Minufiya J. Agric. Res. Vol.36 No. 3:575-587 (2011) "http://www.mujar.net"

التباين الوراثى فى قمح الخبز باستخدام تحليل سلالة × كشاف

صبرى احمد سليم

البرنامج القومى لبحوث القمح – معهد بحوث المحاصيل الحقلية – مركز البحوث الزراعية – مصر

الملخص العربى :

اجريت هذه الدراسة خلال موسمى ٢٠٠٨/٢٠٠٧ و ٢٠٠٩/٢٠٠٨ بمحطة بحوث الجميزة – محافظة الغربية لتقييم ١٦ سلالة من قمح الخبز تم تهجينها مع ٣ اصناف محلية " كشافات " لانتاج ٤٨ هجين باستخدام تحليل سلالة × كشاف باستخدام طريقة التحليل الـ Kempthron 1957 .

وذلك بهدف دراسة القدرة العامة والخاصة على الائتلاف لهذه التراكيب الوراثية وكانت الصفات تحت الدراسة كما يلى :-

١- عدد الأيام للتزهير " يوم " ٢- ارتفاع النبات " سم "

٣- عدد السنابل على النبات ٤- وزن حبوب السنبلة

٥- عدد السنبلات على السنبلة ٦- عدد الحبوب بالسنبلة

٧- وزن حبوب السنبلة ٨- وزن ١٠٠٠ حبة

٩- محصول النبات الفردى

وكانت النتائج المتحصل عليها كما يلى :-

١- أظهرت نتائج تحليل التباين المتحصل عليها معنوية عالية لكل الصفات تحت الدراسة لكل من التراكيب الوراثية والآباء مع الهجين والسلالات والكشاف والسلالات مع الكشاف .

٢- أظهرت النتائج ان الفعل الجينى غير المضيف كان الأكبر والأكثر أهمية فى توارث معظم الصفات

٣- أظهرت النتائج ان السلالة رقم ٣،٤ ، ١٦ كانت ذات قدرة تآلفية عالية لصفة المحصول ومكوناته ويمكن الاستفادة منها فى برامج التربية لرفع إنتاجية القمح وذلك باستخدامها كمواد وراثية .

GENETIC VARIANCE OF SOME BREAD WHEAT CROSSES USING LINE X TESTER ANALYSIS

S.A. Seleem
Wheat Research Department , Field Crop Research Institute A.R.E. Egypt
(Received: Mar. 14, 2011)

ABSTRACT : ***The present study was carried out during 2007\2008 and 2008\2009 growing seasons at Gemmeiza Research Station Gharbia Government ,Egypt. A line x tester mating design, including 16 lines and three testers were carried out to study the grain yield and related yield components ,performance ,variability and genetic parameters of 48 F1 hybrids derived from 19 varieties having diverse morphological and agronomical traits. The studied traits were: days to heading , plant height , number of tillers per plant , number of kernels per spike , number of spikelets per spike , spike length , 1000-grain weight and grain yield per plant. The analysis of data obtained here revealed that : the difference among genotypes , parent and crosses was highly significant for all traits studied. Both general and specific combining ability variance were found to be significant for most traits . The additive genetic variance was more important for most traits , except no. of spikletes per spike , grains weight , 1000-grain weight and grain yield per plant. High positive values of general combining ability effects would be of interest in most traits . While heading date and plant height have a high negative values for (GCA) effects. The lines L3,L4 ,L11 andL16 were found to be a good combiners for grain yield . The best hybrid combination for early was cross number 44 ,42 and cross number 5. The best hybrid combination for plant height was cross number 7,8,3,47 were the excellent hybrids combination for shorter plant height and the hybrids number 4,43,47,26 and 29 were the best for SCA and the crosses numbers 4 , 26 , 47 , 29 , 3 and 16 showed highly significant for grain yield and its components***

Key words: ***Additive , Dominance , combining ability , ,Line X tester analysis.***

INTRODUCTION

Wheat (*triticum aestivum L.*)is the world's most widly adapted crop, supplying one-third of the world population with more than half of their calories and nearly half of their protein . It is cheapest source of energy and supplied 72% of calories and protein in the average diet and related products (Heyne,1987) .

Demand of wheat is also increasing with increasing population . Thus efficient management of the available resources including breeder;s efforts

to breed varieties of wheat with high production even in water stress condition is required

Increasing wheat production could be achieved through maximizing the production per unit area \or invading deserts to expand the cultivated area . The vertical expansion would be reached via developig high yielding genotypes and simultaneously implementing proper cultural practices. The other way for narrowing the gap between our production and consumption is, growing wheat in the new reclaimed areas as indicated by Shehab El-Din (1993).

Wheat is predominantly self pollinated crop and because of autogamous reproductive behavior , wheat population after hybridization rapidly attains state of homozygosity . There is a direction need to develop genotypes having better yield potential per unit area. This could be achieved by exploring maximum genetic potential from available germ plasm of wheat.

Yield has prime importance in any breeding program ultimate goal of breeder is to increase yield. But it is a much complicated traits.

Combining ability analysis is recognized as a primary measure of additive and non additive gene action. General and specific combining ability studied by Seleem (2001), Esmail (2002) Darwish (2003) and seleem (2006) they are reported that GCA and SCA variances were highly significant for grain yield and most of its components. .

Habib and Khan (2003), Mahmood *et al* (2003) and Riaz and Showdhry (2003) describe additive type gene action with partial dominance controlling this trait.

Hybridization between Egyptian wheat cultivars and exotic materials is one of the important source to increase genetic variability to choose the suitable genotypes posses high yielding capacity. There for, the present investigation aims to study the estimates of both general and specific combining ability choosing the desired parental for new breeding programs

MATERIALS AND METHODS

This study was carried out in te tow successive growing seass 2007 / 2008 amd2008/2009 at EL-Gemmeiza Agricultural Research Station to study some breeding parameters by using line x tester analysis in breed wheat genotypes . The name and pedigree of the genotypes which used in this study are presented in Table (1). In 2007/2008 season ,16 bread wheat lines (L) were crossed with three commercial wheat cultivars as testers (T)to produce 48 crosses . In 2008/2009 season, the 48 and their 19 parental genotypes (16 lines and 3 testers) were grown in a randomized complete block design with three replications. Each plot included three rows,3 meter long and 30 cm. between rows. Plant were spaced at 10 cm within rows.

Table (1): The names and pedigree of 19 bread wheat cultivars and lines .

Genotypes	Pedigree
T_1	Gemmeiza 7
T_2	Gemmeiza 11
T_3	SAKHA 93
P_1	Shandaweel 1
P_2	Gemmeiza 9
P_3	CMSS95 MOO672S-01-00M-050Y-050M-11AL-3AL-01PY-1M-04-1PZ-0Y 1M-04-1PZ-14
P_4	SIDS 12
P_5	CMH83.2517 / ELVIRA/6/CMH79A955/4/AGA/3/4*SN64/67//INIA66 /5/NAC
P_6	CMH79A.955/CM1174A.487//CMH81.A74/3/STAR//KAUZ/STAR/6/ CMH79 A955/4/AGA/3/4*SN64/CN067 // INIA66/5/NAC.
P_7	MAYA"S" MON"S" // CMH74A.592/3/SADHA8*2/4/SAKHA61
P_8	CMH79A955/4/AGA/3/4*SN64/CN067//INIA66/5/NAC/6/CMH81.74 9/7/BABAXLR42//BABAX
P_9	CMH79.955/4/AGA/3/4*SN64/CN067INIA66/5/NAC/6/CMH81.749/7 / BAXLR42//BABAX
P_{10}	QIMMA- 12
P_{11}	GEMLine27/PL//CMH79A.955*2/CN079//CMH79A955/BOW"S"//si ds6.
P_{12}	SAKHA69/seri82//SARHAD/3/PLO/TR810328/4/GIZA168
P_{13}	KAUZ//ALTAR84/AOS/3/PASTOR CMSS97Y006565-040Y-050M-020Y-030M-16Y-IM-0Y-0SA
P_{14}	MINO CMSS94Y02299T–030Y-0300M-0100M-4Y-8M-0Y-2PZ-0Y-
P_{15}	CROC-1/AE-SQUARROSA(224)//OPATA/3/PASTOR CMSS97MOO6525-OB-OAP-IAP-OAPS-OAP-6AP-OAP
P_{16}	ISD-75-3-1/MO88//PRL/VEE 6/4/GHURRA"S"/3/AHGAF//MXC /TOB ICW98-0236-9AP-OAPS-030AP-8AP-6AP-OAP

The recommended agriculture practices were applied as usual for the wheat fields in the area. The data were recorded on an individual plant basis for heading date (number of days from sowing to the first appearance of awns). Ten guarded plants were selected at random for subsequent measurements as follows : plant height ,number of spikes\plant, number of spiklets\spike, spike length (cm), number of grains\spike , grains weight\spike (g) , 1000-grain weight and grain yield\plant(g).

Estimates of both general and specific combining ability were calculated according to the procedures of Kempthorne (1957), Singh and Chaudhary (1985).

RESULTS AND DISCSSION

Analysis of variance:

The mean performance of lines , testers and crosses for all traits studied are presented in Table (2). The analysis of variance for all traits studied are presented in Table (3) revealed that the mean square of F1's were highly significant for all the characters , suggested significant genetic differences in the generated material. Significant differences were also observed among the testers for days to heading , plant height , number of spikes \ plant , spike length , number of spikelets\spike , number of grains\spike , 1000-grain weight and grain yield \ plant among the lines. Significant differences were observed for line x testers for all characters . Also, the results in Table (3) showed that mean squares of parents vs. crosses were highly significant for all traits studied except grains weight\spike illustrating the wide rang of heterosis values among the hybrids for all most traits studied .The contribution of lines x testers interaction was highly significant for all traits studied. Results in Table (3) revealed that GCA\SCA ratio exceeded the unity for all traits except for number of spikelets\spike , grains weight \ spike ,1000-grain weight and grain yield \ plant indicating that GCA variance was more important than (SCA) variance and that additive variance was the predominant variance component controlling the inheritance of most traits . Also , the traits controlled by non additive gene action indicates the scope of improvement of these traits thought heterosis breeding for evolving yielding superior genotyps and selection procedures based on the accumulation of additive gene effect would be successful in improving most traits studied . Similar results were reported by Singh *et al.* (1982), Yadav *et al.* (1988) ,Singh *et al.* (1990) , AL-Kaddoussi *et al.* (1994), El-Adle *et al.* (1996) ,Hamada *et al.* (2002) Seleem *et al.* (2006) Moussa *et al.* (2009), ZaHid *et al*. (2011) and Farhad *et al.* (2011)

Mean performance for 48 crosses ,16 lines and three testers are given in Table (2) . The results revealed that the parental lines number 11,14,5 , tester number 1 and the cross number 42,41,48,25 were found to be the earliest genotype . The parental lines 7,4,11,13,14, ,tester number 2 and crosses number 7,8,23,27,43 were found to be the shortest genotypes.

Table 2

Table (3): Mean performances for 67 bread wheat genotypes evaluated for all traits studied in 2008\2009.

Entries	Heading date (days)	Plant height (cm)	No. of spikes \plant	Spike length (cm)	No. of spikelets \ spike	No of grains \spike	Graing weight \spike (gm)	1000-garin weight (gm)	Grain yield \plant (gm)
Line 1	92.50	111.23	12.80	12.72	24.21	68.73	3.86	50.17	42.77
2	91.83	111.89	13.37	12.47	23.41	80.30	3.88	41.10	31.32
3	92.33	113.93	13.27	10.33	22.00	56.73	2.58	42.93	30.98
4	91.33	99.27	11.33	10.57	20.97	57.98	3.19	50.00	29.60
5	86.94	111.80	10.17	11.10	21.33	69.28	3.62	41.10	19.99
6	86.43	114.87	11.93	13.20	25.00	72.75	3.66	43.97	32.72
7	87.93	89.30	12.17	9.00	18 .57	49.63	2.75	41.43	20.17
8	88.43	114.10	12.21	13.00	24.23	60.08	3.55	56.63	19.06
9	88.07	114.66	13.00	12.62	23.65	61.22	3.88	57.27	41.08
10	87.83	113.70	14.38	11.20	21.23	42.80	2.60	52.03	34.34
11	85.00	102.89	9.90	11.33	22.30	51.60	2.53	43.77	25.15
12	91.17	110.93	13.37	8.94	22.86	62.10	3.67	53.80	42.10
13	87.27	108.03	13.71	10.17	21.09	86.38	3.79	42.87	27.42
14	85.70	108.67	13.37	9.90	19.67	59.63	3.11	38.12	42.15
15	91.98	113.60	14.29	10.40	20.78	66.91	4.01	51.77	36.71
16	87.43	114.60	15.38	12.20	22.73	68.10	3.40	52.28	46.88
Line mean	*88.89*	*109.59*	*12.54*	*11.20*	*22.13*	*63.39*	*3.38*	*47.45*	*32.65*
Testers 1	81.00	114.70	12.90	13.03	24.23	69.13	3.76	48.70	42.60
2	83.40	108.67	10.80	12.37	22.76	61.35	3.19	48.47	18.45
3	89.29	113.80	11.25	9.77	19.57	83.93	3.68	41.00	23.15
Tester mean	*84.56*	*112.39*	*11.65*	*11.72*	*22.19*	*71.47*	*3.54*	*46.06*	*28.07*
Crosse 1	88.50	111.63	13.22	15.77	25.43	68.17	3.65	53.43	54.43
2	94.07	112.89	11.76	14.16	23.00	57.78	2.83	51.47	34.51
3	91.90	113.00	11.29	12.57	24.18	72.21	3.99	66.80	67.51
4	85.50	109.75	18.40	16.13	24.80	97.54	5.03	68.07	81.20
5	87.83	117.86	11.09	15.50	24.97	72.80	3.34	56.33	51.15
6	90.17	116.88	13.17	14.97	25.32	72.87	3.59	57.37	41.20
7	91.83	102.23	10.59	13.45	23.13	64.83	2.72	44.90	33.40
8	87.61	102.70	10.38	8.73	24.37	72.01	4.46	67.00	44.05
9	88.83	121.87	12.97	14.61	24.81	56.79	3.42	63.37	42.51
10	93.83	113.27	10.24	14.35	24.79	43.33	2.29	51.70	31.36
11	94.67	112.42	10.74	14.71	24.77	52.34	2.50	50.57	37.06
12	92.22	117.99	12.30	16.10	25.20	62.40	3.33	56.47	31.64
13	94.40	117.08	12.49	12.75	23.17	50.40	2.38	54.30	35.76
14	91.67	120.31	18.26	13.55	22.39	58.93	3.03	47.93	47.98
15	104.67	122.50	11.33	15.97	27.03	40.69	2.76	60.57	34.81
16	92.00	123.60	23.69	15.62	26.00	83.18	3.62	52.87	67.90
17	87.13	111.62	14.39	13.64	24.10	65.21	3.61	49.00	42.54
18	95.67	116.62	12.99	13.30	23.27	68.81	3.82	50.50	35.60
19	94.33	119.10	14.54	12.80	22.06	47.79	3.70	57.87	40.38
20	90.57	110.01	18.45	14.01	24.32	58.87	3.22	41.03	45.44
21	96.22	112.55	12.09	14.03	25.26	81.90	4.41	52.57	49.30
22	93.83	120.86	17.40	13.35	23.12	64.25	4.09	47.10	58.66
23	91.32	104.93	18.27	13.05	22.00	62.42	2.24	53.30	58.66
24	93.50	107.72	21.26	14.02	23.05	67.28	4.75	51.17	68.33
25	86.23	113.80	14.37	13.67	23.93	69.23	4.46	44.70	51.36
26	93.67	111.83	23.34	12.47	23.34	56.62	3.72	55.17	79.04
27	92.67	107.15	17.60	14.17	24.20	65.64	3.27	49.30	51.75

Table : Cont (3):

Entries	Heading date (days)	Plant height (cm)	No. of spikes \plant	Spike length (cm)	No. of spikelets\ spike	No of grains \spike	Graing weight \spike (gm)	1000-garin weight (gm)	Grain yield \plant (gm)
Crosse 28	92.67	110.86	18.67	12.83	23.15	59.46	3.71	51.43	56.64
29	94.38	108.69	23.23	12.67	21.77	63.67	4.54	51.13	68.96
30	88.17	113.48	20.02	12.02	22.52	64.41	3.28	47.33	56.88
31	94.26	116.19	20.27	12.52	21.63	52.38	3.00	50.63	49.29
32	92.57	115.53	19.17	12.03	22.77	70.32	3.74	47.83	49.56
33	87.39	107.90	11.40	15.47	25.90	72.80	4.37	52.37	40.68
34	89.67	111.31	14.02	14.66	24.39	63.42	2.57	46.73	36.93
35	87.00	114.35	16.13	12.07	23.77	71.98	3.35	57.63	56.77
36	88.83	112.00	12.23	15.27	23.67	60.61	2.78	48.00	35.03
37	88.23	110.50	13.67	13.00	24.76	60.70	3.70	56.53	45.00
38	86.05	117.42	13.52	13.76	23.12	61.99	3.39	55.97	40.33
39	88.50	115.77	13.77	15.30	24.83	71.50	3.85	50.77	46.98
40	88.89	108.31	13.31	14.42	24.32	62.37	2.39	42.70	36.73
41	84.18	112.38	10.44	15.68	24.04	61.50	4.07	61.77	34.84
42	81.60	117.90	12.39	15.50	23.43	56.10	3.08	66.83	36.67
43	90.50	107.63	18.43	15.88	25.10	54.15	3.62	52.30	65.58
44	78.66	109.93	15.50	15.86	22.70	59.53	3.62	54.33	45.33
45	87.90	111.46	12.53	16.30	24.63	66.45	3.78	49.13	32.88
46	87.90	111.13	17.73	12.30	22.03	55.73	2.70	43.03	32.60
47	87.98	113.07	16.42	13.80	22.14	60.83	3.36	51.37	63.17
48	85.93	117.34	16.14	14.69	22.60	46.63	2.89	56.90	48.66
Crosses mean	*90.34*	*113.24*	*15.12*	*14.03*	*23.86*	*63.14*	*3.46*	*53.12*	*47.84*

The lines 1,16,14,12,9 were found to be the highest grain yield per plant . Also, the tester 1 was the highest grain yield per plant and the cross number 4,26,29,24,16, were the highest grain yield for all crosses. The lines 1,14,16,, the tester 1,3 and the crosses 4,29,42,16 were found to exhibit the most pronounced grain yield per plant and most of its components.

General combining ability effects

Estimates of the general combining ability effects (GCA)for the three testers and 16 lines for the nine traits studied are presented in Table (4). High positive values of general combining ability effects would be of interest in most traits , while , for heading date and plant height ,high negative values would be useful from the plant breeder point of view ,L_3,L_4,L_{11} and L_{16} were found to be good combiners for grain yield , $L_{4,}$ L_{11},L_{14} and p_{16} was detected to be a good combiner for number of spikes \ plant ,L_1 ,L_4 , L_{12} to be a good combiners for spike length ,L_1 ,L_5 for number of spikelets\spike ,$L_{1,}$ L_4 , L_5 and L_6 for number of grains \spike , L_1 , L_5 and L_9 for grain weight\ spike ,L_3 , L_{10},L_9 and L_5 for 1000-grain weight . On the other hand , the tester number (T3) showed a good combiner for heading date and spike length while the tester number 2 (T2)was a good combiner for number of spike per plant ,

grain weight and grain yield per plant .Also, the tester number 1 (T1) was a good combiner for number of spikelets per spike and 1000-grain weight . These results revealed that five lines 1,3,4,8,16 and testers 2,3 proved to be a good combiners for grain yield and some of its components and considered as a good genetic resources to be used in breeding programs as a source of new combinations of traits and develop high yielding capacity wheat varieties.

Table (4): Estimates of general combining ability effects for 16 lines and three testers evaluated for all traits studied in 2008\2009.

Parents	Heading date (days)	Plant height (cm)	No. of spikes\ plant	Spike length (cm)	No. of spikelets\ spike	No of grains \spik	Graing weight \spike (gm)	1000-garin weight (gm)	Grain yield \plant (gm)
Lines p_1	-2.66**	-2.85**	-2.11**	0.93**	1.28**	5.58**	0.42**	-1.52**	-1.97**
P2	2.80**	0.37	-2.19**	0.008	-0.31**	0.19	-0.39**	-3.55**	-12.18**
P3	0.74**	2.25**	-1.13**	-1.55**	-0.53**	0.85**	0.22**	7.65**	7.03**
P4	-2.04	-2.65**	1.24**	1.10**	0.40**	9.20**	0.22**	-0.75**	6.04**
P5	0.43**	0.40	-2.83**	0.15	1.14**	8.66**	0.36**	2.03**	0.63*
P6	-0.32**	5.15**	-0.42**	-0.006	-0.003	3.23**	0.23**	0.36	-1.12**
P7	0.21	-5.59**	-0.91**	-0.09	0.54**	3.11**	-0.49**	-3.46**	-1.51**
P8	-0.34**	-6.99**	-0.14	-1.64**	0.005	4.08**	0.40**	0.51*	1.85**
P9	-3.92**	2.78**	-2.52**	0.62**	0.40**	-0.63*	0.52**	3.50**	-4.95
P10	-0.64**	1.10**	0.21	0.007	-0.0003	-11.13**	-0.43	4.78**	1.17**
P11	2.28**	-4.17**	0.48**	0.89**	0.83**	-5.77**	-0.33**	-2.39**	3.61**
P12	-2.49**	-0.31	0.38*	0.90**	-0.18**	-2.68**	0.09**	0.96**	-3.32**
P13	1.89**	-0.83**	0.97**	-0.13	-0.67**	-2.97**	0.11**	-1.59**	-1.99**
P14	-1.09**	1.74**	3.55**	-1.41**	-1.55**	-3.45**	-0.46**	-7.02**	-2.03**
P15	5.30**	4.01**	0.89**	0.6	-0.26**	-11.84**	-0.42**	1.07**	1.23**
P16	-0.17	5.59**	4.55**	0.01	-0.01	3.57**	-0.04**	-0.58**	7.52**
T1	1.52**	1.51**	-1.87**	0.28	0.72**	1.00	-0.15**	3.33**	-1.83**
T2	1.99**	-0.68	2.76**	-0.87**	-0.70**	0.50	0.27**	-3.11**	6.04**
T3	-3.51**	-0.84	-0.89*	0.59*	-0.002	-1.50*	-0.12**	-0.22	-4.22**
LSD For Gca lines 0.05	0.24	0.46	0.32	0.24	0.01	0.53	0.01	0.40	0.61
LSD For Gca lines 0.01	0.31	0.61	0.42	0.32	0.01	0.70	0.01	0.53	0.80
LSD For Gca testers 0.05	0.55	1.07	0.74	0.56	0.21	1.23	0.01	0.93	1.40
LSDFor Gca testers 0.01	0.72	1.41	0.97	0.75	0.28	1.63	0.02	1.23	1.85

***and** significant at 0.05 and 0.01 levels of probability respectively**

Specific combining ability effects :

Specific combining ability (SCA) effects of 48 top crosses are shown in Table (5). Seven hybrid combination 44,42,4,47,9 and 31 showed highly significant negative (SCA) effects for heading date. Also, cross number 7,8,3,47,29 and 46 showed highly significant negative (SCA) effects for plant height, respectively earliness, if found, in wheat is favorable for escaping form destructive injuries by stress conditions and for intensive production and for escaping from the stem rust. Concerning number of spikes \plant there are seven hybrids showed highly significant positive (SCA) effects as follow numbers 16,26,29,43,24,35 and 9. Also, 24,45,15,40,16,19 and 5 for spike length as a same positive and highly significant for number of spikelets per spike there are numbers 15,39,16,45,21 and 34 and numbers 48,47,16,21,35,45, and 27 for number of grains per spike , 4,39,8,29,24,33 and 43 for grains weight per spike, numbers 4,8,42,23,41,48 and number 30 for 1000-grain weight . The crosses which showed high (SCA) for grain yield per plant are numbers 4,26,43,47,29,3 and 16 .In majority of the cases positive (sca) effects were usually associated with crosses of tow genetically divergent parents having at least one parent as a good general combiner , what is agreement with studies of Kreljevic-Balaic and Borojevic (1985).

The crosses involving high x low and low x low combiners genetic interaction might be additive x dominance and dominance x dominance type in nuter, respectively. The combinations of two good general combiners not showing positive (SCA) may be due to the fact that parents were not diverse, while in those crosses with high (SCA) involving high x high general combiners, the genetic interaction might be additive x additive, which is fixable in further generation and can be used in wheat breeding.

Table (5): Estimates of specific combining ability for 48 top crosses studied in 2008/2009 .

N	Crosses	Heading date (days)	Plant height (cm)	No. of spikes\ plant	Spike length (cm)	No. of spikelets \ spike	No of grains \spike)	Graing weight \spike (gm)	1000-garin weight (gm)	Grain yield \plant (gm)
1	T1 xL1	-0.70	-0.27	2.09**	0.53	-0.44*	-1.56	-0.01	-1.50	10.37**
2	L2	-0.59	-2.22*	0.71	-0.16	-1.28**	-6.56**	-0.01	-1.43	0.65
3	L3	-0.70	-4.00**	-0.83	-0.19	0.12	7.22**	0.46**	2.70**	14.45**
4	L4	-4.32**	-2.35*	3.91**	0.72	-0.19	24.20**	1.51**	12.37**	29.13**
5	L5	-4.45**	2.71**	0.68	1.04**	-0.75**	0.000	0.32**	-2.14**	4.49**
6	L6	-1.37**	-3.02**	0.34	0.66	0.74**	5.50**	-0.004	0.56	-3.70**
7	L7	-0.24	-6.93**	-1.75**	-0.76	-0.92**	-2.42*	-0.001	-8.09**	-11.12**
8	L8	-3.91**	-5.06**	-2.74**	-3.94**	-0.27	3.79**	0.75**	10.05**	-3.83**
9	L9	0.90	4.34**	2.25**	-0.32	-0.10	-6.72**	-0.41**	3.43**	1.43
10	L10	2.61**	-2.58**	-3.22**	-0.003	0.21	-9.69**	-0.59**	-9.53**	-15.84**
11	L11	0.53	1.84	-2.97**	-0.49	-0.64**	-6.04**	-0.48**	-3.49**	-12.58**
12	L12	2.85**	3.55**	-1.32*	0.89	0.79**	0.93	-0. 69**	-0.94	-11.07**
13	L13	0.65	3.15**	-1.72**	-1.43**	-0.75**	-10.77**	-1.03**	-0.55	-8.28**
14	L14	0.90	3.83**	1.46*	0.65	-0.65**	-1.76	0.18	-1.50	3.99**
15	L15	7.51**	3.73**	-2.80**	1.59**	2.71**	-11.61**	-0.13	3.05**	-12.45**
16	L16	0.31	3.26**	5.89**	1.22*	1.49**	15.47**	0.36**	-3.00**	14.35**
17	T2 xL1	-2.53**	1.91*	-1.38*	-0.45	-0.34	-4.01**	-0.54**	0.51	-9.39**
18	L2	0.54	3.69**	-2.69**	0.13	0.42*	4.98**	0.48**	4.05**	-6.12**
19	L3	1.26**	4.29**	-2.21**	1.19*	-0.57**	-16.70**	-0.24	0.21	-20.55**
20	L4	0.28	0.10	-0.67	-0.26	0.76**	-13.97**	-0.73**	-8.22**	-14.49**
21	L5	3.47**	-0.41	-2.96**	0.73	0.97**	9.60**	0.32**	0.53	-5.23**
22	L6	1.83**	3.15**	0. 01	0.19	-0.002	-2.62*	0.14	-3.27**	5.89**
23	L7	-1.22*	-2.03*	1.30*	-0.001	-0.62**	-4.33**	-0.90**	6.76**	6.27**
24	L8	1.51**	2.15*	3.52**	2.50**	-.016	-.044	0.62**	0.66	12.58**
25	L9	-2.17**	-1.54	-0.99	-0.11	0.38*	6.23**	0.20	-8.80**	2.41
26	L10	1.98**	-1.82	5.26**	-0.77	0.19	4.10**	0.42**	0.38	23.97**
27	L11	-1.93**	-1.24	-0.76	0.12	0.21	7.76**	-0.13	1.69*	-5.76**
28	L12	2.83**	-1.39	0.42	-1.23*	0.17	-1.50	-0.11	0.47	6.05**
29	L13	0.16	-3.04**	4.38**	-0.37	-0.72**	3.00**	0.70**	2.72**	17.05**
30	L14	-3.06**	-0.82	-1.41*	0.27	0.91**	4.22**	-0.001	4.35**	5.01**
31	L15	-3.36**	-0.39	1.50*	-0.70	-1.27**	0.58	-0.30	-0.44	-5.84**
32	L16	0.41	-2.62**	-3.25**	-1.21*	-0.32	3.11**	0.06**	-1.59	-11.86**
33	T3 xL1	3.22**	-1.64	-0.71	-0.01	0.78**	5.57**	0.61**	0.98	-0.98
34	L2	0.004	-1.46	1.98**	-0.002	0.86**	1.58	-0.39**	-2.62**	5.47**
35	L3	-0.57	-0.29	3.04**	-1.00*	0.45*	9.48**	-0.21	-2.92**	6.10**
36	L4	4.04**	2.25*	-3.24**	-0.46	-0.57**	-10.23**	-0.78**	-4.15**	-14.64**
37	L5	0.98*	-2.30**	2.28**	-1.77**	-0.21	-9.60**	-0.0001	1.61	0.73
38	L6	-0.45	-0.13	-0.29	-0.86	-071**	-2.88**	-0.18	2.71**	-2.18

Table (5) : Cont.

39	L7	1.46**	8.96**	0.45	0.77	1.53**	6.75**	1.00**	1.33	4.85**
40	L8	2.40**	2.90**	-0.78	1.44**	0.43*	-3.35**	-1.36**	-10.70**	-8.75**
41	L9	1.28**	-2.80**	-1.26*	0.44	-0.20	0.49	0.20	5.37**	-3.85**
42	L10	-4.59**	4.40**	-2.04**	0.80	-0.40*	5.58**	0.17	9.15**	-8.14**
43	L11	1.40**	-0.60	3.73**	0.37	0.43*	-1.73	0.61**	1.80*	18.34**
44	L12	-5.68**	-2.15	0.90	0.34	-0.96**	0.57	0.18	0.47	5.01**
45	L13	-0.82	-0.12	-2.66**	1.80**	1.46**	7.77**	0.33**	-2.17**	-8.77**
46	L14	2.16**	-3.01**	0.01	-0.91	-0.26	-2.46**	-0.18	-2.84**	-9.00**
47	L15	-4.14**	-3.35**	1.30*	-0.89	-1.44**	11.03**	0.44**	-2.60**	18.30**
48	L16	-0.72	-0.65	-2.64**	-0.02	-1.17**	18.58**	-0.42**	4.58**	-2.49*
	L.S.D 0.05	0.9472	1.855	1.281	0.9777	0.3674	2.135	0.2535	1.611	2.432
	L.S.D 0.01	1.251	2.450	1.688	1.291	0.4852	2.819	0.3178	2.127	3.211

*and** significant differences at 0.05 and0.01 levels of probability, respectively

Conclusion:

From the results obtained here it could be concluded that the hybrid combinations no. 3, 4, 16, 24, 26, 29, 35, 43 and 47 also the parental lines no. 3, 4, 16,were the best new genetic resources (germplasm) must be exploited in wheat breeding for obtaining and release a new improved cultivars in commercial scales and the selection of parents would be more profitable to select first on the basis of the their general combining ability and further selection might then be guided by evaluation of specific combining ability effects. This conclusion was previously drawn by Hamada *et al.* (2002), Esmail (2007) Hendawy *et al*. (2007) and Moussa (2009).

REFERENCES

Al-Kaddossi, A.R., M.M. Essia and S.M. salama (1994). Estimates of genetic variance for yield and its components in wheat (Triticum aestivum L.). Zagazig J. Agri. Res. 21(2):355-366.

Darwish, I.H.I. (2003). Diallel cross analysis of wheat under stress and normal irrigation treatments. Third Pl. Breed Conf. April 26-Giza.253-269.

EL-Adle, A.M. Z.A. Kosba, Z.M. EL-Diasty and G.A.Rizk (1996). The relative importance of additive and non-additive gene variances in new varieties of wheat (Triticum spp.L.). J. Agric. Sci. , Mansoura Univ., 21:1717-1733.

Esmail, R. M. (2002). Estimation of genetic parameters in the F_1 and F_2 generations of diallel crosses of bread wheat (Triticum aestivum L.). Bull. NRC:27(1)85-106.

Esmail, R.M. (2007). Detection of genetic components througt test cross and line x tester analysis in bread wheat. World J. of Agric. Sci., 3(2):184-190.

Farhad, A., S. Khan, Q.A. Saibzada, H. Khan, A. Khan and F. Muhammad (2011). Genetic analysis of some quantitative traits in bread wheat across environmental . African . J.Agaric Res., 6 (3) , pp. 686-692.

Habib, I. and A. S. Khan (2003). Genetic model of some economic traits in bread wheat (Triticum aestivum L.). Asian J. Plant Sci., 2:1153-1154.

Hamada, A.A.E., S.H. EL-Seidy and H.I. Hendawy (2002). Breeding measurements for heading date , yield and yield components in wheat using line x tester analysis . Annals Agric. Sci. Ain Shams Univ. Cairo 472:587-609.

Hendawy, F.A., H.A. Dawan and Mona M. Serag El-Din (2007). The detection of the different components of variation in bread wheat (Triticum aestivum L) . Minufiya . J. Argric. Res., 32 (4): 1071 -1086.

Heyne, E. G. (1987). Wheat and wheat improvement ,2nd edition , pp:32-40. Madison , Wiscon ,USA.

Krljevic-Balaic and S. Borojevic (1985). Nasledivanje visin stabljike I zetvenog in- deksapsenic. Arhiv za poljoprivredne nauk , 46(163), 253-266.

Kempthorne, O. (1957). An introduction to genetic statistical .John Wily-Sosn Inc ., New York.

Mahmood, N., M. A Chowdhary and M. Kashif (2003). Genetic analysis of some physio-morphic traits of wheat under drought condition (Triticum aestivum L ;Pakistan . J. Genet. Breed., 57:385-391.

Moussa, A. M. and A.A. Morad (2009). Estimation of combining ability for yield and is components in bread wheat (Ttriticum aestivum L.).Using line x tester Minufiya J. Agric. Res., 34(3):1191-1205.

Riaz R. and M.A. Chowdhary, (2003). Genetic analysis of some economic traits of wheat under drought condition. Asian J. Plant Sci., 2:790-796.

Seleem ,S. A.(2001). Breeding studies of some characters in common wheat. PHD Thesis Minufiya Univ.-Egypt.

Seleem, S.A. and S.A. EL-Sawi(2006). Line x tester analysis for grain yield and its components in bread wheat. Minufiya J. Agric. Res., 31(1):75-87.

Shehab EL-Din, T. M. (1993). Response of two spring wheat cultivars (Triticum aestivum L. em. Thell.) to seeding rates in sandy soil. J. Agric. Sci. Mansoura Univ., 18:2235-2240.

Singh, S. P., R. M. Singh, J. Singh and R. K. Agarwal (1990). Combining ability for yield and some of its important components in induced mutant of bread wheat. Indian J. Genet ., 50:167-170.

Singh R. K. and B. D. Chaudhary (1985). Biometrical Methods in quantitative genetic analysis, Revised Edition Kolyani publishers. New Delhi-Ludhiana. India.

Singh, R., G. S. Bhullar, K. S. Gill and G. S. Mahal (1982). Combining ability in durum wheat . Crop Improv.,9:135-140.

Yadov, B., C.S. Tyagi and D. Singh (1998). Genetics of transgressive segregation for yield and yield components in wheat. Annals of Applied Biology. 133:227235.

Zahid, A., S. Aimal, K.S. Khan, R. Qureshi and M. Zubair (2011) . Combining ability estimates of some yield and quality related traits in spring wheat (Triticum aestivum L) Pak . J. Bot., 43 (1) : 221-231

التباين الوراثى فى قمح الخبز باستخدام تحليل سلالة × كشاف

صبرى احمد سليم

البرنامج القومى لبحوث القمح – معهد بحوث المحاصيل الحقلية – مركز البحوث الزراعية – مصر

الملخص العربى :

اجريت هذه الدراسة خلال موسمى ٢٠٠٨/٢٠٠٧ و ٢٠٠٩/٢٠٠٨ بمحطة بحوث الجميزة – محافظة الغربية لتقييم ١٦ سلالة من قمح الخبز تم تهجينها مع ٣ اصناف محلية " كشافات " لانتاج ٤٨ هجين باستخدام تحليل سلالة × كشاف باستخدام طريقة التحليل الـ Kempthron 1957 .

وذلك بهدف دراسة القدرة العامة والخاصة على الائتلاف لهذه التراكيب الوراثية وكانت الصفات تحت الدراسة كما يلى :-

١- عدد الأيام للتزهير " يوم "   ٢- ارتفاع النبات " سم "

٣- عدد السنابل على النبات   ٤- وزن حبوب السنبلة

٥- عدد السنبلات على السنبلة   ٦- عدد الحبوب بالسنبلة

٧- وزن حبوب السنبلة   ٨- وزن ١٠٠٠ حبة

٩- محصول النبات الفردى

وكانت النتائج المتحصل عليها كما يلى :-

١- أظهرت نتائج تحليل التباين المتحصل عليها معنوية عالية لكل الصفات تحت الدراسة لكل من التراكيب الوراثية والآباء مع الهجين والسلالات والكشاف والسلالات مع الكشاف .

٢- أظهرت النتائج ان الفعل الجينى غير المضيف كان الأكبر والأكثر أهمية فى توارث معظم الصفات

٣- أظهرت النتائج ان السلالة رقم ٣،٤ ، ١٦ كانت ذات قدرة تآلفية عالية لصفة المحصول ومكوناته ويمكن الاستفادة منها فى برامج التربية لرفع إنتاجية القمح وذلك باستخدامها كمواد وراثية .

Table (2): Mean squares of ordinary analysis and line X tester analysis for all traits studied in 2008/2009 .

S.O.V	d.f	Heading date (day)	Plant height (cm)	No. of spikes\plant	Spike length cm	No. of spikelets \spike	No. of grains \spike	Grains weight\ Spike (gm)	1000-grain weight (gm)	Grain yield\plant (gm)
Rep.	2	0.120	1.38	0.45	0.95	0.13	0.84	0.150	3.31	0.86
Genotypes	66	49.78**	92.11**	35.38**	11.07**	7.75**	328.06**	1.16**	136.94**	582.60**
Parents	18	30.11**	128.87**	6.15**	5.89**	9.62**	380.94**	0.71**	102.02**	258.95**
Crosses	47	54.46**	71.11**	41.64**	6.72**	4.62**	312.79**	1.35**	123.14**	498.57**
Par.v crosses	1	185.22**	417.38**	267.39**	308.92**	121.47**	93.83**	0.13	1414.31**	10357.91**
Lines (L)	15	48.03**	122.83**	37.77**	6.73**	4.55**	340.01**	1.19**	111.29**	216.81**
Testers(T)	2	445.94**	82.56**	286.01**	28.41**	24.54**	83.91**	2.59**	499.67**	1384.11**
L xT	30	31.57**	44.49**	27.28**	5.27**	3.33**	314.45**	1.35**	103.97**	580.41**
Error	132	0.69	2.65	1.26	0.73	0.10	3.50	0.05	1.99	4.55
gca		31.57	44.49	27.28	5.27	1.08	314.45	0.43	33.99	191.96
sca		10.29	13.95	8.67	1.51	3.33	103.65	1.35	103.97	580.41
gca\sca		3.07	3.20	3.14	3.49	0.32	3.03	0.32	0.32	0.33

***and** significant at 0.05 and 0.01 levels of probability respectively.**