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EFFECT OF PHYSIOLOGICAL PARAMETERS ON GRAIN YIELD AND YIELD COMPONENTS OF HYBRID MAIZE (*ZEA MAYS* L.) VARIETIES

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ABSTRACT

This study was carried out in order to determine the effect of some physiological parameters on grain yield and yield components of hybrid maize varieties at the trial site of GAP Agricultural Research Institute in 2018 and 2019 years. Trials were established in a randomized complete block design with three replications. Fifteen medium late maturing hybrid maize varieties were used as metarial. According to the results; Plant Height (PH), Tasseling Time (TT), Grain Moisture (GM), Grain/Cob Rate (GCR), 1000 Grain Weight (GW), Hectoliter (H), Grain Yield (GY), Chlorophyll Content (CC) and Stomatal Conductance (SC) ranged between 201.3-307.5 cm, 50.0-60.7 days, 16.7-28.2%, 76.0-86.0%, 241.6-304.5 g, 54.4-70.7 kg ha^{-1}, 8.3-13.9 t ha^{-1}, 38.5-61.8 spad and 92.7-416.4 H_2O m^{-2} s^{-1} respectively. Public hybrid maize varieties referred to as PL151-0218, SASA-137 and SASA-133 placed in the same group when compared to the check varieties. It has been determined that public varieties can be recommended for second crop conditions in the GAP region and the grain yield had statistically significant relationships with yield components and physiological parameters except grain moisture in correlation analysis, and important yield parameters of maize varieties can be determined in early growing stages through physiological parameters.

KEYWORDS:
Chlorophyll content, grain yield, hybrid maize, stomatal conductance.

INTRODUCTION

Maize is ranked second after wheat in terms of cultivation area (192.05 million ha) but takes first place in terms of production amount (1.108.62 million ton) and grain yield per unit area (5.77 t ha^{-1}) in the world [1]. Maize is also ranked third after wheat and barley with 592 000 hectares and 5.7 million tons in terms of cultivation area and production respectively in Turkey. Furthermore, grain yield per unit area in Turkey is above the average of the world [2].

In recent years, maize cultuvation area and production quantity and its importance have been soared in both GAP region and Turkey. Almost 10% of Turkey's grain maize production is obtained from Şanlıurfa province in the GAP region [2]. Since Şanlıurfa province is located in the hottest region of the Turkey, maize is cultivated as both main and second crop though adversely affected by high temperatures under second crop conditions.

Abiotic stress conditions such as high temperature and adverse climatic conditions affect physiological, morphological and biochemical changes in plant [3] that damage maize negatively [4]. Although maize is a warm climate cereal, negatively affected by extreme temperatures. When temperature reaches 38 °C water lost actualized by evapotranspiration in the irrigated area higher than water taken through the roots. If this situation continues for a few days, the cell structure loses its flexibility and can not return to its preliminary form. [5]. The ability survival of a maize genotype at the high temperatures depends on the variety, development stages, sensitivity of the cell types, and degree and duration of the high temperatures [6].

Under dry and hot weather conditions maize closes its stomata, reduce gas exchange and decrease photosynthesis rate, and consequently the grain yield decreases almost 60% [7]. Maize grain yield is affected by the genetics, environmental conditions and growing techniques [8]. Dry weather conditions adversely affect leaf development and photosynthesis [9]. Maize genotypes highly productive with photosynthesis efficiency, chlorophyll content and stomatal conductance [10]. Heat stress and differences of sunlight negatively affect the grain filling and yield during maize development period [11]. Increasing temperatures in the GAP region have negatively affected maize yield in recent years. It is crucial to determine the tolerant maize genotypes to high temperature and dry weather conditions so as to form a source of germplasm for upcoming breeding studies.

TABLE 1
Important climatic values of experimental location

	Average temperature (°C)			Average highest temperatures (°C)			Average lowest temperatures (°C)			Average humidity (%)		
Month	2018	2019	Average for long years	2018	2019	Average for long years	2018	2019	Average for long years	2018	2019	Average for long years
May	23,0	25,2	22,1	29,8	32,6	28,6	17,0	17,9	15,2	50,1	35,8	38,8
June	28,6	30,7	28,1	36,2	38,3	34,6	21,5	22,9	20,5	36,6	30,6	35
July	31,9	31,7	31,9	39,3	39,2	38,7	24,5	24,3	24,2	34,2	29,6	32,3
August	32,2	32,8	31,3	39,2	40,2	38,3	24,8	25,6	23,9	33,6	29,3	31,4
September	28,8	27,9	26,8	35,9	35,4	33,9	22,1	21,2	19,9	31,3	30,3	29,9
October	21,6	22,9	20,2	27,7	29,8	27,1	16,8	17,3	14,5	45,6	44,9	43,1
November	13,0	14,9	12,8	17,6	22,3	18,7	9,5	10,1	8,4	72,5	65,1	64,8
Average	**25,6**	**26,6**	**24,7**	**32,2**	**34,0**	**31,4**	**19,5**	**19,9**	**18,1**	**43,4**	**37,9**	**39,4**

TABLE 2
Agronomic traits of maize varieties in 2018 and 2019

Varieties	Plant height (cm)						Tasseling time (day)					
	2018		2019		Mean		2018		2019		Mean	
ADA 12.20	295.3	b	271.9	ab	283.6	abc	58.3	b-d	57.00	bc	57.66	bc
ADA 13.4	280.9	b-e	260.8	a-d	270.9	b-e	57.0	c-e	56.33	b-d	56.66	cd
ADA 13.7	275.1	b-e	270.4	abc	272.8	a-e	55.7	e-g	55.33	c-e	55.50	d
ADA 14.6	261.9	d-f	263.7	a-d	262.8	de	53.7	g-ı	52.00	g-j	52.83	e
ADA 14.36	263.4	c-f	252.4	b-d	257.9	ef	57.3	b-e	54.00	e-g	55.66	d
SASA-132	258.5	e-f	251.3	b-d	254.9	ef	52.7	h-j	52.33	f-ı	52.50	ef
SASA-133	292.3	ab	269.4	abc	280.9	a-d	56.5	d-f	54.33	d-f	55.40	d
SASA-136	242.8	f-g	236.8	d	239.8	f	54.7	f-h	53.00	f-h	53.83	e
SASA-137	286.6	a-d	269.5	abc	278.1	a-d	60.7	a	58.33	ab	59.50	a
SASA-139	274.9	b-e	262.9	a-d	268.9	c-e	52.0	ıj	50.00	j	51.00	f
SASA-143	222.5	g	207.5	e	215.0	g	53.0	h-j	52.00	g-j	52.50	ef
Check 1	269.9	b-e	244.0	cd	256.9	ef	59.3	ab	59.66	a	59.50	a
Check 2	288.9	abc	271.8	ab	280.3	a-d	53.3	h-j	51.33	h-j	52.33	ef
Check 3	293.7	ab	285.2	a	289.5	a	59.0	abc	58.00	ab	58.50	ab
ÇM-1	218.9	g	201.3	e	210.1	g	51.3	j	51.00	h-j	51.16	f
PL151-0218	307.5	a	269.7	abc	288.6	ab	52.0	ıj	50.33	ıj	51.16	f
Mean**	270.8	a	255.5	b	263.2		55.4	a	54.1	b	54.7	
CV (%)	5.77		6.33		6.04		2.36		2.44		2.41	
LSD	26.07**		26.94**		18.38**		2.18**		2.20**		1.52**	
Mean LSD					6.67**						0.91*	

**: Statistically significant at 1% level; *: Statistically significant at 5 % level

This study was investigated the effects of chlorophyll content and stomatal conductance as indicator to high temperature tolerance for yield and yield components of some hybrid maize varieties that can be grown under Şanlıurfa conditions.

MATERIALS AND METHODS

Trial site soil was poor in nitrogen-rich in phosphorus and medium level in terms of phosphorus and organic matter and pH value 7.87-7.91. While temperatures were higher than temperatures of long years, relative humidity were lower than relative humidity of long years in 2018 and 2019 (Table 1).

This study was carried out at the trial site of GAP Agricultural Research Institute Directorate by used 12 public, 1 public-private and 3 check late maturing hybrid maize varieties as material (between 650-700 FAO group). Trials were designed in a randomized complete block design with three replications with a density of 80.000 plants ha^{-1}. Maize was sown as a second crop in the last week of June. Fertilizer was applied as of N, P and K with doses of 250, 100, 0 kg ha^{-1} successively according to the soil analysis. Plots were irrigated by furrow irrigation 7 times during growing season considering the critical development periods and lack of water. Harvests were performed in the second week of November.

TABLE 3
Yield component factors of maize varieties in 2018 and 2019

Varieties	Grain moisture (%)						Grain/cob rate (%)					
	2018		2019		Mean		2018		2019		Mean	
ADA 12.20	24.7	c	22.8	c-e	23.7	cd	86.7	a	82.7	abc	84.5	a
ADA 13.4	21.8	ef	21.1	d-g	21.4	f	80.7	e	78.7	c-e	79.7	e
ADA 13.7	20.6	fg	18.8	g-ı	19.7	gh	84.3	a-d	85.0	a	84.7	a
ADA 14.6	19.1	gh	19.0	g-ı	19.0	hı	81.3	de	81.3	a-d	81.3	c-e
ADA 14.36	18.4	hı	17.4	hı	17.9	ıj	85.3	ab	82.0	abc	83.7	abc
SASA-132	27.6	a	25.5	ab	26.6	ab	83.0	b-e	82.0	abc	82.5	a-d
SASA-133	17.3	hı	17.0	ı	17.1	j	82.7	b-e	80.7	b-d	81.7	b-e
SASA-136	26.9	ab	23.2	b-d	25.1	bc	84.7	abc	83.3	ab	84.0	ab
SASA-137	17.5	hı	17.7	hı	17.6	ıj	81.7	c-e	81.0	b-d	81.3	c-e
SASA-139	22.2	d-f	19.8	f-h	21.0	fg	82.7	b-e	76.7	e	79.7	e
SASA-143	25.1	bc	23.6	bc	24.3	cd	81.3	de	78.0	de	79.7	e
Check 1	16.7	ı	16.7	ı	16.7	j	83.7	a-e	84.0	ab	83.8	abc
Check 2	22.4	d-f	19.8	f-h	21.1	fg	82.7	b-e	82.3	abc	82.5	a-d
Check 3	23.4	c-e	20.4	e-g	21.9	ef	83.7	a-e	82.7	ab	83.2	a-d
ÇM-1	28.2	a	27.2	a	27.7	a	81.0	e	80.7	b-d	80.8	de
PL151-0218	24.1	cd	22.2	c-f	23.2	de	84.3	a-d	80.7	b-d	82.5	a-d
Mean**	22.23 a		20.76 b		21.49		83.10 a		81.33 b		82.21	
CV (%)	5.39		7.03		6.23		1.20		2.46		2.43	
LSD	1.99**		2.42**		1.54**		2.12*		2.15**		2.04**	
Mean LSD			1.05*								1.14*	

**: Statistically significant at 1% level; *: Statistically significant at 5% level

TABLE 4
Physiological traits of maize varieties in 2018 and 2019

Varieties	Chlorophyll content (spad)						Stomatal conductance (mol H_2O m^{-2} s^{-1})					
	2018		2019		Mean		2018		2019		Mean	
ADA 12.20	53.06	c-e	52.90	cd	52.98	cd	288.53	cd	258.16	d	273.02	e
ADA 13.4	49.90	ef	46.66	f-h	48.28	fg	142.61	e	140.13	gh	141.37	gh
ADA 13.7	38.46	ı	43.00	h-j	40.73	h	102.03	e	132.18	h	117.10	hı
ADA 14.6	44.86	gh	48.13	ef	46.50	fg	143.97	e	161.40	fg	152.68	g
ADA 14.36	52.25	de	51.06	de	51.66	de	257.28	d	232.33	e	244.80	ef
SASA-132	41.18	hı	41.13	ıj	41.15	h	99.36	e	92.70	ı	96.03	ı
SASA-133	55.53	b-d	53.13	cd	54.33	cd	336.03	bc	291.70	c	313.86	d
SASA-136	40.73	hı	39.20	j	39.96	h	152.10	e	142.90	gh	147.50	g
SASA-137	54.26	c-e	49.76	d-f	52.01	de	281.93	cd	238.76	de	260.35	e
SASA-139	51.76	de	44.00	g-ı	47.88	fg	245.76	d	185.86	f	215.81	f
SASA-143	46.36	fg	44.14	g-ı	45.25	g	337.20	bc	183.20	f	260.20	e
Check 1	57.76	abc	53.63	b-d	55.70	bc	361.83	ab	332.73	b	347.28	c
Check 2	61.80	a	58.36	a	60.08	a	416.40	a	347.98	b	382.19	ab
Check 3	59.73	ab	57.33	ab	58.53	ab	396.51	a	387.53	a	392.02	a
ÇM-1	51.36	de	47.53	e-g	49.45	ef	152.80	e	132.73	h	142.76	gh
PL151-0218	59.76	ab	56.06	abc	57.91	ab	369.33	ab	337.40	b	353.36	bc
Mean**	51.17 a		49.12 b		50.14		255.23 a		224.85 b		240.04	
CV (%)	5.70		4.84		5.30		13.10		6.62		10.78	
LSD	4.85**		3.95**		3.06**		55.71**		24.80**		29.90**	
Mean LSD			1.93*								13.24**	

**: Statistically significant at 1% level; *: Statistically significant at 5 % level

Measurements and observations were done according to the Technical Instructions for Measuring Agricultural Values of the Ministry of Agriculture and Forestry [12].

Parameters such as Plant Height (PH, cm), Grain Moisture (GM, %), Tasseling Time (TT, day), 1000 Grain Weight (GW, g), Hectoliter (H, kg hL^{-1}); Grain/Cob Rate (GCR, %) and Grain Yield (GY, t ha^{-1}) were examined. Stomatal Conductance (SC, mol H_2O m^{-2} s^{-1}) was measured with Leaf Porometer Device, Chlorophyll Content (CC, spad) with Portable Chlorophy II Meter Device (SPAD-502) [13-14].

All data analysis and correlation between grain yield and physiological parameters and other yield components were performed via JUMP software package program. The comparisons of the genotype means were done through LSD test. Correlation analysis was performed between all traits using JUMP package program. [15].

RESULTS AND DISCUSSION

Plant Height (PH) and Tasseling Time (TT) were found statistically important between varieties and years ($P \leq 0.01$). The average of PH and TT were found to be 270.8-255.5 cm and 55.4-54.1 day respectively in 2018 and 2019 (Table 2). It is believed that the PH and TT decreased approximately up to 15 cm and 1.3 days respectively resulting from the higher temperature and lower relative humidity in the second year. When maize plant exposed to high temperatures, the plant height is shortened compared to the plants under optimal conditions [16]. The temperature significantly affected the normal tasseling times and anthesis-silking interval day [17].

Grain Mositure (GM) and Grain/Cob Rate (GCR) were found statistically significant between varieties ($P \leq 0.01$) and years ($P \leq 0.05$). The average of GM and GCR were found between 22.2-20.8% and 83-81% respectively in 2018 and 2019 (Table 3). Environmental factors have a great effect on the grain moisture of varieties, therefore low grain moisture is crucial for combine harvester. Second crop maize has a shorter vegetation time than main crop, this circumstance caused grains at the tip of the ear to not be fully filled in both years. It has been reported that the grain rate on ears affect the grain yield [18].

The differences between varieties and years were found statistically significant for Stomatal Conductance (SC) ($P \lt \leq 0.01$; $P \leq 0.01$) and Chlorophyll Content (CC) ($P \leq 0.01$; $P \leq 0.05$). The average of SC and CC were found as of 51.2 and 49.1 spad, 255.2 and 224.9 mol H_2O m^{-2} s^{-1} respectively in 2018 and 2019 (Table 4). While the values of CC increased at the highest level under ideal climatic conditions [19] the values of CC decreased under the low relative moisture and high temperature conditions. Maize plants close their stoma, slow down the process of photosynthesis and reduce gas exchange in chloroplasts, thus plants intake less CO_2. The rate of photosynthesis and grain yield decreases as a result of these negativeness. Some researchers stated that low relative moisture and high temperatures affect negatively stomatal conductance, CO_2 exchange and stoma opening of maize [20-21].

Grain Weight (GW), Hectoliter (H) and Grain Yield (GY) were found statistically significant between varieties ($P \leq 0.01$). The differences between years were also found statistically significant for GW and GY ($P \leq 0.05$) except H. The average of GW and H were found as of 277.4 g and 63.5 kg hl^{-1} in the first year and 267.1 g and 62.0 kg hl^{-1} in the second year (Table 5). It has been reported that 1000 grain weight was significantly affected from the varieties and environmental conditions [22]. Average of GY were determined as of 11.8 and 10.3 t ha^{-1} respectively in 2018 and 2019. While the highest yields were obtained from the varieties of Check-2 (13.9 t ha^{-1}), PL151-0218 (13.4 t ha^{-1}), SASA-133 (13.0 t ha^{-1}) and ADA 14.36 (12.7 t ha^{-1}) in 2018 and Check-3 (12.5 t ha^{-1}), Check-2 (12.2 t ha^{-1}), SASA-137 (12.1 t ha^{-1}), PL151-0218 (11.5 t ha^{-1}) and SASA-133 (11.4 t ha^{-1}) in 2019, and all varieties formed statistically in the same group (Table 5). GY and other yield components were affected negatively from the adverse climatic conditions in 2019. It was determined that the average of GY decreased about 1.5 t ha^{-1} in the second year. Photosynthesis rate and grain yields are decreased due to unfavorable climatic conditions, these circumstances reduce the efficiency of light usage in photosynthesis activity in leaves and close stoma and gas exchange in chloroplasts and CO_2 intake [23]. Changes in varieties's yields are resulted from their genetics and environmental factors. Late maturing maize varieties were slightly more productive than earlier maturing varieties [24-25].

Correlation coefficients and significance levels between GY, CC, SC and other parameters are given in combined correlation analysis of 2 years (Table 6). Meaning and significant relationships were found significant between GY and PH, GW, H, CC and SC ($P \leq 0.01$). Meaning and significant relationships were found significant between GY and TT, GRC ($P \leq 0.05$). None significant relationships were determined between GY and GH. Meaning and significant relationships were found between CC and PH, GW, H, SC ($P \leq 0.01$). None significant relationships were determined between CC and TT, GRC. Meaning and significant relationships were found between SC and PH, GW, H, CC ($P \leq 0.01$). None significant relationships were determined between SC and TT, GH, GRC. Maize genotypes with high photosynthetic elements were high yielding potential in Konya location [26].

It was reported that photosynthetic properties such as photosynthesis efficiency, chlorophyll content and stomatal conductance have a positive relationship with high yield. Meaning and significant relationship between plant height and grain yield showed that there are more photosynthetic assimilation areas in leaves [27-28].

CONCLUSIONS

High correlation coefficients and very significiant relationships were confirmed between Grain Yield (GY) with GW, H, CC and SC parameters. It was determined that a selection related to photosynthetic factors which are CC and SC should be carried

TABLE 5
Yield and its component factors of maize varieties in 2018 and 2019

Varieties	1000 grain weight (g)						Hectoliter (kg hl^{-1})						Grain yield (t ha^{-1})					
	2018		2019		Mean		2018		2019		Mean		2018		2019		Mean	
ADA 12.20	273.4	a-e	246.4	e	259.9	d-f	65.2	b-e	64.2	a-d	64.7	bc	12.6	bc	9.2	ef	10.9	bc
ADA 13.4	263.4	c-e	250.9	de	257.1	d-f	60.4	f-h	59.0	d-f	59.7	de	11.2	e	9.0	ef	10.1	c-f
ADA 13.7	249.4	de	257.4	c-e	253.4	ef	55.4	ı	57.7	f	56.6	e	9.4	f	10.0	c-e	9.7	d-f
ADA 14.6	261.4	c-e	260.3	b-e	260.8	d-f	59.1	g-ı	61.0	b-f	60.1	de	10.2	ef	10.9	b-d	10.6	b-d
ADA 14.36	292.1	abc	282.2	a-d	287.1	abc	67.5	abc	65.1	abc	66.3	ab	12.7	abc	9.8	de	11.3	b
SASA-132	263.2	c-e	262.9	a-e	263.0	d-f	57.8	hı	58.2	ef	58.0	e	10.2	ef	10.1	c-e	10.2	c-e
SASA-133	284.6	a-d	265.1	a-e	274.9	b-e	65.5	b-d	63.6	a-e	64.6	bc	13.0	ab	11.4	abc	12.2	a
SASA-136	263.7	b-e	247.1	e	255.4	d-f	56.8	hı	56.9	f	56.9	e	10.1	ef	8.3	f	9.2	f
SASA-137	300.1	ab	288.0	abc	294.0	ab	65.9	b-d	63.9	a-e	64.9	bc	12.5	b-d	12.1	ab	12.3	a
SASA-139	286.8	abc	268.7	a-e	277.8	a-d	62.7	d-g	61.0	b-f	61.9	cd	11.4	c-e	9.1	ef	10.3	c-e
SASA-143	271.5	a-e	269.1	a-e	270.3	b-e	64.0	c-f	60.0	c-f	62.0	cd	10.8	e	8.4	f	9.6	ef
Check 1	280.7	a-d	259.2	b-e	269.9	c-e	69.6	ab	65.9	ab	67.7	ab	13.3	ab	11.2	abc	12.2	a
Check 2	307.7	a	289.8	ab	298.7	a	70.7	a	67.7	a	69.2	a	13.9	a	12.2	ab	13.1	a
Check 3	293.9	abc	289.9	ab	291.9	abc	68.1	abc	66.5	ab	67.3	ab	13.4	ab	12.5	a	13.0	a
ÇM-1	242.9	e	241.6	e	242.3	f	61.1	e-h	57.8	f	59.4	de	11.2	de	9.1	ef	10.2	c-e
PL151-0218	304.5	a	294.7	a	299.6	a	66.4	a-d	64.3	a-d	65.3	bc	13.4	ab	11.5	ab	12.4	a
Mean**	277.4	a	267.1	b	272.3		63.5		62.0		62.8		11.8	a	10.3	b	11.1	
CV (%)	7.88		7.21		7.56		4.10		5.60		4.90		6.65		8.06		7.31	
LSD	16.41*		32.10*		23.80**		4.34**		5.79**		3.56**		1.313**		1.384**		0.935**	
Mean LSD			7.75*						ns								1.392*	

**: Statistically significant at 1% level; *: Statistically significant at 5% level

out with many maize lines and candidates in breeding programs. Maize agronomists and breeders will save time and labor as a result of determining the relationship between different agronomic parameters and grain yield through physiological parameters.

Late maturing maize varieties are known to be more both high grain moisture and high yield than early maturing maize varieties. High grain moisture in harvest is undesirable, therefore, farmers would rather early maturing varieties with regard to low grain moisture resulting from the short growing period under the second crop conditions in the GAP region. Our study showed that although varieties used in the trial were in medium and late maturing group, grain moisture of varieties was low (20-21%) because high temperatures in the region quickly reduce grain moisture. It was concluded that the medium and late maturing maize varieties with low grain moisture should be preferred to obtain high yields under the second crop conditions. Late maturing varieties such as PL151-0218, SASA-133 and SASA-137 were statistically placed in the same group with the check varieties in terms of grain yield and these varieties can be recommended for second crop conditions

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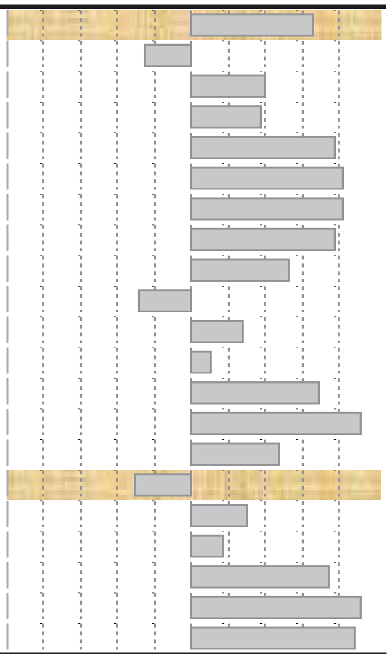
TABLE 6
Correlation coefficients and significance levels of yield components and physiological parameters for grain yield

Traits	Traits	Correlation coefficients	The lowest coefficients	The highest coefficients	Significance levels	Correlation levels
GY	PH	0,6565	0,3992	0,8179	<,0001*	
GY	GM	-0,2456	-0,5474	0,1127	0,1754	
GY	TT	0,3984	0,0577	0,6559	0,0239*	
GY	GRC	0,3811	0,0374	0,6442	0,0314*	
GY	GW	0,7783	0,5897	0,8864	<,0001*	
GY	H	0,8179	0,6564	0,9077	<,0001*	
GY	CC	0,8230	0,6653	0,9104	<,0001*	
GY	SC	0,7743	0,5830	0,8843	<,0001*	
CC	PH	0,5313	0,2241	0,7425	0,0018*	
CC	GM	-0,2815	-0,5739	0,0745	0,1186	
CC	TT	0,2849	-0,0708	0,5763	0,1140	
CC	GRC	0,1076	-0,2505	0,4398	0,5579	
CC	GW	0,6970	0,4602	0,8413	<,0001*	
CC	H	0,9208	0,8427	0,9610	<,0001*	
SC	PH	0,4764	0,1532	0,7076	0,0058*	
SC	GM	-0,2999	-0,5872	0,0545	0,0954	
SC	TT	0,3065	-0,0472	0,5919	0,0880	
SC	GRC	0,1705	-0,1895	0,4900	0,3509	
SC	GW	0,7482	0,5406	0,8699	<,0001*	
SC	H	0,9220	0,8450	0,9616	<,0001*	
SC	CC	0,8846	0,7749	0,9425	<,0001*	



GY: Grain Yield (t ha^{-1}); CC: Chlorophyll Content (spad); SC: Stoma Conductance (mol H_2O m^{-2} s^{-1}); PH: Plant Height (cm); GM: Grain Mousture (%); TT: Tasseling Time (day); GW: 1000 Grain Weight (g); H: Hectoliter (kg hl^{-1}); GRC: Grain/Cob Rate (%)
**: Statistically significant at 1% level; *: Statistically significant at 5 % level

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