Assiut J. Agric. Sci., 52 (4) 2021 (1-11) *ISSN: 1110-0486*
Website:www.aun.edu.eg/faculty_agriculture/journals_issues_form.php *E-mail: ajas@aun.edu.eg*

Estimate of Combining Ability and Correlation for Some Bread Wheat Genotypes

Haridy, M.H.; I.N. Abd El-Zaher and A.Y. Mahdy

Agronomy Department, Faculty of Agriculture, Al- Azhar University, Assiut Branch

Accepted for publication on: 7/12/2021

Abstract:

Seven bread wheat (Sids1, Sids12, Sids13, Misr 1, Giza 171, Gammeiza11 and Sakha93) were used as parents of a 7 x 7 half-diallel cross. The obtained 21 F_1 crosses and their seven parents were evaluated at Experimental Farm, Faculty of Agriculture, Al-Azhar University, Assiut Branch. Results manifested that highly significant differences were detected among genotypes, parents, crosses, parents vs. crosses, general and specific combining abilities for all studied traits. σ^2GCA/σ^2SCA was less than the unity for all studied traits. The F_1 mean performance values were increased significantly over the parental mean values for all the studied traits, except number of days to 50% blooming, where they were not differ significantly. All crosses possessed desirable significant positive heterotic effects over both mid parent and better parent for grain yield/plant, except the crosses, P_3 x P_7 and P_6 x P_7. The cross P_5 x P_6 had significant positive desirable SCA effects for high yielding ability and number of days to 50% blooming. Significant positive correlation was detected between grain yield/plant and both of plant height, number of spikes/plant, length of spike and number of grains/plant, while it gave negative correlation with number of days to 50% blooming and 1000-kernel weight.

Keywords: *Wheat, combining ability, correlation.*

Introduction

Wheat is considered one of great important food crops in the greatest part of the world. Wheat breeders do their best to explore the genetic material in order to develop new high yielding ability of wheat genotypes to face the gap between production and consumption. They need information on heterosis as essential in hybridization programs to develop new superior genotypes. Diallel mating system is one of the most powerful breeding analysis methods to give different genetic variances information about inheritance pattern of any specific trait of specific genotypes, which give guidance to the suitable breeding system to improve and release high yielding ability (Griffing, 1956). The important genetic parameters of diallel analysis are general (GCA) and specific (SCA) combining ability, which are essential in developing plant breeding. Therefore, the concepts of GCA and SCA defined by Sprague and Tatum (1942), which have been used extensively in breeding of several economic species. The concepts of GCA and SCA became useful for characterization of inbred lines in crosses and often have been in the description of an inbred line (Hallauer and Miranda, 1988). The variances of general and specific combining ability are related to the type of gene action effects. Variance for GCA includes additive portion, while that of SCA includes non-additive portion of total variance arising largely from dominance and epistatic deviations (Rojas and Sprague, 1952).

The objectives of the present investigation were to estimate heterosis and correlation, as well as GCA and SCA effects of the seven wheat varieties and its 21 F_1 cross combinations to identify the best parental general combiners and crosses to improve earliness and yield of wheat.

Material and Methods:

This investigation was carried out during two growing seasons; 2016/2017 and 2017/2018 at the Experimental Farm, Faculty of Agriculture, Al-Azhar University, Assiut Branch. Seven varieties of bread wheat wildly different in some their agronomic traits were used as parents of a 7 x 7 half-diallel cross in this study. These varieties were Sids 1 (P_1), Sids 12 (P_2), Sids 13 (P_3), Misr 1 (P_4), Giza 171 (P_5), Gammeiza 11 (P_6) and Sakha 93 (P_7). The pedigree and origin of these varieties are shown in Table 1.

Data were recorded for days to 50% blooming (day), plant height (cm), number of spikes/plant, length of spike (cm), number of grains/plant (g), 1000-grain weight (g) and grain yield/plant (g).

Table 1. The Pedigree and origin of the wheat varieties under investigation:

Name	Pedigree	Origin
Sids1	MRL/BUC/SER1	Egypt
Sids 12	BUC//7C/ALD/5/MAYA74/0N//1160 Egypt/47/3/BB/GLL/4/CHAT"S"/6/MAYA/VUL - //CMH74A.63014*SX.SD7096-4SD-1SD-1SD-0SD.	Egypt
Sida13	ALMAZ.19=KAUZ"S"//TSI/SNB"S"IICSBW1-0375-4AP-2AP-030AP-0APS-3AP-0APS-050AP-0AP-0SD	Egypt
Misr 1	OASIS/SKAUZ//4*BCN/3/2*PASTOR	Egypt
Giza 171	Sakha93 /Gemmeiza9 GZ003 – 101-1GZ -1GZ – 2 GZ -0GZ	Egypt
Gammeiza 11	BOW,,s,,/KVZ/7C/SERI82/3/GIZA168/SAKHA61	Egypt
Sakha 93	SAKHA 92/ TR 810328:	Egypt

Experimental layout:

In the (2016/2017) season, the seven parents were sown in a field in two planting dates with two weeks apart to obtain enough flowers for crossing. Parents were crossed in all possible combinations, except reciprocals to produce twenty one F_1 crosses.

In (2017/2018) season, the twenty one F_1 crosses and their seven parents were sown in a Randomized Complete Block Design (R.C.B.D) with three replications. Planting was carried out on 20th November (2017). Plants were grown on rows, 4 m long and 50 cm apart, in single seeded hill spaced at 15 cm. Each genotype was represented by three rows/plot. The agriculture practices of irrigation and fertilization were carried out as recommended for wheat production. The data were recorded on the mean of ten guarded plants/plot for each genotype.

Statistical analysis:

An ordinary analysis of variance of RCBD for the obtained data was performed according to Snedecor and Cochran (1967) to test the significance of differences among the genotypes and treatments means were compared statistically using the test of the Lest Significant Differences

(LSD). Mid and better parents heterosis was determined for each cross as percentage as follows:
Mid parents heterosis (%) = (F_1 – mid parent/mid parent) x100.
Better parents heterosis (%) = (F_1 – better parent/better parent) x 100.

The analysis of combining ability was performed as outlined by Griffing′s (1956), diallel cross analysis, method II, model I (fixed model).

Results and Discussion

Analysis of variance and mean performance:

The analysis of variance (Table 2) cleared that highly significant differences were detected among genotypes for all the studied traits, indicating a wide range of diversity among the studied materials and combining ability analysis according to Griffing′s (1956), method II, model I could be done. As well as, highly significant differences were detected among parents and crosses for all the studied traits, indicating great diversity among them. Also, highly significant differences between parents vs. crosses were detected for all the studied traits, indicating presence of highly heterosis response in the materials study. Both GCA and SCA mean squares were highly significant for all the studied traits, indicating both additive and non-additive gene actions are involved in the inheritance of all the studied traits. The ratio of σ^2GCA/σ^2SCA was less than one for all the studied traits, indicating the non-additive gene action played the major role in the inheritance of all the studied traits. These results are in agreement with those reported by Fonseca *et al.* (1968), Afiah *et al.* (2000), El-Beially and El-Sayed (2002), El-Borhamy (2004), Farooq *et al.* (2010) and Rahul and Kandalkar (2018).

Table 2. Mean squares of genotypes, parents, crosses, parents vs. crosses, general combining ability (GCA), specific combining ability (SCA) and their ratios. for yield and its components of the seven parents and their 21 F_1 crosses.

S.O.V	d.f	Number of days to 50% blooming	Plant height	Number of spikes/plant	length of spike	Number of grains/plant	1000-grain weight	Grain yield/plant
Replicates	2	3.76	0.32	4.12	6.99	0.77	33.67	21.98
Genotypes	27	5.68**	78.89**	8.26**	6.38**	74.32**	54.83**	23.32**
Parents (P)	6	234.80**	152.40**	101.21**	65.47**	107.60**	80.59**	102.03**
Crosses (C)	20	89.33**	77.98**	43.65**	40.33**	50.22**	46.43**	76.28**
P vs C	1	53.32**	33.76**	21.55**	18.98**	23.42**	16.88**	25.45**
GCA	6	8.31**	112.60**	11.21**	5.47**	137.70**	88.69**	12.33**
SCA	21	9.91**	122.70**	17.56**	6.64**	155.45**	96.96**	25.08**
Error	54	0.87	0.79	1.00	0.37	2.25	1.99	1.04
∑gij2/∑sij2		0.84	0.92	0.95	0.64	0.86	0.92	0.49

** Indicate to significant at 0.01 level of probability, respectively.

Mean performance:

Mean performance values of the seven parents and their twenty one F_1 crosses are presented in Table 3. The obtained results exhibited that mean performance of the parents was wide extended with a range of 81.41 - 84.88 days ($P_5 – P_7$), 91.74 - 106.31 cm ($P_3 – P_6$), 11.11 - 14.44 ($P_6 – P_1$), 13.18 - 14.78 ($P_3 – P_4$), 67.54 - 84.68 ($P_5 – P_6$ and P_7), 43.21 - 52.68 ($P_6 – P_5$) and 25.08-29.58 ($P_7 – P_5$) for number of days to 50% blooming, plant height, number of spikes/plant, spike length, number of grains/plant, 1000-grain weight and grain yield/plant, respectively. Meanwhile, mean performance values of the F_1 crosses were extended with a range of 74.14 – 85.08 day (P_5 x P_6) - (P_2 x P_3), 101.81 - 110.71 cm (P_4 x P_7) - (P_2 x P_6), 12.78 - 17.61 (P_2 x P_5) - (P_1 x P_3), 15.08 - 18.38 cm (P_1 x P_3) - (P_4 x P_6), 78.04 - 93.71 (P_1 x P_5) - (P_2 x P_6), 48.28 - 56.41 g (P_1 x P_6) - (P_2 x P_5 and P_5 x P_7) and 25.08 - 36.38 (P_6 x P_7) - (P_2 x P_7) for the above-mentioned traits, respectively. The F_1 mean performance values were surpassed significantly over the parental mean values for all the studied traits, except number of days to 50% blooming, where they were not differ significantly. Apparently, the different means among the seven parents and their F_1 seemed to be valuable in improving the studied traits in bread wheat breeding programs.

Table 3. Mean performance values of the 7 parents and their 21 F_1 crosses for all the studied traits.

Traits	Number of days to 50% blooming (day)	Plant height (cm)	Number of spikes/plant	Length of spike (cm)	Number of grains/plant	1000-grain weight (g)	Grain yield/plant (g)
P_1	82.44	102.91	14.44	13.24	75.83	45.38	28.81
P_2	84.54	95.41	11.84	14.04	80.54	47.54	28.18
P_3	84.71	91.74	14.41	13.18	81.75	45.01	27.65
P_4	83.01	95.88	12.44	14.78	77.58	47.54	28.24
P_5	81.41	104.81	12.58	14.08	67.54	52.68	29.58
P_6	82.6	106.31	11.11	13.91	84.68	43.21	26.94
P_7	84.88	99.31	13.84	14.04	84.68	50.31	25.08
Mean	83.37	99.48	12.95	13.90	78.94	47.38	27.78
P_1xP_2	81.24	106.71	15.28	16.24	82.28	50.34	31.94
P_1xP_3	82.61	105.91	17.61	15.08	85.68	49.44	31.41
P_1xP_4	82.41	106.01	15.58	17.64	80.18	52.04	31.64
P_1xP_5	81.58	109.41	15.41	15.74	78.04	54.98	33.18
P_1xP_6	80.64	108.31	15.08	16.41	85.74	48.28	31.41
P_1xP_7	84.64	106.41	15.44	16.51	89.61	54.34	32.58
P_2xP_3	85.08	102.31	15.38	15.78	86.61	51.04	30.88
P_2xP_4	82.14	102.01	13.21	17.52	86.64	52.68	32.88
P_2xP_5	82.48	108.41	12.78	16.74	85.04	56.41	33.68
P_2xP_6	82.94	110.71	16.41	16.74	93.71	50.78	29.78
P_2xP_7	82.68	103.51	17.31	16.48	87.24	54.31	36.38
P_3xP_4	82.81	109.01	15.64	17.74	85.51	50.91	30.71
P_3xP_5	83.64	106.61	15.98	16.98	82.38	54.71	32.38
P_3xP_6	82.98	108.61	15.61	15.81	85.68	49.44	30.98
P_3xP_7	83.21	102.21	15.04	16.38	91.81	53.44	29.51
P_4xP_5	82.64	107.01	13.78	17.81	80.54	55.64	32.51
P_4xP_6	83.48	108.61	15.08	18.38	88.54	51.68	30.61
P_4xP_7	82.54	101.81	15.31	17.58	85.21	53.51	32.91
P_5xP_6	74.14	108.91	15.64	16.74	89.18	56.11	34.01
P_5xP_7	83.41	107.71	15.51	16.61	86.98	56.41	34.94
P_6xP_7	83.41	109.51	15.51	16.61	86.98	53.01	25.08
Mean	82.41	106.65	15.36	16.74	85.88	52.83	31.88
$LSD_{0.05}$	1.54	1.47	1.65	1.00	2.48	2.33	1.68
$LSD_{0.01}$	2.06	1.96	2.21	1.34	3.31	3.11	2.25

Heterosis:

Data in Table 4 showed that there were significant values for the heterosis over mid and better parent for all the studied traits, indicating that heterosis played an important role in the inheritance of these traits. For number of days to 50% blooming only cross P_5 X P_6 possessed significant negative desirable standard heterotic effect over both mid parent and better parent.

Doi: 10.21608/ajas.2021.104780.1061
Haridy, et al., 2021 http://ajas.journals.ekb.eg/

Table 4. Heterosis as percentage of mid-parents (M.P) and better parent (B.P) in the F_1 crosses for all the studied traits.

Traits.	Number of days to 50% blooming		Plant height		Number of spikes/plant		Length of spike		Number of grains/plant		1000-grain weight		Grain yield/plant	
	M.P	B.P	M.P	B.P	M.P	B.P	M.P	B.P	M.P	B.P	M.P	B.P	M.P	B.P
P1 X P2	-2.55^{**}	-0.21	7.27^{**}	0.38	17.99^{**}	5.82^{**}	16.83^{**}	9.88^{**}	4.23^{**}	-2.83^{*}	6.25^{**}	-4.44^{**}	14.97^{**}	7.98^{**}
P1 X P3	-0.91	1.47	6.46^{**}	-0.38	35.98^{**}	21.95^{**}	8.49^{**}	2.03^{**}	8.54^{**}	1.18	4.35^{**}	-6.15^{**}	13.07^{**}	6.19^{**}
P1 X P4	-1.15	1.23	6.56^{**}	-0.28	20.31^{**}	7.89^{***}	26.91^{**}	19.35^{**}	1.57	-5.31^{**}	9.84^{**}	-1.21	13.89^{**}	6.96^{**}
P1 X P5	-2.15^{**}	0.21	9.98^{**}	2.92^{**}	19.00^{**}	6.72^{**}	13.24^{**}	6.50^{**}	-1.14	-7.84^{**}	16.04^{**}	4.37^{**}	19.44^{**}	12.17^{**}
P1 X P6	-3.27^{**}	-0.95	8.88^{**}	1.88^{*}	16.45^{**}	4.43^{**}	18.06^{**}	11.03^{**}	8.61^{**}	1.25	1.90	-8.35^{**}	13.07^{**}	6.19^{**}
P1 X P7	1.52	3.97^{**}	6.97^{**}	0.09	19.23^{**}	6.93^{**}	18.78^{**}	11.71^{**}	13.52^{**}	5.82^{**}	14.69^{**}	3.15^{**}	17.28^{**}	10.14^{**}
P2 X P3	2.05^{*}	4.51^{**}	2.84^{**}	-3.76^{**}	18.76^{**}	6.51^{**}	13.53^{**}	6.77^{**}	9.72^{**}	2.28	7.72^{**}	-3.11^{**}	11.16^{**}	4.39^{**}
P2 X P4	-1.48	0.90	2.54^{**}	-4.04^{**}	2.01^{*}	-8.52^{**}	26.04^{**}	18.54^{**}	9.75^{**}	2.31	11.19^{**}	0.00	18.36^{**}	11.16^{**}
P2 X P5	-1.07	1.31	8.98^{**}	1.98^{**}	-1.31	-11.50^{**}	20.43^{**}	13.26^{**}	7.73^{**}	0.43	19.06^{**}	7.08^{**}	21.24^{**}	13.86^{**}
P2 X P6	-0.52	1.88^{*}	11.29^{**}	4.14^{**}	26.72^{**}	13.64^{**}	20.43^{**}	13.26^{**}	18.71^{**}	10.66^{**}	7.18^{**}	-3.61^{**}	7.20^{**}	0.68
P2 X P7	-0.83	1.56^{*}	4.05^{**}	-2.63^{**}	33.67^{**}	19.88^{**}	18.56^{**}	11.50^{**}	10.51^{**}	3.02^{*}	14.63^{**}	3.09^{**}	30.96^{**}	22.99^{**}
P3 X P4	-0.67	1.72^{*}	9.58^{**}	2.54^{**}	20.77^{**}	8.31^{**}	27.63^{**}	20.03^{**}	8.32^{**}	0.98	7.45^{**}	-3.36^{**}	10.55^{**}	3.82^{**}
P3 X P5	0.32	2.74^{**}	7.17^{**}	0.28	23.40^{**}	10.66^{**}	22.16^{**}	14.88^{**}	4.36^{**}	-2.72^{*}	15.47^{**}	3.85^{**}	16.56^{**}	9.47^{**}
P3 X P6	-0.47	1.93^{*}	9.18^{**}	2.16^{**}	20.54^{**}	8.10^{**}	13.74^{**}	6.97^{**}	8.54^{**}	1.18	4.35^{**}	-6.15^{**}	11.52^{**}	4.73^{**}
P3 x P7	-0.19	2.21^{**}	2.74^{**}	-3.86^{**}	16.14^{**}	4.16^{**}	17.84^{**}	10.83^{**}	16.30^{**}	8.42^{**}	12.79^{**}	1.44	6.23^{**}	-0.24
P4 X P5	-0.88	1.51	7.57^{**}	0.66	6.41^{**}	-4.57^{**}	28.13^{**}	20.50^{**}	2.03	-4.89^{**}	17.43^{**}	5.62^{**}	17.03^{**}	9.91^{**}
P4 X P6	0.13	2.54^{**}	9.18^{**}	2.16^{**}	16.45^{**}	4.43^{**}	32.23^{**}	24.36^{**}	12.16^{**}	4.56^{**}	9.08^{**}	-1.90	10.19^{**}	3.48^{**}
P4 X P7	-1.00	1.39	2.34^{**}	-4.23^{**}	18.22^{**}	6.02^{**}	26.47^{**}	18.94^{**}	7.94^{**}	0.63	12.94^{**}	1.58	18.47^{**}	11.26^{**}
P5 X P6	-11.07^{**}	-8.93^{**}	9.48^{**}	2.45^{**}	20.77^{**}	8.31^{**}	20.43^{**}	13.26^{**}	12.97^{**}	5.31^{**}	18.43^{**}	6.51^{**}	22.43^{**}	14.98^{**}
P5 X P7	0.05	2.46^{**}	8.27^{**}	1.32	19.77^{**}	7.41^{**}	19.50^{**}	12.38^{**}	10.18^{**}	2.72^{*}	19.06^{**}	7.08^{**}	25.77^{**}	18.12^{**}
P6 X P7	0.05	2.46^{**}	10.08^{**}	3.01^{**}	19.77^{**}	7.41^{**}	19.50^{**}	12.38^{**}	10.18^{**}	2.72^{*}	11.88^{**}	0.63	-9.72^{**}	-15.21^{**}

* and ** indicate to significant at 0.05 and 0.01 levels of probability, respectively.

For plant height, number of grains/plant and 1000-grain weight; nine, eight and eight crosses out of the twenty one possessed desirable significant positive heterotic effects over both mid parent and better parent, respectively. For number of spikes/plant, length of spike/plant and grain yield/plant all crosses possessed desirable significant positive heterotic effects over both mid parent and better parent, except the three crosses; P_2 x P_4, P_2 x P_5 and P_4 x P_5 for number of spikes/plant and the two crosses; P_3 x P_7 and P_6 x P_7 for grain yield/plant. These results are supported with the findings of Ashoush *et al.* (2001), Jahanzeb and Ihsan (2004), El-Sayed and Moshref (2005), Abdel-Moneam (2009), Peng *et al.* (2009), Kundan *et al.* (2010), Ahmad (2010) and Zaazaa *et al.* (2012).

Assiut J. Agric. Sci., 52 (4) 2021 (1-11) *ISSN: 1110-0486*
Website:www.aun.edu.eg/faculty_agriculture/journals_issues_form.php *E-mail: ajas@aun.edu.eg*

A- General combining ability:

Data in table 5 revealed that P_1, P_2 and P_3 recorded significant desirable GCA effects for plant height. P_4 had significant positive desirable GCA effects for both plant height and increasing length of spike/plant. P_5 possessed significant desirable GCA effects for number of days to 50% blooming, 1000-grain weight and grain yield/plant. P_6 possessed significant desirable GCA effects for number of days to 50% blooming, plant heightens and number of grains/plant. P_7 possessed significant desirable GCA effects for plant shortness, number of grains/plant and 1000-grain weight.

Table 5. General combining ability effects of the seven wheat varieties for all the studied traits.

Traits	Number of days to 50% blooming	Plant height	Number of spikes/plant	Length of spike	Number of grains/plant	1000-grain weight	Grain yield/plant
P_1	-0.12	0.78**	0.19	-0.15	-0.74*	-0.43	0.11
P_2	0.16	1.06**	-0.15	-0.03	0.35	-0.04	0.19
P_3	0.32*	1.21**	0.22	-0.15	0.30	-0.47*	-0.21
P_4	0.03	0.93**	-0.17	0.30*	-0.42	-0.01	0.03
P_5	-0.39**	0.51	-0.14	0.02	-1.33**	1.03**	0.48*
P_6	-0.31**	0.59*	-0.09	0.01	0.96**	-0.59*	-0.41*
P_7	0.31*	-5.08**	0.14	0.001	0.89**	0.51*	-0.19
LSE 0.05	0.29	0.55	0.31	0.19	0.46	0.44	0.31
LSE 0.01	0.48	0.74	0.52	0.32	0.77	0.69	0.52

* and ** indicate to significant at 0.05 and 0.01 levels of probability, respectively.

B-Specific combining ability:

Data in Table 6 illustrated that the cross P_5 x P_6 only possessed significant negative desirable SCA effects for number of days to 50% blooming. The six crosses; P_1 x P_7 , P_2 x P_7 , P_3 x P_7 , P_4 x P_7, P_5 x P_7 and P_6 x P_7 possessed significant positive desirable SCA effects for plant heightens, on the other hand only the cross P_5 x P_6 possessed significant negative desirable SCA effects for plant shortness. None of the crosses possessed significant desirable SCA effects for number of spikes/plant, length of spike and 1000-grain weight. The five crosses; P_1 x P_7 , P_2 x P_6 , P_3 x P_7, P_5 x P_6 and P_5 x P_7 possessed significant positive desirable SCA effects for number of grains/plant. The three crosses; P_2 x P_7, P_5 x P_6 and P_5 x P_7 possessed significant positive desirable SCA effects for high yielding ability and among them the cross $P_5 \times P_6$, also possessed significant desirable SCA effects for number of days to 50% blooming, therefore this cross could be considered as good combination for high yielding ability with earliness.

Table 6. Specific combining ability effects of the 21 F_1 bread wheat crosses for all the studied traits.

Crosses	Number of days to 50% blooming	Plant height	Number of spikes/plant	Length of spike	Number of grains/plant	1000-grain weight	Grain yield/plant
P_1XP_2	-0.52	-1.30	0.53	0.25	-0.23	0.09	0.06
P_1XP_3	-0.21	-1.00	0.25	-0.01	0.96	0.22	0.29
P_1XP_4	0.01	-0.78	0.17	0.39	-0.16	0.63	0.12
P_1XP_5	0.15	-0.63	0.01	0.04	0.04	0.57	0.18
P_1XP_6	-0.24	-1.03	-0.10	0.27	0.31	-0.04	0.49
P_1XP_7	0.47	5.97**	0.13	0.31	1.67*	0.87	0.66
P_2XP_3	0.33	-0.46	-0.20	0.09	0.18	0.37	0.03
P_2XP_4	-0.36	-1.15	-0.37	0.22	0.90	0.45	0.45
P_2XP_5	0.17	-0.62	0.79	0.24	1.28	0.66	0.27
P_2XP_6	0.24	-0.54	0.86	0.25	1.88*	0.41	-0.14
P_2XP_7	-0.47	5.03**	0.24	0.17	-0.21	0.47	1.85**
P_3XP_4	-0.29	-1.08	0.33	0.43	0.58	0.29	0.13
P_3XP_5	0.40	-0.38	0.15	0.45	0.45	0.52	0.24
P_3XP_6	0.11	-0.68	-0.27	0.07	-0.75	0.39	0.66
P_3xP_7	-0.44	5.06**	-0.02	0.27	1.37*	0.62	-0.04
P_4XP_5	0.35	-0.43	0.37	0.28	0.55	0.37	0.04
P_4XP_6	0.56	-0.23	0.22	0.48	0.92	0.67	0.30
P_4XP_7	-0.38	5.12**	0.53	0.22	-0.11	0.17	0.85
P_5XP_6	-2.14**	-2.92**	0.25	0.21	2.05**	1.11	0.98*
P_5XP_7	0.33	5.83**	0.21	0.17	1.39*	0.10	1.07*
P_6XP_7	0.25	5.75**	-4.08**	0.18	-0.91	0.59	-1.32*
$LSE_{0.05}$	0.84	1.61	0.90	0.55	1.35	1.27	0.92
$LSE_{0.01}$	1.39	2.16	1.34	0.93	2.15	2.05	1.47

* and ** indicate to significant at 0.05 and 0.01 levels of probability, respectively.

Correlation:

The correlation values between each pairs of studied traits were shown in Table 7. The obtained results manifested that significant positive correlation was detected between grain yield/plant and both of plant height, number of spikes/plant, length of spike and number of grains/plant, while it gave negative correlation with number of days to 50% blooming and 1000-kernel weight. These obtained results are in the same line with those obtained by El-Sayed and Mostafa (2005), Khaled and Abd El-dayem (2014) and Samier and Ismail (2015).

Table 7. Correlation among studied characters for genotype.

Traits	Plant height	Number of days to 50% blooming	Number of spikes/plant	Length of spike	Number of grains/plant	1000-grain weight	Grain yield/plant
Plant height	-	-0.58**	0.25	0.59**	-0.46*	0. 50*	0.50*
Number of days to 50% blooming		-	-0.47*	-0.44*	-0.47*	-0.56**	-0.53**
Number of spikes/plant			-	0.41*	0.53**	-0.51**	0.66**
Length of spike				-	0.42*	0.47*	0.57**
Number of grains/plant					-	-0.47*	0.59**
1000-grain weight						-	-0.58**
Grain yield/plant							-

* and ** indicate to significant at 0.05 and 0.01 levels of probability, respectively.

Reference

Abdel-Moneam, M.A.(2009). Heterosis in some crosses of bread wheat under irrigation and drought conditions. Pakistan J. of Bio. Sci., 12: 486-491.

Afiah, S.A.N., N.A. Mohamed and M.M. Salem (2000). Statistical genetic parameters, heritability and graphical analysis in 8 x 8 wheat diallel crosses under saline conditions. Ann. of Agric. Sci. Cairo, 45(1): 257-280.

Ahmad, M.S.H. (2010). Combining ability and heterosis estimates for agronomic traits in bread wheat using half diallel analysis. J. Plant Prod., Mansoura Univ. 1 (11): 1441-1450.

Ashoush, H.A., A.A. Hamada and I.H. Darwish (2001). Heterosis and combining ability in F_1 and F_2 diallel crosses of wheat (*Triticum aestivum* L. em. Thell). Mansoura J. Agric. Res. 26(5): 2579-2592.

El-Beially, E. M. A. and El-Sayed, E. A. M. (2002). Heterosis and combining ability for some bread wheat crosses. J. of Plant Pro., 27: 5735–5744.

El-Borhamy, H.S.A. (2004). Genetic analysis of some drought and yield related characters in spring wheat varieties (*Triticum aestivum* L. em. Thell). J. Agric. Sci. Mansoura Univ., 29(7): 3719-3729.

El-Sayed, E.M.A. and M.K. Moshref (2005). Breeding for yield, yield components and some agronomic characters in bread wheat. Egypt. J. Agric. Res., 83 (2): 665-63.

Farooq, J., I. Khaliq, A.S. Khan and M.A. Pervez (2010). Studying the genetic mechanism of some yield contributing traits in wheat *(Triticum aestivu*m). Int. J. of Agric. & Biol. 12(2): 1560–8530.

Fonseca, S. and F.L. Patterson (1968). Hybrid vigor in seven parental diallel cross in common wheat *(Ttiticum aestivum, L.)*. Crop. Sci., 8: 85-88.

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

Hallauer, A.R. and J.B. Miranda (1988). Quantitative genetics in maize breeding. 2nd ed. Iowa State Univ. Press. IA.

Jahanzeb, F. and K. Ihsan (2004). Estimation of heterosis and heterobeltiosis of some quantitative characters in bread wheat crosses. Asian, J. of Plant Sci. 3(4): 508-511.

Khaled, M.A. and S. M. Abd El-dayem (2014). Combining ability analysis for grain yield and its attributes in bread wheat under stress and normal irrigation conditions. J. of Plant Prod., 5 (2): 255-266.

Kundan, K., J.P. Pandey, S. Marker and P.J. Anurag (2010). Heterosis studies for improvement in yield potential of wheat (*Triticum aestivum* L.). Gene. Eng. and Bio. Div., 9(10): 6394-6403.

Peng, Z, P.H. Ru, N.Z. Fu, L.L. Hu, W. Jun and S.Q. Xin (2009). Heterosis and combining ability of major agronomic traits in crosses between ear-branched wheat and common wheat. J. of Triticeae Crops. 29: 212-216.

Rahul, S.R. and V.S. Kandalkar (2018). Combining ability and heterosis for grain yield and its attributing traits in bread wheat (*Triticum aestivum* L.), J. of Pharma. and Phyto., 7 (2): 113–119.

Samier, K. and A. Ismail (2015). Heterosis and combining ability analysis for yield and its components in bread wheat (*Triticum aestivum* L.). Int. J. of Cur. Micro. and Appl. Sci., 4 (8): 1–9.

Snedecor, G.W. and W.G. Cochran (1967). Statistical Methods. 6th Ed., Iowa State Univ., Press, Ames, U.S.A.

Sprague, G.F. and L.A. Tatum. (1942). General versus specific combining ability in single crosses of corn. J. Amer. Soc. Agron., 34: 923-932.

Zaazaa, E.I., M.A. Hager and E.F. El-Hashash (2012). Genetical analysis of some quantitative traits in wheat using six parameters genetic model. American-Eurasian J. Agric. & Environ. Sci., 12 (4): 456-462.

Assiut J. Agric. Sci., 52 (4) 2021 (1-11) *ISSN: 1110-0486*
Website:www.aun.edu.eg/faculty_agriculture/journals_issues_form.php *E-mail: ajas@aun.edu.eg*

تقدير القدرة على التالف والارتباط لبعض التراكيب الوراثية من قمح الخبز

مختار حسن هريدي، ابراهيم نجاح عبد الظاهر، أحمد يوسف مهدي
قسم المحاصيل ، كلية الزراعة ، جامعة الأزهر باسيوط

الملخص

أجريت هذه الدراسة بالمزرعة التجريبية بقسم المحاصيل بكلية الزراعة جامعة الأزهر (فرع أسيوط) خلال موسمي ٢٠١٦/٢٠١٧ و ٢٠١٧/٢٠١٨. تم أختيار سبعة آباء من قمح الخبز لهذه الدراسة وهي سدس١ وسدس ١٢ وسدس ١٣ ومصر ١ وجيزة ١٧١ وجميزة ١١ وسخا ٩٣. في موسم ٢٠١٦/٢٠١٧ تم إجراء التهجين بين الـ ٧ اباء بكل الطرق الممكنة بدون إجراء الهجن العكسية لإنتاج حبوب الـ ٢١ هجين فردى. في موسم ٢٠١٧/٢٠١٨ ، تم تحليل البيانات وراثيا لمحصول الحبوب/نبات وبعض الصفات ذات الصلة للاباء والهجن تبعا للطريقة الثانية، الموديل الأول. أظهر تحليل التباين وجود اختلافات عالية المعنوية بين التراكيب الوراثية والآباء والهجن والآباء مقابل الهجن (تأثير قوة الهجين). كان التباين الراجع إلى القدرة العامة والخاصة على التآلف عالي المعنوية لجميع الصفات المدروسة، مما يشير إلى أهمية كلا من فعل الجين المضيف وغير المضيف في وراثتها. كانت نسبة تباين القدرة العامة على التآلف إلى تباين القدرة الخاصة على التآلف أقل من واحد لجميع الصفات المدروسة، مما يشير إلى أن الفعل الجيني غير المضيف لعب الدور الأهم في توريثها. كان هناك ارتباط موجب ومعنوى بين محصول حبوب النبات وكلا من طول النبات وعدد السنابل/نبات وطول السنبلة وعدد حبوب السنبله بينما كان سالبا مع عدد الايام حتى طرد ٥٠% من السنابل ووزن الالف حبة.