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COMBINING ABILITY FOR YIELD AND OTHER AGRONOMIC TRAITS IN DIALLEL CROSSES OF SIX NEW YELLOW MAIZE INBRED LINES

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ABSTRACT

A complete diallel cross among six new yellow maize inbred lines , *i.e.* 10RF , 11RF , 39RF, 45RF , 48RF and 50RF (Developed Improvement of Maize by Industrial Genotype Project) was made in 2010 summer season .Parental inbred lines and F_1 crosses along with two yellow commercial check hybrids, SC155 and SC162 were evaluated in randomized complete block design with four replications at Gemmeiza in two different dates ; 15 April and 15 may 2011 summer season to study the combining ability in order to identify the most superior parental inbred lines that produce superior hybrids and develop high yielding new yellow single crosses. Results indicated that general combining ability (GCA) were highly significant for plant and ear heights , specific combining ability(SCA) were highly significant for grain yield (ardab / feddan) and a significant for days to 50 % silking .The non-additive genetic effects were more important and played the major role for all traits inheritance of. Generally most of F_1 single crosses were earlier , shorter and had lower ear placement than two checks hybrids ; SC162 and SC155 . All the F_1 crosses were resistance to late wilt disease. All the F_1 crosses out yielded significantly better than the check SC162 , except four crosses . Single crosses (P_4×P_1) was significantly better than the best check SC155 for grain yield ,shorter for plant height and earlier in days to 50%silking , however there were seven single crosses, *i.e.* (P_5×P_4), (P_4×P_2), (P_1×P_4) , (P_1×P_5), (P_2×P_3), (P_6×P_1) and (P_2×P_6)which statistically equal the check cross 155 and significantly earliness, shortens and lower placement ear; in addition those crosses yielded better than the best check hybrid insignificantly P_1 (10 RF) was good combiner for resistance to late wilt disease and grain yield(ard/fed) . However P_4 (45 RF) was good combiner towards shortness, low ear placement and late wilt disease resistance. For (SCA) effects of the 15 F_1 crosses had positive and highly significant effects . However for maternal effect or reciprocal (SCA) effects were found that single crosses *i.e*, (P_5 × P_4), (P_3 × P_6), (P_4 × P_2),(P_5× P_3),(P_1 × P_3) and (P_6 × P_1) yielded highly significant for grain yield of 32.7 , 31.83 , 32.52 , 30.93 , 30.42 and 31.28 (ard/fed) relative to its reciprocal parents , respectively. Therefore , these crosses may be released as new high yielding single crosses.
Keywords: Corn, diallel, combining ability,

INTRODUCTION

Maize has a remarkable place among cereals and it is used as human food, animal feeding and industry (Keskin *et al.*, 2005). The identification of parental inbred lines that perform superior hybrids is the most costly and time consuming phase in maize hybrid development. Performance of maize inbred lines does not predict the performance of maize hybrids for grain yield (Hallauer and Miranda, 1981). Predictors of single-cross hybrid value or heterosis between parental inbred lines could therefore increase the efficiency of hybrid breeding programs (Betran *et al.,* 2003). Plant breeders and geneticists often use diallel mating designs to obtain genetic information about a trait of interest from a fixed or randomly chosen set of parental lines (Murray *et al*.,2003).

The diallel analysis is an important method to know gene actions and it is frequently used by crop breeders to choose the parents with a high general combining ability (GCA) and hybrids with high specific combining ability (SCA) effects (Yingzhong, 1999). Beside gene effects, breeders would also like to know how much of the variation in a crop is genetic and to what extent this variation is heritable, because efficiency of selection mainly depends on additive genetic variance

Large genotype× environment effects tend to be viewed as problematic in breeding because the lack of a predictable response hinders progress from selection (Dudley and Moll, 1969). , influence the environment and interaction between genotype and environment (Novoselovic *et al.* , 2004) .

Breeders still contend, however, that dominance effects caused by genes with over dominant gene action are also important (Horner *et al*., 1989). Most of the literature about maize, the most extensively studied plant species, suggests that additive effects of genes with partial to complete dominance are more important than dominance effects in determining grain yield (Lamkey and Lee 1993).

The objectives for this study was evaluation of six parental inbred line and their crosses thought complete diallel, estimated of (GCA)and (SCA), selection the best crosses for grain yield ,earlier and shortness, resistance to late wilt , lower ear placement ,determine the best allot for these crosses , studied the maternal effects. Therefore, the main objectives of the present investigation are to study and determine the following aspects: Determine the optimum environmental conditions suitable to perform high grain yield and other desired plant characters, identify type of gene action controlling the inheritance for studied traits, estimate of combining ability effects for six inbred lines and identify superior crosses and inbred lines to improve the yielding ability in maize breeding programs.

MATERIALS AND METHODS

The following six new yellow parental inbred lines were studied: 10RF , 11RF , 39RF , 45RF , 48RF and 50RF. These lines were differed considerably in expression of various agronomy traits. Six inbred lines were crossed at Gemmeiza in a full diallel to give 30 crosses including reciprocal crosses in the summer of 2010 at Agricultural Research Center in Egypt (A. R. C.) . The parents and their 30 F_1 hybrids and two check hybrids (single cross 155 and single cross 162) were evaluated at Gemmeiza location on randomized complete block design (RCBD) with four replications in two different planting dates in 15 April and 15 May 2011 . Kernels were hand -

sown at 3 to 4 grains were placed per hill then thinned at two plants per hell after emergence . Each replication contained 38 plots and each plot consisted of one ridge with 6 m a long and spacing of 35 cm between plants within ridge and 80 cm between ridges. In Experiments for each data were recorded on the following characters on plot basis days to 50% silking , plant height (cm), ear height (cm) , percentage of resistance to wilted plants per plot and grain yield, which was adjusted to 15.5 % moisture content (estimated in and ard/fed).

Statistical analysis procedure:

Analysis of variance for mean of performance according to the method outlined by Snedecor and cochran (1977) was used for each experiment and then combined over the two planting dates. The L.S.D. test at 5% and 1% according to (Steel and Torrie , 1980) was used for comparison the mean of performance of the different genotypes .

General combining ability (GCA) and specific combining ability (SCA) effects were estimated according to Griffings (1956B) Method 1 Model 1 . In addition the mathematical model for a single inbred cross were tested for normality by statistical software. Then, data were analyzed using AGR 21 statically software (2001). The evaluating main genotype effects obtain GCA , SCA , reciprocal, maternal and non-maternal effects and their interaction with environment.

GCA and SCA combining ability estimates according to Griffings (1956 b) diallel cross analysis designated as method 1 model 1 for each date. The combined analysis over two dates was carried out whenever homogeneity of variance was detected (Steel and Torri, 1980). Means of genotypes were compared using LSD at 5% and 1% probability level.

RESULTS AND DISCUSSION

The analysis of variance:

The analysis of variance for ordinary analysis and combining ability based on combined data over two planting dates for days to 50% silking, plant and ear heights, resistance to late wilt disease and grain yield (ardab/fed) is presented in Table 1. Mean squares were significant for all the studied traits. Hybrids mean squares were highly significant for the studied five traits. indicating that the hybrids performance differed from planting date to another . These results agree with those obtained by Nawar and El-Hosary (1985), Nass *et al.* (2000) ,Vacaro *et al*. (2002) and Barakat and Abd El-Aal (2006).

Results in Table 1 showed that both general (GCA) and specific (SCA) combining ability mean squares were highly significant for all studied traits excepted days to 50% silking and resistance to late wilt for (GCA)and resistance to late wilt for (SCA). These results indicated that both additive and non additive types of gene effects were involved in the inheritance of these traits. The ratio of GCA/SCA was less than unity for all studied traits . These results indicating that the non-additive genetic effects were more important and played the major role in all studied traits Indicating the non-additive gene was more important than additive gene action. These results agree with the finding of Hallaur and Miranda (1981), El-Hosary (1989) and Soliman *et al* (2005).

The interaction between GCA and SCA with planting dates (Table 1) were significant for all studied traits except for, resistance to late wilt, the magnitude of the interaction was lowest for GCA × planting dates than the SCA × planting dates for grain yield, plant height, ear height , days to 50% silking and resistance to late wilt. This indicates that non-additive genetic variance was influenced by environment. The non-additive component interacted more with the environment than the additive. This conclusion supports the findings by El-Hosary (1989), Mostafa *et al*. (1996). Sughroue and Hallaur (1997) , Soliman *et al.* (2005) and Motawei and Mosa (2009).

The closer of GCA/SCA genetic ratio (Baker , 1978) to unity shows the predictability based on GCA alone. Also the GCA/SCA ratio reveals that different traits show an additive or non-additive genetic effect. GCA/SCA ratio with a value greater than one indicates additive genetic effect, whereas GCA / SCA ratio with a value lower than one indicates dominant genetic effect. In accordance to our results, other researchers indicated dominance of non - additive genetic effects for all traits studies (Vacaro *et al*., 2002)

Mean performance

The combined data of mean performance across the two planting dates for grain yield and other agronomic trails of the six parental inbred lines , 30 F_1 crosses and two check hybrids were presented in Table 2. Results indicating that the P_1 was earliest , P_5 was shorter than other five parental. The parental inbred line P_4 and P_6 were lower ear placement than other parental inbred lines, six parental inbreeds were resistanant to late wilt disease and the parental inbred P_5 was highly grain yield parent .

All crosses were earliest than both single crosses 155 and 162 . Out of 30 crosses ; 23crosses were significantly earlier than the best check SC 155. Twenty eight crosses out of the evaluated new yellow 30 single crosses were significantly shorter than the best check single cross 155 . However twenty two crosses out of the same evaluated 30 crosses were significantly lower ear placement than the best check SC155. However the shorter plant height was the single cross (P_4×P_2) among the 30 crosses with 210 cm and the cross (P_4×P_3) was also the lowest ear placement out of the 30 crosses with 117 cm . For resistance to late wilt disease all of the crosses were resistanant compared with the check . The highest grain yield was obtained from crosses (P_4 xP_1) 32.82 ard/fad and (P_5 × P_4) 32.72 ard/fed in combined , these crosses were significantly out yielded the two checks SC 155. SC 162 at 5%.More over crosses (P_1×P_4) 32.05 ard/ fad , (P1×P5)31.85 ard/fad (P_6 × P_1) 31.28 ard /fed, (P_4×P_2)32.52 ard/fad , (P_2×P_3)31.33 ard /fad and (P_3 × P6) 31.83 ard/fed these crosses were insignificantly better than the checks. Hence it could be concluded that these crosses may be useful for improving maize grain yield program .

Table 1 : Analysis of variance for ordinary analysis and combining ability based combined data over two planting dates for studied traits.

S.O.V.	D.F.		Days to 50 % Silking	Plant height(cm)	Ear height (cm.)	Resistance to late wilt (%)	Grain yield (ard/fed)
Rep	-	3	12.94**	2602.8**	1195.5**	0.706	2.291
Date	-	1	43.55**	17205.1**	7822.9**	0.014	1.797
Rep × Date	-	6	7.84**	169.16**	90.9**	0.822	2.374*
Genotype	35	35	10.36**	3216.2**	549.1**	3.634**	530.13**
Genotype × Loc	-	35	14.02**	376.62**	203.8**	0.492	10.377**
Error	105	210	10.44	46.41	27.1	1.069	3.555
GCA	5	5	1.78	125.3**	8.89**	0.330	0.993**
SCA	15	15	2.15*	860.6**	131.9**	0.588	151.5**
Reciprocal	15	15	0.27	35.61**	25.2**	0.362	2.714**
GCA× Date	-	5	5.77**	164.5**	34.12**	0.574	2.624*
SCA × Date	-	15	8.36**	957.6**	175.45**	0.657	154.8**
Reciprocal× date	-	15	1.52	145.2**	92.11**	0.498	4.939**
Error (me)	105	210	2.61	11.69	6.53	0.134	0.444
GCA / SCA			0.82	0.144	0.067	0.561	0.006

*** and ** significant at 0.05 and 0.01 level of probability , respectively**

Combining ability effects:

Estimates of general combining ability effects (gi) of parental inbred lines were presented in Table 3 Results showed that for days to 50% silking , the parental inbred lines (P_2) and (P_3) possessed negative and GCA effects (desirable)in combined data over the two planting dates .Whereas , P_2 exhibited highest significant negative GCA effects (desirable) for plant height in combined data over the two dates at 1% . Whereas, P_4 possessed negative and significant GCA effects (desirable)in combined data over two planting dates at 5% . Whereas (P_4) exhibited highest significant negative GCA effects (desirable) for ear height in combined data over the two planting date at 1% , The parental line (P_5) had positive and significant GCA effects for resistance to late wilt disease , (P_1) and (P_4) were good combiner for resistance to late wilt disease . The parental inbred lines P_1 had significant positive GCA effects in combined data over the two planting dates for grain yield (ard/fed).

General combining ability for six parental line indicating that the parental inbred line P_2 was good combiner for earliness and shortness . The parental inbred line P_4 was good combiner towards low ear placement and resistance to late wilt , and The parental inbred lines P_1 was good combiner for resistance to late wilt disease and grain yield (ard/fad). In plant breeding, decreasing days from emergence to silking date character is suitable for grain yield improvement program. Therefore, these crosses seem to be suitable. Conformed that resulting Alam *et al*. (2008)

Estimates of SCA effects of 15 yellow single maize crosses

The estimates of specific (sij) combining ability effects in the 15 F_1 crosses for the studied traits are given in Table 4 . For days to 50% sillking dates negative (Sij) effects were detected for cross (P_2 × P_6) in combined data For plant heights results showed significant positive (SCA)effect for all crosses in combined data over two planting dates at 1% except ($P_1 \times P_2$) , ($P_2 \times P_4$) and ($P_4 \times P_5$) had positive and non- significant. Therefore, these crosses seem to be suitable for plant height improvement. Similar results were obtained by Muraya *et al.* (2006) and Alam *et al.* (2008). For ear placement heights results showed negative SCA effect for crosses ($P_3 \times P_4$) , ($P_4 \times P_5$) and ($P_5 \times P_6$), for lowest ear placement for the 15 F_1crosses ($P_1 \times P_2$) , ($P_1 \times P_4$) , ($P_2 \times P_5$) , ($P_3 \times P_5$) , ($P_3 \times P_6$) and ($P_4 \times P_6$)were positively significant (sij) based on combined .For resistance to late wilt disease results showed positive significant SCA effect for crosses ($P_1 \times P_3$) , ($P_1 \times P_4$) in combined data at LSD 1 % , ($P_3 \times P_4$) and ($P_4 \times P_6$)were negative significant SCA effect in combined data at LSD 1% .

Table 2 :Mean Performance of maize genotypes at their combined for the traits studied.

Genotypes		50% Silking date	Plant height (cm)	Ear height (cm.)	Resistance to late wilt (%)	Grain yield (ard/fad)
P_1 (10RF)		59	183	109	97	9.464
P_2 (11RF)		60	179	110	99	8.339
P_3 (39RF)		60	179	109	100	9.064
P_4 (45RF)		61	176	108	100	8.088
P_5 (48RF)		62	171	109	100	9.970
P_6 (50RF)		63	176	108	100	9.905
$P_1 \times P_2$		59	225	133	100	30.65
$P_2 \times P_1$		60	215	128	100	30.27
$P_1 \times P_3$		60	242	125	100	30.42
$P_3 \times P_1$		60	225	128	100	27.75
$P_1 \times P_4$		59	232	128	100	32.05
$P_4 \times P_1$		59	236	137	100	32.82
$P_1 \times P_5$		59	230	129	100	31.85
$P_5 \times P_1$		59	235	126	100	30.34
$P_1 \times P_6$		60	228	124	99	28.81
$P_6 \times P_1$		59	229	124	99	31.28
$P_2 \times P_3$		59	224	131	100	31.33
$P_3 \times P_2$		58	219	122	100	30.63
$P_2 \times P_4$		59	220	126	100	29.54
$P_4 \times P_2$		58	210	119	99	32.52
$P_2 \times P_5$		59	218	130	100	29.38
$P_5 \times P_2$		58	229	128	100	30.93
$P_2 \times P_6$		58	215	124	100	31.04
$P_6 \times P_2$		58	226	127	100	29.72
$P_3 \times P_4$		59	231	128	97	30.43
$P_4 \times P_3$		60	224	117	100	30.72
$P_3 \times P_5$		59	240	133	100	28.21
$P_5 \times P_3$		59	235	127	100	30.93
$P_3 \times P_6$		58	237	136	100	31.83
$P_6 \times P_3$		60	228	127	100	28.82
$P_4 \times P_5$		59	216	120	100	28.37
$P_5 \times P_4$		59	223	120	98	32.72
$P_4 \times P_6$		59	225	124	100	28.91
$P_6 \times P_4$		59	232	140	100	28.02
$P_5 \times P_6$		59	222	120	100	29.01
$P_6 \times P_5$		60	229	121	100	28.28
Checks	155	63	244	135	100	30.94
	162	68	282	169	100	26.65
C.V.		5.590	4.429	5.846	1.039	7.037
L.S.D.at	0.05	3.165	6.6728	5.0945	1.0127	1.8468
	0.01	4.150	8.7534	6.682	1.3261	2.4209

For grain yield , the best SCA effects were significantly positive . These crosses also had the highest combined analysis values, It could be concluded that the parental inbred line for that crosses could made themselves recombinations. Similar results were obtained by (Muraya *et al*. 2006; Amaregouda and Kajidoni, 2007 ;Akbar, 2008and Fan *et al.,* 2009.

Estimates of reciprocal effects of 15 yellow single crosses maize

Maternal effects and sex-linkage give rise to differences between reciprocal crosses. In diallel-cross analyses, the presence of these effects will cause biases in the estimates of genetical components of the variation. A method of analysis is described in which this bias is removed. Also, a worked example demonstrates the analysis for a case where males. only are available . (Wim E Crusio – 1987)

The estimates of specific (rij) combining ability effects of the 15 F_1 crosses for the studied traits are given in Table 5 for days to 50 % silking ,no significant effects were detected for all crosses . For plant height results showed significant negative (rij) effect for 15 F_1 (reciprocal) crosses in combined data over the two planting dates showed negatively and significant reciprocal effect for crosses ($P_6 \times P_2$) and ($P_5 \times P_2$) at LSD 5% and ($P_6 \times P_2$) and ($P_5 \times P_2$) had positive and significant at LSD 5% and ($P_3 \times P_1$) had positive highly significant at LSD 1% . For ear height results of showed negatively and significant (rij) reciprocal effect for crosses ($P_4{\times}P_1$) at 5% and ($P_6\times P_4$) highly significant at LSD 1% in combined data over the two planting dates ,($P_3 \times P_2$) and ($P_6 \times P_3$) had positive significant at LSD 5% and cross ($P_4 \times P_3$)had positively and highly significant at LSD 1 % over the two planting dates. For resistance to late wilt disease , results showed significant for crosses ($P_4 \times P_3$) and(P_5 x P_4) combined data at LSD 1 % . For grain yield , the best (rij) effects were positive and highly significant for crosses ($P_3 \times P_2$) and ($P_6\times P_3$) from combined data over the two planting dates, ($P_4 \times P_2$) was positive and significant . Crosses ($P_3 \times P_1$) , ($P_6 \times P_1$) , ($P_4 \times P_3$) and ($P_5 \times P_4$) had negatively and highly significant for (rij) effect of grain yield and($P_6 \times P_2$) had negatively and significant for (rij) effect of grain yield.

Table 3 : Estimates of GCA effects of six parents maize genotypes at Gemmeiza their combined for the traits studied in growing season 2011 .

Traits / parents	50% Silking date	Plant height (cm)	Ear height (cm)	Resistance to late wilt (%)	Grain yield (ard/fad)
P_1 10RF	0.020	3.409	1.305	-0.263	0.394*
$P_2$11RF	-0.406	-5.100**	0.180	0.059	0.192
$P_3$39RF	-0.510	3.441	0.493	0.017	-0.269
$P_4$45RF	0.270	-1.652*	-5.819**	-0.118	0.075
$P_5$48RF	0.156	-0.111	-1.017	0.194*	-0.016
$P_6$50RF	0.468	0.013	-0.142	0.111	-0.377
LSD at 5% (gi)	0.746	1.58	1.181	0.169	0.307
LSD at 1% (gi)	0.971	2.061	1.5394	0.218	0.400
LSD at5% (gi - gj)	1.296	2.745	2.052	0.293	1.534
LSD at1% (gi - gj)	**1.691**	**3.580**	**2.675**	**0.382**	**0.696**

***and ** significant at 0.05 and 0.01 level of probability , respectively**

Table 4 : Estimates of SCA effects of 15 yellow single crosses maize genotypes at Gemmeiza their combined for the traits studied in growing season 2011.

Crosses \ Traits	Days to 50% silking day	Plant height (cm)	Ear height (cm)	Resistance to late wilt (%)	Grain yield (ard/fad)
P_1 x P_2	0.49	3.37	5.18**	0.37	3.77**
P_1 x P_3	1.40	8.39**	0.99	0.67**	2.03**
P_1 x P_4	-0.68	13.79**	8.30**	0.74**	5.09**
P_1 x P_5	-0.82	10.75**	3.50*	0.24	3.13**
P_1 x P_6	-0.13	6.44**	-0.80	-0.29	4.08**
P_2 x P_3	0.2	4.59*	1.68	0.09	3.28**
P_2 x P_4	-0.51	3.37	-0.50	-0.07	4.46**
P_2 x P_5	-0.52	10.39**	6.06**	-0.07	3.87**
P_2 x P_6	-1.02	7.14**	1.38	0.06	3.43**
P_3 x P_4	0.84	7.26**	-1.19	-0.91**	3.63**
P_3 x P_5	0.02	15.97**	6.69**	0.14	3.84**
P_3 x P_6	-0.41	10.47**	7.25**	0.04	4.39**
P_4 x P_5	-0.51	3.01	-1.86	-0.59**	3.69**
P_4 x P_6	-0.76	11.96**	9.06**	0.24	1.97**
P_5 x P_6	-0.146	7.09**	-1.85	0.18	2.24**
LSD at 5% (Sij)	1.74	3.70	2.66	0.39	0.70
LSD at 1% (Sij)	2.29	4.85	3.62	0.51	0.94
LSD at 5% (Sij - Sik)	2.88	6.11	4.57	0.65	1.19
LSD at 1% (Sij - Sik)	3.78	9.74	5.99	0.85	1.56

***and ** significant at 0.05 and 0.01 level of probability , respectively.**

Table 5 : Estimates of reciprocal effects of 15 yellow single crosses maize genotypes at Gemmeiza their combined for the traits studied in growing season 2011.

Crosses \ Traits	Days to 50% silking day	Plant height (cm.)	Ear height (cm.)	Resistance to late wilt (%)	Grain yield (ard./fad.)
$P_2 \times P_1$	-0.562	5.125*	2.500	0.0625	-0.901
$P_3 \times P_1$	-0.125	8.438**	-1.250	0.0625	-1.254**
$P_4 \times P_1$	0.312	-1.625	-4.125*	-0.1250	0.609
$P_5 \times P_1$	0.062	-2.375	1.500	0.0625	0.656
$P_6 \times P_1$	0.312	-0.313	-0.313	0.1875	-1.450**
$P_3 \times P_2$	0.250	2.875	4.563*	-0.1875	2.014**
$P_4 \times P_2$	0.437	4.938*	3.563*	0.2500	0.932*
$P_5 \times P_2$	0.062	-5.625**	0.938	-0.0625	-0.371
$P_6 \times P_2$	0.125	-5.500**	-1.625	0.1250	-1.030*
$P_4 \times P_3$	-0.437	3.250	5.313**	1.3750**	-1.370**
$P_5 \times P_3$	-0.250	2.500	3.000	-0.1250	-0.576
$P_6 \times P_3$	-0.750	4.250	4.313*	0.0625	1.294**
$P_5 \times P_4$	0.250	-3.563	-0.250	0.7500**	-2.176**
$P_6 \times P_4$	0.187	-3.125	-8.313**	-0.2500	0.445
$P_6 \times P_5$	-0.562	-3.063	-0.313	0.0000	0.363
LSD at 5% (rij)	2.25	4.764	3.561	0.509	0.928
LSD at 1% (rij)	2.93	6.214	4.646	0.663	1.210
LSD at 5% (rij rik)	3.183	6.738	5.037	0.721	1.312
LSD at 1% (rij rik)	4.15055	8.7894	6.56892	0.94062	1.71162

***and ** significant at 0.05 and 0.01 level of probability , respectively.**

In these crosses showing high (rij) only good combiner. Such combinations would show desirable transgerssive segregates, such combinations, providing that the additive genetic system present in the good combiner as well as the complementary and epistatic effects present in cross. act in the same direction to reduce undesirable plant characteristic and maximize the character in view. Therefore, the previous crosses might be of prime importance in breeding program for traditional breeding procedures.

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قدرة التالف لمحصول الحبوب وبعض الصفات الأخرى في الهجن التبادلية لستة من ا لسلالات جديدة والمبشرة من الذرة الشامية الصفراء

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تم عمل الهجن التبادلية الممكنة في اتجاهين بين ستة سلالات من الذرة الشامية الصفراء الحبوب في موسم 2010 وتم تقييم الآباء والهجن والهجن العكسية بالإضافة إلى اثنان من الهجن الفردية التجارية صفراء الحبوب وهى هـ ف 155 و هـ ف 162 في تجارب حقلية من أربع مكرارات تم تنفيذها في موسم 2011 بمحطة البحوث الزراعية بالجميزة في ميعادين للزراعة وذلك لصفات ميعاد ظهور 50 % من النورات المؤنثة وارتفاع كل من النبات والكوز والمقاومة لمرض الذبول المتأخر ومحصول الحبوب وكان الهدف من الدراسة هو تقدير القدرة على التالف وتحديد الهجن الأكثر تفوقا " لاستخدامها في برامج التربية كهجن فردية صفراء الحبوب عالية الإنتاج تتفوق على الهجن التجارية الأخرى وكذلك التبكير في النضج.

أظهرت نتائج التحليل التجميعي للميعادين أن تباينات القدرة العامة والخاصة للائتلاف كانت عالية المعنوية للصفات تحت الدراسة ووجد أن التأثيرات الجينية غير المضيفة تلعب دورا هاما في وراثة صفات المحصول والمقاومة لمرض الذبول المتأخر وارتفاع النبات و الكوز وكذلك صفة التبكير كما أوضحت النتائج أن القدرة العامة للتالف كان عالية المعنوية لصفات ارتفاع النبات والكوز وكانت القدرة الخاصة على التالف عالية المعنوية لك من ارتفاع النبات والكوز وكذلك محصول الحبوب وكانت معنوية عند صفة ميعاد ظهور 50% من النورات المؤنثة والتأثيرات الجينية الغير مضيفة كانت تلعب دورا هاما في توريث الصفات . عامة كانت اغلب الهجن كانت مبكرة واقصر واقل موقع لارتفاع الكوز عن هجن المقارنة وكذلك كانت كل الهجن مقاومة لمرض الذبول المتأخر وأيضا كل الهجن كانت معنوية ومرتفعة في المحصول عن الهجين الفردي التجاري هـ ف 162 ماعدا أربع هجن وكان أفضل الهجن في المحصول معنويا هو $P_4 \times P_1$ عن الهجين التجاري 155 يتبعه كل من $P_5 \times P_4$, $P_4 \times P_2$, $P_1 \times P_4$ إحصائيا أفضل بالمقارنة بالهجين الفردي هـ ف 155 . وبالنسبة للقدرة العامة على التالف للسلالات الأبوية كانت السلالة P_4 (45 RF) الأفضل من ناحية قصر النبات وانخفاض موقع الكوز وكذلك المقاومة لمرض الذبول المتأخر وكذلك السلالة P_1 (10 RF) كانت الأفضل في صفة المقاومة لمرض الذبول المتأخر والمحصول وبالنسبة لتأثير القدرة الخاصة على التالف للخمسة عشر هجين كانت ايجابية وعالية المعنوية وبالنسبة للتأثير الاموى وجد أن الهجن التالية: $(P_5 \times P_4)$,$(P_3 \times P_6)$,$(P_4 \times P_2)$,$(P_5 \times P_3)$,$(P_1 \times P_3)$, $(P_6 \times P_1)$ لها تأثيرات عالية المعنوية محصوليا كالتالي 32.7 و31.83 و32.52 و30.93 و30.42 و 31.28 اردب / الفدان بالنسبة إلى ابائة المتبادلين على التوالى .

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