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ESTIMATION OF HETEROSIS AND COMBINING ABILITY IN SOME BREAD vVHEAT CROSSES (*T. aestivum* L.)

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ABSTRACT

Six wheat genotypes of diverse origin were crossed in half diallel combinations in 2002/2003.In 2003/2004 season, the 15 F_1 crosses and their six parents were grown in a field experiment at Sakha Agricultural Research station, Agricultural Research center, Egypt, in a randomized complete block design with four replications. The experiments aimed to study heterosis and combining ability for heading date, maiurity date, plant height, no. of spikes/plant, no. of grains/spike, 100-kernel weight, spike weight, grain yield/plant, flag leaf area and clorofel Atb.content the results are summarized as follows.

1- Highly significant differences for most traits were obtained among the studied genotypes (parents and crosses). General and specific combining ability mean squares were highly significant for all studied traits
2- The best general combiners for grain yield and one or more of its attributes were line2 and sids while the best general combiners for earliness were line 1 , line2and line 3.
3-Positive heterosis effects relative to the mid-parent were found for most of the traits in the crosses 3x4, 2x5 and 1x3.
4- The gca/sca ratio revealed the importance of Non-additive genetic variance in the inheritance of all traits, except heading date and no. of grains/spike.
5- The results of specific combining ability effects, revealed that the cross line1 x line 4 was the top performing in maturity date, plant height and grain yield/ plant.

INTRODUCTION

Wheat is considered as one of the most strategic food crops in Egypt . The total national wheat production reached about 6.4 million tons. National wheat production is insufficient to meet the local consumption according to the higher increase of population .The diallel cross technigue is used for identifying potential crosses which produce good quality segregates . This method was developed by Hayman , 1954 and Griffing (1956) and was recommended by several research workers dealing with self- pollinated crops Winder and Labsock, 1973 ; El-shami et al 1996, and Afiah, 1999 and Abd El-Aty 2000 , 2004.

Several investigators studied general and specific combining ability and their role in the inheritance of earliness, plant height and grain yield and its components , Bedair et al., 1979, El-Marakby et al., 1993; Hassan, 1997, Abd El-Aty 2000, 2004 and El-Borhamy 2004.

Exploitation of heterosis depends on general and specific combining ability . Heterosis values, relative to mid and better- parents in wheat for ear liness , plant height and grain yield and its components , were studied by many investigators , such as Afia 1999, Abd El-Aty 2000, El-Borhamy 2004 and Abd El-Aty 2004.The main objectives of this research are to:

1- Identify superior parents and cross combinations from half diallel crosses among six genotypes of bread wheat parental.
2- Estimate amount of heterosis for some agronomic characters and grain yield.
3- Estimate combining ability effects and the mode of gene action in the inheritance of grain yield and some related agronomic traits.

MATERIALS AND METHODS

The present study was carried out at Sakha Agricultural Research Station , Agricultural Research Center, Egypt, during the two growing seasons of 2002/ 2003 and 2003/2004. Six wheat genotypes of wide divergent origin were used, namely, Line 1,Line 2,Line3, Line 4,Sids1and Gemmiza 9 were used in half- diallel crosses to produce 15 F1 hybrids in 2002/2003 season..

The F1 hybrids and six parents were tested in 2003/2004 season, using a rondomized complete block design with four replications. Each genotype was grown in a single row of 2m long, 30 cm apart and the plants were spaced 20 cm apart within the rows. The normal cultural practices for wheat production were performed at the proper time. Data were recorded randomly on ten guarded plants per row in each of the four replications to study number of days to heading and number of days to maturity , plant height (cm), number of kernels per spike, 100 kernel weight (g) and grain yield / plant (g). data were statistically analyzed using analysis of variance of R.C.B.D and the significance of differences between genotypes means was calculated by New LSD method according to Waller and Duncan (1969).

Heterosis of F1relative to mid-parent for each cross was calculated as follow:

$$\text{Heterosis\% over mid} - \text{parent} = \frac{F1 - Mp}{MP} x\ 100$$

The data were analyzed using Griffing (1956) method (2) model (1) to estimate general combining ability (GCA) and specific combining ability (SCA)effects . The genotypes were considered fixed . The relative importance of GCA to SCA were expressed as follows :-

$$\frac{K^2 G.C.A}{K^2 S.C.A} = \frac{M\,s\,G.C.A - Ms\,e\,/\,(p+2)}{M\,s\,G.C.A - Ms\,e}$$

Heterosis of F1relative to mid-parent for each cross was calculated as follow:
Where

MS	mean squares of GCA
MS	mean squares of SCA
P	Number of parents
K^2	Is the average squares of the effects.
e	Error term.

Table(1) Names and pedigree of parental Genotypes .

Genotypes	Cross Name and Pedigree
Line # 1	BB /CC/2* CNO /3/ TOB/ 8156 /4/ SUN / PSN'S' /5/ BCH /4/ 7C / PATO (B) /3/ LR 64 / INIA// INIA /BB /6/ K 134 (60) / VEE S. 12544-5S-3S-3S-2S
Line # 2	BL1133/3/ CMH 79A.955*2/ CNO 79// CMH 79A.955 / BOW"s" /7/ CNO "s" / GLL /3/ SON 64 / KLRE // BB /4/ UP 301 /5/ TL // FN. TH / 2* NAR 59161.(B6 * CON ** CON * TOTA / JAR) 2F5 / 2F2 ** (IN* TGLR ** CNO"s" PJ62* JAR "s") 2F1 S.12984-2S-1S-1S-0S
Line# 3	GIZA164 / SAKHA 61 S.9242-IBR-2BR-5BR-2BR-0BR
Line# 4	GIZA158/5/CFN/CNO"s"//RCN/3/BB/NOR67/4/ TL/3/FN/TH//NAR59*2 S.10232-3S-2S-4S-5S
Sids 1	HD2172/ Pavon" S "//1158 .57/ Maya74 "S" Sd.46-4Sd-2Sd-1Sd-0Sd
Gemmiza 9	Ald "S"/ Huac// Cmh74A .630/ Sx CGM4583 -5GM-1GM- 0GM

RESULTS AND DISCUSSION

Analysis of variance

The main squares of genotypes were highly significant for all characters under study, indicating the presence of considerable variability among genotypes. This provide a wide base of genetic variability for improving yield and other important characters.(table 2)

Table (2): Mean squares for general combining ability (G.C.A) and specific combining ability (S.C.A).and their ratio for grain and other agronomic traits.

S.O.V	d.f	Heading date (day)	Maturity date (day)	Plant height (c.m)	No. of spikes /plant	No. of grains / Spike	100-Kernel / weight (g)	Spike weight (g)	Grain yield / plant (g)	Flag . Leaf Area (cm)	Chlorophyll A+b
Rep	3	8.71	14.52	81.25	13.36	38.52	0.03	0.04	11.13	20.92	77.59
Genotype	20	69.61**	63.79**	169.11**	13.45**	70.96**	0.78**	0.37**	145.44**	36.58**	32.26**
GCA	5	224.13**	139.27**	462.81**	31.72**	208.97**	1.08**	0.49**	158.19**	45.93**	68.20**
SCA	15	18.10*	38.63**	71.21**	7.36	24.96*	0.67**	0.33**	141.19**	33.46**	20.28**
Error	60	7.3	7.42	27.92	4.5	12.09	0.26	0.15	7.83	13.77	7.99
GCA/ SCA	-	1.71	0.47	0.89	0.62	1.17	0.21	0.19	0.14	0.18	0.45

*, ** Significant at 0.05 and 0.01 levels of probability.

1-Mean performance:

The mean performance of parents and their F_1 generation are presented in table (3). Line 1 was the earliest genotype and had the highest grain yield per plant, line2 and line3 were inferior in grain yield/ plant compared to the other genotypes.While Gemmiza 9 was the second in grain yield /plant and the Latest one.

All the F_1 were suprior in spike weight and 100-kernel weight relative to their parental means. All the F_1 crosses, had taller plant height than the mid parent. Six crosses had higher number of grains/ spike, in comparison with their corresponding parents. On the other hand all F_1 crosses except five were earlier than their parental means.

Table (3) Means of parents and their F1 crosses for all the studied traits.

Genotype	Heading date (day)	Maturity date (day)	Plant height (c.m)	No. of spikes /plant	No. of grains / Spike	100-Kernel/ weight (g)	Spike weight (g)	Grain yield / plant (g)	Flag . Leaf Area (cm)	Clorophyll A+b
(P_1) Line#1	93.50	145.50	111.30	17.70	66.40	5.34	3.56	43.73	63.20	48.60
(P_2) Line#2	93.80	145.50	115.00	17.70	68.90	5.00	3.47	41.10	66.60	47.20
(P_3) Line#3	97.50	149.80	108.80	15.00	67.10	5.15	3.48	38.06	63.80	46.60
(P_4) Line#4	102.00	150.00	112.50	16.80	62.50	5.22	3.25	42.69	57.10	43.20
(P_5) Sids#1	100.20	151.60	113.80	17.40	69.00	4.81	3.47	41.23	63.40	45.80
(P_6) Gemmiza #9	109.30	155.80	105.00	18.70	66.54	4.83	3.11	43.15	62.60	44.10
$P_1 x p_2$	96.80	148.80	113.80	16.30	67.40	5.04	3.40	41.93	60.10	45.00
$P_1 x p_3$	95.30	148.30	115.00	17.10	68.90	5.02	3.24	43.06	67.50	47.10
$P_1 x p_4$	97.80	149.00	117.50	16.20	69.20	5.38	3.51	41.51	58.00	46.60
$P_1 x p_5$	103.00	152.50	112.50	17.30	66.90	5.24	4.07	42.43	65.50	45.10
$P_1 x p_6$	96.00	150.00	106.30	16.20	67.70	5.78	3.44	42.26	67.60	47.00
$P_2 x p_3$	100.30	146.50	120.00	16.50	64.70	5.85	3.45	41.94	68.50	44.50
$P_2 x p_4$	96.50	144.30	117.50	16.70	65.40	5.85	3.38	39.30	61.40	43.30
$P_2 x p_5$	102.50	153.80	113.80	17.40	66.60	4.23	3.75	43.58	65.20	45.90
$P_2 x p_6$	101.30	151.00	107.50	16.40	70.90	5.51	3.52	41.58	62.20	44.60
$P_3 x p_4$	97.30	144.80	118.80	17.70	66.80	4.77	3.19	41.83	61.80	44.90
$P_3 x p_5$	98.80	149.50	112.50	17.20	63.70	5.84	3.21	40.02	63.90	47.00
$P_3 x p_6$	101.50	149.30	113.80	18.50	58.20	5.07	3.47	39.51	53.10	45.90
$P_4 x p_5$	98.90	148.50	110.00	17.60	68.50	5.07	3.38	40.39	63.30	45.10
$P_4 x p_6$	96.55	148.50	108.80	15.50	64.60	5.31	3.53	43.03	51.60	45.30
$P_5 x p_6$	102.30	148.80	115.00	18.40	66.80	5.25	4.16	43.48	55.30	51.50
Mean	99.10	148.14	112.82	17.06	66.51	5.22	3.48	41.71	61.99	45.92
N.L.S.D	3.50	3.80	7.30	3.3	5.4	1.01	1.25	3.7	6.20	4.10

2-Effect of heterosis

Data in table (4) indicate the heterosis effects for the different studied characters. Significant positive heterosis percentages over mid-parent were obtained in most cases. Significant negative heterosis was observed for earliness in the cross combinations of line 2 x sids1 and line 4 x Gemmiza 9. Highly significant positive heterosis lowards tallness was obtained in the crosses, line 2 x line3, line 3 x line 4 , and line 3 x Gemmiza 9.

Highly significant heterosis for No. of spikes /plant was found in crosses; line 3x line 4; line 3 x Gemmiza 9 and sids1 x Gemmiza 9.

Highly significant positive heterosis for No. of grains / spike was obtained in the crosses $L_1 \times L_4$. The best four crosses in grain yield /plant were ($L_1 \times L_3$), ($L_2 \times L_3$), ($L_2 \times sids_1$) and ($L_3 \times L_4$).

The best five crosses in 100-kernel weight were line1 x Gemmiza 9, line 2 x line 3 , line 2 x line 4 , line2 x Gemmiza 9 and line3 x sids 1.

Positive heterosis was also highly significant for spike weight in crosses (line1 x sids 1 and line 4 x Gemmiza 9).

The best two crosses in flag leaf area were (L_1 x L_3) and line 1 x Gemmiza 9. with respect to chlorophyll content A+B only cross sids 1 x Gemmiza 9 showed highly significant positive heterosis relative to mid parents.

These results are in close agreement with those reported by Ashoush (1996) EL-Henawy (1996) and Abd -ElAty (2000) and (2004).Generally the crosses (L_1 x L_4), (L_3x L_4), (L_1 x L_3), (L_2 x L_3) and (L_2 x sids 1). Were the best in most of the studied characters.

Table (4): Heterosis as percentage of mid- parent (MP) for the studied characters in the half diallel crosses of wheat.

Crosses	Heading date (day)	Maturity date (day)	Plant height (c.m)	No. of spikes /plant	No. of grains / Spike	100-Kernel / weight (g)	Spike weight (g)	Grain yield / plant (g)	Flag . Leaf Area (cm)	Chlorophyll A+b
P_1Xp_2	3.34*	2.23	0.55	-7.91*	-0.37	-2.51	-3.27*	-1.14	-7.40**	-6.05**
P_1Xp_3	-0.21	0.44	-1.08	4.59*	3.22	-4.29*	-7.95**	5.29**	6.30**	-1.05
P_1Xp_4	0.05	0.85	5.03*	-6.09**	7.37**	1.89	3.08	-3.93*	-3.57	1.53
P_1Xp_5	7.85**	4.36*	0.00	-1.42	-1.18	3.25*	15.79**	-0.12	3.48	-4.45*
P_1Xp_6	-1.41	1.27	-1.73	-10.99**	1.85	13.67**	3.15*	-2.72	7.47**	1.40
P_2Xp_3	4.84**	-0.76	7.26**	0.92	-4.85*	15.27**	-0.72	5.96**	5.06*	-5.12**
P_2Xp_4	-0.52	-2.37	3.30	-3.19*	-0.46	14.48**	0.60	-6.19**	-0.73	-4.20*
P_2Xp_5	7.19**	5.22**	-0.55	-0.85	-3.41	-13.76**	8.07*	5.87**	0.31	-1.29
P_6Xp_6	3.85*	1.94	-2.27	-9.89**	4.70*	12.11**	6.99*	-1.29	-3.72	-2.30
P_3Xp_4	-2.46	-3.40*	7.34**	11.32**	3.09	-8.00**	-5.20*	3.60*	2.23	0.00
P_3Xp_5	-0.05	-0.80	1.12	9.55*	-6.39**	17.27**	-7.63**	0.95	0.47	1.73
P_3Xp_6	2.14	-0.67	6.43**	9.79**	-12.90**	1.60	5.31*	-2.70	-15.98**	1.21
P_4Xp_5	-2.18	-1.53	-2.76	2.92*	4.18	1.10	0.60	-3.74*	5.06*	1.35
P_4Xp_6	-8.61**	-2.88	0.00	-7.46**	0.12	5.67*	11.01**	0.26	-13.78**	3.78*
P_5Xp_6	-2.34	-3.19	5.14*	11.18**	-8.18**	-2.51	-3.27*	1.30	-12.22**	14.57**

*, ** Significant at 0.05 and 0.01 l evels of probability.

3-Combining ability effects :

Data in table (2) show that the mean squares of genotypes were highly significant for all the studied characters, the gca and sca mean squares were also highly significant for all the studied traits.

Gca/sca ranged between 0.14 for grain yield /plant to1.71 for heading date and this indicates that both additive and non additive components genetic effects were important in the inheritance of these traits. Specific combining ability was more important than general combining ability for maturity date. Plant height . no. of spikes / plant, 100 kernel weight , spike weight , flag leaf area , chlorophyll A+B and grain yield / plant (table 2)These results suggest a predominant role of non-additive type of gene action for these traits. This indicates that non-additive gene action played a major part in the inheritance of such traits. These results were in agreement with those

A :general combining ability effects.

General combining ability effects given in table (5) revealed that the genotypes Line 1, Line 2 and Line 3 were good general combiners for earliness .with regard to shortness $line_1$ and Gemmiza 9 were the best donors. For no. of spikes / plant the best combiners were $sids_1$ and Gemmiza 9. for no. of grains/ spike and grain yield / plant line 2 and sids1 were considered the best combiners. Line 2 was the best general combiner for 100kernel weight , spike weight and flag leaf area, while Line 1 was the most highly significant positive combiner for chlorophyll content in leaves.

Table (5): Estimates of general Combining ability effects for traits of six wheat parents.

Parent	Heading date (day)	Maturity date (day)	Plant height (c.m)	No. of spikes /plant	No. of grains / Spike	100-Kernel weight (g)	Spike weight (g)	Grain yield / plant (g)	Flag . Leaf Area (cm)	Chloro phyll A+b
(P_1) Line#1	-3.323**	-1.167**	-4.219**	-0.139	-1.228**	-2.910**	0.209	-0.070	0.2288	2.272**
(P_2) Line#2	-1.292**	-1.229**	2.969**	-0.270	1.228**	3.586**	0.225*	0.241**	2.010**	0.604
(P_3) Line# 3	-1.729**	-2.854**	0.938	-4.510**	0.328	-0.608	-0.128	-0.304**	-1.592**	-0.124
(P_4) Line# 4	0.240	0.740	2.188*	0.293	-0.578	-1.390**	-0.182	-0.027	-0.244	0.377
(P_5) Sids # 1	3.615**	2.366**	3.438**	1.468*	0.981**	0.984*	0.168	0.135	0.189	-1.756**
(P_6)Gemmiza #9	2.490**	2.146**	-6.313**	3.158**	-0.731*	0.339	-0.292*	0.026	-0.650	-1.374**
L.C.D (gi) 0.05	0.872	0.879	1.705	1.122	0.684	0.903	0.224	0.169	1.197	0.912
L.C.D (gi) 0.01	1.160	1.167	2.268	1.492	0.910	1.201	0.298	0.225	1.593	1.213
LSD (gi-gj) 0.05	1.351	1.362	2.641	1.738	1.060	1.399	0.348	0.263	1.855	1.413
LSD (gi-gj) 0.01	1.797	1.811	3.513	2.312	1.410	1.860	0.463	0.349	2.467	1.879

*, ** Significant at 0.05 and 0.01 respectively.

B: specific combining ability effects.

Table (6) show the estimates of specific combining ability effects for the studied characters in the crosses . S.C.A for heading was negative and highly significant in cross line 1 x line 6. While the best combinations for earliness in line1 x line 4 , line 1 x line 6, line 2 x line 4, line 2 x Sids 1, line 3 x line 4 and sids 1 x Gemmiza 9. Were negative and significant S.C..A effects. For plant height, crosses line 1 x line 4 and line 3 x sids 1 exhibited positive and significant S.C.A values. While for no. of grains/ spike the cross line 2 x Gemmiza 9 had positive and significant S.C.A effects. Significant positive S.C.A effects values were obtain for grain yield/ plant in crosses line 1 x line 3 and line 1 x line 4.Furthermore, the estimates of S.C.A effects was positive and significant for spike weight in cross line 1 x line 2. These results indicate that the non- additive genetic effects were more predominant in these particular combinations of wheat crosses for these traits. However, Essia (1993), Attia (1998), Elsayed et al (2000) and Abd -ElAty 2000,2004 found that some crosses gave desirable specific combining ability effects for these traits.

found that some crosses gave desirable specific combining ability effects for these traits.

Table (6): Estimates of Specific Combining ability effects for F1 crosses of the studied traits.

Parent	Heading date (day)	Maturity date (day)	Plant height (c.m)	No. of spikes /plant	No. of grains / Spike	100-Kernel / weight (g)	Spike weight (g)	Grain yield / plant (g)	Flag . Leaf Area (cm)	Chlorop hyll A+b
P_1xp_2	1.781	0.527	0.714	0.339	1.246	0.298	0.509*	-0.076	0.888	-0.727
P_1xp_3	-0.281	2.402	-1.004	-0.086	2.962	-0.341	-0.246	8.411**	0.024	1.564
P_1xp_4	-2.000	-2.692*	6.496**	1.371	1.184	-1.832**	-1.021**	2.938*	1.887	-0.928
P_1xp_5	3.375**	4.433**	1.496	-0.764	-1.741	-0.109	-0.248	-10.546**	0.798	-0.260
P_1xp_6	-3.500**	-3.098*	-1.004	-0.651	2.118	-0.185	0.151	-3.762**	-6.307**	0.142
P_2xp_3	0.938	0.464	0.558	-2.041*	-1.432	-0.597	-0.314	-8.298**	-1.158	-0.715
P_2xp_4	-0.781	-2.879*	4.308	0.664	2.065	-0.153	-0.189	1.546	0.872	-0.837
P_2xp_5	1.094	-3.004*	3.058	-0.670	1.040	-0.596	-0.546*	-2.003	1.998	1.446
P_2xp_6	2.969*	3.714**	1.808	-0.958	3.725*	-0.836**	-0.527*	-3.278*	0.200	2.283
P_3xp_4	-1.594	-3.254*8	-3.661	0.564	1.681	0.253	0.311	1.836	0.434	-0.051
P_3xp_5	1.031	-1.379	5.089*	-0.670	-0.894	0.201	-0.013	-1.721	-4.835**	0.797
P_3xp_6	0.656	-2.411	1.339	0.417	-2.335	-0.138	-0.225	3.006*	1.207	0.771
P_4xp_5	-0.188	2.027	-1.161	-2.589**	0.153	0.449	0.392	-7.119**	3.150	0.402
P_4xp_6	1.688	0.996	-8.661**	-1.101	-3.338*	0.206	-0.060	-1.237	1.765	2.064
P_5xp_6	-0.188	-4.879**	-1.161	-0.011	-2.363	-0.416	0.041	-0.511	-1.901	-7.051**
L.S.D(Sij) 0.05	2.395	2.415	4.683	1.879	3.081	0.617	0.466	2.480	3.289	2.505
L.S.D(Sij) 0.01	3.185	3.212	6.228	2.499	4.098	0.820	0.620	3.299	4.375	3.332
L.S.D(Si-sik) 0.05	3.574	3.604	6.989	2.804	4.599	0.921	0.696	3.701	4.909	3.739
L.S.D(Si-sik) 0.01	4.754	4.793	9.296	3.730	6 117	1.225	0.926	4.923	6.529	4.973
L.S.D (sij- skl) 0.05	3.309	3.337	6.471	2.596	4.258	0.852	0.645	3.427	4.545	3.462
L.S.D (sij- skl) 0.01	4.401	4.338	8.606	3.453	6.663	1.134	0.858	4.558	6.045	4.604

*, ** Significant at 0.05 and 0.01 l evels of probability.

REFERENCES

Abd-El-Aty, M.S.M (2000) Estimates of heterosis and combining ability in diallel wheat crosses (T. Aestivum L.) J. Agric. Res. 26(3): 486-498. Tanta univ.

Abd-El-Aty, M.s.M (2002) Heterosis, gene effects , heritability and genetic advance in two wheat crosses (T. aestivum L.) J. Agric, Sci 27(8) : 5121-5129. Mansoura univ.

Abd-El-Aty , M.S.M. (2004) Genetic Diversity , Heterosis and combining Ability in some Bread wheat crosses . J. Agric Res. 30 (4) 847-862.

Afiah, S.A.N. (1999). Combining ability, association and path coefficient analysis of some wheat (T. aestivum L.) Diallel crosses under Desert conitions Mansoura J. Agric- Res . Vol 24N (4 1583-1596.

Ashoush, H.A.H. (1996) Analysis of diallel crosses of some quantitative characters in common wheat (Triticum aestivum L.) . Ph. D . Thesis Fac. Of Agric) Moshtohor, zagazig univ. Benha Branch, Egypt.

Eissa M.M . (1993) combining ability for main spike characters in durum wheat (T.turgidum var . durum. Zag. J. Agric. Res. 20: 1673-1681.

El-Borhamy,H. S.(2004).genetic analisis of some drought and yield related characters in spring wheat varieties(Triticum aestivum L.)J.Agric.Sci.Mansoura univ.,29(7):3719-3729.

El-Henawy, M.A. (1996) Heterosis and combining ability in diallel crosses of eight bread wheat cultivars . Bulletin Fac. Agric.47: 379-392 Cairo univ.

El-Hity, M.A. (1994) Diallel analysis of genetic variation for yield and its component in wheat . Tanta unv, J. Agric Res. Vol. 20 (3) : 440-449.

El-Marakby, A.M.; A.A. Mohamed and M.F. Abd El-Rahaman (1993).Studies on general and specific combining ability in bread wheat (T. aestivum L.) . Annals Agric . Sci., sp Issue, 1: 135-149.

El-Sayed, E.A.M; M. Tammam and S.A. Ali (2000). Genetical studies on some bread wheat crosses (Triticum aestivum L.) Menofiya J. Agric. Res. 25 (2) : 389-401.

El-Shami, M.M.; T.M. Shehab El-Din ; A. H. Abd El-Latif and M.S. Sharshar (1996). Heterosis and combining ability for grain yield and some related characters in bread wheat Monsoura J. Agric Res.Vol. 21No. (2) 2789-2796.

Griffing , B. (1956) concept of general and specific combining ability in relation to diallel crossing systems . Aust . J. Biol . Sci., 9: 463-493.

Hassan , E.E. (1997) combining ability and facter analysis in durum wheat (Triticum turigidum L.) Zagazig J. Agric . Res. 24 (1) : 23-26.

Hayman, Bl(1954). The analysis of variance of diallel tables. Biometries 10 : 235-244.

Waller, R. A. and D. B. Duncan (1969). A bay,s rule for the symmetric multiple comparison problem. J. Asoc., 64: 148-1503.

Winder , J.N. and K.L. Lebock (1973). Combining ability in durum wheat crop sci. 13: 164 -167.

تقدير قوة الهجين والقدرة على الائتلاف تبعض هجن قمح الخبز

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البرنامج القومي لبحوث القمح- معهد بحوث المحاصيل الحقلية - مركز البحوث الزراعية

أجريت هذه الدراسة بمحطة سخا خلال موسمى ٢٠٠٣/٢٠٠٢، ٢٠٠٤/٢٠٠٣ لدراسة قوة الهجين والقدرة على الائتلاف في ستة تراكيب وراثية مختلفة وتم في الموسم الاول ٢٠٠٣/٢٠٠٢ التهجين فيما بينها تهجينا دائريا (عدا الهجن العكسية) وفى الموسم الثانى ٢٠٠٤/٢٠٠٣ تم أختبار الأباء والهجن الناتجه منها في تصميم القطاعات الكاملة العشوائية في أربعه مكررات حيث تمت دراسة الصفات التالية : عدد الايام حتى طرد السنابل ، عدد الايام حتى النضج، ارتفاع النبات(سم) ، عدد السنابل للنبات ، عدد حبوب السنبلة ، وزن المائه حبه(جم) ، وزن حبوب السنبله(جم) ومحصول النبات الواحد(جم) بالإضافة الى مساحة ورقه العلم (سم) والمحتوى الكلورفيلى . ويمكن تلخيص أهم النتائج المتحصل عليها في النقاط الآتية:-

١- أظهرت النتائج وجود اختلافات عالية المعنوية بين التراكيب الوراثية تحت الدراسة .

٢- كانت احسن الأباء للقدرة العامة على الائتلاف لمحصول الحبوب وواحدة أو أكثر من الصفات الأخرى السلالة رقم ٢ والصنف سدس ١ بينما تعتبر السلالات ١؛٢؛٣ من أبكر التراكيب الوراثية .

٣- أمكن الحصول على قوة هجين عالية في الهجن التالية(سلاله ٣ x سلاله ٤) و(سلاله ١ x سلاله ٣) و (سلاله٢ x سدس ١) وذلك فى عديد من الصفات المدروسة.

٤- أوضحت الدراسة أهمية الفعل الجينى غير المضيف في وراثة جميع الصفات المدروسة ما عدا صفتى الطرد وعدد الحبوب للسنبلة حيث كان الفعل الجينى المضيف ليما أكثر أهمية .

٥- كانت القدرة الخاصة على الائتلاف عالية المعنوية لعدد الأيام حتى النضج وارتفاع النبات وكذلك محصول النبات في الهجين الناتج من (سلالة رقم ١ x سلاله رقم ٤).