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SIMULTANEOUS SELECTION FOR YIELD CHARACTERS AND STABILITY IN EXTRA-LONG STAPLE GENOTYPES OF EGYPTIAN COTTON

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Abstract

The main objective of the present study was to compare three selection methods: (1) conventional method based on mean yield alone (YA), (2) Kang's rank-sum (KRS) method, and (3) Yield-stability statistic (YSi) method. The other objective was to study the nature of stability. It was based on genotype-environment (GE) interaction partitioned to heterogeneity due to environmental index (additive main effect) and residual.

The analysis of variance of data set made up of 28 genotype evaluated over six environments indicated significant genotype x environment (GE) interaction for seed cotton yield, boll weight and earliness. While, it was insignificant for lint yield. The removal of heterogeneity revealed that genotype (H11 1414/96) was unstable for seed cotton yield, three genotype (H5 1204/96, H8 1379/96 and G.87) were unstable for boll weight and genotype (H6 1304/96) was unstable for earliness because of the linear effect of environment index. For certain stable genotype, linear and non-linear effect of the environmental index were significant. The KRS method identified the highest number of stable genotypes. The mean seed cotton yield of selected genotypes were 7.92 kentar/feddan for YA method, 7.74 kentar/feddan for KRS method and 7.87 kentar/feddan for yield stability statistic. The fifty bolls weight were 129.10, 126.93 and 126.01gm for the three selection methods, respectively. The mean earliness were 76%, 73.30% and 74.034% for these selection methods, respectively. These reductions were regarded as insignificant considering the breeder would be able to choose more consistently performing genotypes on the basis of KRS than on the basis YA or yield-stability statistic method. Selection of highest genotypes of yield-stability statistic improved this method.

INTRODUCTION

The promising strains derived from hybrids in breeding programe are evaluated in different locations before recommending them for production of farmers. When the multilocation test is made the genotypes performance may vary from location to other due to the significance of genotype x environment (GE) interaction. Plant breeders need practical selection method that would distinguish (GE) interaction. Despite availability of several methods designed to combine yield and stability into single selection criterion (Kang *et al.*, 1991; Kang and Phame, 1991 and Bachireddy *et al.*, 1992), practical integration of stability of performance with yield has not been definitely achieved. Integration of yield and stability of performance across years has generally not been practiced in performance trial, but is of utmost importance for selecting high yielding, stable genotype (Kang and Phame, 1991). Kang and Phame evaluated methods for selecting genotypes on the basis of both yield and stability of performance. The methods included Hühn's (1979) Si3 and Si6 statistic, Lin and Binn's (1988) P1 statistic and Kang's (1988) rank-sum statistic that uses Shukla's (1972) stability variance statistic ($\hat{\sigma}_1^2$). The $\hat{\sigma}_1^2$ is similar to Wrick's (1962) ecovalance (w1) which measures contribution of genotype to GE interaction. Kang's rank-sum (KRS) method (Kang's, 1988) does not take into account significance level of $\hat{\sigma}_1^2$. Recently Kang and Magari (1995) took into consideration significance level of $\hat{\sigma}_1^2$ and adjusted yield rank according to LSD; sum adjusted yield rank and stability ranking to determine YSi statistic.

The objectives of this investigation were: (1) to study the nature of stability for extra long strains, (2) to compare three methods of selection, i.e. conventional method based on mean yield alone, Kang's rank-sum (KRS) method, yield stability statistic (YSi) and highest YSi statistic.

MATERIALS AND METHODS

Twenty eight genotypes were grown in a randomized complete block design with six replication at each of six locations in Nile Delta of Egypt in 1998. The six location were Kafr Saad, Tanta, Meet Ghamer, Tala, Sakha and Dmanhour.

The genotypes consisted of seven cultivars, i.e. Giza 87, Giza 88, Giza 45, Giza 70, Giza 76, Giza 77 and Giza 86 which were numbered (22-28) respectively and 21 genotypes derived from 12 crosses (Table 1). Every strain was sown in plots of five hills (4m long and 60 cm apart). The three central hills of each plot were hand harvested in two harvesting to determine seed cotton yield (SCY) in Kentar/feddan and lint yield (LY) in kentar/feddan and earliness index (E%) according to the following formula:

$$\text{Earliness index} = \frac{\text{Weight of the first harvesting}}{\text{total weight for the tow harvestings}} \times 100$$

A random sample of 50 bolls, harvested from the outer two hills was used to obtain boll weight (BW).

The data for each plot was recorded and subjected to analysis of variance (ANOVA). Because genotype x environment (GE) interaction was significant, it was partitioned into heterogeneity and residual in accordance with Shukla (1972). The $\hat{\sigma}_1^2$ and S_i^2 statistics were computed using (Kang and Magari, 1995) Stable BASIC Program. Selection on the basis of yield rank alone were made by using the LSD with P<0.05 value. All genotypes with yield within one LSD of the highest-yielding genotypes were selected. For the KRS method, the ranks were assigned for mean yield or mean of any character wih the genotypes having the highest mean receiving the rank 28. Similarly, ranks were assigned for $\hat{\sigma}_1^2$ with the lowest receiving the rank 28, while the lower value implies more stable genotype. The two ranks for each genotype were summed. A high rank-sum value was considered desirable. For yield-stability statistic (YSi) method (I) Stability rating (SR) was assigned as follow: -8, -4 and –2 for $\hat{\sigma}_1^2$ significant at 0.01, 0.05 and 0.1 probability levels, respectively, and 0 for insignificant $\hat{\sigma}_1^2$. (II) Yield rank were adjusted according to (LSD) (III) Sums of adjusted yield rank (Y) and stability rating (SR) for each genotype to determine YSi statistic (IV) Calculates mean YSi and identifies genotypes (selection) with YSi > mean YSi. We suggested selection of the same number of genotypes for yield rank alone which showed highest genotypes for yield stability statistic to improvement this method.

RESULTS AND DISCUSSION

ANOVA for yield and other studied traits (Table 2) indicated that the GE interactions were significant for all triats except for lint yield (LY). Partitioning the GE interaction revealed that the heterogeneity caused by the environmental index was significant for lint yield only. The residuals were significant for all traits except lint yield. The significant GE interaction suggested that selection of genotype on the basis of mean yield alone (YA) would not be appropriate for seed cotton yield, boll weight and earliness index. In such situation, methods that combine yield and stability of performance are useful. For lint yield, selection of genotypes on the basis of mean yield alone (YA) would be appropriate.

Stable genotypes and nature of stability:

When $\hat{\sigma}_1^2$ values were examined for seed cotton yield, seven of 28 genotypes were declared unstable (significant $\hat{\sigma}_1^2$) Table (3). After the linear effect of the environmental index was removed and S_i^2 values were examined, six instead of seven genotypes were judged to be stable (significant S_i^2. It was also revealed that genotype number 18 (H_{11} 1414-96) was unstable because of the linear effect of the environmental index. The instability of the six genotypes was probably due to the linear and non linear effects.

For fifty bolls weight, Table (5) showed that when the values $\hat{\sigma}_1^2$ were examined that 17 out of 28 genotypes were considered unstable. When the linear effect of the environmental index was removed, 14 instead of 17 genotypes were judged to be unstable. The three genotypes number 3, 14 and 22 (H_5 1204/96, H_8 1379/96 and Giza 87) were unstable because of the linear effect of the environmental index.

Regarding the earliness index, when $\hat{\sigma}_1^2$ values were examined, six out of 28 genotypes were considered unstable (Table 6). When the values of S_1^2 were examined, five instead of six genotypes were declared unstable due to the removal of linear effect of environmental index. Table (6) showed that the genotype number 9 (H_6 1304/96) was unstable because of the linear effect of environmental index. Information such as this is important in understanding the nature and causes of stability of genotypes (Bachireddy *et al.*, 1992).

Selection:

Regarding seed cotton yield, when selection was based on (YA), nine genotypes were chosen. Eight of the nine selected genotypes were stable (Table 3). Mean yield of these nine genotypes was 7.92 K/F.

When selection was based on the KRS method, eight out of the nine selected genotypes by KRS were the same selected genotypes on the basis of (YA) method (Table 3). The nine selected genotypes based on the KRS were stable with mean yield of 7.74 K/F which recorded reduction of 2.27% less than the mean of selected genotype on the basis of (YA). The breeders may be willing to overlook this reduction (2.27%) for the sake of more consistent performance. When the yield-stability statistic (YSi) was used, ten genotypes were selected with mean yield of 7.87 K/F. One of ten selected genotypes was unstable. The selected genotypes of the highest YSi rank genotype were the same selected genotypes on the basis (YA) Table (3).

Table 3 indicated that seven genotypes number 4, 9, 13, 17, 19, 21 and 23 were selected by four methods (YA, KRS, YSi and highest YSi). Mean yield of YSi method was 7.87 K/F which recorded 0.62% reduction when compared with the (YA) method of selection.

These results indicated that the breeder would be able to choose more consistently performing genotypes on the basis of KRS than YSi and YA. The breeder who is more oriented toward yield than stability may prefer to use the YSi method and highest YSi method (modified method).

Table 4 indicated that seven genotypes were selected on the basis of YA with mean of 8.50 kenyar/feddan. The other methods were not useful because GE was insignificant.

Table 5 showed that four of the seven selected genotypes on the basis (YA) were unstable. Fifty bolls weight of these seven selected genotypes was 129.10 gm. When selection was based on the KRS method, the same two unstable genotypes were selected as those selected on the basis of YA. In addition, five selected genotypes were stable. The fifty bolls weight of KRS selected genotypes was 126.93, which exhibited reduction of 1.66% less than the mean of YA selected genotypes. So the breeder may be willing to sacrifice 1.66% when he can get more consistent performance. When selection was based on YSi method 16 genotypes were selected with mean boll weight of 126.01 gm. Eight out of the sixteen selected genotypes were stable. The higher YSi rank genotypes were the same as those selected genotypes on the basis of YA. These results suggested that KRS method was the best method due to less reduction which the breeder may be willing to sacrifice when they are looking for more consistent performance. Table 5 indicated that five genotypes number 3, 15, 17, 18 and 23 were selected on basis of four methods. The suggested method improved the selection for yield and stability.

Table 6 showed that eight genotypes were selected on the basis of YA with mean earliness of 76%. Four out of the eight selected genotypes were unstable when selection was based on KRS. Eight selected genotypes were stable with mean earliness of 73.3% with reduction of 3.55% less than mean YA selected genotypes. When selection based on YSi method, 15 genotypes were selected with mean earliness of 74.03% which has reduction of 2.3% less than mean YA selected genotypes four out of 15 selected genotypes were unstable. When selection on the basis of highest rank of YSi 8 genotypes was practiced, three of these genotypes were unstable. These higher rank YSi selected genotypes have mean earliness of 75.92% with reduction of only 0.10%. These results indicated that KRS was the best method for selection for stable genotypes and for selection of the highest rank of YSi and was also the best for selection for earliness. Three genotypes were selected on the basis of the four methods.

CONCLUSION

The means of selected genotypes on the basis of KRS method, showed insignificant reduction in the mean of selected genotypes on the basis of yield alone and yield-stability statistic methods. So the breeder would be able to choose more consistently performing genotypes on the basis of KRS. This suggested to modify yield-stability statistic (the highest Ysi) in order to improve the yield-stability statistic.

Table 1. Genotypes of all crosses, their respective parents and their origins.

No.	Genotypes	Parent	Origin
1	H5 1189/96	H4 1133/95-24	G 45 x Bima S^6
2	H5 1196/96	H4 1140/95-13	G 45 x Bima S^6
3	H5 1204/96	H4 1147/95-6	G 70 x Bima S^6
4	H5 1225/96	H4 1166/95-16	G 70 x Bima S^6
5	H5 1241/96	H4 1183/95-31	G 87 x G 71
6	H5 1263/96	H4 1207/95-38	(G 77 x Bima S^6) x [G87 (G77 x G70)]
7	H5 1284/96	H4 1220/95-12	(G 77 x Bima S^6) x [G87 x (G77 x G70)]
8	H6 1298/96	H5 1245/95-37	G 77 x Bima S^6
9	H6 1304/96	H5 1256/95-6	G 77 x Bima S^6
10	H6 1316/96	H5 1264/95-29	G87 x (G77 xG70)
11	H6 1343/96	H5 1276/95-29	G87 x (G77 xG70)
12	H6 1348/96	H5 1279/95-29	G87 x (G77 xG70)
13	H7 1369/96	H6 1360/95-5	(G70xG51B) x (G77 x G45)
14	H8 1379/96	H7 1395/95-2	G84 x G45
15	H8 1387/96	H7 1400/95-28	G84 x G45
16	H8 1400/96	H7 1404/95-16	G77 x [G84 x (G70xG51B)]
17	H9 1404/96	H8 1413/95-4	G68 x G45
18	H11 1414/96	H10 1432/95-4	G84 x (G74xG68)
19	H11 1417/96	H10 1432/95-18	G84 x (G74xG68)
20	H11 1425/96	H10 1443/95-5	G84 x (G74xG68)
21	H19 1434/96	H18 1455/95-5	G84 x (G70xG51B)

Table 2. Mean squars of combined analysis of variance and partitioning of genotype x environment interaction into heterogeneity and residual for seed cotton yield, lint yield, boll weight and earliness.

Source	d.f.	M.S.			
		Seed cotton yield	Lint yield	Boll weight	Earliness
Genotypes	27	27.25 **	40.95 **	711.72 **	695.47 **
Environments	5	864.84 **	856.19 **	35748.6**	19014.82**
Interaction	135	4.28 **	4.63	209.76 **	132.3 **
Heterogeneity	27	1.35	5.65 *	43.15	25.39
Residual	108	4.01 **	3.5	201.13 **	127.33 **
Pooled error	810	1.97	7.74	85.42	83.58

* Significant at 0.05 level.

** Significant at 0.01 level.

Table 3. Yield, yield rank (x), stability variance statistic $\hat{}\sigma_1^2$ Kang's rank sum (KRS), stability rating, S_1^2 statistic adjusted rank and yield-stability (YS_i).

No.	yield	Yield Rank	^_12	^_12 Rank	Rank sum KRS	Stability rating SR	$^\wedge S_1^2$	Adjusted rank	YS_i	Ys_i higher selected
1	6.23	6	0.62	27	33	0	0.6	4	4	
2	5.95	3	1.98	20	23	0	1.86	1	1	
3	6.77	12	0.32	28	40+	0	0.31	11	11	
4	8.13	26+	3.81	11	37+	-2	3.53	29	27+	+
5	6.03	4	9.31**	3	7	-8	8.58**	2	-6	
6	6.65	10	2.62	15	25	0	2.51	9	9	
7	7.84	22+	3.08	12	34	0	2.97	24	24+	+
8	6.85	13	2.12	13	26	0	2.8	12	12	
9	7.56	20+	2.56	16	36+	0	2.32	22	22+	+
10	7.11	15	6.45**	8	23	-8	6.08*	16	8	
11	6.89	14	4.25	10	24	-2	3.98	13	11	
12	7.26	17	12.26**	2	9	-8	11.48**	18	10	
13	7.69	21+	2.39	17	38+	0	2.25	23	23+	+
14	6.45	7	0.74	26	33	0	0.71	6	6	
15	6.22	5	7.69**	7	12	-8	7.00**	3	-5	
16	7.15	16	7.96**	6	22	-8	7.58**	17	9	
17	8.17	27+	2.69	14	41+	0	2.53	30	30+	+

Table 3. continued:

No.	yield	Yield Rank	^_12	^_12 Rank	Rank sum KRS	Stability rating SR	$^\wedge S_1^2$	Adjusted rank	YS_i	Ys_i higher selected
18	7.98	25+	5.03*	9	34	-4	4.43	27	23+	+
19	7.86	23+	1.29	23	46+	0	1.25	25	25+	+
20	7.52	19	9.00*	4	23	-8	8.39**	20	12	
21	7.88	24+	2.21	18	42+	0	2.13	26	26+	+
22	6.48	8	8.34**	5	13	-8	7.73**	7	-1	
23	8.21	28+	0.79	25	53+	0	0.77	31	31+	+
24	4.55	1	15.04**	1	2	-8	14.37**	-2	-10	
25	6.52	9	1.87	21	30	0	1.75	8	8	
26	5.79	2	1.66	22	24	0	1.61	-1	-1	
27	6.66	11	2.03	19	19	0	1.94	10	10	
28	7.43	18	0.96	24	42+	0	0.88	19	19+	
Mean	6.99								12.07	
L.S.D.	0.54									
No. of selected genotype		U S 9= 1 + 8			U S 9 = 0 + 9				U S 10=1 + 9	U S 9 = 1 + 8
Mean yield of selected genotype	7.92				7.74				7.87	7.92
% Reduction in yield	0				2.27				0.62	0

* = Significant at 0.05 level. ** = Significant at 0.01 level.

U = unstable . S = stable. + = Selected genotype.

Table 4. Lint yield, yield rank (x), stability variance statistic $\hat{\sigma}_1^2$, Kang's rank sum (KRS), stability rating, $\hat{S}1^2$ statistic adjusted rank and yield-stability (YS_i).

No.	Lint yield	Yield Rank (x)	^_12	^_12 Rank	Rank sum KRS	Stability rating SR	^S12	Adjusted rank	YS_i	YS_i higher selected
1	6.32	8	0.42	27	35	0	0.4	7	7	
2	6.27	7	2.19	19	26	0	1.77	6	6	
3	7.25	16	0.62	26	42+	0	0.5	17	17+	
4	8.28	22+	3.98	11	33	0	2.68	24	24+	+
5	5.86	2	9.54	2	4	0	6.44	0	0	
6	7.24	15	3.61	15	30	0	3.51	16	16+	
7	7.45	19	3.67	14	33	0	3.36	20	20+	
8	7.39	18	4.76	10	28	0	4.61	19	19+	
9	7.9	20	3.73	13	33	0	1.09	21	21+	+
10	6.88	12	8.58	3	15	0	6.13	11	11	
11	6.06	4	1.98	20	24	0	1.92	2	2	
12	6.57	10	7.55	7	17	0	6.66	9	9	
13	7.35	17	1.76	23	40+	0	1.67	18	18+	
14	6.46	9	0.87	25	34	0	0.76	8	8	
15	6.16	6	7.53	8	14	0	2.9	5	5	
16	7.22	14	8.46	4	18	0	7.18	15	15+	
17	8.7	27+	3.14	18	45+	0	2.9	29	29+	+

Table 4. continued:

No.	Lint yield	Yield Rank (x)	^_12	^_12 Rank	Rank sum KRS	Stability rating SR	^S12	Adjusted rank	YS_i	Ys_i higher selected
18	8.49	25+	8.27	5	30	0	0.82	27	27+	+
19	8.34	24+	1.97	21	45+	0	1.84	26	26+	+
20	7.91	21	8.2	6	27	0	5.86	22	22+	+
21	8.29	23+	3.43	17	40+	0	3.31	25	25+	+
22	6.1	5	7.4	9	14	0	5.62	4	4	
23	8.7	28+	1.9	22	50+	0	1.85	30	30+	
24	4.4	1	16.79	1	2	-2	15.77	-2	-4	
25	6.65	11	1.62	24	35	0	1.14	10	10	
26	5.98	3	3.48	16	19	0	3.35	1	1	
27	7.12	13	3.73	12	25	0	3.52	12	12	
28	7.69	16+	0.39	28	44+	0	0.36	28	18+	
Mean	7.14								14.57	
L.S.D.	1.08									
No. of selected genotype	7				7				15	
Mean yield of selected genotype	8.5				8.19				7.95	8.27
% Reduction in yield	0				3.66				6.51	2.67

Table 5. Mean 50 boll weight, Boll weight rank, stability variance statistic $\hat{}\sigma_1^{2}$ Kang's rank sum (KRS), stability rating, S_1^2 statistic adjusted rank and boll weight stability (YSi).

No.	Boll weight (Y)	BW Rank (X)	^ _1 2	^ _1 2 Rank	Rank sum KRS	Stability rating SR	$\hat{}S_1^2$	Adjusted rank	YS_i	Ys_i higher selected
1	119.17	4	173.79	18	22	-2	167.16	2	0	
2	119.33	5	246.83*	9	14	-4	237.19*	3	-1	
3	128.5	23+	206.81*	15	38+	-4	198.41	25	21+	+
4	120.67	8	332.24**	4	12	-8	319.76**	7	-1	
5	125.17	21	403.83**	2	23	-8	388.19**	22	14+	
6	125	20	301.10**	6	26	-8	288.51**	21	13+	
7	121.5	11	78.96	25	36	0	75.31	10	10+	
8	117.33	3	240.83*	11	14	-4	229.82*	1	-3	
9	119.5	6	60.5	27	33	0	58.29	4	4	
10	122	12	58.15	28	40+	0	55.91	11	11+	
11	124	15	112.33	22	37	0	107.98	16	16+	
12	124.17	17	299.06**	7	24	-8	284.62*	18	10	
13	124	15	96.83	23	38+	0	92.82	16	16+	
14	122	12	201.41*	17	29	-4	193.97	11	7	
15	128.67	24+	84.67	24	48+	0	81.31	26	26+	+
16	113.33	1	301.93**	5	6	-8	289.45**	-2	-10	
17	129.5	27+	222.50*	14	41+	-4	211.71*	29	25+	+

Table 5 continued:

No.	Boll weight (Y)	BW Rank (X)	$\hat{}_{-1}2$	$\hat{}_{-1}2$ Rank	Rank sum KRS	Stability rating SR	$\hat{}S_1^2$	Adjusted rank	YS_i	YS_i higher selected
18	127.17	22+	152.01	20	42+	0	146.01	24	24+	+
19	124.5	18	234.50*	13	31	-4	224.41*	19	15+	
20	116	2	69.13	26	28	0	66.57	-1	-1	
21	132.5	28+	251.49*	8	36	-4	242.15*	31	27+	+
22	121.33	10	206.39*	16	26	-4	196.43	9	5	
23	128.67	24+	159.72	19	43+	-2	153.07	26	24+	+
24	121	9	425.44**	1	10	-8	409.17**	8	0	
25	122.17	14	125.43	21	35	0	120.56	13	13+	
26	119.83	7	347.49**	3	10	-8	331.82**	6	-2	
27	124.5	18	238.38*	12	30	-4	229.56*	19	15+	
28	128.67	24+	241.41*	10	34	-4	231.34*	26	22+	+
Mean	123.22								10.71	
L.S.D.	3.58									
No. of selected genotype		U S			U S				U S	U S
		7= 4 + 3			7 = 2 + 5				16=8 + 8	7 = 4 + 3
Mean yield of selected genotype	129.1				126.93				126.01	129.1
% Reduction on yield	0				1.66				2.39	0

* = Significant at 0.05 level. ** = Significant at 0.01 level.

U = unstable . S = stable. + = Selected genotype.

Table 6: Mean of earliness, mean rank (x), stability variance statistic $\hat{\sigma}_1^2$ Kang's rank sum (KRS), stability rating, S_1^2 statistic adjusted rank and earliness stability (YSi).

No.	Earliness mean	Earliness rank (x)	$\hat{\sigma}_1^2$	$\hat{\sigma}_1^2$ Rank	Rank sum KRS	Stability rating SR	$\hat{S}_1^2$	Adjusted rank	YS_i	YS_i higher selected
1	74.55	21+	363.96**	1	22	-8	350.06**	23	15+	
2	74.9	23+	97.65	15	38+	0	93.7	25	25+	+
3	72.17	17	64.64	20	37+	0	62.21	18	18+	
4	77.03	26+	111.8	14	40+	0	107.6	28	28+	+
5	64.35	3	84.28	17	20	0	81.17	1	1	
6	70.65	16	74.72	19	35	0	71.78	17	17+	
7	76.58	25+	81.03	18	43+	0	78.01	27	27+	+
8	67.93	8	28.02	27	35	0	26.98	7	7	
9	77.22	28+	191.65*	6	34	-4	184.52	30	26+	+
10	72.98	18	51.65	25	43+	0	49.61	19	19+	
11	68.58	12	179.7	8	20	-2	173.05	11	9	
12	68.1	9	149.64	10	19	0	143.64	8	8	
13	68.22	10	87.65	16	26	0	84.19	9	9	
14	73.92	20	17.14	28	48+	0	16.51	21	21+	+
15	74.87	22+	176.86	9	31	-2	170.07	24	22+	+
16	69.25	13	37.12	26	39+	0	35.67	12	12	
17	69.6	14	55.03	23	37+	0	52.99	13	13+	

Table 6 continued:

No.	Earliness mean	Earliness rank (x)	$\hat{}_{-1}^{2}$	$\hat{}_{-1}^{2}$ Rank	Rank sum KRS	Stability rating SR	$^{\wedge}S_1^{2}$	Adjusted rank	YS_i	YS_i higher selected
18	73.47	19	142.63	12	31	0	136.81	20	20+	
19	75.65	24+	239.04*	4	28	-4	229.57*	26	22+	+
20	77.2	27+	302.40**	3	30	-8	291.14**	29	21+	+
21	67.43	7	52.26	24	31	0	50.32	6	6	
22	63.53	2	231.84*	5	7	-4	223.14*	0	-4	
23	68.48	11	133.09	13	24	0	128.06	10	10	
24	63.4	1	184.07	7	8	-2	175.87	-2	-4	
25	64.92	4	146.75	11	15	0	141.04	2	2	
26	69.73	15	59.55	21	36	0	57.34	14	14+	
27	66.3	6	56.97	22	28	0	54.61	4	4	
28	66.23	5	303.82**	2	7	-8	292.54**	3	-5	
Mean	70.62								12.96	
L.S.D.	3.55									
No. of selected genotype		U S 8= 4 + 4			U S 8 = 0 + 8				U S 15=4+11	U S 8 = 3 + 5
Mean yield of selected genotype	76				73.3				74.04	75.92
% Reduction on yield	0				3.55				2.58	0.11

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الانتخاب المتزامن لصفات المحصول و الثابات فى سلالات فائقة الطول للقطن المصرى

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معهد بحوث القطن – مركز البحوث الزراعية

تهدف هذه الدراسة لدراسة ثبات التراكيب الوراثية وطبيعة الثبات كما تهدف مقارنة طريقتين للانتخاب المتزامن للصفات والمحصول وهما.

١- طريقة مجموع الترتيب لكل من الصفة والثبات الوراثى بطريقة **Kang 1988** .

٢- طريقة التقدير الاحصائى للمحصول/النبات **Kang and Magari, 1995 (SYi)** .

بالإضافة لطريقة الانتخاب للصفة فقط مع انتخاب أعلى قيمة للصفة فى حدود **.L.S.D**وقد تم التقييم لعدد ٢٢ طراز وراثى فائق الطول بجانب ستة أصناف فائقة الطول هى جـ٨٧، جـ٨٨، جـ ٤٥، جـ٧٦، جـ ٧٠ ، جـ ٧٧ مع صنف طويل جـ ٨٦.

زرعت هذه الطرز الوراثية مع الاصناف فى ستة مناطق فى الوجه البحرى هى كفر سعد، طنطا، تلا، ميت غمر، سخا، دمنهور فى تجارب صممت بنظام قطاعات كاملة العشوائية ذو ستة مكررات ومساحة القطعة خمسة خطوط بطول أربعة أمتار وأخذ عدد ٥٠ لوزة من الخطين الخارجيين لكل قطعة تجريبية، وأخذت قراءات المحصول من الثلاثة خطوط الوسطى وتم الجنى على جنيتين وتم حساب التبكير من المعادلة الآتية:

$$\text{معامل التبكير} = \frac{\text{وزن محصول القطن الزهر فى الجنية الأولى}}{\text{مجموع وزن محصول القطن الزهر للجنيتين}} \times ١٠٠$$

وتم معالجة البيانات باستخدام برنامج الثبات **(Stable Basic program)**.

وكانت أهم النتائج كما يلى:

١- كان التفاعل بين البيئة والطرز الوراثية معنوى لصفات محصول القطن الزهر- وزن اللوزة - معامل التبكير بينما لم يكن معنويا فى حالة محصول الشعر.

٢- بتجزئة التفاعل بين البيئة والطرز الوراثية إلى التأثير المضيف لعامل البيئة والأثر المتبقى كان التأثير المضيف معنوى فقط فى حالة محصول الشعر بينما المتبقى معنويا فى باقى الصفات.

٣- كان التأثير المضيف سببا فى عدم ثبات الطراز هـ١١ ٩٦/١٤١٤ فى محصول القطن الزهر.