield of 8683 kg/ha, which was 14.11% higher than check hybrid (YH-1898) (Table 6).

(iv) Adaptability / National Uniform Hybrid Maize Yield Trial Spring 2019

One Hundred Ten entries of different maize hybrids were included from all over the Pakistan; it was conducted at twelve different locations in Pakistan during Spring 2019. The results revealed that promising maize hybrid YH-5427 showed grain yield 8604 kg/ha which is 15.13% more than check hybrid YH-1898 (Table 7).

Table 6. Adaptability / National Uniform Maize Hybrids Yield Trial Kharif-2018 including 100 entries over seven locations in Punjab

Grain Yield (kg/ha)				
Location	**YH-5427**	**YH-1898 (C)**	**CV %**	**LSD**
Pioneer, Manga	6977	6502	14.55	1707
Monsanto, Manga	8639	7633	11.27	1744
Vehari	8804	9884	9.7	1703
AARI, Fsd.	7644	6694	16.87	2961
Syngenta	10045	11562	1.52	271
Khanewal	6213	5181	14.2	1689
MMRI	12456	3587	11.72	1470
Average	**8683**	**7291**		
% increase / decrease	**-**	**-14.11%**	**-**	**-**

Table 7. Adaptability / National Uniform Maize Hybrids Yield Trial Kharif-2018 including 100 entries over twelve locations in Pakistan.

Grain Yield (kg/ha)				
Location	**YH-5427**	**YH-1898 (C)**	**CV %**	**LSD**
Vehari	10969	7933	10.65	1831
Arifwala	5889	6644	27.99	-
Dadu Sindh	7111	6407	-	-
Monsanto, Manga	9089	8146	12.67	-
Petal Seed	11103	6782	-	1250
Pioneer	10200	9539	11.05	1820
Yusafwala, MMRI	11391	7627	11.09	2678
AARI, Fsd.	9116	8193	14.12	1784
Pir Sabak, CCRI	2904	2670	30.35	-
Khanewal	8141	8197	13.86	-
Okara, Syngenta	11736	8538	-	-
NARC	5604	5388	20.51	
Average	**8604**	**7172**	**-**	**-**
% Increase / decrease	-	**-15.13%**	-	-

(3) HIGH TEMPERATURE STUDIES:

The newly developed hybrid YH-5427 is tolerant against very high temperature, even at more than 43 C it performed very good and ranked first in grain yield comparison with well-known commercial hybrid NK-8711. An experiment was conducted at research area of Maize & Millets Research Institute, Yusafwala Sahiwal during Spring 2018 and the trial of twenty-Seven entries were sown very late on 22-03-2018 for study the effect of high temperature, at the time of pollination of the crop the temperature ranges from 40 $^{\circ}$C to 46 $^{\circ}$C as revealed in Figure 1. The results in this figure revealed that promising maize hybrid YH-5427 out-yielded all the hybrids including local and commercial Check i.e. NK-8711 by giving grain yield of 13077 kg/ha. Furthermore, promising maize hybrid YH-5427 along with check hybrids was highly correlated with grain yield, plants and cob harvested and stand count.

(4) AGRONOMIC STUDIES:

(a) Plant Population Trial

The trial was conducted to evaluate different plant densities for obtaining maximum grain yield. The data (Table 8) showed that new hybrid YH-5427 gave higher grain yield of 11,690 kg / ha & 8822 kg/ha with 88,888 plants / ha during spring 2017 and spring 2018 respectively, however, it gave higher yield of 8928kg / ha during Kharif 2018 with plant density106, 666 plants/ha which conclude that plant spacing of 15cm is suitable.

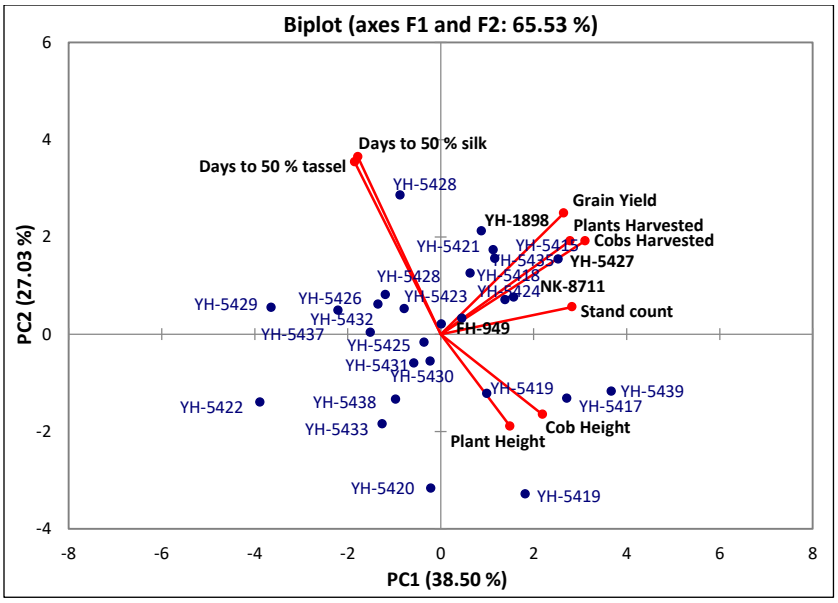

Fig. 1. PC1/PC2 Biplot between maize hybrids and studied traits under heat stress conditions

Table 8. Effect of Population Trial on Maize Yield Performance R x R = 75 cm.

Sr.	Plant Density/ha	Pl. x Pl.	Grain Yield (kg/ha)				
			Spring 2017		Spring 2018		Kharif 2018
			YH-5427	YH-1898	YH-5427	FH-949	YH-5427
1	133,333	10 cm	8335	9630	7767	10163	7552
2	**106,666**	12.5 cm	9289	12881	8466	10950	**8928**
3	88,888	15 cm	**11690**	13353	**8822**	10432	7883
4	76,190	17.5 cm	11021	13121	8559	9759	7387
5	66,666	20.0 cm	10398	11842	7878	9230	7019

(b) Irrigation Trial

The results of (Table 9) showed that 12 irrigations in spring and 11 irrigations Kharif are required for obtaining maximum grain yield of YH-5427.

Table 9. Showing Effect of number of Irrigations on Grain Yield of new Maize Hybrid YH-5427.

Sr. No.	No. of Irrigation	Yield (Kg/ha) YH-5427	
		Spring 2018	Kharif 2018
1	7	7112	7000
2	8	7923	7208
3	9	8865	8098
4	10	8979	8781
5	11	**9754**	9698
6	12	-	**10978**
7	13	-	9790

(C) Fertilizer Trials

These trials were conducted to find out suitable level of NPK Fertilizer to obtain maximum grain yield of YH-5427. The results (Table 10) showed that maximum grain yield was obtained with fertilizer combination 300-150-100 NPK (kg/ha) as for as cost benefit ratio is concerned.

Table 10. Showing Effect of Fertilizers Doses on Yield Performance in new maize hybrid YH-5427.

Sr. #	Treatments			Grain Yield / ha (YH-5427)		
	Kg / ha			Kharif 2017	Spring 2018	Kharif 2018
	N	P	K			
1	0	0	0	4046	5371	5812
2	200	100	100	10332	6514	7199
3	250	125	100	11187	7908	7850
4	300	150	100	**12585**	**8650**	**8723**
5	350	175	100	12351	8698	7616
6	400	200	100	11978	6491	7732

(D) Agronomic Requirements

The following agronomic requirements were recorded during agronomic studies for attaining maximum grain yield for the new hybrid YH-5427 under consideration.

Sowing Time (Optimum)	Spring = 15th January to 28th February Kharif = 10th July to 15th August
Planting Geometry (Optimum)	Planting method = Ridge sowing Row Spacing = 75 cm Plant Spacing = 15 cm
Seed Rate (Optimum)	25 Kg/ha
Plant Population	88888 plants/ ha (Spring) 106,666 plants/ha (Kharif)
Fertilizer Requirement (Optimum)	Spring = (N: P: K) = 300:150:100 Kharif = (N: P: K) = 250-125-100
Irrigation Requirement (Optimum)	Spring= 12 Kharif= 11

(5) PLANT PROTECTION

New Hybrid YH-5427 and other approved maize hybrids both local and multinationals were evaluated to find out the resistance reaction against stalk rot disease through artificial inoculation. The results (Table 11) showed that YH-1898 showed resistant to moderately resistant reaction against stalk rot.

Table 11. Screening of Maize Hybrids against Stalk Rot (*Fusarium moniliforme*) by Artificial Inoculation.

Sr. No.	Name of Hybrids	Spring 2018	Kharif 2018
1	YH-5427	R	MR
2	YH-1898	R	MR
3	FH-949	R	MR
4	FH-985	MR	MR
5	FH-793	MR	MS
6	FH-811	MR	MR
7	NK8711	MS	-
8	31P41	MS	-
9	P1543	MS	-
10	6525	MS	-

(6) ENTOMOLOGICAL MEASURES /ECONOMIC THRESHOLD LEVEL (ETL)

1) (ETL) Shot fly = < 10 % 2) (ETL) Maize Borer = < 10 %

The maize crop is totally susceptible to shoot fly, maize borer and aphid attack which may vary from season to season. The attack of insects can be managed by timely application of:

1. Seed treatment
2. Spray of proper insecticides

3. Granules
4. Biological Control (*Trichogramma* Cards)

(7) SALIENT CHARACTERISTICS

The following salient characteristics were recorded and estimated in comparison with the local approved check hybrid YH-1898 and commercial check hybrid P-1429.

Sr.#	Characters	YH-5427	P-1429	YH-1898
1	Plant Height (cm)	200-210	220-225	230-240
2	Cob Height (cm)	100-105	110-115	115-120
3	Days to 50 % Tassel	72-76	76-78	83-85
4	Days to 50 % Silk	74-78	78-80	84-87
5	Leaf Color	Dark green	Green	Green
6	1000- grain weight gm	320-350	275-290	300-325
7	Av. Grain Yield Kg/ha	11,000	8,870	10,100
8	Yield potential Kg/ha	132,000	12,000	12,500
9	Shelling % age	88	84	86

DISSCUSSION

Development of superior resistant to biotic and abiotic stresses varieties is the ultimate objectives of the plant breeders to get the higher yields and replace the existing low yielding varieties/hybrids. It is reported that modern maize hybrids are more productive under favorable growing environments while tolerance to biotic and abiotic conditions was much higher in older cultivars/landraces especially under heat stress conditions (Mardeh *et al.,* 2006 and Ghani *et al*., 2017). It is further reported that landraces for warmer climatic zones are relatively more heat tolerant as compared to cooler climatic zones, therefore, could serve as base population for the development of heat resilient maize hybrids (Yamamoto *et al*., 2011; Kugblenu *et al*., 2013). This Institute, (MMRI, Pakistan) has developed YH-1898 in 2016, which is a highly heat tolerant maize hybrid and best suited for spring sown in maize growing areas of Punjab (Yousaf *et al.,* 2020). This newly approved local maize hybrid YH-5427 is a full season, high yielding, resistant to lodging and stalk rot which is comparable with local approved & multinationals hybrids currently cultivated in Punjab. It gives very good results in local agro-climatic conditions and has the ability to withstand even at very high temperature (above 40 $^{\circ}$C). It is suitable for Spring season and equally good for Autumn season. It is medium statured and plant is mid cob bearing, with erect leaves and tassel shape is spreading. Emergence of tassel (male part) takes 70 to 75 days and emergence of silk (female part) takes 73 to 78 days in Spring. Plant and cob height ranges from 200-210 cm. Pith size is very thin with light pink color. More number of rows per cob which ranges from 16-18 with deep dented grain.

Number of leaves per plant varies from 12 to 16 and it has additional stay green character at maturity so it can also be used as fodder for animals at harvesting. The 1000-grain weight is from 300 to 350 gm. Similar results were also reported by Kandel *et al*. (2018) and Yousaf et al. (2018) who unveiled the positive and significant correlation of thousand kernel weight with kernel yield under heat stress. Its average grain yield is 11,000 kg per hectare against its potential of 13,200 kg per hectare. The results revealed the presence of statistically significant differences between maize hybrids for kernel yield and its associated traits. These results are consistent with those described by Yousaf et al. (2017), Yousaf et al. (2018) and Shehzad et al. (2019) revealing the presence of significant differences among maize hybrids for yield related traits under optimal and heat stress conditions. This new hybrid YH-5427 is single cross hybrid which has a great potential for higher grain yields and tolerance against adverse climatic conditions and diseases. Similar findings were reported by Yousaf et al. (2017) and Yousaf et al. (2018) who showed that hybrids developed from heat stress adaptive parental material/inbred lines comparatively showed better performance and higher heat stress tolerance. Furthermore, this hybrid is quite comparable with commercial hybrids available in market and grain yield of this hybrid is at par with comparison to well-known spring hybrids i.e. P-1543, P-1429 & P-1574 (Pioneer/Cortiva), DK-6317, DK-9108, DK-7024, DK-6724 & DK-6103(Monsanto/Bayer), NK-8711 & NK-8441(Syngenta) and HC-9091 & HC-9050 (ICI).

CONCLUSION

Newly developed yellow maize hybrid YH-5427 is a full season, high yielding, high temperature tolerant, resistant to lodging and stalk rot. It gives very good yield in local agro-climatic conditions due to its inbred lines derivation and breeding was done in local conditions and has the ability to withstand even very high temperature but multinational hybrids are not locally bred and do not tolerate any sudden change in environment and high stress (drought, high temperature & high humid conditions), this new hybrid YH-5427 can with stand against all stresses. It is e suitable for cultivation in Spring season and equally good for Autumn season. This hybrid YH-5427 is low price hybrid and it will also check the monopoly of the multinational seed companies having high price of hybrids.

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(*Accepted for publication June 2020*)