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STUDY OF GENETIC BEHAVIOUR OF INTERSPECIFIC CROSSES OF MAIZE-TEOSINTE (1)

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ABSTRACT

The present investigation was carried out at two summer seasons of 2011 and 2012 at two different locations. Sids Research Station in Upper Egypt and Sakha Research Station in North Delta of the Agricultural Research Center, Egypt. Each experiment was designed as a randomized complete block design with three replications. The objective of this investigation is aimed to study the behavior of genetic interspecific of maize-teosinte crosses under two locations.

Twenty one crosses were made among three teosinte (*Euchlaena maxicana*) as male tester parents and seven genotypes (*Zea mays*) as female maize parents in 2011 season in 2012 summer season. The 21 F_1 and their ten parents were planted in two experiments in the two locations (Sakha and Sids stations).

Main finding could be summarized as follows:

1-Genotypes appeared to be varied from location to another with respect to their means for most of the studied characters.

2-The parent Maize SC10 had highest and desirable means for all the studied characters and tester Sakha (teosinte) produced highest means for all studied traits.

3-The crosses (SC168 x inbred lines) (SC125 x Sakha) and (inbred line 7 x inbred line 3) were the best for all the studied traits.

4-The best desirable GCA effects in maize fresh yield in kg/plant, stem diameter and dry matter % were found in the single cross 168. The favorable fresh yield in kg/plant was inbred line 34 for number of leaves/plant were inbred line 7 and the two parent inbred line 7 and SC124 for number of leaves/plant.

5-The results indicated that the desirable general combining ability effects teosinte for dry mater % and dry yield/plant in Damietta parent and the desirable for number of leaves/plant for parent line 3 and Sakha.

6-The results revealed that the best desirable estimates of SCA for fresh yield in kg/plant, number of stems/plant, dry matter and number of leaves/plant were the cross (L_2 x T_1) .

In general, the best desirable for most of the studied characters were parents SC168 and inbred line 3 for breeding programs

INTRODUCTION

The need to green fodder feed for farm animals in summer has been increased in Egypt, specially in summer season, where the area of fresh forage crop is very limited. So, great efforts have been made to increase forage yield quality and quantity per unit area. Teosinte is most closely related to maize, maize x Teosinte hybrids (maizente) could provide an answer to overcome the problem of shortage in production of summer fodder.

Maize-teosinte hybrids have been of considerable interest to both maize and teosinte breeders. In this respect, Chaudhuyi and Prasad (1969) reported the successful production of hybrids between maize and teosinte and considerable amount of heterosis was observed in most of the hybrids raised by them.

During the last three decades, a great deal of information about the hybrids between maize and teosinte has been given by several authors (Smith *et al.*, 1984; Aulicino and Magoja, 1991; Alan and Sundberg, 1994; Jode *et al.*, 1996; Rady, 2007; Sakr, *et al*., 2009 and sakr and Ghazy, 2010).

Barriere *et al.* (1984) studied of protein content and agronomic value in progenies from the cross maize x teosinte and assessed that the top crosses was high in fodder yield and protein yield/ha. Aulicino and Magoja (1991) crossed maize inbred as female parent with teosinte as male parent, they found that the teosinte were more prolific than the maize, producing more taller and thinner tillers and exhibited greater variation for most of the studied traits. Habeba (2006) crossed maize and teosinte for improving fodder production. She found that the hybrid (maizente) had more leaves than the maize varieties and the highest mean values of total forage dry weight. Rady (2007) reported that in a line x tester analysis involving 5 lines and 4 testers. The crosses were more than the parents for fresh forage yield and dry forage yield. Sakr and Ghazy (2010) crossed maize and teosinte. They found that all top crosses were superior to their parents of teosinte for green fodder yield per plot, tussling date (toward earliness) and grain yield per plot.

The main objectives of the present investigation was aimed to study inheritance of some forage yield characters in 21 maize x teosinte crosses.

MATERIALS AND METHODS

The Present investigation was carried out during seasons 2011 and 2012 at two different locations; Sids Research Station in Upper Egypt and Sakha Research Station in North Delta of the Agricultural Research Center, Egypt.

The genetic materials used in this study were three male testers namely inbred line 3 (T1), Damietta (T2) and Sakha (T3). Also, seven entries of maize as female parents namely Sc yellow 167, (L1), SC yellow 168 (L2), SC white 10 (L3), SC 124 white (L4), SC white 125 (L5), Inbred line 7 (L6) and Inbred line 34 (L7).

In 2011 summer season, the seven female and the three male testers were crossed according to line x tester design to produce 21 F_1 hybrids as outlined by Kempthorne (1957).

In 2012 summer season, two field experiments conducted at both Sakha and Sids experimental stations.

Each experiment was designed as a randomized complete block design with three replications. Each replicate contained 21 F_1 and ten parents, the plot size was one row, 4 meter long and 0.6 m agricultural practices were applied as recommended. Ten guarded plants were randomly selected for the different measurements. The studied characters were recorded as follows: Fresh yield (kg/plant), plant height (cm), stem diameter (cm), No. of stems, No. of leaves, dry matter%, dry yield (kg).

Statistical analysis were performed for each locations. The combining ability analysis was done using the line x tester procedure as suggested by Kempthorne (1957). Combined analysis between the two locations for each experiment was done whenever homogeneity of variance was detected for the studied characters according to Steel and Torrie (1980).

RESULTS AND DISCUSSION

1- Analysis of variance

The analysis of variance for each experiment and the combined between them for agronomic attributes are presented in Table (1). Location mean squares for all the studied traits were lightly significant. Genotypes mean squares were significant for all the studied traits in both locations and the combined analysis indicating the wide diversity between the parental materials used in the present study. Results also showed that mean squares due to parents, crosses and their interaction with location were highly significant for all the studied traits except of Genotypes × location and Crosses × location for dry yield stem diameter, number of stems, dry matter and dry yield respectively. P.V.C. loc. mean squares was highly significant for fresh yield kg/ plant.

Lines mean squares were significant for all the studied traits except of plant height, while testers mean squares were significant for fresh yield kg/plant, dry matter, dry yield and No. of leaves. Results indicated that both lines and tester were significantly different form one to anther in top crosses.

L × T mean squares were highly significant for all studied expect of the combined data for No of stem, dry yield and number of leaves.

The interaction means squares between (L × Loc) and (T ×loc.) but not significant for all the studied traits. On the other hand, the interaction between (L× T × Loc) was highly significant For all the studied traits except for No of stems dry yield and No of leaves plant

Mean performance:

The mean performance of the tested parental genotypes at each location as well as combined data are presented in Table (2). The performance of studies genotypes appeared to be varied form location to another with respect to their means for most of the studied characters. The results in Table (2) showed that the parent S.C.10 (maize) had the highest and desirable means values for all the studied on the other hand tester Sakha (teosinte) gave the highest mean values for all the studied traits.

The mean performance of the tested 21 crosses at each location and their combined data are presented in Table(2). The crosses (S.C 168 × inbred line 3) (S.C. 125 × Sakha) and inbred line 7 × inbred line 3) were the best for all the studied traits there results are in harmony with those obtained by Aurliciro (2001), Habeba (2006), Rady (2007) Sakr *et al.* (2009) and Sakr and Ghazy (2010).

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Table 2: The mean performance for lines, tester and line x tester for all the studied traits in the location and their combined.

Genotypes	Fresh yield, kg/plant			Dry yield kg/plant		
	L_1	L_2	Com	L_1	L_2	Com
SC167 (1)	1.60	1.10	1.36	0.50	0.32	0.41
SC168 (2)	1.86	1.16	1.51	0.62	0.34	0.48
SC10 (3)	2.30	1.36	1.82	0.72	0.38	0.55
SC124 (4)	2.12	1.47	1.79	0.66	0.40	0.53
SC125 (5)	1.53	1.17	1.35	0.47	0.32	0.40
Inbred line 7 (6)	0.81	0.70	0.76	0.21	0.16	0.19
Inbred line 34 (7)	0.86	0.76	0.81	0.22	0.17	0.20
Inbred line 3 (8)	4.29	3.17	3.73	1.22	0.82	1.02
Demiatta (9)	3.65	3.10	3.37	1.10	0.80	0.95
Sakha (10)	4.20	3.83	4.01	1.31	1.00	1.15
1 x 8	5.37	4.87	5.11	1.33	1.01	1.17
1 x 9	6.63	5.00	5.81	1.74	1.09	1.42
1 x 10	5.70	4.97	5.33	1.49	1.10	1.30
2 x 8	8.63	7.27	7.95	2.22	1.76	1.99
2 x 9	5.73	4.87	5.30	1.51	1.04	1.28
2 x 10	5.74	4.77	5.25	1.61	1.11	1.36
3 x 8	5.00	4.90	4.95	1.27	1.02	1.15
3 x 9	6.50	5.00	5.75	1.65	1.28	1.46
3 x 10	7.63	4.73	6.18	1.92	1.03	1.47
4 x 8	7.20	4.70	5.96	1.76	0.96	1.36
4 x 9	6.12	5.57	5.84	1.48	1.13	1.31
4 x 10	7.66	4.87	6.26	1.89	1.08	1.48
5 x 8	5.51	5.00	5.25	1.40	1.02	1.21
5 x 9	5.06	4.80	4.94	1.34	1.21	1.27
5 x 10	6.17	6.67	6.42	1.46	1.43	1.45
6 x 8	6.23	5.70	5.96	1.50	1.26	1.38
6 x 9	5.96	5.03	5.49	1.53	1.07	1.30
6 x 10	6.62	5.23	5.92	1.60	1.11	1.35
7 x 8	7.33	6.30	6.81	1.77	1.34	1.56
7 x 9	6.62	4.97	5.79	1.56	1.02	1.29
7 x 10	6.31	5.23	5.77	1.48	1.15	1.32
LSD 0.05	0.38	0.25	0.31	0.12	0.07	0.09
LSD 0.01	0.50	0.32	0.42	0.16	0.09	0.13

Table 2: Cont.

Genotypes	Stem diameter, cm			No. of stems		
	L_1	L_2	Com	L_1	L_2	Com
SC167 (1)	2.53	2.27	2.40	1.00	1.00	1.00
SC168 (2)	2.36	2.23	2.30	1.00	1.00	1.00
SC10 (3)	2.56	2.40	2.48	1.00	1.00	1.00
SC124 (4)	2.50	2.17	2.33	1.00	1.00	1.00
SC125 (5)	2.36	2.23	2.30	1.00	1.00	1.00
Inbred line 7 (6)	2.06	1.93	2.00	1.00	1.00	1.00
Inbred line 34 (7)	2.13	1.76	1.95	1.00	1.00	1.00
Inbred line 3 (8)	1.40	1.33	1.36	5.26	4.70	4.98
Demiatta (9)	1.60	1.50	1.55	5.33	4.70	5.01
Sakha (10)	1.73	1.67	1.70	6.26	5.30	5.78
1 x 8	2.60	2.40	2.50	3.90	3.43	3.66
1 x 9	2.83	2.40	2.61	3.73	3.96	4.35
1 x 10	2.63	2.33	2.48	4.60	4.00	4.30
2 x 8	3.00	3.00	3.00	5.47	4.53	5.00
2 x 9	2.50	2.30	2.40	4.20	3.50	3.85
2 x 10	2.50	2.47	2.48	4.23	3.86	4.05
3 x 8	2.40	2.43	2.41	4.53	3.10	3.81
3 x 9	2.53	2.46	2.50	5.17	3.33	4.25
3 x 10	2.73	2.30	2.51	5.27	3.53	4.40
4 x 8	2.70	2.50	2.60	5.03	3.33	4.18
4 x 9	2.26	2.73	2.50	4.53	3.23	3.88
4 x 10	2.63	2.43	2.53	5.10	3.13	4.11
5 x 8	2.23	2.40	2.31	4.16	3.43	3.80
5 x 9	2.40	2.63	2.51	4.40	3.23	3.81
5 x 10	2.46	2.83	2.65	4.60	4.30	4.45
6 x 8	2.36	2.46	2.41	4.60	3.66	4.13
6 x 9	2.40	2.43	2.41	4.67	3.13	3.90
6 x 10	2.50	2.60	2.55	4.83	3.30	4.06
7 x 8	2.63	2.86	2.75	5.23	4.43	4.83
7 x 9	2.46	2.60	2.53	4.70	3.20	3.95
7 x 10	2.43	2.63	2.51	4.43	3.37	3.90
LSD 0.05	0.35	0.21	0.20	0.28	0.26	0.33
LSD 0.01	0.46	0.27	0.27	0.38	0.33	0.43

Table 2: Cont.

Genotypes	No. of leaves/plant			Plant height, cm			Dry matter		
	L_1	L_2	Comp	L_1	L_2	Comp	L_1	L_2	Comp
SC167 (1)	15.0	13.3	14.16	247.0	222.7	234.83	31.40	29.00	30.2
SC168 (2)	15.0	13.0	14.83	236.0	226.0	231.0	33.60	29.60	31.6
SC10 (3)	16.0	13.7	14.80	283.3	246.0	264.7	31.33	28.60	29.9
SC124 (4)	14.0	13.7	13.80	267.6	235.0	251.3	31.46	27.66	29.5
SC125 (5)	15.0	13.7	14.30	255.3	240.0	247.7	30.63	28.13	29.3
Inbred line 7 (6)	11.7	9.7	10.70	175.7	164.3	170.0	26.56	23.70	25.13
Inbred line 34 (7)	11.0	9.3	10.20	164.7	160.3	162.5	26.46	23.26	24.8
Inbred line 3 (8)	111.7	82.0	86.80	320.0	301.3	310.7	28.56	25.90	27.3
Demiatta (9)	103.0	91.7	97.30	310.0	303.3	306.7	30.16	25.96	28.0
Sakha (10)	107.7	96.3	102.00	315.0	308.3	311.7	31.20	26.13	28.6
1 x 8	70.3	67.0	68.70	316.1	308.0	312.0	24.80	20.90	22.8
1 x 9	73.0	70.3	71.70	340.3	311.7	326.0	26.23	21.96	24.1
1 x 10	74.7	72.7	73.70	330.3	306.3	318.3	26.26	22.20	24.2
2 x 8	102.3	96.3	99.30	339.0	322.6	330.8	25.76	24.23	25.0
2 x 9	72.7	74.7	73.70	331.0	301.3	316.1	26.46	21.36	23.9
2 x 10	70.0	80.7	75.30	332.0	306.3	319.1	28.03	23.43	25.7
3 x 8	77.3	81.3	79.30	335.7	306.7	321.1	25.46	21.00	23.2
3 x 9	96.7	83.3	90.00	35.7	310.3	323.0	25.40	25.70	25.5
3 x 10	102.7	91.3	97.30	335.0	309.3	322.1	25.20	21.80	23.5
4 x 8	95.3	85.3	90.30	338.0	301.7	319.8	24.43	20.36	22.4
4 x 9	74.0	77.7	75.80	335.0	317.0	326.0	24.26	20.36	22.3
4 x 10	99.7	86.3	93.00	332.7	306.0	319.3	24.70	22.30	23.5
5 x 8	76.7	86.7	81.70	324.7	310.0	317.3	25.50	20.50	23.0
5 x 9	88.7	75.0	81.80	333.7	309.3	321.5	26.53	25.13	25.8
5 x 10	90.3	84.0	87.20	342.0	315.3	328.7	23.73	21.56	22.6
6 x 8	90.7	82.7	86.70	333.7	308.7	321.1	24.16	22.13	23.1
6 x 9	86.7	80.3	83.50	330.3	303.7	317.0	25.66	21.33	23.5
6 x 10	99.0	90.7	94.80	334.3	312.6	323.5	24.16	21.33	22.7
7 x 8	101.0	82.3	91.70	341.7	314.6	328.1	24.23	21.30	22.7
7 x 9	84.3	79.0	81.70	330.0	312.0	321.0	23.70	20.60	22.1
7 x 10	83.00	76.0	79.50	334.7	309.3	322.0	23.53	22.13	22.8
LSD 0.05	2.7	4.9	3.05	9.7	4.07	7.2	1.1	0.7	.9
LSD 0.01	3.5	6.5	4.02	12.6	2.92	9.7	1.4	0.9	1.2

Combining ability

a- General combined ability effects

Estimate of general combining ability effects of ten genotypes for all the studied traits in each location and their combined data are shown in Table 3. The best desirable GCA effects in maize fresh yield kg/plant , stem diameter and dry mater % were found in the single cross 168. Meanwhile, for favorable fresh yield kg/plant was inbred line 34. for number of leaves/plant were inbred line 7 and single crosses 124, where they exhibited highly significant positive estimates of GCA effects

Table 3: Estimates of general combining ability effect of ten genotypes for all studied genotypes at Sakha, Sids locations and their combined data.

	Fresh yield, kg/plant			Dry yield, kg/plant			Stem diameter, cm		
	L_1	L_2	Comp.	L_1	L_2	Comp.	L_1	L_2	Comp.
L_1	-0.47**	-0.31**	-0.39**	-0.076**	-0.08**	-0.08**	0.15**	-0.15**	-0.008
L_2	0.33**	0.37**	0.35**	0.18**	0.14**	0.16**	0.13**	0.05*	0.09*
L_3	0.01	-0.38**	-0.18	0.01	-0.04**	-0.01	0.02	-0.13**	-0.05
L_4	0.62**	-0.21**	0.20	0.11**	-0.09**	0.01	0.00	0.02	0.01
L_5	-0.78**	0.23**	-0.27**	-0.19**	0.06**	-0.6*	-0.16**	0.08*	-0.03
L_6	-0.09	0.06	-0.01	-0.05**	-0.01	-0.03	-0.11**	-0.03	-0.07
L_7	0.38**	0.23**	0.31**	0.01	0.01	0.01	-0.03	0.16**	0.06
LSD 0.05	0.16	0.10	0.11	0.05	0.02	0.03	0.099	0.07	0.082
LSD 0.01	0.21	0.13	0.14	0.06	0.03	0.04	0.120	0.10	0.100
T_1	0.09	0.27**	0.18**	0.01	0.04**	0.02	0.02	0.04	0.037
T_2	-0.27**	-0.22**	-0.25**	-0.08**	-0.03**	-0.04*	-0.04	-0.02	-0.36
T_3	0.17**	-0.05	0.06	0.03	0.01	0.01	0.01	-0.02	-0.0008
LSD 0.05	0.10	0.06	0.07	0.03	0.01	0.02	0.06	0.05	0.05
LSD 0.01	0.13	0.08	0.09	0.04	0.02	0.03	0.07	0.06	0.069

	No. of stems			Plan height, cm			Dry matter			No. of leaves/plant		
	L_1	L_2	Comp.	L_1	L_2	Comp.	L_1	L_2	Comp.	L_1	L_2	Comp.
L_1	-0.27**	0.22**	-0.00	-4.66	-1.00	-2.83	0.61**	-0.29*	0.15	-13.42	-11.12	-12.30
L_2	-0.05	0.39**	0.09*	0.38	0.44	0.41	1.60**	1.02**	1.31**	-4.43**	2.76**	-0.85
L_3	0.30**	-0.25**	-0.05	1.83	-0.88	0.47	0.84	0.84**	0.52*	6.02**	4.20**	5.14**
L_4	0.20**	-0.33**	0.01	1.61	-1.44	0.08	-0.68**	-0.97**	-0.83**	3.52**	1.98**	2.75**
L_5	-0.29**	0.08	-0.03	-0.16	1.88*	0.86	0.100	0.41**	0.25	-0.92	0.26**	-0.07
L_6	0.01	-0.20**	-0.07	-0.83	-1.33	-1.08	-0.48	-0.38**	-0.43**	5.96**	3.42**	4.69**
L_7	0.10	0.09	0.06	1.83	2.33**	2.08	-1.33**	-0.63**	-0.98**	3.30**	-2.01**	0.64
LSD 0.05	0.14	0.13	0.13	4.00	1.66	2.9	0.45	0.28	0.36	1.29	0.15	1.34
LSD 0.01	0.18	0.17	0.17	5.2	2.15	3.8	0.59	0.36	0.46	1.67	1.95	1.62
T_1	0.01	0.13**	0.03	-0.92	0.66	-0.12	-0.24	-0.49**	-0.36**	1.52**	1.96**	1.24*
T_2	-0.05	-0.20**	-0.03	0.10	-0.33	-0.11	0.31**	0.36**	0.33*	-3.85**	-3.93**	-3.89**
T_3	0.03	0.06	0.00	0.81	-0.33	0.24	-0.06	0.12	0.03	2.33**	1.96**	2.15**
LSD 0.05	0.09	0.08	0.08	2.6	1.08	1.9	0.29	0.18	0.23	0.84	0.98	0.88
LSD 0.01	0.12	0.11	0.10	3.4	1.4	2.5	0.38	0.24	0.28	1.09	1.27	1.15

Highly significant and desirable values general combining ability effects in teosinte for dry matter % and dry yield/plant were found in the Demiatta g. Also the best desirable GCA effects for number of leaves / plant was tester inbred line 3 at Sakha these results are in harmony with those obtained by Aulicinox *et al.* (1999); Bogdan (1977); Chaudhury and Prasad (1968); Chaugale and Chavan (1965) and Corcuera (1991).

Specific combined ability effects

Estimates of specific combining ability effects of 21 top crosses for seven traits for each location and their combined data are shown in Table (4).

Table 4: Estimates of specific combining ability effects of 21 crosses for all the studied at Sakha, Sids and their combined.

	Fresh yield (kg/plant)			Dry yield (kg/plant)			Stem diameter (cm)		
	L_1	L_2	Com.	L_1	L_2	Com	L_1	L_2	Com
L_1 x T_1	-0.63**	-0.35**	-0.49**	-0.20**	-0.10**	-0.15**	-0.11	-0.02	-0.07
L_1 x T_2	1.01**	0.25**	0.64**	0.27**	0.06*	0.16**	0.19*	0.04	0.11
L_1 x T_3	-0.37*	0.07	-0.15	-0.06	0.03	-0.01	-0.07	-0.02	-0.04
L_2 x T_1	1.82**	1.35**	1.59**	0.42**	0.41**	0.42**	0.30**	-0.36**	0.33
L_2 x T_2	-0.69**	-0.54**	-0.61	-0.21**	-0.23**	-0.22**	-0.11	-0.26**	-0.19**
L_2 x T_3	-1.13**	-0.81**	-0.97**	-0.21**	-0.12**	-0.19**	-0.18*	-0.10	-0.14*
L_3 x T_1	-1.47**	-0.25**	-0.86**	-0.35**	-0.12**	-0.24**	-0.18*	-0.01	-0.09
L_3 x T_2	0.40	0.35**	0.37	0.08	0.20**	0.14**	0.02	0.09	0.05
L_3 x T_3	1.07**	-0.09	0.49**	0.26**	-0.07*	0.09	0.15	-0.07	0.03
L_4 x T_1	0.11	-0.60**	-0.24	0.03	-0.14**	-0.05	0.13	-0.10	0.01
L_4 x T_2	-0.59**	0.74**	0.07	-0.12**	0.10	-0.03	-0.21*	0.20**	-0.01
L_4 x T_3	0.48**	-0.13	0.17	0.13**	0.03	0.08	0.08	-0.10	-0.01
L_5 x T_1	-0.17	-0.76**	-0.47**	-0.01	0.23**	-0.12*	-0.16	-0.26**	-0.21**
L_5 x T_2	-0.24	-0.45**	-0.34	-0.01	0.01	0.00	0.08	0.03	0.05
L_5 x T_3	0.41**	1.22**	0.81**	0.02	0.21**	0.21**	0.08	0.23**	0.15**
L_6 x T_1	-0.13	0.10	-0.01	-0.05	0.06*	0.01	-0.08	-0.07	-0.08
L_6 x T_2	-0.02	-0.06	-0.04	0.03	-0.04*	0.00	0.02	-0.04	-0.01
L_6 x T_3	0.16	-0.03	0.06	0.01	-0.02	0.01	0.05	0.12*	0.08
L_7 x T_1	0.48**	0.52**	0.50**	0.15**	0.12**	0.14**	0.10	0.12*	0.11
L_7 x T_2	0.14	-0.30**	-0.08	0.01	-0.11**	-0.05	0.01	-0.07	-0.03
L_7 x T_3	0.62**	-0.21**	-0.42	-0.16	-0.01	-0.08	-0.11	-0.04	-0.08
LSD 0.05	0.26	0.17	0.19	0.08	0.046	0.06	0.17	0.12	0.14
LSD 0.01	0.34	0.21	0.26	0.11	0.087	0.08	0.22	0.15	0.19

	No. of stems/plant			No. of leaves/plant			Plant height (cm)			Dry matter (%)		
	L_1	L_2	Com.	L_1	L_2	Com.	L_1	L_2	Com.	L_1	L_2	Com.
L_1 x T_1	-0.53**	-0.49**	-0.51**	-3.85**	-4.96**	-4.4**	-11.85**	-1.33	-6.59**	-0.72	-0.29	-0.50
L_1 x T_2	0.37**	0.36**	0.37*	4.19**	4.26**	4.23	11.28**	3.33*	7.30**	0.15	-0.09	0.03
L_1 x T_3	0.15	0.13	0.14	-0.33	0.6*	0.18	0.57	-2.00	-0.71	0.56	0.38	0.47
L_2 x T_1	0.81**	0.43**	0.62**	19.14**	10.47**	14.80**	5.92	11.88**	8.90**	-0.74	1.71**	0.48
L_2 x T_2	-0.37**	-0.26	-0.32*	5.14**	-5.28**	-5.21**	-3.10	-8.44**	-5.77*	-0.60	-2.01**	-1.30**
L_2 x T_3	-0.43**	-0.16	-0.30*	-14.00**	-5.19**	-9.59**	-2.81	-3.44	-3.13	1.34**	0.29	0.81
L_3 x T_1	-0.47**	-0.35**	-0.41	-16.41**	-5.96**	-11.19**	1.14	-2.77	-0.81	0.35	-1.32**	-0.49
L_3 x T_2	0.23	0.21	0.22	8.30**	1.93	5.11**	0.11	1.88	1.00	-0.26	2.49**	1.11**
L_3 x T_3	0.23	0.00	0.19	8.11**	4.03**	6.07**	-1.26	0.88	-0.18	-0.09	-1.15	-0.62
L_4 x T_1	0.12	-0.03	0.04	4.14**	0.25	2.19	3.69	-7.22**	-1.76	0.21	-0.15	0.03
L_4 x T_2	-0.29	0.20	-0.04	-11.80**	-1.50	-6.65**	-0.32	9.11**	4.39	-0.51	-1.01**	0.70**
L_4 x T_3	0.17	-0.16	0.01	7.66**	1.25	4.46*	-3.37	-1.88	-2.63	0.29	1.16**	0.73**
L_5 x T_1	-0.24*	-0.35**	-0.29	-10.07**	2.80*	-3.63	-7.85*	-2.22	-5.03	0.49	-1.40**	-0.45
L_5 x T_2	0.06	-0.22*	-0.07	7.30**	-2.95*	2.17	0.11	-1.88	-0.88	0.96**	2.36**	1.66**
L_5 x T_3	0.17	0.57**	0.37*	2.77*	0.14	1.46	7.73*	4.11**	5.92*	-1.45**	-0.95**	-1.20**
L_6 x T_1	-0.11	0.16	0.02	-2.96**	-3.85	-3.41	1.80	-0.33	0.73	--0.25	1.02**	0.38
L_6 x T_2	0.02	-0.03	-0.003	-1.58	-0.28	-0.93	-2.54	-4.33**	-3.44	0.68	-0.63**	0.02
L_6 x T_3	0.09	-0.13	-0.02	4.55**	4.14**	4.34*	0.73	4.66**	2.70	-0.43	-0.39	-0.41
L_7 x T_1	0.42**	0.63**	0.53**	10.03**	1.25	5.64*	7.14*	2.00	4.57	0.65	0.44	0.55
L_7 x T_2	-0.03	-0.26*	-00.14	-1.25	3.82**	1.28	-5.54	0.33	-2.60	-0.43	-1.11**	-0.77**
L_7 x T_3	-0.39**	-0.36**	-0.38**	-8.22**	-5.07**	-6.92**	-1.59	-2.33	-1.96	-0.22	0.66**	0.21
LSD 0.05	0.24	0.22	0.22	2.16	2.51	2.39	6.9	2.87	5.12	0.78	0.49	0.62
LSD 0.01	0.32	0.29	0.29	0.22	3.32	3.08	8.9	3.72	6.72	1.02	0.63	0.81

***,** significant and highly significant at 0.05 and 0.01 levels of significantly, respectively**

The best desirable estimates of SCA effects for fresh yield kg/ plant height (cm), number of stem/plant dry matter% and number of leaves/plant were obtained by cross (L 2 × T1). Combinations (Sc168 x inbred line3)and (Sc125 x sakha) expressed high significant SCA effects in each location and their combined for number of leaves / plant height. The most height crosses that showed high SCA effects had one or two good combiners these results are in harmony with those obtained by Desai ***et al.*** (2000), Doebley (1990), El-Balkini (1959), Gill and Patil (1985), Hebaba (2006) and Hagag (1979).

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دراسة السلوك الوراثى للهجن النوعية الناتجة من الذرة الشامية والذرة الريانة

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أجريت هذه الدراسة خلال موسمين ٢٠١١ ، ٢٠١٢ فى محطة البحوث الزراعية بسخا ومحطة البحوث الزراعية بسدس محافظة بنى سويف وتم تقييم آباء الذرة الشامية كسلالات وهى (هجين فردى ١٦٧ ، هجين فردى ١٦٨ أصفر ، هجين فردى ١٠ أبيض ، هجين فردى ١٢٤ ، هجين فردى ١٢٥ أبيض ، سلالة ٧ ، سلالة ٣٤) وثلاثة كشافات ، سلالة ٣ ودمياط وسخا وتم التهجين بينهما باستخدام طريقة line tester بهدف دراسة تأثير تهجين الذرة الشامية مع الذرة الريانة لإنتاج العلف والتركيب الكيماوى له وقد أجريت التهجينات تبعاً لهذه الطريقة فى الموسم الصيفى ٢٠١١ لإنتاج بذور هجين الجيل الأول وفى موسم ٢٠١٢ تم تقييم الآباء بالإضافة إلى الجيل الأول فى تجربتين حقلتين فى كل من محطتى سدس وسخا فى تصميم القطاعات كاملة العشوائية فى ثلاث مكررات.

ويمكن تلخيص أهم النتائج فيما يلى

١. أشارت النتائج إلى وجود فروق عالية المعنوية للتباين بين كل من الموقعين والتراكيب الوراثية والآباء والهجن الناتجة منها والسلالات والكشافات وتفاعلاتها فى جميع الصفات المدروسة وكان أفضلها الهجين فردى ١٠.
٢. أوضحت النتائج أن هناك اختلاف معنوى بين آباء الذرة الريانة لجميع الصفات المدروسة وكان أفضلها الصنف سخا ١.
٣. أظهرت النتائج أن الهجن الناتجة الثلاثة (SC168× lien3) (SC125 ×Sakha) (line inbred 7 x inbred line3). الأفضل والأعلى فى صفات المحصول الأخضر للنبات

وارتفاع النبات وعدد السيقان وقطر الساق وعدد الأوراق والمحصول الجاف للنبات بالنسبة للآباء الناتجة منه.

٤. كانت أفضل الآباء من الذرة الشامية بالنسبة للقدرة العامة على الائتلاف لصفات المحصول الأخضر للنبات وقطر الساق والنسبة المؤية للمادة الجافة هى الهجين فردى ١٢٥ فى حين كان الآب (سلالة ٣٤) الأفضل بالنسبة لصفة المحصول الأخضر للنبات والآبان (سلالة ٧ وهجين فردى ١٢٤ بالنسبة لصفة عدد الأوراق للنبات بالنسبة للقدرة العامة على الائتلاف).

٥. أظهرت النتائج أن أفضل الآباء من الذرة الريانة لصفة النسبة المئوية للمادة الجافة والمحصول الجاف هى الآب Demiatta فى حين الآبان inbred line 3 وسخا الأفضل لصفة عدد الأوراق للنبات.

٦. أشارت النتائج إلى أن أفضل الهجن بالنسبة للقدرة الخاصة على الائتلاف بالنسبة لصفات المحصول الأخضر للنبات وعدد سيقان النبات والمحصول الجاف وعدد الأوراق هى الهجن SC168 ×3 inbred line والهجين Sakha × SC125 بالنسبة لصفتى المحصول الأخضر النبات وارتفاع النبات فى حين كانت الهجين (Demiatta × SC167) و (Sakha × SC168) و (Sakha × inbred line 7) الأفضل فى القدرة الخاصة على الائتلاف بالنسبة لصفة عدد الأوراق للنبات

توصى هذه الدراسة بإستخدام الاباء SC168 و inbred line3 فى برامج التربية المستقبلية لتحسين وزيادة محصول العلف.

قام بتحكيم البحث

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Table 1: Observed mean squares for genotypes for all the studied traits in each location and their combined data.

SOX	df sin	df Com	Fresh yield (kg/plant) L_1	Fresh yield L_2	Fresh yield Com	Dry yield (kg/plant) L_1	Dry yield L_2	Dry yield Com	Plant height (cm) L_1	Plant height L_2	Plant height Com	Stem diameter (cm) L_1	Stem diameter L_2	Stem diameter Com
Rep	2	-	0.028	0.013	-	0.001	0.00	-	12.58	13.17	-	0.010	0.008	-
Location	-	1	-	-	39.91**	-	-	6.510**	-	-	21731.7**	-	-	0.145**
Rep/Loc	-	4	-	-	0.020	-	-	0.01	-	-	12.8	-	-	0.009
Genotypes	(30)	(30)	14.28**	10.28**	23.66**	0.778**	0.457**	1.16**	6657.9**	5777.3**	12321.8**	0.338**	0.42**	0.68**
Parents	9	9	4.98**	3.84**	8.67**	0.45**	0.254**	0.68**	8877.1**	8355.5**	17037.2**	0.526**	0.40**	0.911**
Crosses	20	20	2.56**	1.41**	2.86**	0.15**	0.100**	0.18**	100.7**	77.56**	122.4**	0.10**	0.11**	0.21**
P. vs.crosses	-1	1	332.35**	245.5**	574.6**	16.17**	9.410**	25.13**	117829**	965688**	213870**	3.36**	6.95**	9.99**
Lines	6	6	2.25**	0.81**	1.59**	0.14**	0.06**	0.11**	47.9	22.2**	44.06	0.12**	0.12**	0.070
Testers	2	2	1.26**	1.35**	2.15**	0.04**	0.03**	0.05*	16.0	7.00	1.84	0.03	0.03*	0.057
Line x tester	12	12	2.93**	1.71**	3.62**	0.17**	0.12**	0.23**	141.3**	116.9**	181.71**	0.102**	0.11**	0.15**
G x Loc	-	(30)	-	-	0.896**	-	-	0.067**	-	-	113.5**	-	-	0.076**
Cro x Loc	-	20	-	-	1.106**	-	-	0.068**	-	-	55.91**	-	-	0.09**
Pa x Loc	-	9	-	-	0.16**	-	-	0.021**	-	-	195.4**	-	-	0.017**
PVC x loc	-	1	-	-	3.27**	-	-	0.47**	-	-	528.5**	-	-	0.32**
Lin x Loc	-	6	-	-	1.47**	-	-	0.090**	-	-	26.19	-	-	0.179
Tester x Loc	-	2	-	-	0.45**	-	-	0.012**	-	-	21.18	-	-	0.012
L x T x Loc	-	12	-	-	1.02**	-	-	0.66**	-	-	76.56**	-	-	0.060**
Eb	60	120	0.05	0.02	0.03	0.006	0.002	0.003	34.4	5.93	20.17	0.021	0.01	0.017

***,** significant and highly significant at 0.05 and 0.01 levels of significantly, respectively**

Table 1: Cont.

SOX	df sin	df Com	No. of stems			No. of leaves/plant			Dry matter (%)		
			L_1	L_2	Com	L_1	L_2	Com	L_1	L_2	Com
Rep	2	-	0.007	0.085	-	2.45	6.419	-	0.258	0.063	-
Location	-	1	-	-	31.54	-	-	1381.9**	-	-	484.19
Rep/Loc	-	4	-	-	0.046	-	-	4.4	-	-	0.161
Genotypes	(30)	(30)	8.46**	4.94**	12.81**	3428.3**	2784.7**	6115.4**	24.15**	24.38**	46.17**
Parents	9	9	15.16**	10.72**	25.69**	6138.2**	4265.7**	10278.5**	15.16**	14.16**	28.61**
Crosses	20	20	0.50**	0.58**	0.699**	400.2**	154.4**	465.6**	3.96**	6.67**	7.6**
P. vs.crosses	-1	1	107.4**	40.00**	139.26**	39600.4**	42061.0**	81642.9**	504.90**	470.68**	975.2**
Lines	6	6	0.46**	0.66**	0.190	447.5**	254.2**	625.7**	8.21**	5.30**	11.8**
Testers	2	2	0.05	0.66**	0.53	237.7**	244.06**	480.05**	0.02	4.14**	5.3**
Line x tester	12	12	0.59**	0.52**	0.97**	403.7**	89.58**	383.17**	2.21**	7.77**	5.9**
G x Loc	-	(30)	-	-	0.58**	-	-	97.6**	-	-	0.30**
Cro x Loc	-	20	-	-	0.38**	-	-	89.05**	-	-	3.01**
Pa x Loc	-	9	-	-	0.19**	-	-	125.4**	-	-	1.17**
PVC x loc	-	1	-	-	8.09**	-	-	18.54**	-	-	0.069**
Lin x Loc	-	6	-	-	0.93**	-	-	76.01	-	-	1.68
Tester x Loc	-	2	-	-	0.18	-	-	1.77	-	-	0.53
L x T x Loc	-	12	-	-	0.142	-	-	110.13**	-	-	4.08**
Eb	60	120	0.044	0.40	0.104	3.58	4.85	4.2	0.44	0.174	0.30

***,** significant and highly significant at 0.05 and 0.01 levels of significantly, respectively**