



## Estimation of heterosis combining ability and some genetic Parameters in maize (zea mays L.) using full diallel cross.

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### Abstract

A field experiment was carried out in Abu Sadeerah /saqlawiyah Fallujjh/AL Anbar region by using six inbred lines of corn. Inbred lines which were planted in spring season (2009) to reproduce (15) single crosses and (15) reciprocal crosses and reproduce parent seeds away from self-pollination. Seeds were grown by using randomized complete block design (R.C.B.D) with three replicates in fall autumn season (2009). The objective of this study was to identify and select superior corn inbred lines based on their performance as well as to evaluate their single cross performance based on results of estimation heterosis and some genetic parameters. The results of genetic analysis showed that there were significant differences among crosses for all the studied traits. Single cross (5×6) and reciprocal cross (4×2) were less than single reciprocal crosses and it took last about (53.6)(51.00) day to succession and superiority parent (2) giving high values to reach (199.95) in character yield and so single cross (1×3) and reciprocal cross (4×2) give high values to reach (228.28)(229.03) to succession. Reciprocal cross (6×2) give high value negative heterosis reach (-7.14) silking. The results showed that there were highly significant differences among crosses for all the studied traits except the number of rows/ear. General combining ability was significant, it showed the importance of additive gene action and not gene action to domination on heritability characters. The inbred line (R2) was found as the best general combining for number of rows/ear (0.21) and 500 grain weight (3.40) and plant yield (6.84). The best cross (5×6) and reciprocal (5×1) showed positive (S.C.A) effects for plant yield (9.13) and (25.65) on succession. The values of the component general combining ability were less than 1.0 except for plant and ear length and plant yield. The value of its more than 1.0. Value variance genetic dominance most characters whereas was  $\sigma^2A$  least  $\sigma^2D$  to all characters except yield plant. and  $\sigma^2A$  least  $\sigma^2D$  to all characters except silking, ear length as to be height broad sense heritability to all characters studied at single crosses except yield plant was low and to reach (4.52) (4.84) on succession. narrow sense heritability low to most characters comparison broad sense heritability and was value height it to silking to reach (18.25) at single crosses and (46.09) at reciprocal crosses. This showed that developing elite hybrids were the best method for improving maize grain yield.

(Zea mays L. )

( B2 B1 A)

(1942)Tatum Sprague

.(3) Asefa (2)

/

.2009

(5) ZM19R (4) ZB607 (3) S<sub>7</sub> (2)R<sub>2</sub> (1) S<sub>2</sub>

6-1

2009

.(6)HS

3

6

(10-5)

2009

(15

+ 15

+ 6 )

(36)

(RCBD )

2009/7/22

(4)		(3)	
		%50	-1
		( )	-2
		( )	-3
		( )	-4
			-5
	( )	( )	500 -6
		. %15.5	
	(%15.5)	( / )	-7
		1	
	(51) (54)	(4×2)	(2×4)
		(192.2)	(6×3)
	(5×4)	(191.7)	
		( 108.97 )	
		(3×5)	(105.90)
	(21.06)	(6×4)	
	(17.40) (17.40)		(2×6) (1×6)
	(17.00)	(4×3)	
	(168.33) (168.66)		500
(182.33)		(1×3) (3×4)	
		(2×3)	(5×2)
	(5×2) (4×2)	/	(236.40)
		/	(225.93) (229.03)
		(2)	



(25.65) (9.13)

.(16 15 14 8 7 5)

. (17 9 7 6 5 3)

(6)

 $\sigma^2_{gca} / \sigma^2_{rca}$ 

(%98.68)

(%58.81)

. (%8.27)

(%0.54)

(%46.09 )

(21 20 19 18 11 8 6)

(ZB607) (R2)

(4×2) (1×3)

## .2009

( )	500 ( )	( )	( )	( )	( )	( )	( )
199.26	133.00	15.53	16.06	71.5	147.9	57.67	<b>1</b>
199.95	134.00	16.00	15.00	70.76	155.2	56.00	<b>2</b>
191.41	128.66	17.26	14.06	73.18	153.2	57.00	<b>3</b>
185.81	118.00	16.93	15.13	69.54	146.8	58.3	<b>4</b>
187.30	147.66	15.40	17.33	67.38	143.4	57.3	<b>5</b>
195.83	125.00	16.53	16.33	70.98	168.7	56.00	<b>6</b>
199.06	128.33	16.86	19.66	95.90	183.0	57.6	<b>1×2</b>
228.28	168.33	13.33	19.93	90.94	172.0	59.6	<b>1×3</b>
201.66	131.00	16.33	14.60	94.50	168.7	55.00	<b>1×4</b>
227.41	138.33	15.06	16.26	97.75	189.2	57.3	<b>1×5</b>
212.86	137.00	17.40	15.73	95.83	179.9	57.00	<b>1×6</b>
236.40	134.00	14.46	19.00	93.26	178.3	56.6	<b>2×3</b>
195.00	138.66	16.93	14.20	102.44	189.3	54.00	<b>2×4</b>
209.01	117.66	15.86	17.40	102.18	186.5	56.3	<b>2×5</b>
193.43	132.00	17.40	16.00	92.62	186.2	56.00	<b>2×6</b>
214.14	168.66	13.53	19.13	95.23	191.7	57.6	<b>3×4</b>
216.82	138.66	16.06	21.20	105.90	188.6	56.00	<b>3×5</b>
202.66	154.00	15.26	17.53	71.51	186.3	54.00	<b>3×6</b>
214.03	156.00	16.93	16.13	99.74	188.2	60.3	<b>4×5</b>
227.80	160.00	15.20	20.13	102.23	186.5	57.6	<b>4×6</b>
217.61	149.33	15.00	14.73	95.71	171.1	53.6	<b>5×6</b>
197.11	78.66	16.26	17.93	93.90	166.5	57.6	<b>6×1</b>
186.10	115.66	16.26	14.86	96.81	176.2	58.00	<b>5×1</b>
196.46	144.66	14.53	16.00	102.6	176.7	57.00	<b>4×1</b>
184.09	107.66	15.40	18.26	96.49	185.0	59.6	<b>3×1</b>
216.17	151.66	15.66	14.46	102.98	191.1	59.3	<b>2×1</b>
210.84	125.00	16.20	16.86	99.48	174.5	52.00	<b>6×2</b>
225.93	182.33	16.06	18.26	96.23	170.3	58.3	<b>5×2</b>
229.03	173.33	14.20	17.26	94.29	181.5	51.00	<b>4×2</b>
200.88	140.66	16.06	14.46	107.51	179.7	57.3	<b>3×2</b>
215.57	147.66	16.80	17.66	104.67	192.2	55.3	<b>6×3</b>
189.69	106.00	16.93	21.06	102.36	178.7	54.3	<b>5×3</b>
203.40	129.33	17.00	20.60	93.54	183.3	54.00	<b>4×3</b>
204.14	128.66	14.53	20.16	94.66	187.4	56.3	<b>6×4</b>
207.91	109.66	16.33	16.33	108.97	189.6	58.00	<b>5×4</b>
218.68	139.65	14.60	14.73	104.30	172.9	56.00	<b>6×5</b>
207.67	137.65	15.75	17.15	93.26	176.84	56.41	المعدل العام
31.96	6.29	2.23	2.10	5.54	6.94	2.99	<b>5 %</b> <b>L.S.D</b>
42.44	8.35	2.96	2.79	7.36	9.22	3.97	<b>1%</b> <b>L.S.D</b>

( Griffing 1956 b)

(2)

.(2009)

/	500							
243.96**	111.51**	2.33*	22.38**	45.27**	102.37**	0.78	2	
667.24*	1049.83**	3.67 **	13.39**	414.00 **	554.21**	15.45**	35	
377.34	14.94	1.88	1.67	11.60	18.21	3.38	5	
197.34**	84.41**	1.29*	2.81*	13.36**	47.69 **	9.81**	15	
127.23**	224.93**	1.45*	7.06 **	290.46**	371.37**	6.48**	15	
325.94**	563.45**	1.29*	2.40**	27.08 **	43.78**	2.25*	70	

%1

\*\* %5

\*

3

( )	500 ( )							
-13.15	-4.23	5.37	9.22	34.12	17.91	2.85	1×2	
14.56	26.56	-22.76	24.09	24.26	12.27	4.56	1×3	
1.20	-1.50	-3.54	-9.09	32.16	14.06	-5.66	1×4	
14.12	-6.31	-2.20	-6.17	36.71	27.92	-1.06	1×5	
0.96	3.00	12.98	-3.67	34.02	6.63	1.78	1×6	
3.13	0.00	-16.22	5.55	27.43	14.88	1.07	2×3	
-14.92	3.47	0.00	-21.11	44.77	21.97	-3.57	2×4	
-8.81	-20.31	-0.87	-3.33	44.40	20.16	0.53	2×5	
-15.61	-1.49	8.75	-11.11	30.48	10.37	0.00	2×6	
11.87	31.08	-21.61	26.43	30.13	25.13	1.05	3×4	
13.27	-6.09	-6.95	22.33	44.71	23.10	-1.75	3×5	
-3.87	19.69	-11.58	7.34	-2.28	10.43	-3.57	3×6	
14.27	5.64	0.00	-6.92	43.96	28.20	5.23	4×5	
8.04	28	-10.21	23.27	44.02	10.55	2.85	4×6	
3.21	1.13	-2.59	-15.00	34.84	1.42	-4.28	5×6	



-6.50	-40.85	11.90	9.79	31.32	-1.30	2.85	6×1
-11.62	-21.67	5.58	-14.25	35.39	19.13	1.22	5×1
-1.40	8.76	-14.17	-0.37	43.49	19.47	-2.22	4×1
-7.61	-19.05	-10.77	13.69	31.85	20.75	4.56	3×1
-5.69	13.17	-2.12	-19.66	44.02	23.13	5.89	2×1
0.47	-6.71	1.25	-6.33	40.15	3.43	-7.14	6×2
-1.43	23.47	0.37	1.44	35.99	9.72	4.10	5×2
-0.08	29.35	-16.12	-4.11	33.25	16.94	-8.92	4×2
-12.36	4.97	-6.95	-19.66	46.91	15.78	2.32	3×2
2.24	14.76	-2.66	8.14	43.03	13.93	-1.25	6×3
-0.89	-28.21	-1.91	21.52	39.87	16.64	-4.73	5×3
6.26	0.52	-1.50	36.15	27.82	19.64	-5.26	4×3
-3.17	2.92	-14.17	23.45	33.36	11.08	0.53	6×4
11.00	-25.73	-3.54	-5.77	57.28	29.15	1.22	5×4
3.72	-5.41	-5.19	-15.00	46.94	2.48	-8.39	6×5

 $\hat{\sigma}^2_{si}$  $(\hat{\sigma}^2 \hat{g}_i)$  $(\hat{g}_i)$ 

4

 $(\hat{\sigma}^2)$ 

حاصل النبات (غم)	وزن حبة (غم)	عدد صفوف العنوص	طول العنوص	ارتفاع العنوص (سم)	ارتفاع النبات (سم)	التزهير الاثنوي (يوم)	التأثير والتباين	الاباء
-4.52	-4.17	-0.23	-0.50	-1.81	-3.25	1.52	$\hat{g}_i$	S2
-8.09	-4.31	-0.25	-0.52	-1.93	-3.27	1.50	$\hat{\sigma}^2 \hat{g}_i$	
290.27	378.44	1.47	3.62	39.43	113.68	2.17	$\hat{\sigma}^2 \hat{s}_i$	
6.84	3.40	0.21	-0.19	-0.05	0.72	-0.55	$\hat{g}_i$	R2
3.28	3.27	0.20	-0.21	0.16	0.63	-0.59	$\hat{\sigma}^2 \hat{g}_i$	
236.07	475.16	1.08	4.47	55.98	83.53	5.72	$\hat{\sigma}^2 \hat{s}_i$	
-1.43	0.13	0.03	0.92	0.76	1.67	0.11	$\hat{g}_i$	S7
-5.00	-0.01	0.01	0.91	0.66	1.10	0.8	$\hat{\sigma}^2 \hat{g}_i$	
244.53	536.60	1.87	5.58	65.92	78.88	2.49	$\hat{\sigma}^2 \hat{s}_i$	
-2.23	2.10	0.02	-0.08	-0.22	1.20	0.02	$\hat{g}_i$	ZB607
5.80	1.96	0.01	-0.10	0.33	1.13	-0.03	$\hat{\sigma}^2 \hat{g}_i$	
113.24	461.75	1.70	5.04	59.70	93.19	8.27	$\hat{\sigma}^2 \hat{s}_i$	
-1.18	-0.17	0.07	-0.01	1.27	-2.00	0.8	$\hat{g}_i$	ZM19R
-4.75	-0.31	0.06	-0.03	1.17	-2.08	0.05	$\hat{\sigma}^2 \hat{g}_i$	
228.83	615.85	0.45	4.25	62.69	123.40	5.54	$\hat{\sigma}^2 \hat{s}_i$	
2.52	-1.28	-0.10	-0.13	0.05	1.56	-1.19	$\hat{g}_i$	HS
-1.04	-1.43	-0.13	-0.15	-0.05	1.48	-1.23	$\hat{\sigma}^2 \hat{g}_i$	
133.30	234.56	1.39	4.12	47.12	62.84	4.31	$\hat{\sigma}^2 \hat{s}_i$	
21.40	0.830	0.10	0.64	0.64	1.01	0.18	S.E $\hat{\sigma}^2 \hat{g}_i$	
20.90	1.329	0.72	1.26	1.26	1.38	0.98	S.E $\hat{\sigma}^2 \hat{s}_i$	

(^ sij )

5

التضريبات	التزهير الانثوي (يوم)	ارتفاع النبات (سم)	ارتفاع العرنوص (سم)	طول العرنوص (سم)	عدد صفوف العرنوص	وزن حبة (غم) 500	حاصل النبات (غم)
1×2	1.08	12.73	7.10	0.60	0.53	3.20	-2.37
1×3	1.58	3.23	-0.77	1.51	-1.18	4.48	4.47
1×4	-2.00	-2.09	6.51	-1.26	-0.10	2.34	-1.84
1×5	-0.38	11.10	3.64	-1.07	0.07	-6.21	-0.20
1×6	0.55	-1.95	2.53	0.31	1.42	-7.60	-0.69
2×3	1.00	-0.24	5.68	-1.16	-0.73	-3.76	5.56
2×4	-3.41	6.63	4.62	-1.14	-0.46	12.92	-0.26
2×5	1.36	2.83	3.89	0.87	-0.08	9.20	4.13
2×6	-0.69	1.21	2.04	-0.39	0.93	-11.18	-14.91
3×4	-0.75	7.78	-0.36	1.87	-0.54	9.20	4.77
3×5	-1.47	7.13	7.95	3.06	0.64	-15.18	-1.78
3×6	-0.69	9.16	9.79	-0.34	0.35	14.42	0.35
4×5	2.61	12.85	9.32	-0.82	0.78	-6.65	6.72
4×6	1.72	7.34	4.39	3.21	-0.91	5.95	8.00
5×6	-2.83	-4.40	4.56	-2.24	-0.91	8.39	9.13
6×1	-0.83	-4.05	-3.54	2.60	0.60	-11.66	-8.55
5×1	0.00	-5.00	-4.22	0.83	-1.03	30.33	22.09
4×1	-1.00	-4.00	-4.18	-0.70	0.90	-6.83	2.60
3×1	-0.33	6.50	0.49	0.70	-0.60	11.33	25.65
2×1	-0.33	6.70	1.08	-1.10	0.56	12.50	7.87
6×2	-0.33	-0.70	-7.35	2.26	-0.80	-3.33	17.75
5×2	1.50	3.90	4.17	-1.53	1.33	-17.33	-17.01
4×2	-1.00	8.10	3.09	-0.43	1.33	-32.33	-8.45
3×2	2.00	5.85	-3.40	-0.43	0.60	3.50	-8.70
6×3	1.83	4.20	0.84	-0.73	-1.73	19.66	5.37
5×3	0.83	4.95	1.84	0.06	-0.43	16.33	13.56
4×3	-0.66	-2.95	0.15	-0.06	-0.76	3.16	-6.46
6×4	1.16	-0.70	-4.84	-0.10	0.30	23.16	3.06
5×4	0.66	-0.45	3.78	-0.01	0.33	15.66	11.83
6×5	1.16	-0.90	-4.40	-0.03	0.20	4.83	-0.53

دول 6 تقدير المعالم الوراثية للصفات المدروسة في الذرة الصفراء .

التضريبات التبادلية							
المعالم الوراثية	التزهير الانثوي (يوم)	ارتفاع النبات (سم)	ارتفاع العنوص (سم)	طول العنوص (سم)	عدد صفوف العنوص	وزن 500 حبة (غم)	حاصل النبات/غم
$\sigma^2_{gca}$	0.72	3.46	0.79	0.18	0.05	6.61	5.73
$\sigma^2_{sca}$	5.35	365	286	6.51	0.82	219	1.78
$\sigma^2_{Rca}$	0.56	18.85	11.61	0.92	0.33	279.24	98.75
$\sigma^2_{gca}/\sigma^2_{sca}$	0.13	9.49	2.76	0.02	0.06	0.03	3.22
$\sigma^2_A$	1.44	6.93	1.58	0.37	0.10	13.2	11.4
$\sigma^2_D$	5.35	365.30	286.59	6.51	0.82	219.95	1.78
$\sigma^2_G$	6.80	372	288	6.88	0.92	233	13.2
$\sigma^2_E$	1.12	6.07	3.86	0.55	0.62	4.97	125.44
$\sigma^2_P$	7.93	387.30	292.04	7.44	1.55	238.17	138.70
$h^2_{b.s}$	58.81	98.40	98.68	92.50	59.80	97.91	8.27
$h^2_{n.s}$	18.25	1.83	0.54	5.05	6.45	5.55	9.55
$\bar{a}$	2.72	10.26	19.02	5.88	4.06	5.76	0.55
التضريبات العكسية							
$\sigma^2_{gca}/\sigma^2_{rca}$	1.27	0.18	0.06	0.20	0.14	0.02	0.05
$\sigma^2_{D-r}$	0.56	18.85	11.61	0.92	0.33	279.24	100.25
$\bar{a}-r$	0.88	2.33	3.82	2.21	2.56	6.49	4.17
$h^2_{b.s-r}$	25.40	6.82	4.52	17.48	88.28	78.39	4.84
$h^2_{n.s-r}$	46.09	21.77	9.27	20.28	9.52	4.45	5.59

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