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EVALUATION OF SOME NEWLY DEVELOPED YELLOW MAIZE INBRED LINES FOR COMBINING ABILITY IN TWO LOCATIONS

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ABSTRACT

Thirteen new yellow maize inbred lines were top crossed to three tester, lines (Gm. 1002 , Gm. 1004 and Gm. 1021) during summer season of 2006. The resultant 39 top crosses with three single crosses checks i.e. 155, 3084 and 3080 were evaluated for grain yield, days to 50 % silking, resistance to late wilt disease, plant and ear heights traits at Gemmeiza and Nubaria Agricultural Research Stations in 2007 summer season. Mean squares for locations exhibited highly significant differences for all of the studied traits. Variances of crosses and their partitions ; Lines (L), Testers (T) and L x T interaction were highly significant over locations and their combined data variances for each of crosses, lines and testers by location and Line x Tester x loc. were highly significant in the two locations and combined data .

Non-additive genetic variance played an important role in the inheritance of all studied traits , except grain yield, which was affected by additive genetic variance ,while, values of K^2 S.C.A. x Loc. was higher than values of K^2 G.C.A. x Loc. for all of the studied traits. Gm. tester inbred line 1021 found to be the best combinor for grain yield, which manifested better G.C.A. effects and high grain yield average performance followed by Gm. 1002 and Gm. 1004 respectively. Results showed that crossing of Gm. 1021 inbred line tester with the tested fife inbred lines i.e. 409 , 401 , 430 , 425 and 417 significantly out yielded the best check S.C. 155(31.15 ard./fed.) by 3.35 , 2.35 , 2.05 , 1.85 and 1.45 ard./fed. respectively. However there were three tested lines i.e. 406 , 414 and 419 yielded 32.8 , 33.3 and 33.4 ard./fed. respectively with the tester line Gm. 1002 and significantly were better than the best check hybrid. Also there were 3 significantly promising new single cross with tester line Gm. 1004 i.e. Gm. 1004 x 404 , Gm. 1004 x 411 and Gm. 1004 x 417 gave 34.3 , 32.7 and 32.7 ard./fed. respectively. Therefore these eleven new yellow single crosses might be advanced to another steps for testing and releasing as new yellow single cross hybrids.

Keywords : Maize *Zea mays* L., Line x Tester, Combining ability, Gene action, Top crosses

INTRODUCTION

Recently, yellow maize grain yield production became very important for providing the requirements of growing poultry industry as well as animal feeding and emphasized the need for breeding and improving yellow maize inbred line for developing superior high yielding and good quality yellow maize hybrids. Successful development of good yellow maize hybrids is considered among the main objectives and based on accurate of yellow inbred lines evalution and selection. Top cross procedure was first suggested by Davis(1927) to test the superior inbred lines for hybrid development. Sprague and Tatum (1942) suggested the concepts of general and specific combining abilities. The differences between G.C.A. and S.C.A. has been attributed to the tester genetic base., broad or narrow. Davis (1934) and Rawlings and Thompson (1962) concluded that a good tester should have a narrow genetic base, low yielding or posses a considerable number of

homozygous recessive loci so that the masking effects of dominance would be at minimum. AL- Naggar *et al.* (1997) found that the tester has the narrowest genetic base exhibited the highest genetic variation in test crosses for most of the studied traits. Katta (1971) and Galal *et al.* (1987) reported the superiority of single crosses as narrow genetic base testers. Hallauer (1975) stated that a suitable tester should include simplicity in use, provide in formation that correctly classified the relative merit of lines and maximum genetic gain.

This study aimed to investigation can be summarized as follows:-

1. Evaluation of combining ability effects for thirteen in new yellow inbred lines.
2. Determining the type of gene action for the studied traits .
3. Identifying the superior inbred lines and the resulting top crosses.

MATERIALS AND METHODS

Thirteen new yellow inbred lines ; namely Gm. 401 , Gm. 404 , Gm. 406 , Gm. 409 , Gm. 411 , Gm. 414 , Gm. 417 , Gm. 419 , Gm. 425 , Gm. 430 , Gm. 432 , Gm. 435and Gm. 440 were used in this study. These inbred lines were developed at Gemmeiza Agricultural Research Station. The commercial inbred lines Gm.1002 , Gm.1004 and Gm.1021 narrow genetic lines were used as testers to give 39 top crosses during the summer season of 2006. The thirty nine top crosses plus three checks (S.C. 155 , S.C. 3084 and S.C. 3080) were evaluated in two locations (Gemmeiza and Nubaria Agricultural Research Stations) during the 2007 summer season. A Randomized Complete Block Design (RCBD) was used with four replications for the two locations. The plot size was one row 6m. long and 80 cm. apart with 25 cm. between hills. The different agronomic operations were carried out. The collected data were on : Days number to 50% silking, Plant height (cm.) , ear height (cm), resistance to late wilt disease(%), ear length (cm.) ear diameter (cm.), number of rows/ear, number of kernels/row, weight of 100- kernels and grain yield (ard/fed.) adjusted to 15.5% moisture content.

The analysis of variance of Randomized Complete Block Design for each location and across the two locations was performed according to Steel and Torrie (1980). Combining ability analysis was computed using the line x tester procedure suggested by Kempthorne (1957). Combined analysis between the two locations was done based on the homogeneity test.

RESULTS AND DISCUSSION

Mean squares of the studied traits in each location and their combined in the two locations are presented in table (1). Locations mean squares were highly significant for all the studied traits, mean values for Gemmeiza location being higher than those for Nubaria for all studied traits. Variances of crosses and their partitions; lines (L), Testers (T) and the interaction (L x T) were highly significant in both locations and their combined, data, Mean squares of crosses x Loc. and their partitions; Lines x Loc., Testers x Loc. and Lines x Testers x Loc. were highly Significant in the two locations and their combined data in the same order ,indicating that these traits differed from location to another.

Table 1: Analysis of variance of top crosses for grain yield and other traits in Gemmeiza, Nubaria and their Combined data in 2007 season.

S.O.V.	D.F.	Days to 50% silking (Day)			Plant height (cm)			Ear height (cm)		
		Gm.	Nub.	Comb	Gm.	Nub.	Comb	Gm.	Nub.	Comb
Locations (Loc.)	1	---	---	3413.5**	---	---	217567.7**	---	---	106043.3**
Reps / Loc.	6	---	---	2.02	---	---	390.3	---	---	199.25
Crosses (C)	38	56.49**	54.30**	59.20**	1666.52**	358.6**	1257.8**	1222.75**	408.9**	1310.9**
Lines (L)	12	59.51**	28.30**	22.20**	749.34**	521.8**	628.2**	1410.12**	737.7**	781.18**
Testers (T)	2	155.4**	4.810*	26.47**	2115.8**	816.74**	862.93**	6703.15**	1336.7**	3479.1**
L x T	24	46.74**	71.40*	34.48**	2087.7**	238.8**	747.6**	672.3**	317.3**	356.03**
Cr. x Loc.	38	---	---	51.60**	---	---	767.3**	---	---	320.75**
L x Loc.	12	---	---	65.8**	---	---	646.94**	---	---	1066.62**
T x Loc.	2	---	---	133.74**	---	---	2069.6**	---	---	4560.73
LxTx Loc.	24	---	---	83.66**	---	---	1578.9**	---	---	633.57**
Error	228	0.74	2.26	1.50	65.88	72.81	69.34	30.28	61.51	45.90
C.V. %		1.50	2.55	2.03	2.94	3.84	3.39	3.49	6.48	4.98

*,** Significant and highly Significant at 0.05 and 0.01 level of probability.

Table 1: Cont.

S.O.V.	D.F.	Resistance to late wilt (%)			Grain yield (ard/fed.)		
		Gm.	Nub.	Comb	Gm.	Nub.	Comb
Locations (Loc.)	1	---	---	79.0**	---	---	379.5**
Reps / Loc.	6	---	---	0.03	---	---	1.52
Crosses (C)	38	18.3**	65.76**	74.24**	55.10**	43.8**	62.24**
Lines (L)	12	20.03**	99.58**	99.6**	43.22**	244.81**	44.81**
Testers (T)	2	2.87**	13.03**	13.03**	209.73**	45.65**	45.65**
L x T	24	18.79**	53.25**	53.25**	48.15**	43.08**	43.08**
Cr. x Loc.	38	---	---	9.32**	---	---	36.61**
L x Loc.	12	---	---	20.01**	---	---	43.22**
T x Loc.	2	---	---	2.87*	---	---	209.73
L x T x Loc.	24	---	---	18.78**	---	---	48.15**
Error	228	0.06	2.53	1.30	13.02	13.15	13.09
C.V. %		0.70	1.62	1.16	11.61	12.59	12.06

*,** Significant and highly Significant at 0.05 and 0.01 level of probability.

These results are agreement with these reports by EL-Zeir (1999), Amer (2004) and Ibrahim *et al.* (2004).

Mean performances of five studied traits for 39 top crosses in the two locations and their combined dara are presented in table (2). Mean values of days to 50% silking ranged from 52 to 66.5 , 53 to 68 and 53.5 to 66 days for Gemmeiza and Nubaria location and their combined data, respectively. It is clear that, Gemmeiza location was earlier than Nubaria location for days to 50% silking date trait, mean values of plant height trait ranged from 220 to 310 , from 201 to 246 and from 212.6 to 284.8 cm. for Gemmeiza location, Nubaria location and their combined , respectively. Mean values of ear height trait ranged from 114.5 to 187, from 101 to 147.5 and from 107.9 to 161.9 cm. for Gemmeiza , Nubaria and their combined, respectively, showing that plant and ear heights were higher at Gemmeiza location comparing to Nubaria location. Mean values of resistance to late wilt disease ranged from 94 to 100% , from 83 to 100% and from 89 to 100% under Gemmeiza , Nubaria conditions and their combined, respectively. Mean values of grain yield ranged from 22.6 to 38.5 , from 24.2 to 35.2 and from 25.5 to 34.3 ard/fed. under Gemmeiza , Nubaria location and their combined, respectively.

There are three crosses i.e.,Gm. 401 x 1021 (38.5 ard./fed.), Gm. 404 x 1002 (38.4 ard./fed.) and Gm. 430 x 1021 (38.4 ard./fad.) surpassed the highest check S.C. 155 (35.6 ard./fed.) under Gemmeiza location ,while, twelve crosses i.e., Gm.414 x 1002 (35.2 ard./fed.) Gm. 409 x 1004 (33.3 ard./fad.) , Gm. 409 x 1021 (32.5 ard./fad.), Gm. 419 x 1002 (32.4 ard./fad.), Gm. 406 x 1002 (32.2 ard./fad.), Gm. 417 x 1021 (31.9 ard./fad.), Gm.411 x 100 (31.7 ard./fad.), Gm. 417 x 1004 (31.5 ard./fad.), Gm. 401 x 1004 (31.4 ard./fad.), Gm. 419 x 1004 (31.2 ard./fad.), Gm. 411 x 1002 (30.6 ard./fad.) and Gm. 414 x 1021(30.5 ard./fad.) surpassed relative to the highest check S.C. 3084 (28.9 ard./fed.).as well as, under combined data, eleven single cross gave grain yield mean performances which were significantly higher than the highest check S.C. 155 (31.15 ard./fad.) i.e. ; Gm.401 x 1021(33.5 ard./fed.), Gm.404 x 1004(34.3 ard./fed.), Gm.406 x 1002(32.8 ard./fed.), Gm 409 x 1021 (34.5 ard /fed), Gm.411 x 1004 (32.7 ard./fed.), Gm.414 x 1002 (33.3 ard./fed.), Gm.417 x 1021 (32.6 ard./fed.), Gm.417 x 1004 (32.7 ard./fed.), Gm.419 x 1002 (33.4 ard./fed.), Gm.425 x 1021(33.0 ard./fed.), Gm.430 x 1021(33.15 ard./fed.). therefore, it is considered favorite crosses and could be used it in maize program.

Estimates of variance for general (K^2 G.C.A.) and specific (K^2 S.C.A.) combining ability and their interactions with locations are shown in table (3). The results exhibited that values of K^2 S.C.A. (non–additive genetic variance) were higher than values of K^2 G.C.A. (additive genetic variance) for most traits, while, values of K^2 G.C.A. were higher than values of K^2 S.C.A. for grain yield, indicating that both non–additive genetic variance and additive genetic variance played an important role in the in heritance of these studied traits. On the other hand, values of K^2 S.C.A. x Loc. was higher than the values of K^2 G.C.A. x Loc. for the studied traits. These results indicated that non – additive gene action was more influenced and interacted with location than additive gene action.

Table 2: Mean performance of 39 top crosses for grain yield and some of other traits of yellow maize at Gemmeiza (Gm.), Nubaria (Nub.) and their Combined data in 2007 season.

Top Crosses	Days to 50% silking (Day)			Plant height (cm)			Ear height (cm)			Resistance to late wilt (%)			Grain yield (ard/fed.)		
	Gm.	Nub.	Comb	Gm.	Nub.	Comb	Gm.	Nub.	Comb	Gm.	Nub.	Comb	Gm.	Nub.	Comb
Gm. 401 x 1021	66.5	60.5	63.5	282.0	227.0	254.5	170.0	117.5	143.8	100.0	100.0	100.0	38.5	28.5	33.5
" " " " " x 1004	58.0	62.0	60.0	282.0	234.0	258.0	175.5	134.0	154.8	100.0	100.0	100.0	28.4	31.4	29.9
" " " " " x 1002	54.0	63.0	58.5	278.0	233.0	255.5	148.5	124.0	136.3	100.0	100.0	100.0	30.9	28.4	29.6
Gm. 404 x 1021	58.0	63.0	60.5	220.5	227.5	224.0	177.0	145.0	161.0	94.5	95.0	94.8	35.4	28.5	31.9
" " " " " x 1004	67.0	65.0	66.0	286.0	246.0	266.0	166.0	147.5	156.8	100.0	100.0	100.0	38.4	30.3	34.3
" " " " " x 1002	54.0	55.0	54.5	292.0	234.0	263.0	185.0	143.0	164.0	100.0	100.0	100.0	29.0	25.3	27.1
Gm. 406 x 1021	57.0	65.0	61.0	285.0	214.0	249.5	170.0	117.5	143.6	100.0	100.0	100.0	32.5	28.9	30.7
" " " " " x 1004	54.5	60.5	57.5	286.0	225.0	255.5	159.0	126.0	142.5	100.0	98.0	99.0	27.1	27.6	27.4
" " " " " x 1002	57.0	64.0	60.5	285.0	204.0	244.5	151.0	109.0	130.0	100.0	100.0	100.0	33.4	32.2	32.8
Gm. 409 x 1021	63.0	64.0	63.5	288.0	222.0	255.0	187.0	135.0	160.9	100.0	100.0	100.0	36.4	32.5	34.5
" " " " " x 1004	58.0	68.0	63.0	267.0	220.0	243.5	166.0	111.0	138.5	98.0	96.0	97.0	27.2	33.3	30.3
" " " " " x 1002	58.0	63.0	60.5	278.0	225.0	252.0	153.0	117.5	135.3	100.0	100.0	100.0	31.2	30.6	30.9
Gm. 411 x 1021	59.0	54.0	56.5	285.0	219.0	251.9	165.1	127.5	146.3	100.0	100.0	100.0	28.9	25.5	27.2
" " " " " x 1004	61.0	65.0	63.0	247.0	213.0	230.0	147.0	114.0	130.5	100.0	100.0	100.0	33.7	31.7	32.7
" " " " " x 1002	63.5	67.0	65.3	268.0	226.0	247.0	142.0	115.0	128.5	96.0	96.0	96.0	29.7	29.9	29.8
Gm. 414 x 1021	59.0	66.0	62.5	282.5	221.0	251.8	161.0	115.0	138.0	100.0	100.0	100.0	32.3	30.5	31.4
" " " " " x 1004	57.0	53.0	55.0	273.0	218.0	245.5	151.5	115.0	133.3	100.0	100.0	100.0	30.1	26.1	28.1
" " " " " x 1002	57.0	68.0	62.5	277.0	220.0	248.5	159.0	116.0	137.5	100.0	100.0	100.0	31.4	35.2	33.3
Gm. 417 x 1021	58.0	65.5	62.0	287.0	236.0	261.5	182.5	141.0	161.8	100.0	100.0	100.0	33.3	31.9	32.6
" " " " " x 1004	54.0	65.0	59.5	283.0	227.5	255.3	169.0	117.5	143.3	100.0	100.0	100.0	33.8	31.6	32.7
" " " " " x 1002	58.0	63.0	60.5	269.0	211.0	240.0	140.0	114.0	127.0	100.0	100.0	100.0	29.1	26.9	28.0

Table 2. Cont.

Top Crosses		Days to 50% silking (Day)			Plant height (cm)			Ear height (cm)			Resistance to late wilt (%)			Grain yield (ard/fed.)		
		Gm.	Nub.	Comb	Gm.	Nub.	Comb	Gm.	Nub.	Comb	Gm.	Nub.	Comb	Gm.	Nub.	Comb
Gm. 419 x 1021		59.0	63.0	61.0	297.0	237.6	267.3	175.0	134.0	154.5	95.0	97.0	96.0	31.1	27.4	29.3
" " " " " x 1004		53.0	57.0	55.0	261.0	217.6	239.3	152.0	115.0	133.3	100.0	100.0	100.0	22.6	31.2	26.9
" " " " " x 1002		57.0	60.0	58.5	281.0	219.0	250.0	145.0	116.0	130.5	100.0	100.0	100.0	34.3	32.4	33.4
Gm. 425 x 1021		56.0	58.0	57.0	310.0	236.0	273.0	187.0	142.5	164.8	100.0	100.0	100.0	36.9	29.1	33.0
" " " " " x 1004		52.0	55.0	53.5	245.5	225.0	235.3	127.0	115.0	121.0	100.0	100.0	1000.0	28.6	27.0	27.8
" " " " " x 1002		55.0	60.0	57.5	248.0	230.0	239.0	159.0	124.0	141.5	100.0	100.0	100.0	31.3	27.0	29.2
Gm. 430 x 1021		66.0	64.0	65.0	248.0	229.0	238.5	158.0	129.0	143.5	100.0	96.0	98.0	38.5	27..9	33.2
" " " " " x 1004		59.0	62.0	60.5	233.0	231.0	232.0	128.0	114.0	121.0	98.0	100.0	99.0	28.3	28.1	28.2
" " " " " x 1002		59.0	63.0	61.0	292.0	214.0	253.0	155.0	117.5	136.3	100.0	100.0	100.0	29.4	28.6	29.0
Gm. 432 x 1021		53.0	60.0	56.5	272.0	217.6	244.6	155.0	129.0	142.0	100.0	100.0	100.0	26.9	24.1	25.5
" " " " " x 1004		58.0	61.0	59.5	290.0	222.5	256.3	156.0	114.0	135.0	100.0	100.0	100.0	30.3	29.7	30.0
" " " " " x 1002		55.0	60.0	57.5	220.0	205.0	212.5	129.0	111.0	120.0	98.5	97.5	98.0	26.4	29.4	27.9
Gm. 435 x 1021		57.0	62.0	59.5	275.0	224.0	249.5	150.0	116.0	133.0	98.0	98.0	98.0	33.6	27.7	30.7
" " " " " x 1004		58.6	60.0	59.3	281.5	221.5	251.5	158.0	116.0	137.0	100.0	100.0	100.0	29.6	25.6	27.6
" " " " " x 1002		59.0	60.0	59.5	269.0	201.0	235.0	114.5	101.0	107.8	90.0	88.0	89.0	31.1	27.5	29.3
Gm. 440 x 1021		53.0	60.0	56.5	282.0	221.0	251.5	159.0	119.0	139.0	94.0	90.0	92.0	27.8	28.2	28.0
" " " " " x 1004		56.0	61.0	58.5	272.0	224.0	248.0	150.0	110.0	130.0	95.0	83.0	89.0	26.0	27.5	26.8
" " " " " x 1002		53.5	60.5	57.0	283.0	219.0	251.0	152.0	124.0	138.0	100.0	98.0	99.0	29.1	26.9	28.0
$\overline{X}$		57.7	61.8	59.8	275.8	223.0	249.4	158.0	121.0	139.5	99.0	98.0	98.5	31.2	28.8	30.0
Checks	S.C.155	52.8	63.5	58.2	283.0	237.5	260.3	158.9	122.5	140.7	100.0	100.0	100.0	35.6	26.7	31.15
	S.C.3084	56.3	61.5	58.9	275.3	238.8	257.1	150.6	118.8	134.7	100.0	100.0	100.0	25.4	28.9	27.15
	S.C.3080	60.0	64.5	62.3	288.8	256.3	272.6	145.4	133.8	139.6	100.0	100.0	100.0	26.3	26.6	26.5
L.S.D.	0.05	1.20	2.10	1.21	11.36	11.95	11.66	7.7	10.98	6.71	0.84	2.23	1.13	1.23	1.58	0.88
	0.01	1.57	2.74	1.58	14.81	15.57	15.19	10.04	14.31	8.74	1.22	2.90	1.60	1.60	2.05	1.14

These results were similar to those reported by Ibrahim (2001), Amer *et al* . (2003), EL-Shenawy *et al* (2003) and Aly, A.A. (2004).

Table 3: Estimates of variance of general (K^2 G.C.A.) and specific (K^2 S.C.A.) Combining ability for combined data and their interaction with two locations (Gemmeiza and Nubaria).

Variance	Days to 50% silking	Plant height	Ear height	Resistance to late wilt %	Grain yield
K^2 G.C.A.	0.412	5.270	20.95	0.163	1.190
K^2 S.C.A.	3.915	13.083	88.93	4.155	0.040
K^2 G.C.A./K^2 S.C.A.	0.105	0.403	0.236	0.039	29.750
K^2 G.C.A. x Loc.	0.503	22.29	6.850	0.230	1.60
K^2 S.C.A. x Loc.	20.540	377.39	146.920	4.370	11.27
K^2 G.C.A. x Loc. / K^2 S.C.A. x Loc.	0.024	0.059	0.047	0.053	0.142

Estimates of general combining ability effects for 13 inbred lines are presented in table (4). High positive values would be of interest under all the studied traits, except days to 50% silking , plant height and ear height ,where, high negative ones would be useful from point of view. The inbred line. Gm.417 had positive and desirable significant for high grain yield. Also, the inbred lines Gm. 411 and 432 had favorite effects for plant height and ear height, towards shorts plants and resistance to late wilt disease. These results indicated that pervious lines Gm. 411, Gm. 417and 432 possessed fruitful genes for improving hybrids with short plants, yielding ability and resistance to late wilt disease, respectively. While, the inbred line Gm 435 exhibited desirable effects for plant and ear heights, too.

On the other hand, the tester(inbred line Gm. 1021) gave desirable effects for grain yield ,while, the two testers (inbred lines Gm. 1002 and Gm 1004) exhibited desirable effects for plant and ear heights, towards short plants and low ear position. These results agreed with these reported by Aly and Tepora (1986), Mahmoud (1996) and AL-Naggar *et al.* (1997), indicating that the most efficient testers for yield and its components were inbred lines which had the narrowest genetic base and the lowest yield potential.

Estimation of specific combining ability effects for single crosses are presented in table(5). Desirable significant (S.C.A.) effects were obtained in the two locations and their combined data from crosses :- Gm. 404 x 1002 , Gm. 409 x 1002 and Gm. 414 x 1002 for days to 50% silking ; the crosses Gm. 404 x 1021 , Gm. 417 x 1002 and Gm. 419 x 1004 for Plant height ; the crosses Gm. 401 x 1002 , Gm. 435 x 1002 for Ear height ; the crosses Gm. 404 x 1004 , Gm. 409 x 1021, Gm. 419 x 1021,430 x 1021 , Gm. 430 x 1004, Gm. 435 x 1021, Gm. 435 x 1004 and Gm. 440 x 1002 for resistance to late wilt disease ; the crosses Gm. 406 x 1002 , Gm. 411 x 1004 , Gm. 425 x 1021 and Gm. 432 x 1004 for grain yield. Also, and in this respect, the cross Gm. 425 x 1004 gave favorable S.C.A. effects for days to 50% silking , plants and ear heights towards earliness and short plants as well as the cross Gm. 430 x 1021 gave desirable S.C.A. effects for resistance to late wilt disease and high grain yield and it is considered of the best crosses in this respect

Table 4: Estimates of general combining ability effects for grain yield and other traits at Gemmeiza, Nubaria and their combined data.

Lines		Days to 50% silking			Plant height			Ear height			Resistance to late wilt %			Grain yield		
		Gm.	Nub	Com.	Gm.	Nub.	Com.	Gm.	Nub.	Com.	Gm.	Nub.	Com.	Gm.	Nub.	Com.
L – 401		2.47	5.19	1.22	4.83	8.22	6.45	6.80	4.01	5.42	1.01	2.01**	1.47**	1.59**	0.51	1.09**
L – 404		2.38	-2.95**	-0.19	-9.76**	12.81	1.45	24.72	14.42	19.58	-0.82	0.34	-0.19	3.23**	-0.76	1.24**
L – 406		-1.12	5.65	-0.11	9.74	-8.86**	0.45	1.97	-3.50	-0.67	1.01	1.34	1.14**	0.01	0.76	0.38
L – 409		0.88	1.35	1.06	2.08	-0.52	0.87	10.80	0.26	5.42	0.34	0.34	0.31	0.54	3.35**	1.95**
L – 411		0.59	-1.65**	0.69	-9.17**	-3.86	-6.38**	-6..45**	-2.24	-4.33**	1.01	2.01**	1.47**	-0.26	0.19	-0.03
L – 414		0.38	-1.48**	-0.61	1.58	-3.03	-0.63	-0.53	-5.58**	-3. 08*	-0.32	0.68	1.04**	0.30	1.76**	1.3**
L – 417		2.20	0.69	0.69	3.74	1.97	2.69	6 05	3.17	4.50	1.01**	2.01**	1.47**	1.02**	1.27**	1.14**
L – 419		0.87	1.44	0.31	3.91	1.52	2.87	-0.45	0.67	0.17	-0.65	-1.49	-0.94	-1.67	1.54**	-0.07
L – 425		2.95	-2.56**	2.61	11.66	7.39	9.53	0.13	6.09	3.08	1.02**	2.01**	1.47**	1.26**	-1.12	-0.07
L – 430		4.13	1.27	2.72	-6.01*	1.56	-2.05	-10.78	-0.99	-5.83	0.35**	0.34	0.31	1.02*	-0.63	0.20
L – 432		1.75	1.85	0.14	-15.26**	-8.03**	-11.72**	-11.28**	-3.08	-7.17**	1.01**	2.01**	1.47**	-3.46	-4.50	-3.98
L – 435		1.13	0.94	1.06	-0.59	-7.53**	-4.05*	-17.20**	-9.74**	-13.50**	-2.32	-3.99	-3.11	-0.22	-1.22	-0.72
L – 440		3.12	-0.23	1.61	3.24	-1.69	0.53	-3.78*	-3.50	-3.58**	-2.65	-7.65	-5.03	-3.36	-1.24	-2.30
L.S.D. gi –Lines	0.05	0.49	0.86	0.51	4.64	4.88	3.88	3.15	4.48	2.57	0.14	0.19	0.45	0.99	1.01	0.69
	0.01	0.64	1.12	0.67	6.05	6.36	5.06	4.10	5.84	3.35	0.18	1.19	0.59	1.29	1.32	0.90
L.S.D. gi-gj Lines	0.05	0.69	1.21	0.75	3.15	6.90	5.48	4.45	6.34	3.63	0.20	1.30	0.64	1.40	1.43	0.97
	0.01	0.91	1.58	0.98	4.11	9.00	7.15	5.80	8.26	4.73	0.26	1.68	0.83	1.83	1.87	1.27
Testers																
Gm. 1021		1.63	-0.33	0.63	6.72	2.57	4.69	12.73	5.40	9.20	-0.26	-0.03	-0.12	2.22**	-1.08	0.57**
Gm. 1004		0.19	0.07	0.15	-5.97**	1.99	-1.99	-3.65**	-1.86**	-2.74	0.05	-0.49	-0.20	-1.69	0.63	-0.53
Gm. 1002		1.81	0.26	0.76	-0.74	-4.56**	-2.70**	-9.08**	-3.88**	-6.46**	0.14	0.52	0.32**	-0.54	0.45	-0.04
L.S.D. gi – Testers	0.05	0.24	0.41	0.25	2.23	2.34	1.85	1.51	2.15	2.57	0.07	0.44	0.22	0.48	0.49	0.33
	0.01	0.31	0.54	0.33	2.90	3.05	2.43	1.97	2.81	3.35	0.09	0.57	0.28	0.62	0.63	0.43
L.S.D. gi-gj Testers	0.05	0.33	0.58	0.36	3.15	3.31	2.64	2.14	3.05	1.74	0.10	0.62	0.31	0.67	0.69	0.47
	0.01	0.43	0.76	0.47	4.11	4.32	3.43	2.78	3.97	2.27	0.12	0.81	0.40	0.88	0.90	0.61

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

Table 5: Estimates of specific combining ability effects for grain yield and some other traits at Gemmeiza, Nubaria and their combined data.

Crosses	Days to 50% silking			Plant height			Ear height			Late wilt resistance %			Grain yield		
	Gem.	Nub.	Comb.	Gem.	Nub.	Comb.	Gem.	Nub.	Comb.	Gem.	Nub.	Comb.	Gem.	Nub.	Comb.
Gm. 401 x 1021	5.21	-3.17**	0.87	-5.38	-6.32	-5.85	-7.40**	-13.24**	-10.53**	0.26	0.03	0.12	3.69**	0.07	1.88**
Gm. 401 x 1004	-1.60**	4.18	1.35	7.31	0.51	3.82	14.49	1.61	12.66	-0.01	.049	0.20	-2.49	1.34	-0.58
Gm. 401 x 1002	-3.60**	-1.01	-2.22**	-1.92	5.81	2.03	-7.09*	2.63	-2.13	-0.21	-0.51	-0.32	-1.20	-1.41	-1.30
Gm. 404 x 1021	-3.46**	2.17	-0.71	-52.3**	-10.90**	-31.35**	1.44	-16.15**	-7.45**	-3.41	-3.31	-3.21	-1.08	1.50	0.21
Gm. 404 x 1004	7.23	3.76	5.53	25.90	8.42	17.07	-12.68**	13.94	0.49	1.78**	2.15**	1.87*	5.82**	1.65	3.74**
Gm. 404 x 1002	-3.77**	-5.93**	-4.81**	26.41	2.48	14.28	11.24	2.21	6.96	1.63**	1.15	1.34	-4.75	-3.15	-3.74
Gm. 406 x 1021	-0.71	0.92	0.21	-7.05	-2.99	-5.10	-2.81	-5.74	-4.20	0.25	0.69	0.46	-0.70	0.38	-0.16
Gm. 406 x 1004	-1.77**	0.01	-0.81	6.90	8.84	7.82	2.57	10.61	6.74	-0.25	-0.85	-0.47	-2.21	-2.53	-2.37
Gm. 406 x 1002	2.48	-0.93	0.61	0.16	-5.85	-2.72	0.24	-4.87	-2.54	-0.05	0.15	0.01	2.91**	2.15*	2.53**
Gm. 409 x 1021	3.54	-0.58	1.79	3.61	-2.57	0.48	5.35	8.01	6.71	-0.21	1.69*	1.29**	2.58**	1.46	2.02**
Gm. 409 x 1004	-0.02	2.67	1.27	-4.69	-4.49	-4.60	0.98	-8.14	-3.60	0.92**	-2.85	-2.13	-2.62	0.56	-1.03
Gm. 409 x 1002	-3.52**	-2.18**	-3.06**	1.07	7.06	4.12	-6.34	0.13	-3.13	-1.38	1.15	0.85	0.04	-2.02	-0.98
Gm. 411 x1021	-0.63	-7.83**	-4.21**	11.62	-2.99	4.23	1.10	3.01	2.21	0.46	0.03	0.12	-4.08	-2.47	-3.27
Gm. 411 x 1004	3.06	3.01	3.02	-13.94**	-1.32	-11.35**	-0.76	-3.14	-2.09	0.26	0.48	0.20	4.59**	2.04*	3.31**
Gm. 411 x 1002	-2.44**	4.82	1.19	2.32	-3.24	7.12	-0.76	0.13	-0.13	-0.05	-0.51	-0.32	-0.51	0.42	-0.04
Gm. 414 x 1021	-0.21	4.25	2.21	-1.63	4.56	-1.52	-0.34	-6.15	-7.33**	-2.41	-2.64	-2.54	-1.20	0.97	-0.12
Gm. 414 x 1004	-1.02*	-9.90**	-5.56**	1.56	8.68	-0.85	-8.81**	1.44	-0.34	1.28**	1.82*	1.53**	0.54	-5.17	-2.31
Gm. 414 x 1002	1.23	5.65	3.36	0.08	0.51	2.36	-2.18	4.71	7.87	1.13**	0.82	1.01*	0.66	4.20**	2.43**
Gm. 417 x 1021	1.62	1.33	1.29	0.70	-9.19*	4.65	11.00	11.35	8.63	0.26	0.03	0.12	-0.96	2.87**	0.96
Gm. 417 x 1004	-1.44**	0.18	-0.48	9.39	10.34	5.07	5.85	-4.81	1.83	-0.05	0.49	0.20	3.46**	0.76	2.11**
Gm. 417 x 1002	-0.19	-1.51*	-0.81	-10.09*	-9.19*	-9.72**	8.74	-6.54	-10.46**	-0.21	-0.51	-0.32	-2.50	-3.64	-3.07
Gm. 419 x 1021	0.79	-1.67*	-0.71	10.53	10.34	10.48	-14.59**	6.35	5.71	1.92**	3.53**	2.54**	-0.43	-1.85	-1.14
Gm. 419 x 1004	-3.52**	1.67	-0.73	-12.53**	-9.08*	-10.85**	5.10	-4.81	-3.34	-3.38	-6.51	-4.63	-5.04	0.27	-2.38
Gm. 419 x 1002	2.73	-0.01	1.44	1.99	-1.27	0.37	-2.01	-1.54	-2.38	1.46**	2.98**	2.10	5.47**	1.58	3.52**

Table 5 :Count.

Crosses		Days to 50% silking			Plant height			Ear height			Resistance to late wilt %			Grain yield		
		Gem.	Nub.	Comb.	Gem.	Nub.	Comb.	Gem.	Nub.	Comb.	Gem.	Nub.	Comb.	Gem.	Nub.	Comb.
Gm. 425 x 1021		0.37	4.08	2.21	39.3	3.26	21.06	17.02	9.68	13.30	0.26	0.03	0.12	2.40**	2.40**	2.40**
Gm. 425 x 1004		-2.69**	-6.57**	-4.81**	-36.03**	-9.41*	8.70*	-27.10**	-20.22**	-18.51**	-0.05	0.48	0.20	-2.2	-1.28	-1.65
Gm. 425 x 1002		2.31	2.49	2.61	-3.01	4.15	4.40	10.08	0.54	5.21	-0.21	-0.51	-0.32	-0.39	-1.28	-0.75
Gm. 430 x 1021		3.04	-1.00	1.12	7.20	1.59	-12.7**	-1.56	3.01	0.71	0..92**	1.69*	1.29**	4.13**	3.12**	2.46**
Gm. 430 x 1004		-2.52**	1.10	-0.90	-30.11**	4.67	8.30	-15.68**	-4.39	-10.09**	061**	2.15**	1.37**	-2.04	0.79	-1.39
Gm. 430 x 1002		-0.52	-0.10	-0.22	22.91	-6.27	2.06	17.24	1.38	9.37	-1.54	-3.85	-2.65	-2.09	-0.74	-1.07
Gm. 432 x 1021		-4.13**	-1.08	-2.54**	4.45	-0.07	20.50	-4.06	5.09	0.55	0.25	0.03	0.12	-2.84	-0.05	-5.93
Gm. 432 x 1004		2.81	-0.49	1.18	35.14	5.51	-22.55**	12.82	-2.31	5.24	-0.05	0.49	0.20	3.45**	-4.38**	3.92**
Gm. 432 x 1002		1.31	1.57	1.35	-39.6**	-5.44	-0.35	-8.76**	-2.79	-5.79**	-0.21	-0.51	-0.32	-0.61	4.64**	2.1**
Gm. 435 x 1021		-2.71**	1.08	-0.96	-6.97	5.93	8.07	-3.65	-0.74	-2.12	2.09**	1.30*	1.71**	0.58	1.15	0.87
Gm. 435 x 1004		-0.02	0.43	0.27	12.22	3.76	-7.72*	20.74	6.86	13.83	3.28**	6.48**	4.78**	-1.47	-0.63	-1.05
Gm. 435 x 1002		2.73	-1.51*	0.69	-5.26	-9.69*	-3.19	-17.09**	-8.12*	-11.71**	-5.37	-7.51	-6.49	0.88	-0.52	0.18
Gm. 440 x 1021		-2.71**	1.5	-0.54	-3.8	-2.65	-0.26	-7.56**	-4.49	-6.03	-1.57	-2.81	-2.13	-2.09	1.73	-0.18
Gm. 440 x 1004		1.48	-0.15	0.69	-1.11	0.67	3.45	0.07	-5.64	-2.84	-1.88	-4.85	-3.30	0.02	-0.65	-0.32
Gm. 440 x 1002		1.23	-1.35	-0.14	4.91	1.98	2.86	7.49	10.13	8.87	3.46**	7.65**	5.43**	2.07*	-1.07	0.49
L.S.D.	0.05	0.85	1.49	0.92	8.04	8.45	6.72	5.45	7.76	4.45	0.24	1.28	0.98	1.72	1.76	1.19
sij	0.01	1.49	1.49	1.20	10.47	11.01	8.75	7.10	10.12	5.80	0.32	2.05	1.02	2.24	2.29	1.55
L.S.D.	0.05	1.20	2.10	1.30	11.36	11.95	9.50	7.70	10.98	6.29	0.35	2.23	1.10	2.43	2.48	1.69
Sij - skl	0.01	1.57	2.74	1.69	14.80	15.57	12.38	10.04	14.31	8.20	0.45	2.90	1.44	3.17	3.24	2.20

*,** Significant and highly significant at 0.05 and 0.01 level of probability

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تقييم بعض سلالات الذرة الصفراء الجديدة للقدرة التآلفيـــة في موقعين

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- تم تهجين ١٣ سلالـــة جديدة صفراء من الذرة الشامية مع ثلاثة سلالات كشافة هي جميـــزة ١٠٠٢، جميزة ١٠٠٤ ، جميزة ١٠٢١ بمحطة البحوث الزراعية بالجميزة الموسم الصـــيفي ٢٠٠٦م.
- تم تقييم الـــ ٣٩ هجينا قميا الناتجة بالمقارنة مع ثلاثة هجن فرديـــة للمقارنـــة هـــي ١٥٥ ، ٣٠٨٤ ، ٣٠٨٠ في محطتي البحوث الزراعية بالجميزة والنوبارية خلال الموســم الصـــيفي ٢٠٠٧م. واستخدمت طريقة تحليل السلالة × الكشاف للعالم كمبثورن(١٩٥٧م) وذلك لصفات عدد الأيام حتى ظهور ٥٠ % حريره ، طول النبات وموقع الكوز (ســم) ، مقاومـــة مـــرض الذبول المتأخر كنسبة مئوية ومحصول الحبوب بالأردب للفدان تحت ظروف الموقعين

وكانت أهم النتائج المتحصل عليها ما يلي:-

- وجدت اختلافات معنوية بين المواقع لكل الصفات المدروسة ، أظهرت الهجن الناتجة فروقـــا معنوية للصفات المدروســـــة لكل من (الســـلالات ، الكشافات والتفاعل بينهما). كما أظهـــر تفاعل الهجن الناتجة مع المواقع فروقا معنوية لكل الصفات المدروسة.
- لعب التأثير الغير تراكمي دورا هاما في وراثة صفات عدد الأيام حتى ظهور ٥٠% حريره ، ارتفاع النبات والكوز والمقاومة لمرض الذبول المتأخر بينما كان للتأثير التراكمي الدور الفعال في صفة محصول الحبوب.
- أظهرت السلالة الكشافة جميزة ١٠٢١ قدرة عامة على التآلف لصفة المحصول ثـــم جميـــزة ١٠٠٢ ثم جميزة ١٠٠٤ على الترتيب .
- قد تفوق معنويا إحدى عشر هجينا قميا قياسا بأعلى هجن المقارنـــة وهـــو هـــــف ١٥٥ (٣١,١٥ إردب للفدان). حيث أعطت خمس هجن مع السلالة جميـــزة ١٠٢١ وهـــي ٤٠٩ × ١٠٢١ ، ٤٠١ × ١٠٢١ ، ٤٣٠ × ١٠٢١ ، ٤٢٥ ، ١٠٢١ ، ٤١٧ × ١٠٢١ زيـــادة فـــي إنتاجية محصول الحبوب عن إنتاجية هـــف ١٥٥ معنويا بمعدل ٣,٣٥ ، ٢,٣٥ ، ٢,٠٥ ، ١,٨٥ ، ١,٤٥ إردب للفدان على الترتيب. بينما تفوقت ثلاثة هجـــن قميـــة مع الأب الكشـــاف جميزة ١٠٠٢ معنويا على نفس هجن المقارنة وهي ٤٠٦ × ١٠٠٢ ، ٤١٤ × ١٠٠٢ ، ٤١٩ × ١٠٠٢ بمحصول قدره ٣٢,٨ ، ٣٣,٣ ، ٣٣,٤ إردب للفدان على الترتيـــب. كمـــا تفوقـــت معنويا ٣ هجن قمية أخرى مع السلالة الكشافة جميزة ١٠٠٤ هـــي ٤٠٤ × ١٠٠٤ ، ٤١١ × ١٠٠٤ ، ٤١٤ × ١٠٠٤ بمحصول قـــدره ٣٤,٣ ، ٣٢,٧ ، ٣٢,٧ إردب للفدان على الترتيب.

لذلك فإن هذه الهجن القمية الإحدى عشر يجـــب دخولها خطوات متقدمـــة لاختبـــارات التسجيل لإطلاق ما يتأكد كفاءته كهجن فردية صفراء جديدة.