ASSESSMENT OF GENETIC DIVERSITY AND STABILITY FOR YIELD TRAITS OF SOME EGYPTIAN LONG-STAPLE COTTON GENOTYPES

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Abstract

The present study aimed to evaluate some Egyptian cotton genotypes using stability statistical analysis and genetic diversity for seed and lint cotton yield, boll weight, lint percentage, seed index, lint index and earliness index.

Nineteen cotton genotypes were evaluated with two promising crosses i.e. Giza 89 x Pima S6 and Giza 89 × Giza 86 and three Egyptian varieties i.e. Giza 89, Giza 86 and Giza 85, used as a check, were grown in a randomize complete blocks design with three replications at five locations.

The studied traits showed highly significant mean squares for, genotypes, environment and genotype × environment interaction. Nine genotypes no. 1,2,3,4,6,15,16,17,19 and the promising cross Giza 89 × Giza 86 exhibited high average level of stability and surpassed other genotypes in the mean performance of seed and lint cotton yield. The genotypes no. 4, 9 and 18 behaved in the same way for boll weight, the genotypes no. 5, 10 and 18 and Giza 86 behaved in the same way for lint % and the genotypes no. 1, 4, 5, 6, 8, 9 and 17 for seed index. Also the genotypes no. 1, 3, 6 and 10 behaved the same way for lint index and the genotype no.6, 16 for earliness index.

As for the genetic diversity, the results showed that the genotypes no. 1 and 16 revealed the lower genetic distance while the genotypes no. 13 and 14 showed the highly genetic distance. Also the results indicated that variety Giza 85 could be replaced by the promising cross Giza 89 × Pima S_6. While variety Giza 89 could be replaced by Giza 89 × Giza 86. The breeder should select the superior genotypes to produce commercial variety or used in the breeding program.

INTRODUCTION

Studying of variability and stability is very important for breeders to select the genotypes that possess the high level of stability and high performances for yield and its components traits. Also the choice of high genetic diversity parents which have a high level of stability in the beginning the breeding program is very important step for the success of such programs. So understanding the nature of genotype x environment empower breeders to test and select the more efficient genotypes.

Breeding genotypes with wide adaptability has long been a universal goal among plant breeders. Bilbro and Ray (1976) showed that a successful breeding program should focus effort on genotype yield level (average yield compared to standards), adaptation (which environment does the genotype best perform in), and stability (how consistent does the genotype yield compared to others). Campdell and Jones (2005) indicated that genotype stability for trait performance is a direct measure of the presence and effect of genotypes. To achieve this goal, evaluating breeding lines over time and space has become an integral part of any plant breeding program.

The obscure impact of the genotype environment interaction (G × E) on the relative performance and stable genotype across environment is important and forms challenging difficulty to the breeder in developing superior cultivar adaptation (Eberhart and Russell 1966). Some techniques have been proposed to characterize the stability of yield performance when the genotypes are tested at a number of environments by Tai (1971) who suggested partitioning the genotype × environment interaction into two components, namely: α statistic that measures the linear response to environmental effect and λ that measures the deviation from linear response in terms of the magnitude of error variance. Using of Additive Main Effect and Multiplicative Interaction (AMMI) model, EL-Shaarawy (1998) studied stability for thirty genotypes over five environments and found that the most stable strains for lint yield were M5 491/91and F_5 795/91. Badr (1999) found that average genotype stability degrees were recorded for seed and lint cotton yield for Giza 86, boll weight for 85, seed index for Giza 85, Giza 86 and Giza 89.

Eight cotton genotypes were evaluated under six locations by Hassan *et al* (2000). They found that phenotypic and genotypic stability were exhibited by Giza 89 for both seed and lint yield and Giza 85 for lint percentage. EL-Feki *et al* (2005) studied the genetic diversity for twelve advanced promising strains by using of hierarchical clustering and found that the studied genotypes were divided into two clusters which were jointed at the distance level 16.49.

This investigation was carried out to evaluate strains of fourteen crosses belong to (*G. barbadense*. L) at five different locations for studied of genetic diversity and mean performance of each genotype for yield component traits by determine genotypic stability level for each genotype over environments.

MATERIALS AND METHODS

Twenty-four genotypes were evaluated in a randomized complete block design grown in the Delta at five locations in 2006 season (Table 1). The five locations were Abo-Kbeer, Tanta, Sakha, Mansoura and Menofia. The genotypes consisted of two promising crosses (Giza 89 × Pima S6) and (Giza 89 × Giza 86) and three genotypes cultivars (Giza 89, Giza 86 and Giza 85) which were numbered 20-24, respectively and nineteen genotypes derived from fourteen crosses (no.1-19). The inbred seeds of all genotypes were obtained from Cotton Breeding Section, Cotton Research Institute, Agricultural Research Center, Giza, Egypt.

Each genotype was sown in a plot with five rows (4 m. Long and 60 cm. Apart). At maturity, the three central rows of each plot were hand-picked twice to determine seed cotton yield (S.C.Y.), lint cotton yield (L.Y.) in kentar/ fed., earliness index (E.I.), random sample of 50 bolls, picked from the outer two rows, was used to obtain average boll weight (B.W.), lint index (L.I.) and seed index (S.I.).

Table 1. The Origin of examined strains of all crosses along with the control varieties in 2006 season

No	Family	Origin
1	F_5 617/04	G 89 / G 86 // G 86
2	F_5 633/04	G 89/ G 86 // G 89
3	F_5 642/04	G 89 // G 86 / G 75
4	F_5 650/04	G 89 // G 86 / G 75
5	F_5 657/04	10229 / AUST. // G 86
6	F_5 659/04	10229 / AUST. // G 86
7	F_6 717/04	G 87 // G 89 / G 86
8	F_6 720/04	G 87 // G 89 / G 86
9	F_6 747/04	G 77 // G 89 / G 86
10	F_6 756/04	BAH105 / G 67 // G 72 / DEL /// G 89 / G 86
11	F_6 757/04	BAH105 / G 67 // G 72 / DEL /// G 89 / G 86
12	F_7 797/04	G 89 / G 81
13	F_7 803/04	6022 Russ. / G 86
14	F_8 886/04	24202 / PIMA S_6 // G 85 / Pima S_6
15	F_9 913/04	G75 // CB 58 / Pima S7
16	F_{10} 914/04	G75 / Sea
17	F_{10} 918/04	G75 / Sea
18	F_{13} 970/04	G 81 / G 83 // G75 / G70
19	F_{13} 977/04	G 89 / G 85 // G 86
20	G 89 / Pima S_6	G 89 / Pima S_6
21	G 89 / G 86	G 89 / G.86
22	G 89	G75 / Russ.6022
23	G 86	G75 / G 81
24	G 85	G 67 / CB 58

Statistical analysis

1- Combined analysis of variance was carried out for mixed model with fixed genotypes and random environments.

2- The genotypic stability analysis was carried out according to the method described by Tai (1971). Stability parameters Alfa (α_i) and Lambda (λ_i) were estimated for each variety separately. Parameters Alfa (α) measures the linear response to environmental effects and Lambda (λ) measures the deviation from linear response in terms of the magnitude of error variance. The two statistics in the regression method were equivalent to α and λ are (b-1) and Dev. Ms/MSE/P, respectively (Tai, 1971).The value (α =-1, λ = 1) refers to the perfect stability. However, the value (α = 0, λ = 1) refer to the average stability, whereas the value (α < 0, λ = 1) refer to the above average stability, and the value (α > 0, λ = 1) refer to the below average stability.

3-Estimation of genetic distance, cluster analysis were presented as dendrogram constructed on Euclidean distance basis as outlined by Anderberg (1973) and developed by Hair et al (1987). All these computation were performed using SPSS computer 1995.

RESULTS AND DISCUSSION

Analysis of variance (ANOVA) indicated significant variation among genotypes and E the G×E for each of all traits measured (Table 2). Significant GE variation for each of the traits allowed for subsequent analysis of GE using ANOVA, genotype stability statistics

Degree of stability for each genotype and two stability parameters (α and λ) were shown in Tables (3&4). Also the distribution of α and lambda are shown in Figures (1-7)

Table 2. Mean squares for all studied traits in 2006 season at five locations

S O V	d f	Seed Cotton yield	Lint cotton yield	Boll weight	Lint %	Seed index	Lint index	Earliness index
Rep.	10	21.28**	31.90**	65.37*	1.21**	2.53*	759.83**	0.50**
Locations	4	145.75**	197.05**	16356.54**	72.29**	112.95**	13393.31**	26.06**
Genotypes	23	6.19**	11.78**	525.12**	2.29**	33.39**	287.14**	3.07**
G. x L.	92	4.37**	6.43**	154.21**	0.80**	1.54**	84.29**	0.32**
Error	230	2.59	3.65	32.67	0.366	0.91	46.11	0.16

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

Measurements of genotypic stability α and λ for and mean performances seed cotton yield as estimated by Tai (1971) are displayed in Tables (3&4) and graphically illustrated in Figure (1). It showed that yield ranged from 8.7 k/fed for genotype no 10 to 11.1 k/f for genotype no 16. The genotypes no. 1, 2, 3, 4, 5, 6, 15, 16, 17, 19 and the promising cross Giza 89 x Giza 86 showed average level of stability and surpassed average mean performances. The distribution of α for genotype no 9 was negative and significantly differed from zero suggesting that this genotype was responsive to poor environment. Genotype no. 13 and 18 were exhibited positive and negative α, respectively. They did not significantly differ from zero indicating that they were more responsive to the environmental change and therefore, more adaptive. Unpredictable component, λ was more important than the predictable component, α for the genotypes no. 11, 12, 14 and 10 which were considered unstable genotypes. These finding agreed with those obtained by Abou-Zahra *et al* (1989) and El-Helw *et al* (2002).

Concerning, lint yield, Tables (3&4) and Figure (2) indicated that the mean performances for genotypes ranged from 10.4 k/f for genotype no. 7 to 13.6 k/fed for genotype no. 6. Fourteen genotypes showed average level of stability. Meanwhile, the genotypes no. 1, 2, 3, 4, 6, 13, 15, 16, 17, 19, the promising cross Giza 89 x Giza 86 and variety Giza 89 possessed average levels of stability and surpassed mean performances. The distribution of α for genotypes 5, 18 and 7 was negative response and did not significantly differ from zero. It indicated that they were more responsive to the environmental change, while genotype no. 9 negatively and significantly differed from zero suggesting that this genotype was responsive to poor environment. Genotypes no 10,11,12,14 and the Variety Giza 86 were considered unstable.

For the fifty boll weight, results in Tables (3&4) and Figure (3) indicated that this trait ranged from 134.9 gm for genotype no. 14 to 155.5 gm for genotype no. 13. Eight strains showed average level of stability and 13 strains higher mean performances. Meanwhile the genotypes no. 4, 9 and 18 possessed the two advantages (average stability and higher performance). The distribution of statistic α and λ indicates that statistic λ was greater than unit for 21 genotypes suggesting the importance of unpredictable (GE) component of interaction. Similar results were obtained by Badr (2003).

Regarding the seed index, results in Tables (3&4) and Figure (4), indicated that this trait ranged from 9.4 gm for the genotypes no. 2 and 7 to 10.7 gm for the genotypes no. 1 and 3. Thirteen genotypes revealed average levels of stability. Meanwhile, eleven genotypes surpassed average mean performances, the genotypes no. 1, 4, 5, 6, 8, 9 and 17 posse average level of stability and also were above average of mean performances. Distribution of $\alpha = 0$ and $\lambda = 0$ for genotype no. 2, and 3 indicated that they were less response to the environmental change and consequently more adaptive for environment. Moreover, the distribution indicated that λ statistic was greater than unity for genotypes no. 10, 12, 15, 16, 19, 20, the Giza 89 x Giza 86, variety Giza 86 and variety Giza 85 suggesting the importance of the unpredictable component of (GE) interaction, and these nine genotypes were declared unstable.

As seen in Tables (3&4) Figure (5), lint percentage was ranged from 33.8 % for genotype no. 14 to 40 % for genotype no. 6. Data revealed that genotypes 12 and 11 had average level of stability and higher mean performances, respectively. The genotypes no 5, 10, 18 and the Variety Giza 86 had average level of stability and above mean performances. Distribution of α for genotypes 2, 6 and 17 was almost equal zero indicating that the three genotypes were response to poor environment. The distribution of λ for the genotypes 4, 9, 11, 13, 14, 19, Giza 89 x Pima S_6, Giza 89 and Giza 85 was greater than unity revealed significant of GE and unstably of these genotypes.

The mean performances and stability measurements of earliness index are shown in Tables (3&4) and graphically illustrated in Figure 6.The results indicated that 9 and 10 genotypes had average level of stability and acceptable mean performance, respectively. The genotypes 6 and 16 exhibited average level of stability and above mean performance. However, the other genotypes, had either average level of stability but under average mean performance like genotypes 2, 4, 5, 10, 17 and the promising cross Giza 89 x Giza 86 or above average mean performances but unstable like genotypes no. 1, 7, 9, 11, 12, 18, 19 and the promising cross Giza 89 x Pima S6.

The results of lint index trait are found in Tables (3&4) and Figure (7), genotypes 12 and 10 had average level of stability and above mean performances, respectively. The genotypes which showed the two features (average level of stability and above mean performances) were no. 1, 3, 6, 10 and the variety Giza 86.

Generally, the main objective of plant breeders in breeding programs is to select genotypes that exhibited high average performance and being more stable at various environments. Subsequently, from pervious results, it is evident that genotypes 1, 4 and 6 met the assumption of the stable genotype described by Tai (1971) and high yield potential, they possessed high mean performances and stability. The genotypes 3, 5, 16 and 17 showed high potential for three traits at least i.e, seed cotton yield and lint cotton yield for all these genotypes. Therefore, it may be concluded that these genotypes may be recommended to be released as commercially stable high yielding cultivars and / or incorporated in breeding program aiming for production stable high yielding lines (Ashmawy *et al*. 2003).

Table 3. Mean performance for different genotypes studied over five environments in 2006 season

Genotypes	Seed Cotton yield	Lint cotton yield	Boll weight	Lint Percent.	Seed index	Lint index	Earliness index
1	10.5	12.2	147.4	37.1	10.7	6.3	69.0
2	10.4	12.2	148.0	37.2	9.4	5.6	60.1
3	10.6	12.2	153.8	36.5	10.7	6.1	66.7
4	10.7	12.2	147.4	36.1	10.4	5.8	63.7
5	10.7	13.3	143.7	39.7	10.6	7.0	68.3
6	10.7	13.6	154.0	40.0	10.4	6.9	69.3
7	9.0	10.4	136.4	36.4	9.4	5.4	70.4
8	9.8	11.2	138.4	36.2	10.2	5.8	65.2
9	9.8	10.8	145.5	35.0	10.1	5.5	70.3
10	8.7	10.7	149.8	39.3	9.8	6.4	66.8
11	10.1	12.5	141.5	39.0	9.6	6.1	71.1
12	10.2	11.9	135.0	36.9	9.8	5.8	69.7
13	11.0	13.3	155.5	38.5	9.9	6.2	68.4
14	10.6	11.3	134.9	33.8	10.0	5.1	66.1
15	11.0	12.9	142.1	37.2	10.1	6.0	78.5
16	11.1	12.6	146.5	35.8	10.1	5.7	70.0
17	10.7	12.2	150.3	35.9	10.3	5.8	66.5
18	9.8	11.6	147.0	37.5	9.5	5.7	74.0
19	11.0	13.1	136.7	37.8	9.9	6.0	77.2
20	10.4	12.5	139.5	38.3	9.5	5.9	71.5
21	10.4	12.4	148.8	37.6	9.9	6.0	66.9
22	9.4	10.6	143.7	36.1	9.7	5.5	62.2
23	9.7	11.7	146.1	38.4	10.3	6.4	61.8
24	9.8	11.7	144.3	37.7	9.7	5.9	67.5
mean	10.3	12.0	144.8	37.2	10.0	5.9	68.4
L.S.D1%	0.569	0.375	6.387	0.897	1.513	1.798	5.377
L.S.D5%	0.433	0.286	4.860	0.682	1.151	1.368	4.091

Table 4. Stability parameters for different genotypes studied over five environments in 2006 season

Genotypes	Seed Cotton yield		Lint cotton yield		Boll weight		Lint Percent.		Seed index		Lint index		Earliness index	
	λ	α	λ	α	λ	α	λ	α	λ	α	λ	α	λ	α
1	0.75	-0.50	0.77	-0.57	2.15	-0.18	1.09	-0.16	1.45	-0.01	1.07	-0.14	0.42	-0.08
2	0.84	-0.69	1.01	-0.70	4.97	-0.06	0.33	0.01	0.35	-0.29	0.40	-0.22	1.82	0.08
3	1.51	0.22	1.70	0.18	3.21	-0.13	1.08	-0.17	0.45	0.25	1.00	0.24	0.42	-0.04
4	0.93	0.24	1.00	0.17	1.86	-0.14	3.35	-0.36	1.43	0.15	0.55	-0.06	0.59	0.27
5	0.59	-0.33	0.38	-0.18	0.95	0.01	1.05	0.09	0.62	0.19	0.32	0.61	1.17	-0.05
6	0.79	0.19	0.84	0.35	3.92	0.09	0.27	-0.03	1.66	-0.20	1.75	0.09	0.64	0.30
7	0.51	-0.33	0.47	-0.36	0.86	-0.07	0.75	-0.08	1.48	0.10	1.09	0.11	2.22	0.00
8	0.52	-0.05	0.68	-0.01	1.10	0.45	0.84	-0.07	0.69	0.09	1.43	0.16	2.17	-0.13
9	0.16	-0.72	0.11	-0.83	1.07	-0.10	2.32	-0.16	1.60	0.31	1.01	0.18	0.06	-0.03
10	4.24	-0.47	4.34	-0.49	2.63	-0.47	0.87	-0.01	2.41	-0.25	1.61	-0.22	0.80	0.01
11	2.73	-0.02	3.33	0.11	5.94	-0.07	2.58	-0.27	0.92	-0.11	2.11	0.01	0.38	-0.10
12	2.95	0.76	3.02	0.88	2.62	0.20	0.48	0.07	2.92	-0.46	1.58	-0.23	0.10	0.16
13	0.45	0.06	0.75	0.01	3.08	0.09	4.82	-0.20	1.08	0.26	2.57	0.01	1.03	0.43
14	2.98	0.08	2.30	-0.06	2.82	0.07	4.25	-0.40	0.84	0.38	0.07	0.09	0.91	0.10
15	1.02	0.23	0.96	0.24	2.36	0.13	1.12	-0.21	2.56	-0.02	2.11	-0.07	2.19	-0.52
16	1.01	0.31	1.10	0.35	3.58	0.05	0.72	-0.09	2.42	-0.49	3.11	-0.45	0.72	-0.05
17	0.96	0.15	1.22	0.14	5.00	-0.09	0.25	0.02	0.71	-0.05	0.62	-0.05	1.54	0.09
18	0.24	-0.11	0.24	-0.07	1.77	-0.01	0.54	-0.08	0.85	-0.05	0.53	-0.04	0.18	-0.19
19	1.35	-0.13	1.34	-0.24	0.87	-0.29	3.86	0.07	4.10	-0.32	4.27	-0.34	0.23	-0.28
20	0.25	1.64	0.25	1.62	3.91	0.74	5.02	-0.36	2.53	0.47	3.00	0.22	2.59	-0.48
21	0.57	-0.07	0.71	-0.01	4.31	-0.11	3.75	-0.23	2.30	0.12	0.14	0.09	1.58	0.09
22	1.04	-0.16	0.84	-0.29	1.47	-0.03	2.84	-0.21	0.60	0.03	0.51	-0.28	4.79	0.31
23	2.14	-0.25	2.32	-0.25	5.70	0.09	1.07	0.06	3.83	-0.11	2.98	0.06	0.38	0.37
24	1.18	-0.07	1.41	0.02	5.50	-0.18	4.59	-0.16	2.44	0.00	5.40	0.24	0.45	-0.29

Genetic estimates and heritability:

Results in Table (5) showed the variance components, heritability estimates and genotypic coefficient of variability (G.C.V). The data indicated the presence of substantial amount of genetic variance for boll weight and earliness index, these results agreed with those obtained by EL-Helw et al (2002).

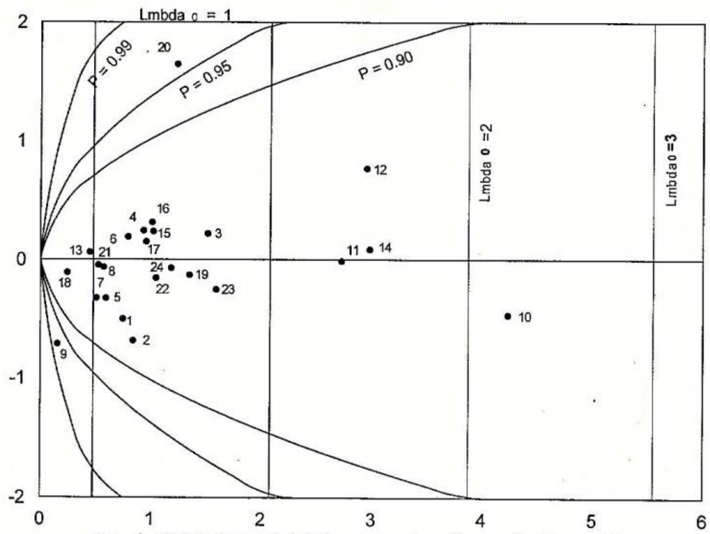

Fig. 1. Distribution of stability parameters for seed cotton yield

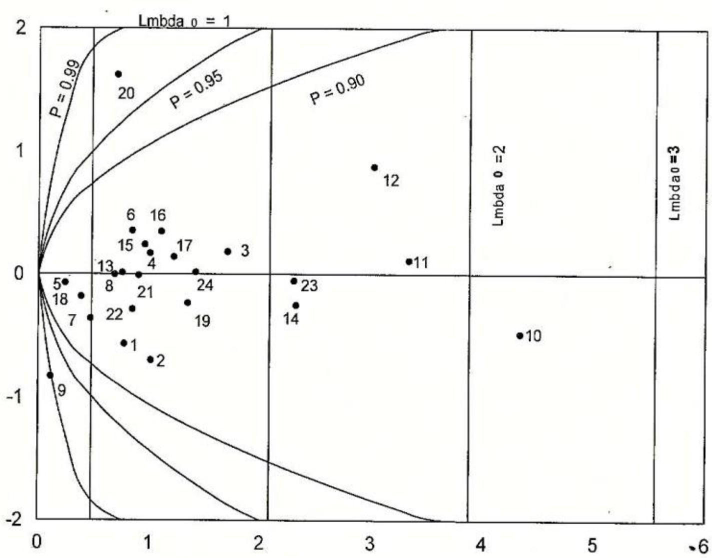

Fig. 2. Distribution of stability parameters for lint cotton yield

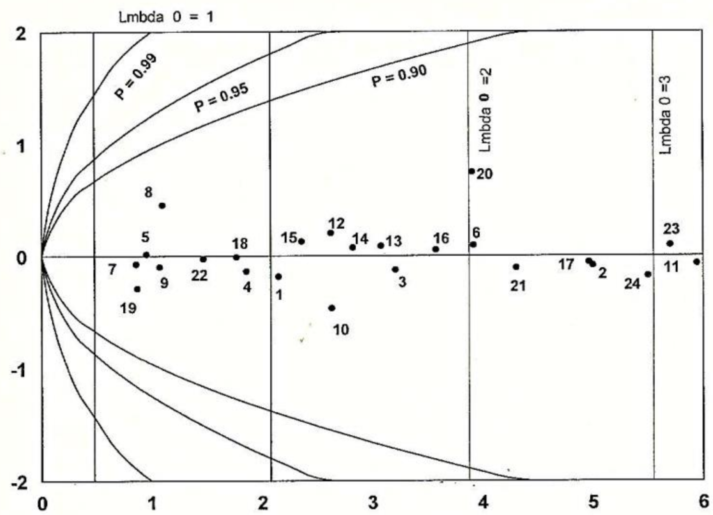

Fig. 3. Distribution of stability parameters for boll weight

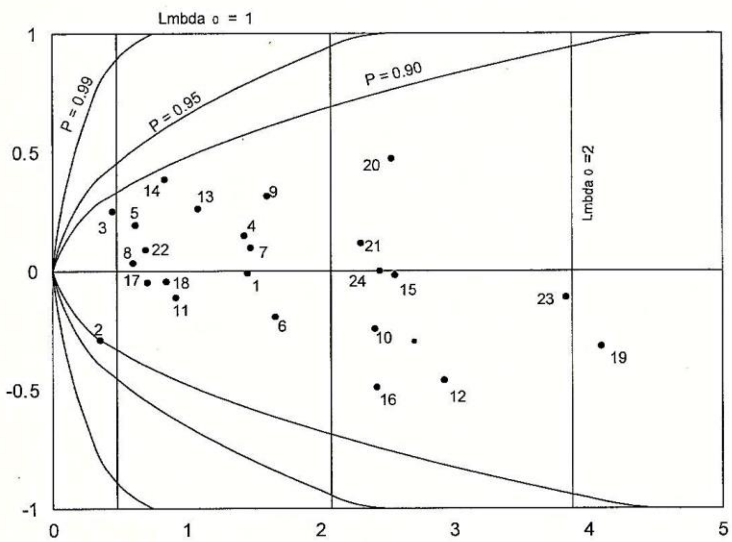

Fig. 4. Distribution of stability parameters for seed index

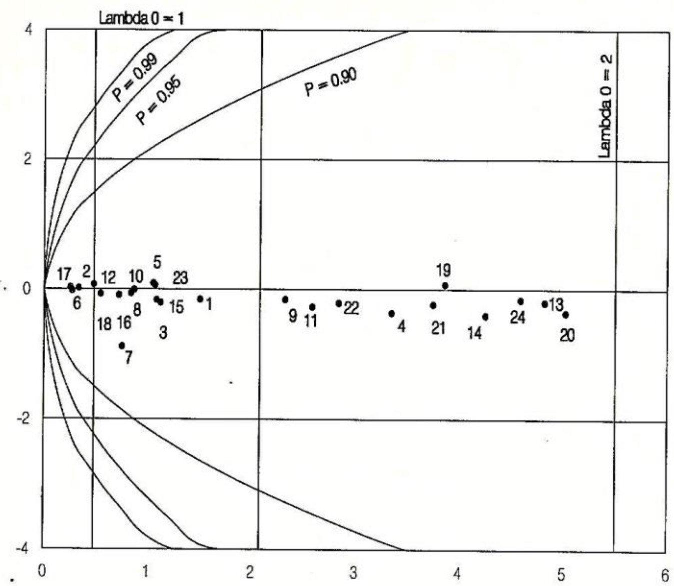

Fig. 5. Distribution of stability parameters for lint percentage

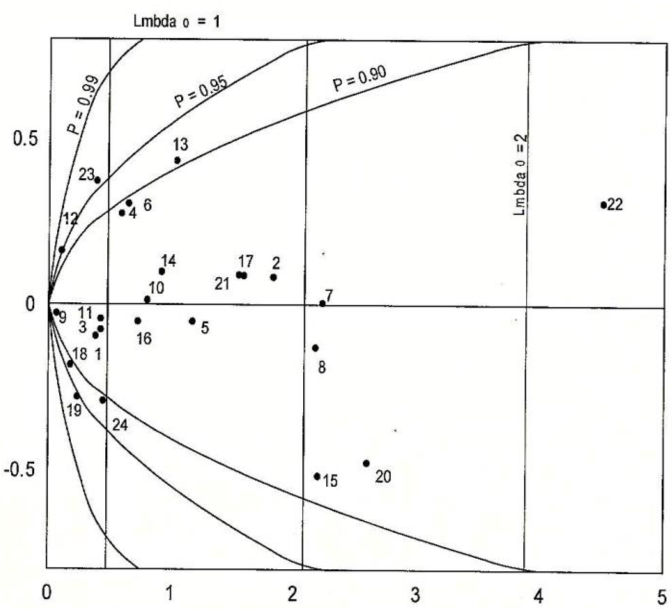

Fig. 6. Distribution of stability parameters for earliness index

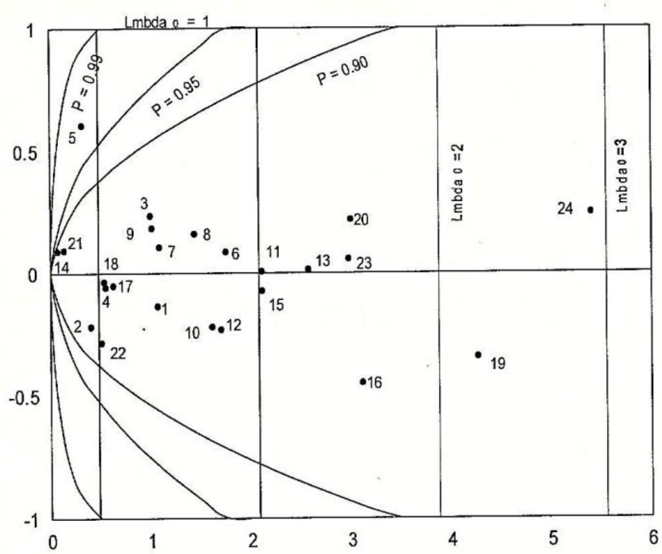

Fig. 7. Distribution of stability parameters for lint index

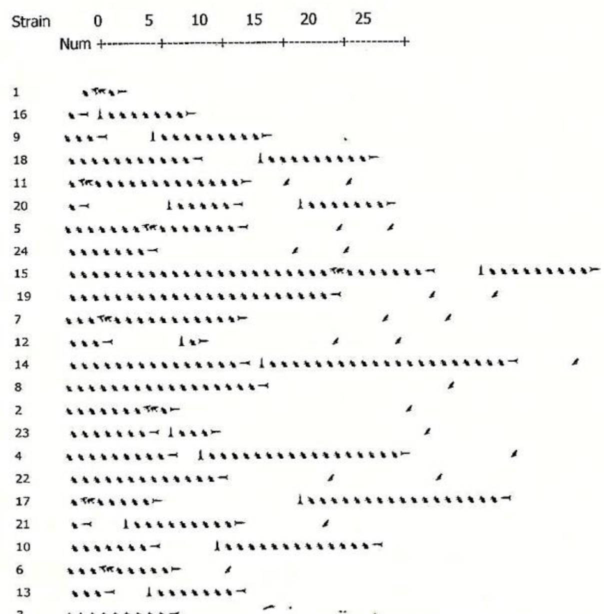

Fig. 8. Den'rogram using Average Linkage (Within Group)

Table 5. Values of the variance components, heritability estimates and genetic variability coefficients (G.C.V.)

	Seed Cotton yield	Lint cotton yield	Boll weight	Lint Percent.	Seed index	Lint index	Earliness index
σ e	2.586	3.654	32.673	0.366	0.909	46.110	0.159
σ g	0.595	0.926	40.511	0.145	0.209	12.728	0.052
σ gl	0.121	0.356	24.728	0.099	2.123	13.523	0.183
σ ph	3.302	4.936	97.912	0.611	3.242	72.362	0.395
h^2 %	18.028	18.759	41.375	23.805	6.450	17.589	13.230
G.C.V	5.77	7.71	27.97	1.45	0.56	18.6	0.88

The genetic coefficient variability (G.C.V) show low values for S.C.Y, L.C.Y, L.%, L.I. and S.I. indicating that the genetic diversity in those characters were low. In the same time, it was of considerable magnitude for boll weight and earliness index (27.79 and 18.6), respectively, indicating that the scope of selection is much more effective for these characters.

Concerning heritability estimates, the results reveled that low moderate estimates of heritability for boll weight of 41.38 %. This indicates that the environment had effect in the inheritance of this character. The low estimates of heritability for the other characters indicated that the environmental variance played substantial roles in the inheritance of these traits. Contrasting results were found by El-Adly *et al.* (2006) who reported high heritability estimates for boll weight, seed cotton yield and lint percentage while moderate heritability estimates in the broad sense were obtained for lint cotton yield, seed index and lint index.

Hierarchical clustering:

Hierarchical clustering was applied to determine the relative genetic diversity and genetic distances within the tested germplasm. Results are shown in the dendrogram in Fig (8). From this figure the studied genotypes were divided into two main clusters and each one was further separated into sub cluster. Generally the first main group contained a large number of genotypes which were distribution in small groups according to the small genetic distance, as follow, the first group contained the genotypes no. 1, 16, 9 and 18, the second group contained genotypes no. 11, 20, 5 and the Variety Giza 85. While the genotypes no. 15 and 19 were separated into unique cluster. The third group contained the genotypes no. 7, 12, 14 and 8.

For the second main group , was subdivided into small similar groups i.e. the first contained the genotypes no. 2, 4, Giza 89 and Giza 86, the second group contained the genotypes no. 7, the promising cross Giza 89 x Giza 86 and 10, finally the last group contained the genotypes no 6, 13 and 3.

Generally narrow genetic distance was observed between the genotypes no. 1 and 16 with the genetic distance (2.18) the data for the genetic distance is not shown, and the high genetic distance were noticed between genotypes no 13 and 14 with the genetic distance (21.37).

Based on this classification and the characters for all genotypes we can conclude that Giza 89 x Pima S_6 can be replaced Giza 85 and also there are some genotypes which can be replaced by this new promising cross in the future, and the same results can be applied for the other group which Giza 89 x Giza 86 can replace the varieties Giza 89 and Giza 86. Similar results were obtained by EL-Feki *et al* (2005). Also from the previous results that show the degree of stability established on the α and λ, and also the genetic distance from the dendrogram no. (8). The breeder can select the genotypes that had average level of stability, high performance and unique cluster to begin the breeding program to increase the percent of segregation in the F_2 and producing stable high yielding lines.

REFERENCES

1. Abou-Zahra, S.I.S., M.M. Awad and S.A El-Shaarawy. 1989. Analysis of genotypic stability in some Egyptian cotton genotypes under different locations. Agric. Res. Rev., 67 (5): 679-686.
2. Anderberg, M.R. 1973. Cluster analysis for applications academic press, New York.
3. Ashmawy,F., A.A.A. Al- Akhadar, A.M.S.A. El- Taweel and Hanem Mohamed. 2003. Egypt. J. Plant Breed. 7 (2): 143- 164.
4. Badr, S.S.M. 1999. Genotypic stability for the new Egyptian cotton varieties Giza 85, Giza 86 Giza 89, Giza 87 and Giza 88. Egypt. J. Agric. Res., 77(1), 331- 342.
5. Badr, S.S.M. 2003. Evaluation and genotypic stability for the hybrid (Giza89 x Giza 86) and some Egyptian long cotton varieties. Egypt. J. Agric. Res., 81(3), 1171-1191.
6. Bilbro,J.D. and L.L.Ray. 1976. Environmental stability and adaptation of several cotton cultivars. Crop Sci. 16: 821- 824.
7. Campdell, B.T.and M.A. Jones. 2005. Assessment of genotype x environment interactions for yield and fiber quality in cotton performance trials. Euphytica,144: 69- 78.

8. Eberhart, S.A. and W.A.Russell. 1966. Stability parameters for comparing varieties. Crop Sci. 6: 36-40.
9. El-Adly, H.H., S.A.S Mohamed and G.M. Hemadia. 2006. Genetic diversity of some cotton genotypes (Gossypium barbadense L.). Egypt. J. Res., 84 (5), 1549-1559.
10. El-Feki, T.A.,M.G.I.Beheary and A.A.A. Al- Akhedar. 2005. Technological and genetical estimates for yield and fiber properties of some extra-long Egyptian cotton promising genotypes. J. Agric. Res. Tanta Univ., 31 (1) 32- 45.
11. EL-Helw, S.S.H.,M.A.M.Allam, Hanem A.Mohamed and M.A. Abd EL-Gelil. 2002. Estimation of stability and genetic parameters for some characters of Egyptian extra-long staple genotypes. J. Agric. Sci. Mansoura Univ. 27(8): 5303 - 5314.
12. El-Shaarawy, S.A. 1998. Use of AMMI model to analysis genotype x environment interaction for Egyptian cotton. Egypt. J. Agric. Res., 76 (2) 773-782.
13. Hair,J.F.Jr., R.E. Anderson and R.L. Tatham. 1987. Multivariate data analysis with reading. Macnillan publ. Co., New York
14. Hassan,I.S.M., A.M. Abdel-Aziz and E.M. Ghoneim. 2000. Balanced response for genotype x environmental interaction in some Egyptian cotton genotypes. J. Agric. Sci. Mansoura Univ. 25(1):23-32.
15. SPSS. 1995. SPSS Computer user, guide. SPSS Inc., USA.
16. Tai, G.C C. 1971. Genotypic stability analysis and its application to potato regional traits. Crop Sci. 11:184-190.

تقدير التنوع الوراثى و الثبات الوراثى لصفات المحصول فى القطن المصرى طويل التيلة

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تهدف هذه الدراسة إلى تقييم بعض التراكيب الوراثية من القطن المصري لدراسة الثبات الوراثي وكذلك درجة التباعد الوراثي حيث تم تقييم عدد ١٩ سلالة و اثنان من الهجن المبشرة وهما الهجين جيزة ٨٩ × ٨٦ والهجين جيزة ٨٩ × بيماس ٦ وكذلك ثلاث أصناف تجارية وهى جيزة ٨٩ وجيزة ٨٦ وجيزة ٨٥ في موسم ٢٠٠٦في تجربة ذات تصميم قطاعات كاملة عشوائية ذو ثلاثة مكررات في خمسة مناطق في الوجه البحري وهى أبو كبير وطنطا وسخا والمنصورة والمنوفية وقد استخدمت طريقة (Tai 1971) لدراسة الثبات الوراثي وتم تحليل التباعد الوراثي باستخدام الحاسب الآلي(برنامج SPSS) .

وتهدف هذه الدراسة لاستخدام المعلومات المتاحة من هذه التقديرات لتوجيه برنامج التربية إما بانتخاب التراكيب الوراثية الأكثر ثباتا مع المحصول العالي أو دراسة تباعد هذه السلالات واختيار السلالات المتباعدة وراثيا لبداية برنامج تهجيني .

ويمكن تلخيص النتائج كالتالي:

١- كان تأثير الصنف والبيئة والتفاعل بينها عالي المعنوية على جميع الصفات تحت الدراسة.

٢- أظهرت تقديرات الثبات الوراثي أن معظم السلالات كان سلوكها متوسط الثبات وكان أدائها أعلى من المتوسط العام وهذه السلالات هي ١و٢و٣و٤و٦و١٥و١٦و١٧و١٩والهجين المبشر جيزة ٨٩ × جيزة٨٦ لكلا من صفتي محصول القطن الزهر والشعر والسلالة ٥ لصفة محصول القطن الزهر فقط بينما أظهرت التراكيب الوراثية ٤و٩و١٨ نفس السلوك لصفة وزن اللوزة والتراكيب الوراثية ٥و١٠و١٨والصنف جيزة ٨٦ لصفة تصافى الحليج والتراكيب الوراثية ١و٤و ٥ و٦و ٨ و٩و١٧ لصفة دليل البذرة والتراكيب الوراثية ١و٣و٦و١٠ لصفة دليل الشعر في حين أن السلالتين٦و ١٦ أظهرتا نفس السلوك لصفة دليل التبكير.

٣- بالنسبة لدراسة التباعد الوراثي فقد كانت السلالتين ١ و ١٦ اقل السلالات تباعدا في حين أن السلالتين ١٣و١٤ أكثر السلالات تباعدا أما بالنسبة لسلوك الأصناف والهجن المبشرة فقد كان الهجين المبشر جيزة ٨٩ × بيماس٦ والسلالتين ٥ و١١ اقرب ما يمكن للصنف جيزة ٨٥. في حين أن السلالتين ٢و٤ كانت درجة تباعدهما الوراثي اقل ما يمكن عن الصنف جيزة ٨٩،في حين الهجين المبشر جيزة ٨٩ × جيزة ٨٦ كانت درجة تباعده الوراثي اقل ما يمكن بالسلالتين ١٧و١٠ .

مما سبق يتضح أن على مربى القطن اختيار السلالات الأكثر ثباتا والأعلى محصولا والأفضل فى التيلة لاستخدامها كأصناف تجارية وكذلك استخدام السلالات الأكثر تباعدا في بداية البرنامج التهجيني . وباستعراض النتائج يمكن الاستدلال على أن الهجين المبشر جيزة ٨٩ × بيماس٦ يمكن أن يكون بديل للصنف جيزة ٨٥ كما توجد سلالات أخرى يمكن أن تكون بديلا جيدا لذلك الهجين المبشر. في حين أن الهجين المبشر جيزة ٨٩ × جيزة ٨٦ يمكن أن يكون بديلا للصنف جيزة ٨٩ أو الصنف جيزة ٨٦.