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Combining Ability of Some Yellow Maize Inbred Lines for Grain Yield and Other Attributes

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ABSTRACT: Combining ability was conducted using line x tester analysis. Sixteen yellow inbred lines of maize and two single crosses (Sc.162 and Sc.177) as testers were crossed during during 2023 season. The resulted 32 crosses plus one check hybrid TWC. 368 were evaluated in three Research Stations (Sakha, Gemmeiza and Sids) using a randomized complete block design with three replication for days to 50 % silking, plant height, ear height, ear length and grain yield during 2024 season. The results showed that the mean squares due to locations, inbred lines, testers, inbred lines x testers and their interactions were significant or highly significant for most studied traits. The additive gene effects were more important than non-additive gene effects in the inheritance of all studied traits expect for plant height. Four inbred lines; L1, L10, L13 and L15 showed desirable general combining ability effects for grain yield. Two crosses; (L1 x Sc.162) and (L4 x Sc.162) were out-yielded the check TWC. 368.these crosses could be use in maize breeding programs. The HSGCA heterotic grouping method was able to classify nine inbred lines out of 16 lines. These two groups could be used in the breeding program for picking the wanted parents for making crosses.

Keywords: *Zea mays L.; additive gene effects; non-additive gene effects; General and specific combing ability; Heterotic groups. Crosses*

INTRODUCTION

Maize (*Zea mays* L.) is one of the most multipurpose crops with worldwide economic importance, widely used as food, fodder and raw material for industrial products. It is one of the most important cereal crops grown next to wheat and rice in area and production across the world. This combining ability, broken down into general (GCA) and specific (SCA) effects, reveals a line's potential to create high-performing hybrids. In essence, selecting the right parents is the cornerstone of successful hybrid breeding programs. Identifying hybrids with high yield depends upon knowing parent's genetic structure and their combining ability **(Ceyhan 2003). Kempthorne (1957)** proposed the line × tester analysis method, which stands out as one of the most powerful approaches for estimating effects of both (GCA) and (SCA), facilitating the selection of good parents and crosses. The efficiency of this method mainly depends on the type of tester used in the evaluation. The suitable tester should be simple in use, provide information that correctly classifies the relative merit of lines and maximizes the genetic gain **(Hallauer, 1975 andMenz *et al.*,1999)**.**Girma *et al.*(2015)** reported that a narrow tester's genetic base participatesmore to line x tester interaction than does a large basis one. Mean while, **Neveen *et al.* (2021)** found that tasters of broad genetic base are more efficient than those of the narrow genetic base for evaluation of GCA inbred lines of maize. **Gamea (2015), Abd El-Mottalb (2017), Abd El- Azeem *et al.*(2021) and Abd El-Azeem *et al.*(2022)**. Found that the additive gene effect plays a major role in the expression of grain yield. Meanwhile, **Ibrahim *et al.* (2012), Mosa *et al.* (2017), Abd El-Mottalb (2019) and Abd El-Azeam *et al.* (2022)** found that the non-additive gene effects played the major role in the inheritance estimation of heterotic groups using general and specific combining ability (HSGCA) method is a practical and straightforward for categorizing maize inbred lines into known heterotic groups **(Fan *et al.*,2009).** Heterotic patterns are crucial because they facilitate breeders to select the germplasm to be utilized in hybrid production over a long period thus simplifying management and organization of germplasm**(Nepir *et al.*,2015 and Oppong *et al.*, 2020)**.The objectives of this investigation were to estimates both general (GCA) and specific (SCA) combining ability effects for inbred lines and their hybrids, elucidation of the grain yield (ard/fad) and other studied traits, identify the superior three way crosses and classify the new sixteen yellow maize inbred lines into heterotic groups using (HSGCA).

MATERIALS AND METHODS

Sixteen yellow maize inbred lines were used as parents in this study developed at Sids Agricultural Research Station. The parental codes, sources and names of these inbred lines are presented in Table (1). In 2023 growing season, the sixteen inbred lines were crossed with the two single crosses as testers; Sc 162 and Sc. 177 using line x tester mating design. In 2024 summer season, the resulting 32 crosses and the one commercial check hybrid TWC.368 were evaluated in replicated yield trial conducted at three Agricultural Research Stations, ie. Sakha, Gemmeiza and Sids. A randomized complete block design (RCBD) with three replications was used at each location. Plot size was one ridge, 6 meter long, 80 cm apart and 25 cm between hills. Two grains were planted per hill and thinned later to one plant per hill. All agricultural practices were applied as recommended at the proper time. Data were recorded for days to 50% silking, plant height (cm), ear height (cm), ear length (cm)and grain yield ardab/feddan (ard./fed) adjusted to 15.5% moisture content. (ardab = 140 kg, one faddan = 4200 m^2).The combined analysis was done according to **(Snedecor and Cochran 1989)**among the three locations when the homogeneity test of variance was not significant according to **(Barteltt's test 1937)**.The GCA effects of the lines and testers and SCA effects of the crosses were calculated using line x tester analysis according to **(Kempthorne1957).**Calculation of variances analysis was carried out by using computer application of Statistical Analysis System (SAS 2008).Heterotic group specific and general combining ability (HSGCA) method according to **Fan *et. al*., (2009**) was employed for grouping inbred lines into heterotic groups.

Table (1). The parent code, name and source of the used parental maize inbred lines.

Parent code	Name	Source
L1	Sd. 35A	Cimmyt, Mexico
L2	Sd. 316	Cimmyt, Mexico
L3	Sd. 334	Cimmyt, Mexico
L4	Sd. 3009	Maize Research Department
L5	Sd. 3014	Maize Research Department
L6	Sd. 3017	Maize Research Department
L7	Sd. 3021	Maize Research Department
L8	Sd. 3105	Cimmyt, Mexico
L9	Sd. 3113	Maize Research Department
L10	Sd. 3124	Maize Research Department
L11	Sd. 3125	Maize Research Department
L12	Sd. 3160	Maize Research Department
L13	Sd. 3166	Cimmyt, Mexico
L14	Sd. 3207	Cimmyt, Mexico
L15	Sd. 3302	Maize Research Department
L16	Sd. 3303	Maize Research Department

RESULTS AND DISCUSSION

Analysis of variance:

The combined analysis of variance across three locations of new 32 crosses for five studied traits is presented in Table (2). Highly significant differences were found between three locations (Loc) for all the traits in this study, which indicated a clear variation between the three locations in climatic and soil conditions for these studied traits. The means of genotypes and their interaction with locations had significant or highly significant effect for all studied traits except for number of days to 50% silking of genotypes × locations interaction. The Mean squares due to crosses and their partitions, lines (L), testers (T) and (L x T) and their interactions with locations (Loc)are presented in Table (3).Highly significant differences among crosses (C) were detected for all studied traits, indicating that crosses had a wide genetic diversity among themselves for these traits providing opportunity for selection. Significant or highly significant difference mean square were found for lines (L), tester (T) and their interaction (L xT) for all studied traits except for (L x T) for days to 50% silking, ear height and ear length, meaning that great diversity exists among inbred lines and among testers. Also indicated that the inbred lines performed differently in their respective crosses depending on the type of testers used for these traits. These results are in agreement with those reported by **Abd El-Mottalb (2014), Barh Anupan *et al.* (2015), Gamea (2015), Darshan and Marker (2019), Abu Shosha *et al.* (2020), Gamea (2020) and Ismail *et al.* (2024).** The interaction of crosses x locations (C x Loc) and their partitions i.e., lines x locations (L x Loc), were significant or highly significant for plant height, ear height, ear length and grain yield, also testers x locations (T x Loc) were highly significant for plant height and ear height. Mean while the interaction between lines x testers x locations (L x T x Loc) were significant and highly significant for plant height and grain yield, respectively.

Table (2). Analysis of variance for days number to 50% silking, plant height, ear height, ear length and grain yield traits across three locations.

S O V	d.f	Days to 50% silking	Plant height (cm)	Ear height (cm)	Ear length (cm)	Grain yield (ard/fed)
Location (Loc)	2	312.19**	93506.10**	33079.64**	534.21**	1624.57**
Reb./ Loc	6	30.14	5728.33	3684.92	7.30	35.24
Genotype (G)	32	18.28**	1061.88**	696.48**	4.26**	65.58**
G x Loc	64	2.54	521.02**	255.60**	2.84*	24.80**
Error	192	2.49	246.94	157.61	1.94	6.68
C V %		2.50	5.93	8.60	7.24	11.82

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

Genetic components:

The estimates of K^2GCA, K^2SCA and their interactions with locations (Loc)for all traits, are presented in Table (4). The results revealed that values of K^2GCA were higher than K^2SCA for all traits except for plant height, indicating that additive gene effects were more important than non-additive gene effects in the inheritance of these traits. While the interaction K^2SCA x Loc. was greater than K^2GCA x Loc. for plant height, ear length and grain yield, indicating that the non-additive gene effects were more interacted with the environmental conditions than the additive gene effects for these traits. While the interaction K^2GCA x Loc. was greater than K^2SCA x Loc. for days to 50% silking and ear height, indicating that the additive gene effect interacted more with with the environmental conditions than the non-additive gene effects for these traits. These results are in agreement with **Gamea (2020), Abu Shosha *et al.* (2020), Ibrahim *et al.* (2021) and Ismail *et al.* (2024).**

Table (3): Mean squares due to crosses, lines, testers, lines x testers and their interactions with location for six studied traits.

S O V	d.f	Days to 50% silking	Plant height (cm)	Ear height (cm)	Ear length (cm)	Grain yield (ard/fed)
Crosses (C)	31	17.80**	1095.98**	718.78**	4.36**	67.48**
Lines (L)	15	21.13**	1584.28**	1033.11**	3.99*	88.37**
Testers (T)	1	178.92**	1229.25*	3791.75**	49.83**	337.83**
L x T	15	3.73	598.80**	199.58	1.70	28.56**
C x Loc	62	2.62	494.30**	246.78*	2.75*	25.37**
L X Loc	30	2.95	560.88**	276.81*	3.25*	26.24**
T x Loc	2	6.00	1629.27**	1165.67**	4.44	16.24
L x T x Loc	30	2.07	352.07*	155.49	2.14	25.10**
Error	186	2.51	251.39	158.41	1.93	6.76

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

Table (4): Estimates of genetic parameters for five studied traits across three locations.

Genetic parameters	Days to 50% silking	Plant height (cm)	Ear height (cm)	Ear length (cm)	Grain yield (ard/fed)
K^2 GCA	1.16	0.8	20.33	0.29	2.33
K^2SCA	0.18	27.41	4.9	0.001	0.38
K^2 GCA x Loc	0.09	27.52	20.95	0.06	0.001
K^2 SCA x Loc	0.001	33.56	0.001	0.07	0.11

Mean performance:

Mean performance of 32 crosses and one check hybrid Twc.368 for all studied traits are presented in Table (5). The mean values for days number to 50% silking ranked were 60.67days for (L16 x Sc.177) to 65.78 days for (L10 x Sc.162). The crosses between inbred lines L1, L2, L4,L5, L6, L7,L8, L9, L11, L12, L14, L15, L16 with Sc.177 and between inbred lines L4, L7, L8, L9, L14, L15, L16 with Sc.162 were significantly earlier than check hybrid Twc. 368. For plant height, the crosses ranged from 236.89 cm (L12 x Sc.177) to 287.56 cm (L6 x Sc.177) with four crosses; (L5 x Sc.177), (L7 x Sc.162), (L7 x Sc.177) and (L12 x Sc.177) were significantly shorter than check hybrid Twc.368. For ear height five crosses; (L2 x Sc.177), (L5 x Sc.177), (L7 x Sc.162), (L7 x Sc.177) and (L12 x Sc.177) were significantly lower for ear placement compared with the check hybrid Twc.368. For ear length none of the crosses possessed longer ears than the check hybrid TWC.368. For grain yield, two crosses; (L1 x Sc.162) and (L4 x Sc.162) significantly out yielded the check hybrid Twc.368. Meanwhile twelve crosses; (L1, L10, L13, L15 x Sc. 177 and L3,L8, L10, L11, L13, L14, L15, L16 x Sc.162) were not significant from the check hybrid Twc.368. These high yielding crosses are recommended for further evaluation to accurately identify the promising ones for further commercial cultivation.

Table (5): Mean performance of 32 crosses and one check hybrid for days number to 50% silking, plant height, ear height, ear length and grain yield across three locations.

Code	Cross	Days to 50% silking	Plant height (cm)	Ear height (cm)	Ear length (cm)	Grain yield (ard/fed)
L1	Sd-35A × Sc.162	63.67	278.67	158.67	19.71	26.53
	Sd-35A × Sc.177	62.56	274.44	152.67	19.29	23.52
L2	Sd-316 × Sc.162	64.44	262.00	147.22	19.27	18.12
	Sd-316 × Sc.177	61.67	257.78	134.22	18.73	17.29
L3	Sd-334 × Sc.162	65.00	265.11	151.22	20.11	23.56
	Sd-334 × Sc.177	64.33	265.56	148.33	19.18	18.74
L4	Sd-3009 × Sc.162	63.44	269.89	148.56	20.00	25.35
	Sd-3009 × Sc.177	62.67	267.00	142.78	20.02	20.14
L5	Sd-3014 × Sc.162	64.67	264.67	145.44	20.47	22.33
	Sd-3014 × Sc.177	60.78	238.00	127.00	17.89	14.09
L6	Sd-3017 × Sc.162	63.89	266.44	143.89	19.09	22.32
	Sd-3017 × Sc.177	62.78	287.56	150.44	18.53	21.95
L7	Sd-3021 × Sc.162	62.22	243.00	128.11	18.82	21.66
	Sd-3021 × Sc.177	61.44	249.78	129.11	18.40	21.78
L8	Sd-3105 × Sc.162	62.89	266.67	150.00	19.18	23.37
	Sd-3105 × Sc.177	60.89	262.56	144.00	18.51	21.73
L9	Sd-3113 × Sc.162	63.00	260.22	142.78	19.04	19.50
	Sd-3113 × Sc.177	62.22	258.89	137.33	18.31	21.29
L10	Sd-3124 × Sc.162	65.78	270.67	157.00	19.84	23.38
	Sd-3124 × Sc.177	64.11	275.00	154.00	18.98	23.69
L11	Sd-3125 × Sc.162	65.11	269.67	156.56	19.91	22.93
	Sd-3125 × Sc.177	63.44	265.78	143.67	19.00	22.15
L12	Sd-3160 × Sc.162	63.56	264.00	146.89	19.24	20.36
	Sd-3160 × Sc.177	61.22	236.89	128.22	17.47	15.80
L13	Sd-3166 × Sc.162	65.44	278.44	160.33	20.44	24.98
	Sd-3166 × Sc.177	64.11	267.00	148.11	19.31	23.64
L14	Sd-3207 × Sc.162	62.78	265.67	151.22	19.87	23.61
	Sd-3207 × Sc.177	62.22	265.00	145.89	18.93	21.98
L15	Sd-3302 × Sc.162	62.56	277.56	156.67	19.82	24.76
	Sd-3302 × Sc.177	61.11	267.67	147.22	19.27	22.96
L16	Sd-3303 × Sc.162	63.00	272.78	149.56	19.27	23.95
	Sd-3303 × Sc.177	60.67	270.44	145.00	18.96	21.29
Twc.368		65.00	265.89	146.78	19.53	22.72
LSD	5%	1.47	14.61	11.67	1.29	2.40
	1%	1.94	19.27	15.40	1.71	3.17

General combining ability effects:

The general combining ability (gî) effects of the sixteen inbred lines and two testers are presented in Table (6). The results showed that the best tester for GCA effects was SC177 for earlier and ear height and SC162 for ear length and grain yield. Meanwhile, three lines i.e. L7, L15 and L16 had negative significant (gî) effects for number of days to 50% silking, indicating that these inbred lines are considered the best combiner for earliness. For plant height three inbred lines; L5, L7 and L12 had significant negative GCA effects toward shortness. For ear height four inbred lines; L5, L7, L9 and L12 had significant negative GCA effects toward lower ear placement. For ear length two inbred lines; L4 and L13 had significant and positive GCA effects. For grain yield four inbred lines; L1, L10, L13 and L15 had significant and positive GCA effects. **Abd El-Atief *et al.* (2020),El-Hosary (2020), Gamea (2020) and El-Shahed *et al.*(2020),**found that desirable GCA (gî) effects of some inbred lines for earliness, plant and ear heights, grain yield and its components.

Specific combining ability (SCA) effects:

Specific combining ability effects of 32 crosses for all studied traits are presented in Table (7). Results showed that the desirable crosses for SCA effects were one cross (L5 x Sc. 177) for earliness, three crosses; (L5 x Sc. 177), (L6 x Sc. 162) and (L12 x Sc. 177) for short plant height, three crosses; (L4 x Sc. 177), (L5 x Sc. 162) and (L12 x Sc. 162) for ear length and two crosses; (L5 x Sc. 162) and(L9 x Sc. 177) for high grain yield, suggesting the use of this crosses in maize breeding programs.

Heterotic group:

The inbred lines were classified to heterotic groups based on specific and general combining ability (HSGCA) effects for grain yield according to **Fan *et al.* (2009).** The lines L2, L6, L7, L9 and L11 were grouped with the tester SC-162 and the inbred lines L3, L4, L5 and L12 were grouped with the tester SC-177. Nevertheless, this method was unable to classify the inbred lines L1, L8, L10, L13,L14, L15 and L16 **Lee (1995), Mosa *et al.*,(2017**) and **Ismail *et al.*,(2022)** stated that, the heterotic group is a collection of closely related inbred lines which tend to result in vigorous hybrids when crossed with lines from a different heterotic group, but not when crossed to other lines of the same heterotic group. Hence, Heterotic group method could be recommended in breeding programs for selecting the diverse parents to make crossing between them.

Table (6). General combining ability (GCA) effects of the sixteen inbred lines and two testers for all studied traits across three locations.

code	Inbred Lines	Days to 50% silking	Plant height (cm)	Ear height (cm)	Ear length (cm)	Grain yield (ard/fed)
L1	Sd-35A	0.06	11.41**	9.66**	0.29	3.19**
L2	Sd-316	0.00	-5.26	-5.28	-0.21	-4.13**
L3	Sd-334	1.61	0.18	3.77	0.43	-0.69
L4	Sd-3009	0.00	3.30	-0.34	0.80*	0.91
L5	Sd-3014	-0.33	-13.82**	-9.78**	-0.04	-3.63**
L6	Sd-3017	0.28	11.85**	1.16	-0.40	0.30
L7	Sd-3021	-1.22**	-18.76**	-17.39**	-0.60	-0.12
L8	Sd-3105	-1.16	-0.54	1.00	-0.37	0.71
L9	Sd-3113	-0.44	-5.59	-5.95*	-0.54	-1.44*
L10	Sd-3124	1.89**	7.68*	9.50**	0.20	1.70**
L11	Sd-3125	1.23**	2.57	4.11	0.24	0.70
L12	Sd-3160	-0.66	-14.70**	-8.45**	-0.86**	-3.76**
L13	Sd-3166	1.73**	7.57*	8.22**	0.66*	2.48**
L14	Sd-3207	-0.55	0.18	2.55	0.19	0.96
L15	Sd-3302	-1.22**	7.46	5.94*	0.33	2.02**
L16	Sd-3303	-1.22**	6.46	1.27	-0.10	0.78
LSDgî	1%	0.74	7.44	5.90	0.65	1.22
	5%	0.96	9.64	7.65	0.85	1.58
LSD	1%	1.05	10.52	8.35	0.92	1.72
g i -gj	5%	1.36	13.64	10.82	1.20	2.24
Check	Sc.162	0.79**	2.67**	3.63**	0.42**	1.08**
	Sc.177	-0.79**	-2.67**	-3.63**	-0.42**	-1.08**
LSDgî	1%	0.26	2.63	2.09	0.23	0.43
	5%	0.34	3.41	2.71	0.30	0.56
LSD	1%	0.37	3.72	2.95	0.33	0.61
g î -gj	5%	0.48	4.82	3.83	0.42	0.79

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

Table (7): Specific combining ability (SCA) effects of 32 crosses for all studied traits across three locations.

code	Crosses	Days to 50% silking	Plant height (cm)	Ear height (cm)	Ear length (cm)	Grain yield (ard/fed)
L1	Sd-35A × Sc.162	-0.23	0.05	-0.63	-0.20	0.42
	Sd-35A × Sc.177	0.23	-0.05	0.63	0.20	-0.42
L2	Sd-316 × Sc.162	0.60	0.05	2.87	-0.15	-0.67
	Sd-316 × Sc.177	-0.60	-0.05	-2.87	0.15	0.67
L3	Sd-334 × Sc.162	-0.45	-2.29	-2.18	0.05	1.32
	Sd-334 × Sc.177	0.45	2.29	2.18	-0.05	-1.32
L4	Sd-3009× Sc.162	-0.40	-0.62	-0.74	-0.43*	1.53
	Sd-3009× Sc.177	0.40	0.62	0.74	0.43*	-1.53
L5	Sd-3014× Sc.162	1.16*	11.27*	5.59	0.87*	3.04**
	Sd-3014× Sc.177	-1.16*	-11.27*	-5.59	-0.87*	-3.04**
L6	Sd-3017× Sc.162	-0.23	-12.62*	-6.91	-0.14	-0.90
	Sd-3017× Sc.177	0.23	12.62*	6.91	0.14	0.90
L7	Sd-3021× Sc.162	-0.40	-5.45	-4.13	-0.20	-1.14
	Sd-3021× Sc.177	0.40	5.45	4.13	0.20	1.14
L8	Sd-3105× Sc.162	0.21	-0.01	-0.63	-0.08	-0.26
	Sd-3105× Sc.177	-0.21	0.01	0.63	0.08	0.26
L9	Sd-3113× Sc.162	-0.40	-1.40	-0.91	-0.05	-1.98*
	Sd-3113× Sc.177	0.40	1.40	0.91	0.05	1.98*
L10	Sd-3124× Sc.162	0.05	-4.23	-2.13	0.02	-1.23
	Sd-3124× Sc.177	-0.05	4.23	2.13	-0.02	1.23
L11	Sd-3125× Sc.162	0.05	-0.12	2.82	0.04	-0.71
	Sd-3125× Sc.177	-0.05	0.12	-2.82	-0.04	0.71
L12	Sd-3160× Sc.162	0.38	11.49*	5.70	0.47*	1.19
	Sd-3160× Sc.177	-0.38	-11.49*	-5.70	-0.47*	-1.19
L13	Sd-3166× Sc.162	-0.12	3.66	2.48	0.15	-0.41
	Sd-3166× Sc.177	0.12	-3.66	-2.48	-0.15	0.41
L14	Sd-3207× Sc.162	-0.51	-1.73	-0.96	0.05	-0.27
	Sd-3207× Sc.177	0.51	1.73	0.96	-0.05	0.27
L15	Sd-3302× Sc.162	-0.07	2.88	1.09	-0.14	-0.18
	Sd-3302× Sc.177	0.07	-2.88	-1.09	0.14	0.18
L16	Sd-3303× Sc.162	0.38	-0.90	-1.35	-0.26	0.25
	Sd-3303× Sc.177	-0.38	0.90	1.35	0.26	-0.25
LSD s_{ij}	1%	1.05	10.52	8.35	0.92	1.72
	5%	1.36	13.64	10.82	1.20	2.24
LSD Sîj-Sik	1%	1.49	14.87	11.81	1.30	2.44
	5%	1.93	19.28	15.31	1.69	3.16

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

Table (8): Estimates of heterotic groups based on specific and general combining ability (HSGCA) method for grain yield across the three locations

code	lines	HSGCA	
		Sc162	Sc177
L1	Sd-35A	3.61	2.77
L2	Sd-316	-4.80 #	-3.46
L3	Sd-334	0.63	-2.01 #
L4	Sd-3009	2.44	-0.62 #
L5	Sd-3014	-0.59 #	-6.67 #
L6	Sd-3017	-0.60 #	1.20
L7	Sd-3021	-1.26	1.02
L8	Sd-3105	0.45	0.97
L9	Sd-3113	-3.42 #	0.54
L10	Sd-3124	0.47	2.93
L11	Sd-3125	-0.01#	1.40
L12	Sd-3160	-2.57	-4.95 #
L13	Sd-3166	2.07	2.89
L14	Sd-3207	0.69	1.23
L15	Sd-3302	1.84	2.20
L16	Sd-3303	1.03	0.53

#means that this inbred line belongs to tester group.

CONCLUSION

The inbred lines L1 (Sd 35A), L10 (Sd 3124), L13 (Sd 3166) and L15 (Sd 3303) which gave best GCA effects for grain yield compared with anther inbred lines in this study which may be considered promising lines for improving grain yield. The inbred line L7which possessed the best GCA effects for days to 50% silking and plant height is recommended for developing varieties characterized with earlier maturity and shorter plants. Moreover, the crosses L1 (SD35A) × Sc. 162 and L4 (Sd.3009) × Sc. 162 were the best crosses for grain yield. The HSGCA heterotic grouping method was able to classify nine inbred lines out of 16 lines. These two groups could be used in the breeding program for picking the wanted parents for making crosses.

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الملخص العربي

القدرة علي التآلف لبعض سلالات الذرة الصفراء لمحصول الحبوب وصفات اخري.

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تم إجراء تحليل القدرة العامة علي التالف باستخدام تحليل السلاله x الكشاف من خلال التهجين بين سته عشر سلاله صفراء من الذرة الشامية مع كشافين هما (الهجين الفردي الاصفر162 و الهجين الفردي الاصفر 177) خلال موسم الزراعة 2023 بمحطة البحوث الزراعية بسدس. تم تقيم 32 هجينا الناتجه مع هجين المقارنة (الهجين الثلاثي الاصفر 368) في ثلاث محطات بحثيه هم (سخا والجميزة وسدس) باستخدام القطاعات كاملة العشوائية في ثلاثة مكرارات لصفات عدد الأيام حتى ظهور50٪ من حرائر النورات المؤنثه وارتفاع النبات (سم) وارتفاع الكوز(سم) وطول الكوز(سم) ومحصول الحبوب (اردب / فدان) خلال موسم الزراعة 2024. أظهرت النتائج ان التباين الراجع الي المواقع و السلالات و الكشافات و السلالات x الكشافات والتفاعل بينهم معنوي لمعظم الصفات محل الدراسة. كانت تاثيرات الجينات المضيفة اكثر اهمية من تاثيرات الجينات الغير مضيفة في وراثة جميع الصفات المدروسة ما عدا صفة ارتفاع النبات. كما اظهرت النتائج وجود اربع سلالات (سلاله 1 و سلاله 10 وسلاله 13 وسلاله 15) كانت الافضل في القدرة العامة علي التالف لصفة محصول الحبوب (اردب / فدان). اظهر الهجينين (الهجين الفردي الاصفر162 x السلاله 1) و (الهجين الفردي الاصفر 162 x السلاله 4) تفوق معنوي لصفة محصول الحبوب (اردب / فدان) مقارنة بهجين المقارنه الهجين الثلاثي الاصفر 368 مما يرجح امكانية استخدام هذه الهجن في برامج التربية للمحصول العالي. تمكنت طريقة التجميع الهجين HSGCA من تصنيف 9 سلالات في مجموعتين هجينيتين من أصل 16 سلالة. ويمكن استخدام هاتين المجموعتين في برنامج التربية لاختيار الآباء لانتاج هجن مرغوبة.