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ESTIMATION OF PHENOTYPIC AND GENOTYPIC STABILITY FOR SOME WHEAT GENOTYPES

BY

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ABSTRACT

This investigation was carried out during 2003/2004, 2004/2005 and 2005/2006 seasons at seventeen field experiments. The experiments were performed at Al-Gemmeiza, Moshtohor, Toska and Giza in 2003/2004, 2004/2005 and 2005/2006, Shandweel, Zarzoura in 2004/2005 and 2005/2006 and Nubaria in 2005/2006 at Agriculture Research Stations, Agriculture Research Center fields. These sites represent North, South, Middle Delta, Upper Egypt and New Valley to evaluate twenty four genotypes, under seventeen environments and their interaction for number of spikes/m2, 1000-kernel weight and grain yield (ardab/fed.). In addition to estimation of phenotypic and genotypic stability parameters according to Eberhart and Russell (1966) and Tai (1971), respectively. The design used was a Randomized Complete Block .The obtained results may be summarized:

1- Environment mean squares were highly significant for number of spikes/m^2, 1000 kernel weight and grain yield (ardab/fed.). E1 (Gemmeiza 2003/2004) environment was superior to the other locations regarding number of spikes/m^2, while the 1000 kernel weight which recorded the highest mean value in E14 (Moshtohor2005/2006). For grain yield (ardab/fed.), the environments number 11 (Shandweel 2004/2005) and 16 (Shandweel 2005/2006) recorded the highest values followed by environments number 8 (Moshtohor 2004/2005) and 13 (Gemmeiza 2005/2006).
2- Number of spikes/m2, 1000-kernel weight and grain yield (ardab/fed.) were significantly affected by genotypes. Based on the over all means genotypes number 2 (Gem.7) and 6 (Gem.5) gave the highest significant values for number of spikes/m2, 1000-kernel weight and grain yield (ardab/fed.) compared to the other genotypes while genotype no. 17 (L15) gave the lowest significant number of spikes/m2, 1000-kernel weight and grain yield (ardab/fed.).
3- Significant interaction between genotypes and environments were detected for number of spikes/m^2, 1000-kernel weight and grain yield (ardab/fed.). (* Feddan = 4200 m^2).
4- For grain yield (ardab/fed.), the genotypes number 2 (Gem.7), 6 (Gem.5), 7(L5), 8 (L6), 9 (L7), 10 (L8), 15 (L13), 22 (G.168) and 23 (Gem.9) were the phenotypically stable where they gave the highest mean values than grand mean b = 1 and S^2d_i equal zero. The genotypes number 2 (Gem.7), 13 (L11), 21 (L19), 18 (L16), 6 (Gem.5), 17(L15) and 23 (Gem.9) were genetically stable for grain yield under the environments.

INTRODUCTION

Wheat is one of the most important cereal crops in Egypt , either as a staple food grain for human or as a major source of straw fodder for animal feeding.(In season 2005,the total cultivated area of wheat was about 3.1 million feddan, with an average yield of about 18.2 (ardab /fed.). Increasing wheat production per unit area could be possible rather than increasing the area devoted for wheat production due to limitations of arable land and irrigation water. The main goal of the Egyptian National Wheat Program is to develop high yielding. This can be achieved through, genetic studies of stability and genetic components for wheat genotypes to select proper lines from good genotypes.

Identification of a genotype with high yield potential and least seasonal fluctuation over a wide range of environments is important in any improvement program Eberhart and Russell (1966) reported that an ideal cultivar is the one that has the highest yield over a broad range of environments. They defined a stable cultivar as the one that has regression coefficient, bi equal to 1 and mean square deviation from regression S2di equal to zero. Tai (1971) suggested portioning the genotype x environment interaction effects of a genotype into two components, α statistic that measures the linear response to environmental effects and λ statistic that measures the deviation from linear.

On the other hand, stability may, in fact, depend on holding certain morphological and physiological attributes steady and allowing others to vary, resulting in predictable G x E interaction quantitatively inherited and are greatly influenced by the environment (Polignano and Uggenti, 1984).

The present study was initiated to achieve the following objectives:
1- To observe genotypic stability (with respect to grain yield) of 24 spring wheat genotypes across seventeen environments and three years in Egypt
2- To select genotypes combining a high level of grain yield with yield stability.
3- To group the genotypes having similar response pattern over all environments.

MATERIALS AND METHODS

Seventeen environments were carried out at seven Research Stations Farm Agriculture Research Center and Experimental Center of the Faculty of Agric. at Moshtohor during 2003/2004, 2004/2005 and 2005/2006 seasons to estimate the stability parameters for number of spikes /m2 ,1000-kernel weight and grain yield (ardab/fed.). The experiments were performed at Al-Gemmeiza, Moshtohor, Toska and Giza in 2003/2004, 2004/2005 and 2005/2006; while it performed at Shandweel and Zarzoura in 2004/2005and 2005/2006 and Nubaria in 2005/2006 at Agriculture Research Stations, Agriculture Research Center Fields. These sites represent North, South, Middle Delta, Upper Egypt and New valley. Each experiment included twenty four genotypes, namely Giza168 (G.168), Gemmeiza5 (Gem.5), Gemmeiza7 (Gem.7), Gemmeiza9 (Gem.9) cultivars and twenty genotypes (Lines i.e. L1 to L20) from National Gene Bank and Genetic Resources. The names, pedigree and origin of the tested genotypes are presented in Table (1). A randomized complete block design with three replications was used in each experiment. The experimental plot comprised of 3.5 meter long and 1.2 meter wide (4.2 m2). The same planting date was approximately applied during the three growing seasons across all locations. The dray method of planting was used and the rest of cultural practices were followed as used for ordinary wheat area. At maturity, the plots 3.5 x1.2.m were harvested. For each genotypes grain yield (ardab/fed.), number of spikes/m2 and 1000 kernel weight were recorded in this study.

Table (1): The code number, pedigree and origin of all genotypes used in the study.

Code No.	Genotype	Pedigree	Origin
1	Line1(L1)	CHIRYA-1/ Vee's'/3/Hork's'/YMH//KAL/BB	Gemmeiza
2	Gemmeiza 7	CMH74A.630/Sx//SERI82/Agent CGm4611-2Gm- 3Gm-1Gm-0Gm	EGYPT
3	Line2 (L2)	PARENTSK 47A-4-1/ GOV/AZ//MUS/ 3/DODO/4/BOW	Gemmeiza
4	Line3 (L3)	Sham4//Vee's'/Sub's' /3/ Kauz*2/TRAP// KAUZ	Gemmeiza
5	Line4 (L4)	Kauz / STAR// Bocro-1	Gemmeiza
6	Gemmeiza 5	Vee's'/SWM6252GM4017-1Gm-7Gm-3Gm-0Gm	EGYPT
7	Line5 (L5)	Prl"S" /Toni //Attila	Gemmeiza
8	Line6 (L6)	Vee "S" Swm 6525 /4/ Trm // Kal/Bb/3/ Corp "S" / Piy "S"	Gemmeiza
9	Line7 (L7)	HUDHUD-10	ICARDA
10	Line8 (L8)	Gemmeiza 3 // Attila / 3 * Bcn	Gemmeiza
11	Line9 (L9)	Land races from Qena	Qena
12	Line10 (L10)	OASIS/SKAUZ//4*BCNCMSS93Y04054M-1M-0Y	CIMMIT
13	Line11 (L11)	Dove''s''/Buc''s''//STAR's'0	ICARDA
14	Line12 (L12)	Land races from Qena	Qena
15	Line13 (L13)	Land races from Qena	Qena
16	Line14 (L14)	Land races from Sohag	Sohag
17	Line15 (L15)	Gemmeiza 3 Land races from Sohag	Sohag
18	Line16 (L16)	DVERD 2/AE.SQARROSA(214)//2*BCN	CIMMIT
19	Line17 (L17)	Land races from Sohag	Sohag
20	Line18 (L18)	Land races from Sohag	Sohag
21	Line19 (L19)	Land races from Sohag	Sohag
22	Giza 168	MRL/Buc//SERICM93046-8M-0Y-0M-2Y-0B0GZ	EGYPT
23	Gemmeiza 9	ALD's'/HUAC//CMH74A.630/SxCGm4583-5Gm-1Gm-0Gm	EGYPT
24	Line20 (L20)	Desconocido # 6/4/Bl 1133/3/Cmh 79A.955 *2/Cno 79 //79A. 955/Bow "s"	Sids

A regular analysis of variance of a randomized complete block design of separate environment was carried out for each trait according to Snedecor and Cochran (1967). Combined analysis of the seventeen experiments carried out whenever homogeneity of variance was detected. The stability analysis was computed according to Eberhart and Russel (1966) and Tai (1971) to detect the phenotypic and genotypic stability parameter for the previous three traits. In the analysis of the data, the genotypes were considered as fixed variables while, years and locations were considered as random variables.

RESULTS AND DISCUSSION

Combined analysis of variance for number of spikes/m^2, 1000-kernel weight (g) and grain yield (ardab/fed.) of wheat genotypes is presented in Table (2). The analysis of variance for single environments and the combined analysis over seventeen environments were made for the three studied traits. Bartlett's test of homogeneity of variance showed that the variance estimates of error were homogenous.

The analyses of variance for the combined analysis for the three studied traits are given in table (2). Mean squares of environments, genotypes and genotypes x environments interactions for the three traits were highly significant table (2). Significant mean squares for environment were detected for the three traits, indicating that the performance of these traits differed from environment to another. Significant mean squares due to genotypes and genotypes x environment interaction were detected for the three studied traits, revealing that genotypes carried genes with different additive and additive x additive effects which seemed to be inconstant from environment to another. These results emphasize that the environments had stress and non stress conditions. The significant of genotypes x environments interaction is in agreement with Hassan (1997) and Tarakanovas and Ruzgas (2006)

The environment no.1 (Gem. 2003/2004) gave the highest number of spikes/m2 followed by environment number 2 (Giza 2003/2004) and then by environment 10 (Giza 2005/2006) and 11 (Shandweel 2004/2005). While, the environment number 3 (Toska 2003/2004) gave the lowest one (Table 3). The environment number 14 (Moshtohor 2005/2006) had the highest significant mean value for 1000-grain weight than other environments. Also, the environments number 6 (Gemmeiza 2004/2005), 8 (Moshtohor 2004/2005), 10 (Giza 2005/2006), 11 (Shandweel 2004/2005), 13 (Gemmeiza 2005/2006), 16 (Shandweel 2005/2006) and 17 (Zarzoura 2005/2006) recorded the second ones for seed index. While, the environment number 3 (Toska 2003/2004), 4 (Toska 2004/2005) and 13 (Gemmeiza 2005/2006) recorded the lowest ones. For grain yield (ardab /fed.), the environment number 11 (Shandweel 2004/2005) and 16 (Shandweel 2005/2006) recorded the highest values followed by environments number 8 (Moshtohor 2004/2005) and 13 (Gemmeiza 2005/2006). While, the environments number 3 (Toska 2003/2004) and 15 (Toska 2005/2006) gave the lowest ones. Theses results indicating that the climatic conditions and soil properties of environments number 11 (Shandwel 2004/2005) and E16 (Shandweel 2005/2006) location encouraged production of wheat genotypes.

Sharma *et al.*, (1987), El-Morshidy *et al.*, (2000) and Ammar *et al.*, (2003) found differences between environments under their studies.

Table (2). Combined analysis of variance for number of spikes/m², 1000-grain weight and grain yield (ardab /fed.) of wheat genotypes.

Sources of variation	d.f	Number of spikes/m²	1000-grain weight	Grain yield (ardb/fed.)
Environments	16	352717.00**	1417.938**	86.184**
Replication within / Environments	34	503.294	99.055**	0.352
Genotypes	23	15944.7**	130.722**	4.572**
Environments x Genotypes	368	727.847**	6.418**	0.251**
Error	782	238.956	1.306	0.115

Table (3): Mean values of number of spikes/m², 1000-grain weight and grain yield as affected by environments.

Environments \ Traits		Number of spikes/m²	1000-grain weight	Grain yield (ardb/fed.)
Gemmeiza 2003/2004	E1	373.945	39.769	21.121
Giza 2003/2004	E2	361.931	38.671	23.566
Toska 2003/2004	E3	150.014	30.065	10.117
Toska 2004/2005	E4	174.570	30.175	12.273
Moshtohor 2003/2004	E5	327.417	40.249	21.564
Gemmeiza 2004/2005	E6	326.458	40.428	24.332
Giza 2004/2005	E7	327.028	40.099	24.201
Moshtohor 2004/2005	E8	336.333	40.260	24.290
Zarzoura 2004/2005	E9	343.542	38.411	22.423
Giza 2005/2006	E10	355.458	40.694	23.846
Shandweel 2004/2005	E11	342.611	40.490	24.691
Nubaria 2005/2006	E12	175.861	40.779	16.613
Gemmeiza 2005/2006	E13	338.958	40.196	24.448
Moshtohor 2005/2006	E14	341.306	41.518	24.271
Toska 2005/2006	E15	151.945	30.922	10.826
Shandweel 2005/2006	E16	324.792	40.747	24.677
Zarzoura 2005/2006	E17	317.500	40.444	22.045
over all mean		298.216	38.477	20.900
L.S.D 0.05		5.050	0.370	0.110
L.S.D 0.01		6.620	0.500	0.145

The differences among genotypes overall environments regarding the three studied traits reached the significance level (Table 4). Genotype number 6 (Gem.5) gave significant highest number of spikes/m2 but without significant superiority over genotype number 2 (Gem.7) .On the other hand, the genotypes number 12 (L10) gave the lowest number of spikes/m2 but without significant than over those genotypes number 1 (L1), 5 (L4), 14 (L12) and 16 (L14). For 1000-kernel weight, the genotype number 6 (Gem.5) recorded the heavier seed index followed by the genotypes number 2 (Gem.7) and number 23 (Gem.9) while, genotype number 14 (L12) gave the lowest one. The genotype number 6 (Gem.5) had the highest grain yield (ardab/fed.) followed by genotype number 23 (Gem.9) and then number 2 (Gem.7) while, the genotype number 24 (L20) gave the lowest one. Such results are in agreement with those obtained by Sharma *et al.*, (1987), El-Morshidy *et al.*, (2000) and Ammar *et al* (2003) they found differences among genotypes over all environments in their studies.

Table (4): Mean values of number of spikes/m², 1000-grain weight and grain yield as affected by genotypes (combined analysis).

Traits Code No.	Genotypes	Number of spikes/m²	1000-grain weight	Grain yield (ardb/fed.)
1	L1	283.392	38.145	20.435
2	Gem.7	333.373	41.22	23.142
3	L2	291.804	38.376	20.314
4	L3	287.569	37.843	20.104
5	L4	283.882	38.137	20.402
6	Gem.5	341.02	42.037	23.940
7	L5	304.118	39.108	21.452
8	L6	308.667	39.208	21.760
9	L7	312.02	40.008	22.180
10	L8	320.647	40.625	22.932
11	L9	288.588	37.463	19.856
12	L10	277.863	37.645	20.118
13	L11	287.373	37.167	19.898
14	L12	281.588	36.027	19.819
15	L13	299.549	38.873	21.014
16	L14	283.039	37.139	19.945
17	L15	285.961	37.114	19.380
18	L16	287.49	36.624	19.660
19	L17	286.118	36.996	20.211
20	L18	292.431	37.098	20.094
21	L19	291.353	37.165	19.866
22	G.168	316.373	40.125	22.554
23	Gem. 9	324.000	40.725	23.328
24	L20	288.980	38.592	19.194
L.S.D 0.05		5.990	0.440	0.130
L.S.D 0.01		7.870	0.580	0.173

The stability analysis

Results of the pooled analysis of variance in table (5) showed that the genotypes and genotype x environments interaction mean squares were significant for the three traits under study. The significance of genotype –environment (linear) mean squares was detected for the three studied traits, indicating linearity responses of different genotypes to different environmental conditions when they test of pooled deviations. On the other hand, the highly significant of pooled deviation for the three traits under study indicating that the major role of deviation from linear regression to determine degree of stability of each genotypes under study. These results confirmed with those previously reached by Salem *et al.*, (1990) and Mevlut *et al.*, (2005). Also, Mishrs and Chandraker (1992), Kheirall and Ismail (1995) and Salem *et al.*, (200) found in their studies highly significant differences among the studied genotypes, environments and genotypes x environments interaction for number of spikes/m2, 1000-kernel weight and grain yield (ardab/fed.).

Table (5): Mean squares of variance for G x E interaction for number of spikes/m^2, 1000-grain weight and grain yield.

Source of variation	d.f	Mean squares		
		Number of spikes/m^2	1000-grain weight	Grain yield (ardb/fed.)
Total	407	5141.681	22.982	1.242
Genotypes	23	5313.913**	34.981**	0.654**
Env. x (Genotypes x Env.)	384	5131.365**	22.263**	1.278**
Env. (Linear)	1	1881138**	7564.415**	459.653**
(Genotype x Env.) Linear	23	373.0163**	11.850**	0.886**
Pooled deviation	360	224.2935	1.978	0.029
Genotype 1 (L1)	15	943.842**	2.301	0.041
2 (Gem.7)	15	206.4594**	0.987	0.065
3 (L2)	15	101.7297	1.078	0.014
4 (L3)	15	298.5016**	0.785	0.017
5 (L4)	15	327.6235**	2.092	0.008
6 (Gem.5)	15	156.4761	3.144	0.034
7 (L5)	15	12.46563	1.091	0.002
8 (L6)	15	82.22393	3.690**	0.004
9 (L7)	15	81.54013	0.752	0.007
10 (L8)	15	91.0906	0.567	0.016
11 (L9)	15	56.34375	4.302**	0.015
12 (L10)	15	867.266**	0.751	0.015
13 (L11)	15	65.69687	3.341	0.051
14 (L2)	15	224.293**	3.004	0.075
15 (L3)	15	26.27657	0.407	0.006
16 (L14)	15	387.7172**	2.291	0.050
17 (L15)	15	339.9605**	0.963	0.033
18 (L16)	15	435.6302**	2.401	0.039
19 (L17)	15	81.26667	3.575**	0.011
20 (L18)	15	39.84896	1.658	0.044
21 (L19)	15	108.2219	1.553	0.043
22 (G.168)	15	102.1443	1.102	0.008
23 (Gem.9)	15	160.4016	1.039	0.026
24 (L20)	15	186.0229**	4.589**	0.083
Pooled	816	83.32353	1.793	0.041

Phenotypic and genotypic stability parameters:

The phenotypic stability of the studied genotypes was measured by the three parameters i.e., mean performance over environments, the linear regression and the deviations from regression function. Phenotypic stability parameters of the three studied traits are presented in table (6). The results showed clearly that regression coefficient (bi) of all genotypes were significantly differed from zero in the three traits.

1-Number of spikes/m^2

For number of spikes/m^2, regression coefficients (b_i) for all genotypes were insignificant differed from unity except for genotypes number 6 (Gem.5), 7(L5) and 2 (Gem.7) whereas they gave significant from unity. The genotypes number 8 (L6), 9 (L7), 10 (L8) and 22 (G.168) gave mean values above the grand mean and their regression coefficient (b_i) did not differ significantly from unity. Also, the minimum deviation mean squares (S^2d_i) were detected, revealing that these genotypes were more stable than others under the environments studied for this trait. However, the genotypes numbers 2 (Gem.7), 6 (Gem.5) and 23 (Gem.9) gave the highest number of spikes/m^2 and the regression coefficient (b_i) were insignificantly from unity and relatively had high deviation mean squares (Table 5). These genotypes however could be overlooked because their high number of spikes /m^2 potential was limited to unstress environments.

Table (7) and fig (1) showed that the stability parameter α was not significant differed from zero for all genotypes at all the probability levels except number 2 (Gem.7), 6 (Gem.5), 7 (L5), 8 (L6), 9 (L7), 10 (L8) and 14 (L12). The estimated λ statistics were significant differed from $\lambda = 1$ for all genotypes except 19 (L17) ,21 (L19), 8 (L6), 9 (L7), 10 (L8), 3 (L2) and 22 (G.168) these results indicated that wheat genotypes number 2 (Gem.7) ,8 (L6), 9 (L7), 10 (L8) and 22 (G.168) showed below average degree of stability. While, genotypes number 19 (L17) and 21 (L19) showed the average degree of stability at all probability levels for number of spikes/m^2.

2-1000-kernel weight

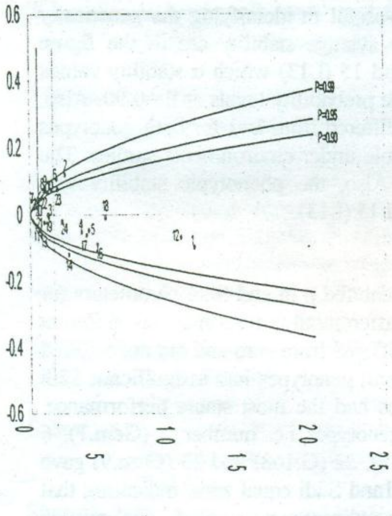
For 1000-kernel weight, the means averaged over environments and phenotypic stability parameters for 1000-kernel weight are given in table (6). Regression coefficients (bi) for all genotypes were significantly differed from zero. However, bi was significantly differed than unity for genotypes number 3 (L2), 22 (G.168) and 23 (Gem.9). With respect to the second stability parameter (S2d) the wheat genotypes number 8 (L6), 11 (L9), 19 (L17) and 24 (L20) had significant deviation from regression indicating that they would be classified as being unstable. These results suggests that only five genotypes number 2 (Gem.7), 7 (L5), 9 (L7), 10 (L8) and 15 (L13) were stable for 1000-kernel weight because these genotypes have (S2di) values were not significantly different from zero and bi = 1, and heavier grain compared with average over all genotypes. Roy and Romagosa (1988) and Kheiralla *et al.*, (1997) indicated that thousand kernel weight was the most stable component.

Table (6): Estimates of phenotypic stability for number of spikes/m^2, 1000-grain weight and grain yield (Ard/fed.) of twenty four wheat genotypes

Code No.	Genotypes	Average	Number of spikes/m^2				Average	1000-Grain weight				Average	Grain yield (Ard/fed.)			
			b_i	S^2d_i	$t_{b=1}$	$t_{b=0}$		b_i	S^2d_i	$t_{b=1}$	$t_{b=0}$		b_i	S^2d_i	$t_{b=1}$	$t_{b=0}$
1	L1	283.392	0.901	860.518	-0.902	8.213	38.145	0.929	0.508	-0.830	10.865	20.435	1.025	-0.0003	0.548	22.053
2	Gem.7	333.373	1.1207	123.135	2.352	21.846	41.22	1.029	-0.805	0.517	18.375	23.142	0.977	0.024	-0.379	16.714
3	L2	291.804	1.0015	18.406	0.041	27.819	38.376	1.136	-0.715	2.324	19.418	20.314	1.039	-0.027	1.427	37.923
4	L3	287.569	0.9478	215.178	-0.846	15.361	37.843	1.003	-1.007	0.060	20.100	20.104	0.992	-0.024	-0.245	32.540
5	L4	283.882	0.9389	244.299	-0.944	14.511	38.137	0.922	0.299	-0.957	11.312	20.402	1.008	-0.033	0.411	48.258
6	Gem.5	341.02	1.1083	73.152	2.422	24.794	42.037	0.994	1.351	-0.060	9.949	23.94	0.973	-0.007	-0.625	22.903
7	L5	304.118	1.0457	-70.857	3.626	82.992	39.108	1.004	-0.701	0.067	17.045	21.452	1.019	-0.038	1.585	82.886
8	L6	308.667	1.0729	-1.0996	2.250	33.114	39.208	0.982	1.897	-0.166	9.075	21.760	1.015	-0.037	0.974	65.490
9	L7	312.02	1.0748	-1.783	2.315	33.275	40.008	1.076	-1.04	1.554	22.004	22.180	1.012	-0.034	0.615	50.615
10	L8	320.647	1.0801	7.7671	2.348	31.674	40.625	1.052	-1.225	1.226	24.811	22.932	1.017	-0.025	0.604	34.969
11	L9	288.588	0.9552	-26.979	-1.671	35.641	37.463	1.033	2.509	0.282	8.844	19.856	0.960	-0.026	-1.381	33.340
12	L10	277.863	0.9311	783.942	-0.654	8.850	37.645	1.156	-1.041	3.196	23.688	20.118	1.007	-0.025	0.242	34.844
13	L11	287.373	0.9413	-17.626	-2.024	32.458	37.167	1.042	1.548	0.407	10.116	19.898	0.994	0.009	-0.108	19.196
14	L12	281.588	0.8805	140.969	-2.233	16.457	36.027	0.926	1.211	-0.758	9.487	19.819	0.991	0.034	-0.136	15.761
15	L13	299.549	1.0235	-57.047	1.284	55.928	38.873	1.052	-1.385	1.444	29.222	21.014	1.035	0.035	1.988	58.168
16	L14	283.039	0.911	304.393	-1.266	12.958	37.139	1.096	0.498	1.125	12.848	19.945	1.056	0.008	1.095	20.665
17	L15	285.961	0.953	256.636	-0.713	14.461	37.114	0.973	-0.829	-0.488	17.594	19.380	0.956	-0.007	-1.023	22.729
18	L16	287.49	0.9913	352.306	-0.116	13.288	36.624	0.888	0.608	-1.282	10.171	19.660	0.995	-0.002	-0.097	21.977
19	L17	286.118	0.9765	-2.056	-0.729	30.326	36.996	0.911	1.782	-0.835	8.553	20.211	1.022	-0.03	0.925	42.078
20	L18	292.431	1.0255	-43.474	1.133	45.577	37.098	0.985	-0.134	-0.206	13.567	20.094	1.0003	0.003	0.006	20.710
21	L19	291.353	0.9932	24.898	-0.182	26.698	37.165	0.989	-0.239	-0.156	14.088	19.866	0.999	0.002	-0.008	21.044
22	G.168	316.373	1.0681	18.82	1.886	29.587	40.125	1.023	-0.69	0.389	17.309	22.554	1.012	-0.033	0.629	49.409
23	Gem. 9	324.000	1.0775	77.078	1.714	23.838	40.725	1.123	-0.753	2.142	19.564	23.328	0.959	-0.016	-1.108	25.918
24	L20	288.98	0.9806	102.699	-0.398	20.135	38.592	0.669	2.796	-2.742	5.542	19.194	0.927	0.042	-1.103	14.048

Table (7): Parameters of genotypic stability for number of spikes/m^2, 1000-grain weight and grain yield (Ard/fed.) of twenty four wheat genotypes

Traits		Number of spikes/m^2			1000 -Grain weight			Grain yield (Ard/fed.)		
Code No.	Genotypes	α	λ	Dev/mse/P	α	λ	Dev/mse/P	α	λ	Dev/mse/P
1	L1	-0.0991	11.5906	55.52012	-0.0757	5.1622	0.135387	0.025	1.054	0.036
2	Gem.7	0.1209	2.5335	12.14467	0.0315	2.2255	0.058107	-0.022	1.668	0.057
3	L2	0.0015	1.249	5.984098	0.1461	2.3667	0.063413	0.039	0.365	0.012
4	L3	-0.0522	3.6651	17.55892	0.0034	1.7747	0.046234	-0.007	0.453	0.015
5	L4	-0.0611	4.0227	19.27197	-0.0839	4.6892	0.123103	0.008	0.213	0.007
6	Gem.5	0.1085	1.92	9.204475	-0.0065	7.0745	0.184948	-0.026	0.878	0.030
7	L5	0.0457	0.1519	0.733272	0.0052	2.4624	0.064226	0.019	0.073	0.002
8	L6	0.073	1.0085	4.836702	-0.0193	8.2991	0.217085	0.015	0.116	0.004
9	L7	0.0749	1.0004	4.796478	0.082	1.6811	0.044267	0.012	0.195	0.006
10	L8	0.0802	1.1169	5.358271	0.0559	1.2766	0.033392	0.017	0.413	0.014
11	L9	-0.0449	0.6912	3.314338	0.036	9.6713	0.253062	-0.040	0.403	0.014
12	L10	-0.069	10.6506	51.01565	0.1678	1.6123	0.044221	0.007	0.406	0.014
13	L11	-0.0588	0.8061	3.864522	0.0456	7.5098	0.196541	-0.005	1.309	0.045
14	L12	-0.1197	2.753	13.19371	-0.0794	6.7381	0.176721	-0.008	1.931	0.066
15	L13	0.0236	0.3221	1.54568	0.0562	0.9157	0.023986	0.035	0.153	0.005
16	L14	-0.0891	4.7608	22.80689	0.1032	5.1245	0.13478	0.056	1.274	0.044
17	L15	-0.0471	4.1744	19.99767	-0.0281	2.1699	0.056656	-0.043	0.864	0.029
18	L16	-0.0087	5.3495	25.62531	-0.1203	5.3607	0.141294	-0.004	1.0002	0.034
19	L17	-0.0235	0.9974	55.52012	-0.0953	8.0141	0.210339	0.022	0.288	0.010
20	L18	0.0255	0.4887	12.14467	-0.0153	3.7354	0.097585	0.0003	1.139	0.039
21	L19	-0.0068	1.3287	5.984098	-0.011	3.4982	0.091375	-0.0004	1.100	0.038
22	G.168	0.0682	1.2536	17.55892	0.0245	2.4856	0.064853	0.013	0.204	0.007
23	Gem. 9	0.0776	1.969	19.27197	0.1326	2.2928	0.061154	-0.041	0.666	0.023
24	L20	-0.0194	2.2843	9.204475	-0.3553	9.9296	0.269959	-0.073	2.122	0.073



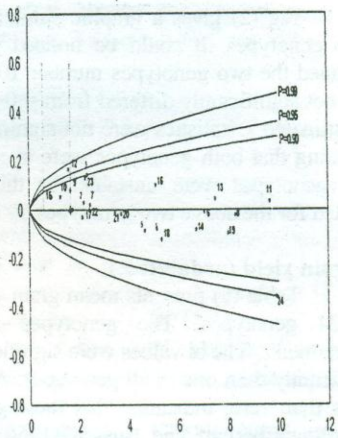


Fig.(1)Distribution of stability statistics of number of spikes in wheat

Fig.(2)Distribution of stability statistics of 1000 grain weight in wheat

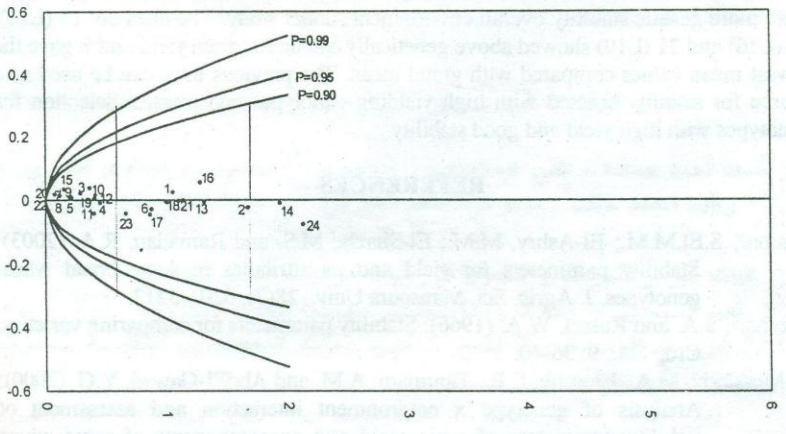


Fig.(3)Distribution of stability statistics of grain yield in wheat

Fig (2) gives a graphic summary that useful in identifying the genetically stable genotypes .It could be noticed that the average stability are in the figure contained the two genotypes number 10 (L8) and 15 (L13) which α stability values were not significantly differed from = 0 at all the probability levels at P =0.90. Also, the estimated λ statistics were not significantly differed from λ=1 for both genotypes indicating that both genotypes were average stable under environments studies. The other genotypes were unstable for this trait. Also, the phenotypic stability was detected for the above two genotypes 10 (L8) and 15 (L13).

3- Grain yield (ardab/fed.)

Table (5) presents mean grain yield (ardab/fed.), bi and S2di parameters for the 24 genotypes. The genotypes were differentially response at different environments. The bi values were significantly differed from zero and did not differed significantly than one in all genotypes. Also, the all genotypes had insignificant S2di values than zero, indicating that these genotypes had the most stable performance. According Eberhart and Russell (1966) nine genotypes i.e. number 2 (Gem.7), 6 (Gem.5), 7 (L5), 8 (L6), 9 (L7), 10 (L8), 15 (L13), 22 (G.168) and 23 (Gem.9) gave the highest mean values than grand mean, bi = 1and S2di equal zero, indicating that these genotypes are phenotypically stable over environments studied. The graphic analysis fig (3) showed that could be useful in identifying stable genotypes. The genotypes number 2 (Gem.7), 13 (L11), 21 (L19), 18 (L16), 6 (Gem.5), 17 (L15) and 23 (Gem.9) had above genaticaly stable for grain yield under the environments. While, the two genotypes number 1(L1) and 16 (L14) gave below average stability. The genotypes number 6 (Gem.5) and 23 (Gem.9) showed above stable and it gave the highest mean values compared with grand mean, indicating that both genotypes were more genetic stability overall environments under study. The lines no. 13 (L11), 18 (L16) and 21 (L19) showed above genetically stabile for grain yield and it gave the lowest mean values compared with grand mean. The previous lines can be used as a source for stability crossed with high yielding genotypes and practice selection for genotypes with high yield and good stability.

REFERENCES

Ammar, S.El.M.M.; El-Ashry, M.M.; El-Shazly, M.S. and Ramadan, R.A. (2003): Stability parameters for yield and its attributes in some bread wheat genotypes. J. Agric. Sci. Mansoura Univ., 28(7): 5201-5213.

Eberhart, S.A. and Russel, W.A. (1966): Stability parameters for comparing varieties. Crop Sci., 9: 36-40.

El-Morshidy, M.A., Elorong, E.E., Tammam, A.M. and AbdEl-Gawad, Y.G. (2000): Analysis of genotype x environment interaction and assessment of stability parameters of grain yield and its components of some wheat genotypes (*Triicum aestivum* L.) under New Valley conditions .The 2nd Conf.of Agric. Sci. Assiut, Egypt Oct. (1) : 13-34.

Hassan, E.E. (1997): Partitioning of variance and phenotypic stability for yield and its attributes in bread wheat. Zagazig J. Agric. Res., 24 (3): 421-433.

Kheiralla, K.A. and Ismail, A.A. (1995): Stability analysis for grain yield and some traits related to drought resistance in spring wheat. Assiut J. Agric. Sci., 26 (1): 253-266.

Kheiralla, K.A.; Ismail, A.A. and El-Nagar, G.R. (1997): Drought tolerance and Stability of some spring wheat cultivars. Assiut J. Agric. Sci., 28 (1): 75-88.

Mevlut, A.; Yuksel, K. and Seyfi,T. (2005): Genotype-Environment interaction and phenotypic stability analysis for grain yield of durum wheat in the central Anatolian region. Turk J. Agric. 29: 369-375.

Mishra, B.K. and Chandraker, P.K. (1992): Stability of performance of some promising wheat varieties .Advances in Plant Sciences, 5: 496-500.

Polignano, G.B. and Uggenti, P. (1984): Genetic variability in entries of (*Vicia faba* L). of Mediterranean origin. Genet. Agr. 38: 249-266.

Roy, C. and Romaosa, L. (1988): Yield component stability in *T. aestivum* L. and *T.turgidum* var. durum. Cereal Res. Comm. 16(1-2): 77-84

Salem, A.H.; Rabie, H.A.; Mohamed, M. and Selim, M.S. (1990): Genotype–environmental interaction for wheat grain yield and its contributing characters. Proc. 4 th Conf. Agron., Cairo, 1: 1-11.

Salem, A.H.; Nigem, S.A.; Eissa, M.M. and Oraby, H.F. (2000): Yield stability parameter for some bread wheat genotypes. Zagazig J. Agric. Res. 27 (4) : 789-803.

Sharma, B.C.; Smith, E.L. and McNew, R.W. (1987): Stability of harvest index and grain yield in winter wheat. Crop Sci., 27: 104- 108.

Snedecor, G.W. and Cochran, W.G. (1967): Statistical Methods 7th Edition, Lowa State Univ. Press. Ames., U.S.A., 325-330.

Tai, G.C.C. (1971): Genotypic stability and its application to potato regional trails. Crop Sci., 11: 184-190.

Tarakanovas, P. and Ruzgas, V. (2006): Additive main effect and multiplicative interaction analysis of grain yield of wheat varieties in Lithuania. Agronomy Res. 4 (1): 91-98.

تقدير الثبات المظهري والوراثي لبعض التراكيب الوراثية للقمح

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اقيمت سبعة عشر تجربة حقلية فى كل من مزرعة محطة البحوث الزراعية بالجميزة والجيزة وتوشكى ومزرعة كلية الزراعة بمشتهر خلال مواسم ٢٠٠٤/٢٠٠٣، ٢٠٠٤ /٢٠٠٥، ٢٠٠٦/٢٠٠٥ ومزرعة محطة البحوث الزراعية بشندويل و زرزورة خلال موسمى ٢٠٠٥/٢٠٠٤،٢٠٠٦/٢٠٠٥ والنوبارية ٢٠٠٦/٢٠٠٥ وهذه المواقع تمثل شمال ووسط وجنوب الدلتا ومصر العليا والوادى الجديد بغرض تقييم أربعة وعشرون تركيب وراثي من القمح للصفات المحصولية

ودراسة تأثير الصنف والمنطقة والتفاعل بينهما على محصول الحبوب وصفة عدد السنابل ووزن الألف حبة كما تضمنت الدراسة تقدير قيم الثبات المظهري والوراثي حسب طريقة Eberhart and Russell (1966) و Tai (1971) لمحصول الحبوب وعدد السنابل ووزن الألف حبة ونفذت التجربة فى تصميم القطاعات كاملة العشوائية فى ثلاث مكررات وكانت أهم النتائج كمايلى :

١- كان هناك تأثير عالي المعنوية للمناطق على محصول الحبوب وصفة عدد السنابل ووزن الألف حبة وجاءت المنطقة رقم ١ (Gemmeiza ٢٠٠٣/٢٠٠٤) المركز الأول بين المناطق كلها لصفة عدد السنابل وجاءت المنطقة رقم ١٤ Moshtohor)٢٠٠٥/٢٠٠٦ (المركز الأول في صفة وزن الألف حبة بينما كانت المنطقة رقم١٦ Shandweel ٢٠٠٥/٢٠٠٦) (و١١ (٢٠٠٥/ Shandweel٢٠٠٤) الأولى فى محصول الحبوب وتلتها المنطقة رقم ٨ (Moshtohor٢٠٠٤/٢٠٠٥) و١٣ (Gemmeiza٢٠٠٥/٢٠٠٦).

٢- أظهرت التراكيب الوراثية معنوية عالية فى صفات عدد السنابل / م٢ و وزن الألف حبة و محصول الحبوب وأظهرت التراكيب الوراثية أرقام ٢ (Gem.7)و ٦ (Gem.5) معنوية عالية لصفة عدد السنابل / م٢ و وزن الألف حبة و محصول الحبوب فى كل المناطق بالمقارنة بالتراكيب الوراثية الأخرى بينما أعطى التركيب الوراثي رقم ١٧ (L15)أقل قيمة معنوية لصفة عدد السنابل و وزن الألف حبة و محصول الحبوب.

٣- كان التفاعل بين التراكيب الوراثية والمناطق معنويا فى تاثيرة على كل من عدد السنابل ووزن الألف حبة ومحصول الحبوب.

٤- أوضحت النتائج ثبات محصول الحبوب مظهريا للتراكيب الوراثية رقم ٢(Gem.7)، ٦ (Gem.5)٧(L5)، ٨(L6)، ٩(L7)، ١٠(L8)، ١٥(L13)، ٢(G.168) و٢٣(Gem .9) ، بينما كان الثبات الوراثى للتراكيب الوراثية رقم ٢(Gem.7)، ١٣(L11)، ٢١(L19)، ١٨(L16)، ٦(Gem.5)، ١٧(L15) و ٢٣(Gem .9) لصفة محصول الحبوب.