Genetic Analysis for Grain Yield and Some Agronomic Traits in Some New White Maize Inbred Lines by Using Line X Tester Analysis

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ABSTRACT

Nineteen new white maize inbred lines were top crossed with two testers i.e.; Sd. 7 and Sd. 63 at Gemmeiza Research Station in 2017 growing season. The resulted 38 crosses in addition to three commercial check hybrids i.e. SC10, SC128 and SC 2031 were evaluated at Gemmeiza and Sids Agriculture Research Station Farms during 2018 growing season. Data were recorded for the following traits: days to 50% silking, plant height, ear height and grain yield. Analysis of variance of crosses and their components, lines, testers and lines x testers showed highly significant differences for all traits, except lines x testers for days to 50% silking. σ^2GCA was larger than σ^2SCA for all traits. These results indicated the dominance of additive gene action in the inheritance of these traits. The inbred lines L_4, L_7,L_{10} and L_{19} (for earliness) and the inbred lines L_1, L_5,L_{10}, $L_{11}$and L_{12} (for grain yield) had high general combining ability. The crosses L_{10} x T_1 (42.91 ard. /fed.), L_{11} x T_1 (38.40 ard./fed.) and L_{14} x T_1(35.65 ard /fed) had high mean values and highly significant SCA effects for grain yield.

Key words: Maize, *Zea mays* L., line x tester, Combining ability, crosses.

INTRODUCTION

Maize is one of the most important economic cereal summer crops all over the world. It ranks the third after wheat and rice contributes a highly percentage of maize production to livestock and poultry. Also, it is a row material for several industrial products. It possesses one of the most studied genetic systems among cereals which have motivated a rich history of research into the genetics of various traits in maize. In fact maize has been subjected to extensive genetic studies than any other crop (Hallauer and Miranda, 1988). High productivity hybrids is an objectives of plant breeders, through evaluating lines according to general and specific combining abilities. The procedure of topcross suggested by Davis (1927) was used early to evaluate combining abilities. The theory of specific (SCA) and general (GCA) combining abilities established by Sprague and Tatum (1942) had been used broadly in improving of several economic plant species. Darrah *et al.* (1972) and Harnor *et al.* (1973) reported that the inbred lines tester have the advantage of sampling errors of genetic variability within the testers and greater genetic variation among test crosses. Al-Naggar *et al.*(1997) suggested that inbred line testers can be effectively used for evaluation of both general and specific combining abilities. Alamine *et al*. (2006), Sedhom *et al*. (2007) and Abd El-Mottalb *et al*. (2013) indicated the relative importance of G.C.A. variance in controlling the inheritance of yield, its component and some morphological traits, such as days to 50% silking, plant height and ear height. Many investigators sugggested that G.C.A. effects were relatively more important than S.C.A. effects in inbred lines (Shehata 1992, Mosa 1996 and EL-Zeir 1999). While, (Shehata and Dhawan 1975) found that the S.C.A. effectes were more important than G.C.A. effects in inheritance of grain yeild. Many investigators sugggested that non additive gene effects played an important role in the inheritance of grain yield and some other agronmic traits Aly 2013, Izhar and Chakroborty 2013 and Umer *et al.* 2014. While, Abd El- Mottalb *et al.* 2013 and Abdalla 2014 found that preponderance of additive gene action in controlling inheritance of grain yield and its components.

The aims of this study were to estimat combining abilities of inbred line for grain yield and other agronomic traits and identify superior crosses with improved yielding ability in a maize breeding program.

MATERIALS AND METHODS

This study was conducted at the experimental fields of Gemmeiza and Sids Agricultural Research stations, ARC, Egypt during summer seasons of 2017 and 2018. Twenty one white maize inbred lines of were used nineteen newly were developed namely Gm 8, 52, 64, 147, 150, 187, 194, 204, 212, 291, 294, 300, 327, 332, 357, 385, 386, 387 and 389) were used as female lines and two released inbred lines (Sd.7and Sd. 63) were used as testers (males). In 2017 summer season, top crosses were made between the nineteen white inbreed lines and the two testers at Gemmeiza Agriculture Research Station (Table 1).

Table 1: Source population, designation and symbols for nineteen white inbred lines and two white inbred testers.

Source population liens,	designation	symbols
Gemmeiza white pop.	Gm.8, 52, 64, 147, 150, 187, 194, 204, 212, 291, 294.	L_1: L_{11}
Giza 2	Gm. 300, 327, 332, 357.	L_{12} : L_{15}
Tuxpino	Gm. 385, 386,387, 389.	L_{16} : L_{19}
Testers		
A.E.D*	Sd. 7	T_1
TEP# 5**	Sd. 63	T_2

At both of Gemmeiza and Sids Agriculture Research Stations, a 38 cross hybrids and three check hybrids single cross (SC 10, SC 128 and SC 2031) were evaluated in 2018 summer season. A randomized complete block design with four replications was used. Plot size was one row, 6 m long and 0.8 m apart. Seeds were planted in hills evenly spaced at 0.25 m with two kernels-hills. Seedlings were thinned to one plant-hill after 21 days from planting. All cultural practices for maize production were applied as recommended. Analysis of variance was done over locations according to Steel and Torrie (1980). Bartlett test was used to test the homogeneity of error variances. The procedure of line x tester analysis according to Kempthorne (1957) was used for estimating general and specific combining ability effects. Data were recorded on the following characters on plot basis for number of days to 50% silking , plant height (cm), ear height (cm) and grain yield, ardab/faddan (ard/fed) adjusted to 15.5 % moisture content (one ardeb = 140 kg).

Data cleared that, locations were significantly different These results were in agreement with those reported by Abd EL-Azeem (2011), Ibrahim *et al.* (2012) EL- Gazzar, *et al.* (2013), Abdallah (2014), Gamea (2015) and Gamea *et al.* (2018). Analysis of variance of crosses and their portions lines, testers and lines x testers showed significant differences all traits, except lines x testers for days to 50% silking. These findings indicates that the inbred lines behaved differently in respective tester crosses. These results are in agreement with those obtained by, Mosa *et al.* (2008), Abd EL- Hadi *et al.* (2009), EL-Gazzar and Khalil (2012) and Aboyousef *et al.* (2016).

Gene actions

Genetic variance components for all studied traits over locations and their interaction with locations are shown in Table (3). Results revealed that estimates of (σ^2GCA(T)) were higher in magnitude than (σ^2 GCA(L)) for plant height, ear height and grain yield, indicated that most of the total GCA variances were due to the testers. Also, general combining ability variance components, σ^2GCA was larger than σ^2SCA for all traits. These results indicated the dominance of additive over non-additive gene action in the inheritance of these traits.

RESULTS AND DISCUSSION

Analysis of variance

Analysis of variance for the four traits (days to 50% silking, plant height, ear height and grain yield) from combined data were presented in Table (2).

Table 2: Analysis of variance for days to 50% silking, plant height, ear height and grain yield traits of 38 top crosses combined across two locations (2018).

S. O. V	Df	Days to 50% silking	Plant height cm	Ear height cm	Grain yield ard./fed.
Loc.	1	115.030 **	2968.750**	3592.188**	248.880**
Rep/Loc.	6	7.315**	935.471**	1358.745**	10.044
Crosses (C)	37	8.667**	1471.915**	1075.482**	210.004**
Lines (L)	18	12.569**	1324.041*	925.037**	117.163**
Testers (T)	1	34.898**	19745.066**	15848.766**	4215.695**
L x T	18	3.308	604.614**	405.190**	80.307**
C/Loc.	37	3.786*	424.662**	304.181**	25.188**
L X Loc.	18	3.412*	287.674**	386.458**	21.126*
T X Loc.	1	27.240**	636.842**	742.188**	66.728**
L x T x Loc.	18	2.858	549.863**	197.569*	26.942**
Pooled error	222	2.042	107.600	113.699	10.907
CV %		2.3	4.3	8.0	11.6

*, ** Indicating significant at 0.05 and 0.01 levels of probability, respectively.

Table 3: Estimates of variance component for days to 50% silking, plant height, ear height and grain yield traits

S.O.V	Days to 50% silking	Plant height cm	Ear height cm	Grain yield ard./fed.
σ^2 GCA-L	0.54	61.35	20.68	2.67
σ^2 GCA-T	0.05	125.35	98.02	26.94
σ^2 GCA(average)	0.74	167.29	140.16	19.06
σ^2SCA	0.06	6.84	25.95	6.67
σ^2 GCAL x Loc.	0.07	-32.77	23.61	-0.73
σ^2 GCAT x Loc.	0.32	1.14	7.17	0.52
σ^2 GCA x Loc.	0.07	-32.77	23.61	-0.73
σ^2 SCA x Loc.	0.20	110.57	20.97	4.01

All negative estimates of variance were considered zero.

Similar results have been reported in maize Aly (2004), Kumar *et al.*(2005). Abd El-Mottalb (2014) and Gamea (2015). Variance of σ^2SCA × locations interaction was higher than the variance of σ^2GCA× locations for most studied traits (days to 50% sillking, plant height and grain yield). These results indicated that non additive type of gene action was more affected by environmental conditions. Similar results were reported, Attia *et al.* (2015), Abdel-Moneam *et al*. (2014), Darwich *et al.* (2016) and Abu shosha and Habouh (2019).

The proportional contribution

The contribution of lines, testers and their interactions to total variances are presented in Table 4. The proportional contribution of line to total variances was much higher than tester and line x tester in all traits, except for grain yield, where,s the contribution of tester was higher than the lines and lines x testers. These suggest female parent maximum contributed to total variance. Amin *et al*. (2014). Mean performance, GCA and SCA effects and superiority percentage for all traits under this study are presented from Table 5 to Table 8.

Days to 50% silking:

Data in (Table 5) cleared that, means of days to 50% silking ranged from 59.6 days (L_{10} x T_1) to 63.8(L_{16} x T_1) and ranged from 60.9 (SC 128) to 64.4 (SC 2031) for crosses and checks, respectively. In the same time, side 4 crosses had lower values in earlines compared to the early check SC 128. The inbred lines; L_4, L_7 and L_{10} exhibited highly significant GCA effects towards earlines, while the tester (T_2) was a good tester of highly significant GCA effects for days to 50% silking. Non of the crosses had a significant SCA effects and superiority percentage relative to short check (s.c128) for that trait.

Plant height:

Regarding the results in (Table 6) values of plant height showed that twelve crosses had low values of plant height, four (L_3 x T_2), (L_6x T_2), (L_7 x T_2) and (L_{15} x T_2) had negative and desirable significant short plant height compared the short check (s.c128). Five inbred line (L_2, L_3, L_{13} and L_{15}) and tester (T_2) had negative and desirable significant of GCA effects for this trait. On the other hand Four crosses; (L_2 x T_1), (L_7x T_2), (L_{11} x T_2) and (L_{12} x $_{T1}$) had negative and desirable significant SCA effects. Four crosses (L_3 x T_2), (L_6x T_2), (L_7 x T_2) and (L_{15} x T_2) exhibited desirable and highly significant superiority percentage for shortness relative to short check SC 128.

Ear height:

For ear height data in (table 7) cleared that, out of the 38 test crosses, four test crosses;(L_3 x T_2), (L_7x T_2), (L_{13} x T_2) and (L_{15} x T_2) exhibited desirable and highly significant means compared to the best check SC 128 for low ear placement. The inbred lines; L_2, $L_3$and L_{13} and tester; T2 exhibited negative and desirable significant of GCA effects for ear height. Eight crosses (L_2xT_1), (L_7 x T_2), (L_{12} x T_1), (L_{18} x T_1), (L_3x T_2), (L_7 x T_2), (L_{13} x T2) and (L_{15} x T_2) had negative and desirable highly significant of SCA effects and superiority percentage relative the best check SC 128 for low ear placement, respectively.

Table 4: Proportional contribution of line, tester and their interaction to total variance.

Source	Days to 50% silking	Plant height cm	Ear height cm	Grain yield ard./fed.
Due to line	70.6	43.8	41.8	27.1
Due to tester	10.9	36.3	39.8	54.3
Due to line x tester	18.6	20.0	18.3	18.6

Table 5: Mean performance, combining ability effects and superiority percentage for days to 50% silking.

Lines	Means (day)		GCA effects		SCA effects		Superiority percentage relative to early check SC 128 (60.9day)	
	T₁	T₂	Lines		T₁	T₂	T₁	T₂
L₁	62.3	61.6	0.4		0.0	0.0	2.3*	1.2
L₂	62.1	60.6	-0.2		0.4	-0.4	2.1	-0.4
L₃	62.3	61.5	0.3		0.0	0.0	2.3*	1.0
L₄	61.3	59.9	-1.0**		0.3	-0.3	0.6	-1.6
L₅	62.8	61.5	0.6		0.3	-0.3	3.1**	1.0
L₆	61.0	61.8	-0.2		-0.7	0.7	0.2	1.4
L₇	61.5	59.9	-0.9**		0.5	-0.5	1.0	-1.6
L₈	61.9	61.6	0.2		-0.2	0.2	1.6	1.2
L₉	61.8	60.5	-0.4		0.3	-0.3	1.4	-0.6
L₁₀	59.6	60.1	-1.7**		-0.6	0.6	-2.1	-1.2
L₁₁	60.9	61.4	-0.4		-0.6	0.6	0.0	0.8
L₁₂	62.4	60.5	-0.1		0.6	-0.6	2.5	-0.6
L₁₃	61.3	62.4	0.3		-0.9	0.9	0.6	2.5**
L₁₄	63.0	62.9	1.4**		-0.3	0.3	3.5**	3.3**
L₁₅	62.0	60.0	-0.6		0.7	-0.7	1.8	-1.4
L₁₆	63.8	63.3	1.9**		-0.1	0.1	4.7**	3.9**
L₁₇	63.3	62.4	1.3**		0.1	-0.1	3.9**	2.5*
L₁₈	61.9	61.4	0.1		-0.1	0.1	1.6	0.8
L₁₉	61.3	60.0	-0.9**		0.3	-0.3	0.6	-1.4

	SC10	64.1	LSD	5%	0.7	LSD	5%	1.0	LSD	5%	1.4
	SC 128	60.9	gᵢ	1%	0.9	Sᵢⱼ	1%	1.3		1%	1.8
	SC 2031	64.4	LSD	5%	1.0	LSD	5%	1.4			
LSD	5%	1.4	gᵢ-gⱼ	1%	1.3	Sᵢⱼ-Sₖᵢ	1%	1.8			
	1%	1.8	Testers								
				T1	0.3						
				T2	-0.3**						
			LSD	5%	0.2						
			gᵢ	1%	0.3						
			LSD	5%	0.3						
			gᵢ-gⱼ	1%	0.4						

*, ** Indicating significant at 0.05 and 0.01 levels of probability, respectively.

Grain yield (ard./fed.):

The main objective of maize breeders is to develop a high yielding maize hybrids. The mean performance of grain yield ranged from 19.93 to 42.91 for crosses and from 27.78 to 33.87 for checks, respectively (Table 8). Six crosses (L₁x T₁, L₇ x T₁, L₁₀ x T₁, L₁₁x T₁, L₁₂ x T₁ and L₁₄ x T₁), nine crosses ((L₁x T₁, L₄ x T₁, L₅ x T1, L₇x T₁, L₈ x T₁, L₁₀ x T₁, L₁₁x T₁, L₁₂ x T₁ and L₁₄ x T₁) and two crosses (L₁₀ x T₁ and L₁₁x T₁) had significantly mean values of yield better than the checks SC 10,

SC 128 and SC 2031, respectively. Regarding data in Table (8), five inbred line; L₁, L₅,L₁₀, L₁₁and L₁₂ had positive and highly significant of GCA effects. From the testers, T1 (SD 7) had positive and highly significant GCA effects for this trait. Five crosses (L₁₀x T₁, L₁₁ x T₁, L₁₄ x T₁, L₁₆x T₂and L₁₇ x T₁) exhibited significant and highly significant SCA effects for grain yield. The superiority percentage relative to the best checks (SC 2031) ranged from -41.14 % for crosses L13x T2 to 26.71% for crosses L₁₀x T₁ and two crosses; L₁₀x T₁ and L₁₁ x T₁ had

positive and highly significant superiority percentage for grain yield.

Repenting on the previous might be concludes that, the inbred lines L_4, L_7,L_{10} and L_{19} are good donor for earlinees and the inbred lines L_1, L_5,L_{10}, L_{11} and L_{12} that had high general combining ability. For grain yield might be utilized in the national hybrid breeding programs to improve such traits.

Also, these lines have high potential to transfer these desirable characters to their cross progenies. Crosses L_{10} x T_1(42.91 ard. /fed.), L_{11} x T_1(38.40 ard. /fed.) and L_{14} x T_1(35.65 ard. /fed.) had high means values and highly significant SCA effects for grain yield, so might be used in maize hybrid development programs.

Table 6: Mean performance, combining ability effects and superiority percentage for plant height.

Lines	Means (cm)		GCA effects	SCA effects		Superiority percentage relative to shortest check SC 128 (234.4cm)	
	T_1	T_2	Lines	T_1	T_2	T_1	T_2
L_1	241.9	226.3	-5.0	-0.2	0.2	3.2	-3.5
L_2	232.5	231.9	-6.9**	-7.7*	7.7*	-0.8	-1.1
L_3	227.5	208.8	-21.0**	1.3	-1.3	-2.9	-10.9**
L_4	250.0	241.3	6.5*	-3.7	3.7	6.7**	2.9
L_5	255.6	240.6	9.0**	-0.6	0.6	9.1**	2.7
L_6	238.1	217.5	-11.3**	2.3	-2.3	1.6	-7.2**
L_7	260.6	215.0	-1.3	14.8**	-14.8**	11.2**	-8.3**
L_8	247.5	230.0	-0.3	0.7	-0.7	5.6*	-1.9
L_9	261.3	239.4	11.2**	2.9	-2.9	11.5**	2.1
L_{10}	266.3	235.6	11.9**	7.3*	-7.3	13.6**	0.5
L_{11}	265.6	233.1	10.3**	8.2*	-8.2*	13.3**	-0.5
L_{12}	236.3	241.9	0.0	-10.9**	10.9**	0.8	3.2
L_{13}	236.3	225.0	-8.5**	-2.4	2.4	0.8	-4.0
L_{14}	247.5	240.6	5.0	-4.6	4.6	5.6*	2.7
L_{15}	241.9	212.5	-11.9**	6.6	-6.6	3.2	-9.3**
L_{16}	250.0	235.0	3.4	-0.6	0.6	6.7**	0.3
L_{17}	242.5	232.5	-1.6	-3.1	3.1	3.5	-0.8
L_{18}	253.1	245.0	10.0*	-4.0	4.0	8.0**	4.5
L_{19}	241.3	237.5	0.3	-6.2	6.2	2.9	1.3

SC 10	270.0	LSD g_i	5%	5.2	LSD s_{ij}	5%	7.3	LSD	5%	10.3
SC 128	234.4		1%	6.7		1%	9.5		1%	13.4
SC 2031	276.9	LSD g_i-g_j	5%	7.3	LSD s_{ij}-s_{ki}	5%	10.3			
			1%	9.5		1%	13.4			
LSD	5%	10.3	Testers						
	1%	13.4	T1		8.1**			
			T2		-8.1**			
			LSD g_i	5%	1.7			
				1%	2.2			
			LSD g_i-g_j	5%	2.4			
				1%	3.1			

*, ** Indicating significant at 0.05 and 0.01 levels of probability, respectively.

Table 7: Mean performance, combining ability effects and superiority percentage for ear height.

Lines	Means (cm)		GCA effects	SCA effects		Superiority percentage relative to lowest ear placement check SC 128 (131.3 cm)	
	T_1	T_2	Lines	T_1	T_2	T_1	T_2
L_1	135.0	127.5	-2.0	-3.5	3.5	2.9	-2.9
L_2	124.4	127.5	-7.3**	-8.8*	8.8*	-5.2	-2.9
L_3	121.3	108.1	-18.6**	-0.7	0.7	-7.6	-17.6**
L_4	145.0	128.8	3.6	0.9	-0.9	10.5**	-1.9
L_5	151.9	137.5	11.4**	0.0	0.0	15.7**	4.8
L_6	140.6	122.5	-1.7	1.8	-1.8	7.1	-6.7
L_7	150.0	111.3	-2.6	12.2**	-12.2**	14.3**	-15.2**
L_8	144.4	127.5	2.7	1.2	-1.2	10.0*	-2.9
L_9	145.0	128.8	3.6	0.9	-0.9	10.5**	-1.9
L_{10}	155.6	130.0	9.6**	5.6	-5.6	18.6**	-1.0
L_{11}	146.9	125.6	3.0	3.4	-3.4	11.9**	-4.3
L_{12}	137.5	138.1	4.6	-7.5*	7.5*	4.8	5.2
L_{13}	130.6	108.1	-13.9**	4.0	-4.0	-0.5	-17.6**
L_{14}	143.8	130.6	3.9	-0.7	0.7	9.5*	-0.5
L_{15}	137.5	118.8	-5.1	2.2	-2.2	4.8	-9.5*
L_{16}	148.1	127.5	4.6	3.1	-3.1	12.9**	-2.9
L_{17}	133.8	125.6	-3.6	-3.2	3.2	1.9	-4.3
L_{18}	141.3	142.5	8.6**	-7.8*	7.8*	7.6	8.6*
L_{19}	136.3	128.1	-1.1	-3.2	3.2	3.8	-2.4

SC 10	157.5	LSD	5%	5.3		5%	7.5	LSD	5%	10.6
SC 128	131.3	g_i	1%	6.9	LSD s_{ij}	1%	9.7		1%	13.8
SC 2031	157.5	LSD	5%	7.5		5%	10.6			
LSD	5%	10.6	g_i-g_j	1%	9.7	LSD $s_{ij}-s_{ki}$	1%	13.8		
	1%	13.8	Testers							
			T1	7.2**						
			T2	-7.2**						
			LSD	5%	1.7					
			g_i	1%	2.2					
			LSD	5%	2.4					
			g_i-g_j	1%	3.2					

*, ** Indicating significant at 0.05 and 0.01 levels of probability, respectively.

Table 8: Mean performance, combining ability effects and superiority percentage for grain yield ard./ fed.

Lines	Means (ard/fed)		GCA effects	SCA effects		Superiority percentage relative to highest check SC 2031 (33.87ard/ fed)	
	T_1	T_2	Lines	T_1	T_2	T_1	T_2
L_1	35.43	27.75	3.23**	0.11	-0.11	4.60	-18.06**
L_2	30.74	23.63	-1.18	-0.17	0.17	-9.24	-30.23**
L_3	27.44	24.48	-2.40**	-2.24	2.24	-18.98**	-27.73**
L_4	31.68	25.99	0.47	-0.88	0.88	-6.47	-23.27**
L_5	33.57	28.13	2.49**	-1.01	1.01	-0.88	-16.94**
L_6	29.53	25.26	-0.97	-1.59	1.59	-12.81**	-25.42**
L_7	34.38	23.73	0.70	1.60	-1.60	1.52	-29.92**
L_8	32.68	22.83	-0.61	1.20	-1.20	-3.51	-32.60**
L_9	29.96	23.70	-1.53	-0.59	0.59	-11.52*	-30.01**
L_{10}	42.91	27.46	6.83**	4.00**	-4.00**	26.71**	-18.91**
L_{11}	38.40	22.33	2.00*	4.31**	-4.31**	13.37**	-34.07**
L_{12}	34.72	27.77	2.88**	-0.25	0.25	2.51	-18.00**
L_{13}	29.83	19.93	-3.48**	1.22	-1.22	-11.91*	-41.14**
L_{14}	35.65	22.24	0.59	2.98*	-2.98*	5.27	-34.32**
L_{15}	30.73	20.54	-2.73**	1.37	-1.37	-9.28	-39.34**
L_{16}	28.87	29.09	0.62	-3.84**	3.84**	-14.77**	-14.11**
L_{17}	25.88	24.87	-2.99**	-3.22**	3.22**	-23.60**	-26.56**
L_{18}	30.39	26.39	0.03	-1.73	1.73	-10.28	-22.07**
L_{19}	26.85	21.97	-3.95**	-1.28	1.28	-20.71**	-35.13**

	SC 10	30.80	LSD g_i	5%	1.64	LSD S_{ij}	5%	2.32	LSD	5%	3.29
	SC 128	27.78		1%	2.13		1%	3.01		1%	4.26
	SC 2031	33.87	LSD g_i-g_j	5%	2.32	LSD $S_{ij}-S_{ki}$	5%	3.29			
	LSD 5%	3.29		1%	3.01		1%	4.26			
	1%	4.26	Testers								
			T1		3.72**						
			T2		-3.72**						
			LSD g_i	5%	0.53						
				1%	0.69						
			LSD g_i-g_j	5%	0.75						
				1%	0.98						

*, ** Indicating significant at 0.05 and 0.01 levels of probability, respectively.

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الملخص العربي

التحليل الوراثي لصفة محصول الحبوب وبعض الصفات المحصولية لبعض سلالات الذرة الشامية البيضاء الجديدة باستخدام تحليل السلالة* الكشاف

حمدي السيد احمد جامع

مركز البحوث الزراعية - معهد بحوث المحاصيل الحقلية - قسم بحوث الذرة الشامية

نفذت هذه الدراسة باستخدام احدي وعشرون سلاله مرباه داخليا من الذرة الشامية البيضاء بينهم تسعه عشر سلاله حديثة الاستنباط استخدمت كأمهات مع سلالتين مسجلتين هما سدس ٧ وسدس ٦٣ كآباء كشافة خلال الموسمين الزراعيي٢٠١٧ و٢٠١٨ فى كل من محطتي البحوث الزراعية بالجميزة وسدس– مركز البحوث الزراعية – مصر. في موسم ٢٠١٧ تم إجراء التهجين القمى بين التسعة عشر سلالة الجديدة مع كشافين (سلالتين) سدس ٧، سدس ٦٣ لإنتاج ٣٨ هجين قمى تم إجريت التهجينات في محطة البحوث الزراعية بالجميزة .تم تقيم ٣٨ هجن ناتجة بالإضافة إلي ثلاث هجن فردية للمقارنة هم الهجن الفردية ١٠، ١٢٨هاي تك٢٠٣١ في كل من محطتي البحوث الزراعية الجميزة وسدس خلال الموسم الزراعي ٢٠١٨. تم تصميم التجربة في قطاعات كاملة العشوائية في أربع مكررات وكانت الصفات محل الدراسة عدد الأيام من الزراعة حني ظهور ٥٠% من النورة المؤنثة وطول النبات وارتفاع الكوز ومحصول الحبوب بالإردب للفدان.

وكانت أهم النتائج كالتالي:

اظهر التباين الراجع إلى المواقع معنوية عالية لجميع الصفات محل الدراسة وكذلك اظهر التباين الراجع للهجن ومكوناتها (السلالة، الكشاف، السلالة × الكشاف) معنوية لمعظم الصفات محل الدراسة. كان الفعل الجيني المضيف أكثر تأثيرا عن الفعل الجيني الغير مضيف في وراثة الصفات محل الدراسة. أظهرت السلالات (L4، L7، L10، L19) والسلالات (L1،L5،L10، L11،L12) تأثيرات مرغوبة للقدرة العامة على التالف نحو التبكير فى النضج ومحصول الحبوب على التوالي.

أعطت الهجن الفردية L10x T1 (٤٢,٩١) اردب للفدان و L11x T1 (٣٨,٤٠) اردب للفدان و L14x T1 (٣٥,٦٥) اردب للفدان تفوقا في محصول الحبوب عن أفضل هجن المقارنة وكذلك تأثيرات مرغوبة للقدرة الخاصة علي التالف لصفة محصول الحبوب وعليه يمكن استخدام السلالات الابوية والهجن المتفوقة الناتجة فى المزيد من الدراسات لاعتمادها كهجن جديدة بعد التأكيد من ثباتها الوراثي.