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Efficiency of Selection for Seed Cotton Yield under Newly Reclaimed Lands Conditions

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ABSTRACT

Selection for seed cotton yield plant^{-1} was applied in F_2, F_3 and F_4-generations of a population of cross Giza 80 X Giza 90 cotton. The experiment was carried out during three successive summer seasons; 2019, 2020 and 2021 at farm west of Minia, El Minia under new reclaimed lands conditions. Entries mean squares of the selection criterion; seed cotton yield were significant or highly significant in F_3 and F_4-generations. Reduction was observed in the phenotypic and genotypic coefficients of variability from F_3 to F_4 compared to the phenotypic variation in F_2 for the most studied traits as a result the selection for seed cotton yield/plant and reduction the genetic variation. Moreover, increasing the homozygosity. The four selected families of no. 13, 17, 18 and 26 were showed highly significant increase compared to both bulk and better parent for the two traits seed cotton yield and lint yield plant^{-1}. Seed cotton yield /plant was showed positive genotypic and phenotypic correlation coefficients with bolls weight, lint yield /plant^{-1} and number of bolls plant^{-1}. While, negative correlations were observed for Seed cotton yield / plant with each of lint percentage and lint index on genotypic and phenotypic levels.

Keywords: selection, population, cross, phenotypic, homozygosity.

INTRODUCTION

Cotton is the most important fiber crop not only in Egypt, but also all over the world. Cotton production in Egypt faces some constraints, notably the apparent delay by farmers in sowing cotton to gain complete winter crop before cotton.

In Egypt cotton is important for both export and local textile industry. Egyptian cottons of long and extra-long staple have a good reputation worldwide for their good fiber quality. Furthermore, cotton is the second major oil seed crop after soybeans which is used to produce oil all over the world. Development of a new variety with high yield and fiber quality parameters is the prime objective of all cotton breeders.

Plant breeders are continuously searching for more effective and efficient selection method. Although several selection methods were used to improve cotton traits.

Hybridization followed by pedigree selection was and still the breeding procedure that yielded all Egyptian cotton varieties grown commercially. Most of plant breeders use pedigree selection method to develop cotton varieties.

The information about the degree of association among different traits and different generations (F_2, F_3 and F_4) of cotton is of great importance to plant breeding programs designed to combine the desirable expression of several characters.

Negative correlation between any traits selected may results in a reduction in the rate of improvement for some of the traits in comparison to the improvement that could be attained if the correlations were positive or non-existent. Therefore, the breeder should use some kinds of modified selection procedures to improve the population mean of concerned traits.

The Egyptian cotton variety Giza 90 traced back to a cross between Dandra and Giza 83, it released in season 2000. It was bred to replace Giza 83 in the southern districts of Upper Egypt, due to its high tolerance to high temperature. Giza 90 is characterized by earliness, high yield potentiality, tolerance to high temperature, lowest level of quality compared with other Egyptian cottons, it is low in its price and very suitable for population garments. Abdel-Zaher et al. (2007), Khan et al. (2009), Tang et al. (2009) and Soomro et al. (2010) and Abdel-Zaher et al. (2006) found that the genotypes mean squares were highly significant for seed index, lint percentage and lint index in both seasons and in combined analysis. However, insignificant mean squares were obtained in both seasons among the pure nuclei for all yield traits.

The main objective of the present study was to determine selection efficiency for seed cotton yield/plant and its effect on the other traits.

MATERIALS AND METHODS

Selection for seed cotton yield plant^{-1} in a segregation population of cotton (*Gossypium barbadense* L.) under new reclaimed lands conditions.

Table 1. The chemical analysis of the sandy soil.

Items	Value	Range			
p H	7.8	7.00 - 7.50			
E.C.	1.15	1.00-2.00			
Ca Co3 %	4.17	≤ 7.00			
Soluble Cations (meq/L.)			Soluble Anions (meq/L.)		
Ca +2	9.00	0.30	CO_3^{-2}	0.00	-
Mg +2	1.00	3.00	HCO_3^{-1}	10.00	-
Na +	13.00	0.30	Cl	1.40	-
K +	0.12	-	SO_4^{-2}	0.10	-
Macro elements (ppm)			Micro elements (ppm)		
N	10.00	80.00-100.00	Fe	1.57	4.00-6.00
P	0.02	15.00-25.00	Cu	0.62	1.00-1.50
K	91.00	250.00	Zn	0.24	1.20-1.50
			Mn	0.21	1.80-2.00

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The experiment was carried out for three successive seasons; 2019, 2020 and 2021 at Mallawy Agriculture Research station, El Minia. The basic material was a segregating population in F_2-generation raised from the cross (Giza 80 X Giza 90).

Table 2. The pedigree and categories of the two parental cotton varieties.

Variety	Pedigree	Category
Giza 80	Giza 66 x Giza 73	Long stable
Giza 90	Giza 83 x Dandara	Long stable

Experiment layout:

In 2019 season, 500 individuals' plants in F_2-generation were grown on March 26th 2019 in spaced plants in rows 60. cm apart and 40 cm within a row between hills. After full emergence three weeks after growing the hills were thinned to one plant per hill. Also, the two parents were grown in separate plot. The recommended cultural practices for cotton production in newly reclaimed lands were adopted throughout the growing seasons.

Data were recorded on 400 plants from each population. At end of the growing season, two pickings were taken on all single plants. Pedigree selection was practiced on the highest 100 yielding plants in seed cotton yield / $plant^{-1}$ as a selection criterion (25% selection intensity) form each population.

An equal number of from each plant (500 plants) were bulked to give F_3 random bulk sample.

In 2020 season, the100 families along with the parents and the bulk simple were grown in March 29th 2020. A randomized complete black design of three replications was used. The plot size was one row 4 m. in long, 60 cm. apart and 40 cm. within a row between hills. After full emergence seedlings were thinned to one plant per hill (10 plants/row). At end of the season, the best plant from each of the best 30 families in seed cotton yield $plant^{-1}$ was save to give 30 selected plants for the selection criterion (seed cotton yield per plant).

In 2021 season, the thirty selected plants (F_4-generation) were grown on March 24th 2021. The same procedures for the previous season were followed.

The following traits were recorded on individual guarded plants of each plot of the two populations.

1- Seed cotton yield /plant in gm. (SCY/P) was determined as the total seed cotton yield of the two picks.
2- Lint yield / plant in (gm.) (LY/P) was determined as total lint yield of the two picks of each plant.
3- Lint percentage (LP) was determined as the percentage of lint yield to seed cotton yield per plant.
4- Boll weight in gm. (BW) was estimated as average weight of bolls/plant.
5- Number bolls / plant (NB/P)
6- Seed index in gm. (SI) was determined as weight of l00 seeds.
7- Lint index in gm. (LI) was estimated as weight of lint cotton in sample (weight of seeds in this sample) x seed index.

The following fiber quality traits were taken on only 100 individual plants selected from F_2-generation in season 2019 because of difficulty take fiber quality traits on the all F_2 plants (500 plants), while in F_3 and F_4, the four fiber quality traits were taken on all selected plants by 100 plants of F_3 and 30 plants of F_3.

1- Fiber fineness (Mic), fineness was expressed as Micronaire value.
2- Fiber strength as Pressley Index (PI) was measured by the H.V.I instrument
3- Fiber length (UHM), the Upper Half Mean length was measured by H.V.I.
4- Uniformity index (UI %) was measured as a ratio between the mean length and the upper half mean length of fibers and is expressed as a percentage.

Table 3. The form of analysis of variance, covariance and their expected mean squares (EMS).

S.O.V	d.f	M.S.	E.M.S.	
			Variance	Covariance
Replications	r-1	M_3	$\sigma^2e + g\sigma^2r$	$\sigma_{e.y} + g\sigma_{r.ij}$
Genotypes	g-1	M_2	$\sigma^2e + r\sigma^2g$	$\sigma_{e.ij} + r\,\sigma g_{r.ij}$
Error	(r-1)(g-1)	M_1	σ^2e	$\sigma_{e.ij}$

Statistical procedures:

Data were subjected to proper statistical analysis of RCBD according to Steel and Torri (1980). Analysis of variance and covariance were performed on the studied traits based on the plot mean. Two analysis of romance were done the first one was for all genotypes (selected family) + parents + bulk samples and the second one was for the selected families only to estimate heritability, genotypic and phenotypic coefficients variations, phenotypic and genotypic correlations were estimated by the methods outlined by Johnson *et al*. (1955).

Where: r and g are number of replications and genotypes, respectively. σ^2_e and $\sigma_{e.ij}$ gave are error variance and covariance respectively and σ^2_g and gov. g are genotypic variance and genotypic covariance respectively. The phenotypic ($\sigma^2 p$) variance were calculated according to the following formula: $\sigma^2_g = (M_2 - M_1)/r$, $\sigma^2_p = \sigma^2_g + (\sigma^2_e/r)$

Broad sense heritability H.bs was estimated as the ratio of genotypic σ^2_g to phenotypic (σ^2_p) variances according to Walker (1960).

The phenotypic (pcv%) and genotypic (gcv%) coefficients of variability were estimated according to Burton (1952) as follows:

$$\text{pcv \%} = \frac{\sigma p}{\bar{X}} X\ 100 \quad , \quad \text{gcv \%} = \frac{\sigma g}{\bar{X}} X\ 100$$

Where, 6 p and 6 g are standard deviation of phenotypic and genotypic of the families mean, respectively and $\bar{X}$ is mean of the families for a given trait.

The calculation of the phenotypic covariance (cor p12) and genotypic covariance (cor g12) between pairs of traits (1 and 2) followed the same from as analysis of variance.

Phenotypic (rp x y) x and genotypic (rg x y) correlation coefficients were determined as outlined by Hanson *et al*. (1956).

Estimates of broad sense heritability in F_2-generation were as follows:

$$\sigma^2_E = \frac{\sigma^2_{p1} - \sigma^2_{p2}}{2}$$, **where, P1 and P_2 are the two parent's varieties.**

$$\sigma^2_G = \sigma^2_{F2} - \sigma^2_E$$ **Where, σ^2_G is the genotypic variance.**

Estimates of expected genetic advance (Δ G) in F_2-generation as follows:

$$\Delta G = Sh^2 = I\,\sigma p\, h^2$$

where S= the selection differential, and it depended on selection intensity and phenotypic standard deviation of F_2

$$S = i\sigma p \text{ (Falconer, 1981)}$$

Where, I = selection intensity

σp = phenotypic standard deviation and h^2 = heritability of the character

Observed direct selection response for the selected families were determined by following formula given by Steel and Torri (1980) and measured as deviation percentage of family mean from the bulk sample or the better parent.

The significance of observed direct response to selection was using least significant difference LSD as follows: $L.S.D = t \cdot \sqrt{\frac{2\,MSe}{r}}$

RESULTS AND DISCUSSION

A- Description of the base population.

Mean of seed cotton yield /plant in the F_2-generation ranged from 20.26 to 173.20 gm. with an overall mean of 65.74 gm (Table 4). Indicating wide range of variability of the population and selection for seed cotton yield could be effective. Similar results are found by Shaheen et al. (2000), Jin and Zhang (2005), El-Lawendey et al. (2008) and El-Okkiah et al. (2008).

Comparing the population mean with the two parental means indicated over dominance towards the high yielding parent Giza 90 in seed cotton (65.47 gm.) in which the population mean (65.74 gm.) (Figure 1). The coefficient of variability in seed cotton yield were 41.10%, these values were very high indicating ability for selection seed cotton yield in F_2-generation of the base population (Table 4). Similar results are found by Mahdy et al. (2001a), Mahdy et al. (2006), Mahdy et al. (2007) and Hassaballa et al. (2012).

The phenotypic variance of seed cotton yield was very high (730.17) compared the two parents 229.66 Giza 80 and 582.19 of Giza 90. The wide range of variability of the two parents which are determine the environmental variances reduced the genetic variance in F_2-generation of the population. Furthermore, the dominance effect was obvious hence estimates of broad sense heritability was intermediate by 44.41% (Table 4).

Estimate of broad sense heritability were high for lent percentage (68.12%), number of boll (58.24%) and lint index (67.05%) while, were intermediate for the rest traits ranged from 41.59% of boll weight to 48.01% of seed index.

Regard lint cotton yield ranged from 7.10 to 66.50 gm. with average 25.14 g. The population showed dominance or over dominance compared to the highest parent of Giza 90 (24.83 gm.). Over dominance towards to the lower parent Giza 90 was observed of traits seed index (7.46 gm.) and lint index (4.55 gm.) where the population means were 7.07 of seed index and 4.36 gm. of lint index. Lint percentage showed partial dominance towards to the lower parent Giza 80 (38.31%) where the population mean was 38.02%. The same trend was observed for weight bolls (Table 4 and Figure 1).

Table 4. Means, phenotypic variance (δ²ph), broad sense heritability (H b) and expected genetic advance (ΔG) of the base population (F2) for the studied traits in cotton; season 2019.

Items	SCY/P	LCY/P	L %	N.B/P	BW	SI	LI
Mean	65.74	25.14	38.02	35.22	1.88	7.07	4.36
±SE	±1.35	±0.54	±0.11	±0.75	±0.01	±0.02	±0.03
σ^2 ph	730.17	117.18	4.58	225.98	0.02	0.23	0.27
Kurtosis	1.71	1.28	7.19	2.25	0.10	0.08	0.76
Skewness	1.23	1.18	-1.30	1.35	-0.32	0.22	-0.13
Min.	20.26	7.10	22.28	9.65	1.50	5.80	1.95
Max.	173.20	66.50	44.80	96.22	2.20	8.80	6.11
C.V.%	41.10	43.06	5.63	42.68	7.35	6.74	11.94
H b %	44.41	47.10	68.12	58.24	41.59	48.01	67.05
ΔG	15.25	6.48	1.85	11.13	0.07	0.29	0.44
ΔG/Mean	23.20	25.77	4.87	31.59	3.89	4.12	10.17
			Giza 80				
Mean	63.23	24.16	38.31	34.98	1.80	7.54	4.68
±SE	±4.79	±1.74	±0.33	±2.28	±0.04	±0.09	±0.05
σ^2	229.66	30.30	1.06	51.99	0.02	0.08	0.02
Min.	42.90	16.30	36.73	23.83	1.60	7.10	4.35
Max.	90.10	34.10	40.11	47.42	2.00	8.00	4.89
C.V.%	23.97	22.78	2.69	20.61	6.93	3.86	3.37
			Giza 90				
Mean	65.47	24.83	37.77	33.75	1.93	7.46	4.55
±SE	±7.63	±3.06	±0.43	±3.70	±0.03	±0.12	±0.12
σ^2	582.19	93.69	1.86	136.74	0.01	0.15	0.15
Min.	34.90	13.10	35.54	18.37	1.80	6.90	4.03
Max.	106.70	42.60	39.93	53.35	2.00	8.00	5.25
C.V.%	36.85	38.98	3.61	34.65	4.27	5.22	8.64

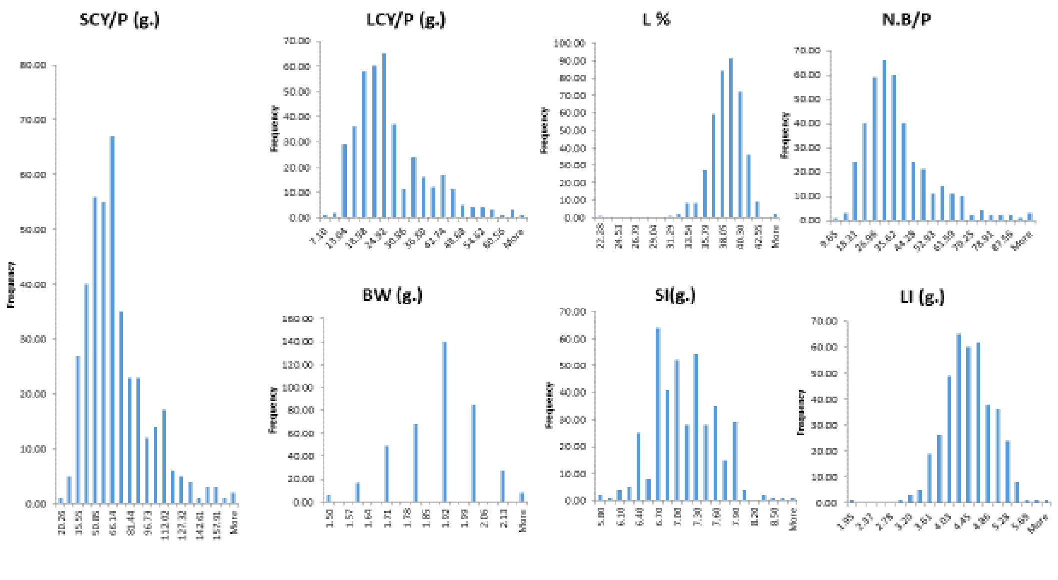

Figure 1. The characteristics of the individual plants in F_2-generation for the studied traits.

Seed cotton yield plant^{-1} showed positive and significant (p≤0.01) correlation with all studied traits in base population except boll weight where the correlation coefficient was very low negative and insignificant (Table 5). Indicating that selection for SCY may resulted in increase in these traits, while may cause decrease in boll weight. Correlation coefficients between lint cotton yield with each of L%, NB/P, SI and LI were positive significant (p≤0.01) (Table 5). Indicating, selection for seed cotton yield resulted in increased lint percentage, bolls/plant and lint index. Lint percentage showed positive and significant (p≤0.01) correlation with each of bolls number and lint index (Table 5).

Positive and significant (p≤0.01) correlation was found among number of boll/plant, seed index and lint index. Boll weight showed insignificant negative correlation with each of seed and lint index. Positive significant (p≤0.01) correlation was observed between seed index and lint index in F_2-generation (Table 5).

Table 5. Simple correlation coefficients among traits of base population in the F_2-generation, season 2019.

Traits	SCY/P	LCY/P	L %	NB/P	BW	SI
SCY/P	-					
LCY/P	0.99**	-				
L %	0.25**	0.36**	-			
N.B/P	0.98**	0.97**	0.26**	-		
BW	-0.06	-0.07	-0.09	-0.24**	-	
SI	0.19**	0.21**	0.17**	0.18**	-0.01	-
LI	0.30**	0.39**	0.82**	0.30**	-0.07	0.70**

***, ** significant at 0.05 and 0.01 level of probability, respectively.**

B- Evaluation of pedigree selection for seed cotton yield in F_3-generation, season 2020.

1- Means, variance and heritability estimates

Mean squares of all the studied trait were significant (p≤0.01) except for uniformity index%. Indicating, the presence of the variation in the selection criterion, seed cotton yield plant^{-1} (Table 6). Similar results are found by Abdel-Zaher et al. (2007), Khan et al. (2009), Tang et al. (2009) and Soomro et al. (2010).

Seed cotton yield/plant ranged from 74.23 gm. to 155.30 gm. with an average 105.73 gm., which fell outside of the two parents and nearly showed partial dominant towards to the lower parent Giza 80 (103.97 gm.) (Table 6). Complete dominance was found for lint index where the dominance was towards to the lower parent Giza 80 (4.34 gm.) and mean of population (4.36 gm.). Seed index of was showed over dominance to lower parent Giza 90. Lint yield/plant and fiber strength was showed additive gene action or no dominance because the mean of population was nearly equal to the mid parents (Table 6). Lint percentage, boll weight and fiber length were showed the complete dominance towards to the higher parent Giza 90. The rest traits were showed over dominance towards to the lower parent Giza 90.

Estimate of genotypic (g.c.v) and phenotypic (p.c.v) coefficients of variation were high for seed cotton yield plant^{-1} by 15.65 and 16.14%, respectively. Also, g.c.v and p.c.v values were high for LY/P and NB/P by (17.06 and 17.66) and (17.98 and 19.17%), respectively (Tables 6). The close estimates of g.c.v and p.c.v resulted in high estimates of broad sense heritability of SCY/P, LY/P and NB/P by 93.96%, 93.29% and 88.01%, respectively. These high values of coefficients of variability and heritability resulted in high estimates of the expected genetic advance of F_3 mean by 17.59%, 19.11% and 19.57% for SCY/P, LY/P and NB/P, respectively (Table 6). The g.c.v and p.c.v values for the rest traits were low ranged from (0.27 and 0.71%) of UI% to (8.72% and 9.77%) of LI (Table 6). Similar results are found by Tang et al. (2009) and Hassaballa et al. (2012).

Table 6. Mean squares of the studied characters for the 100 families in F_3-generation, family mean, the parents and the bulk sample, phenotypic (p.c.v.) and genotypic (g.c.v.) coefficients of variability, expected genetic advance (ΔG) and broad sense heritability (H b).

Items	df	SCY/P	LY/P	L%	NB/P	BW	SI/g
MS Reps	2	178.1	37.97	1.46	345.73	0.68	0.86
MS Entries	102	851.81**	143.71**	8.33**	326.78**	0.08**	0.39**
MS Error	204	51.63	9.85	4.75	39.9	0.03	0.13
Mean		105.73	39.68	37.5	54.84	1.96	7.23
±SE		±1.71	±0.70	±0.17	±1.06	±0.02	±0.04
Min.		74.23	23.67	30.53	34.02	1.64	6.3
Max.		155.30	60.63	40.46	87.63	2.41	8.07
g.c.v. %		15.65	17.06	3.32	17.98	6.44	3.95
p.c.v. %		16.14	17.66	4.5	19.17	8.35	4.93
H b%		93.96	93.29	54.58	88.01	59.52	64.28
ΔG		18.6	7.58	1.07	10.73	0.11	0.27
ΔG/Mean %		17.59	19.11	2.85	19.57	5.76	3.67
Bulk		116.67	43.9	37.59	58.38	2	7.67
Giza 80		103.97	37.63	36.21	60.35	1.73	7.73
Giza 90		108.53	40.93	37.74	58.72	1.97	7.9
LSD average 5%		8.17	3.57	2.48	7.18	0.2	0.42
LSD average 1%		6.59	2.88	2	5.79	0.16	0.34

Items	df	LI g.	MIC	PI	UHM	UI%
MS Reps	2	0.29	0.05	0.05	0	0.46
MS Entries	102	0.64**	0.10**	0.33**	0.63*	1.06
MS Error	204	0.13	0.05	0.15	0.44	0.88
Mean		4.36	4.02	10.4	31.68	83.39
±SE		±0.05	±0.02	±0.03	±0.04	±0.06
Min.		2.8	3.53	9.77	30.6	81.63
Max.		5.54	4.83	11.1	32.78	85.2
g.c.v. %		8.72	3.44	2.45	0.72	0.27
p.c.v. %		9.77	4.61	3.25	1.42	0.71
H b%		79.69	55.82	57.14	25.55	14.25
ΔG		0.39	0.12	0.22	0.13	0.1
ΔG/Mean %		9.03	2.98	2.15	0.42	0.12
Bulk		4.44	4.3	10.23	30.77	83.66
Giza 80		4.34	4.23	10.3	30.9	82.23
Giza 90		5.33	4.1	10.67	31.62	82.97
LSD average 5%		0.41	0.25	0.44	0.76	1.07
LSD average 1%		0.33	0.2	0.35	0.61	0.86

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

ΔG = expected genetic advance from selection the superior 8.33% of the families.

LSD. Aver. = to compare families mean with the bulk sample or the better parent.

2- Average direct observed gain for seed cotton yield in F_3 generation.

The average direct response from selection based on of the unselected bulk sample of SCY was significant ($p \le 0.05$) lower than the bulk by -9.37%.

Based on the better precut average observed gain was showed insignificance decrease -2.58% of in seed cotton yield plant^{-1} (Table 7).

Average correlated gains of the 100 selected families showed significant ($p \le 0.01$) decrease in percentage the bulk sample of traits LY/P, BW, SI, LI and Mic, by -9.61, -2.00, -5.70, -1.77 and -6.51% respectively (Table 7). Also, average correlated gains showed insignificant decrease of by -0.23 of LP%, -0.32% of UI and -6.06|% of NB/P in percentage the bulk sample (Table 7). Average correlated gains in percentage the better parent insignificant decrease was found for SCY/P (-2.58%), LY/P (-3.06%) and LP% (-0.65%) and insignificant increase was found UI% by 0.51% (Table 7).

Table 7. The average observed and correlated gain from selection 100 families in percentage of bulk and better parent of F_3-generation, season 2020.

Trait	Bulk	Better parent	LSD 5%	LSD 1%
SCY/P	-9.37*	-2.58	8.26	10.87
LY/P	-9.61**	-3.06	3.57	4.71
LP/%	-0.23	-0.65	2.24	2.95
NB/P	-6.06	-9.12*	7.17	9.44
BW	-2.00**	-0.34**	0.20	0.27
SI/g	-5.70**	-8.48**	0.42	0.55
LI/g	-1.77**	-18.12**	0.38	0.50
Mic	-6.51**	-5.04**	0.24	0.32
PI	1.63**	-2.50**	0.44	0.57
UHM	2.97**	2.52**	0.76	1.00
UI%	-0.32	0.51	1.08	1.42

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

C- Evaluation of selection for seed cotton yield in F_4-generation, season 2021.

1- Means and variances

Entries mean squares of the selection criterion; seed cotton yield, in addition lint yield/plant and number of bolls/plant were significant ($P \le 0.01$). In addition significant ($P \le 0.05$ or 0.01) differences for boll weigh, fiber fineness and uniformity index (Table 8). Indicating, sufficient retained genetic variability for further cycles of selection for these traits. Similar results are found by Younis (1999), Mahdy et al. (2001b) and Soomro et al. (2010).

Phenotypic coefficient of variability; pcv% was slightly larger than the GCV% for all traits (Table 8). The narrow differences between GCV and PCV% resulted in high estimates of broad sense heritability for the seed cotton yield, lint yield/plant and number of branches/plant by 97.10, 94.89 and 93.69%, respectively. In comparison values of GCV and PCV in the three generations F2, F3 and F4, its observed grading reduction in the values of pcv and gcv from F2 to F3 and F4 for the most studied traits as a result the selection for the selection criterion seed cotton yield/plant and reduction the genetic variation. Moreover, increasing the homozygosity. Moderate estimates of broad sense heritability were recorded for boll weight (44.71%), fiber fineness (47.66%) and uniformity index (45.22%). Moreover, low values of broad sense heritability were estimated for the remained traits (Table 8). Similar results are reported by Mahdy et al. (2006), Abdel-Zaher et al. (2007), Khan et al. (2009), Hassaballa et al. (2012) and Yahia and Hassan (2015)

Table 8. Mean squares, phenotypic (p.c.v.%), genotypic (g.c.v.%) coefficients of variation and broad sense heritability (Hb%) for the 30 selected families with the parents and bulk in F_4-generation, season, 2021.

S.V.	Reps	Entries	Error	g.c.v.%	p.c.v.%	H b%
df	2	32	64	-	-	-
SCY/P	67.84	2737.17**	79.42	29.22	29.65	97.10
LY/P	6.36	372.40**	19.04	29.07	29.84	94.89
LP	1.84	13.34	10.58	2.6	5.73	20.63
BW	0.09	0.06*	0.03	5.44	8.13	44.71
NB/P	28.33	820.43**	51.79	27.2	28.11	93.69
SI	0.72	0.12	0.11	0.88	2.61	11.33
LI	0.07	0.4	0.35	3.04	8.17	13.85
Mic	0.36	0.08**	0.04	2.89	4.19	47.66
PI	0	0.11	0.09	0.7	1.88	13.9
UHM	0.6	0.75	0.5	0.93	1.6	33.39
UI%	0.01	0.87*	0.48	0.43	0.64	45.22

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

Mean the selection criterion; seed cotton yield of the thirty selected families in the F_4-generation ranged from 53.33 to 166.00 with an average of 100.76 gm (Table 9). Only seven selected families, No. 1, 4, 13, 17, 18, 20 and 25 were higher than the better parent Giza 90 and the bulk sample in seed cotton yield and lint yield per plant, in addition four families no. 3, 9, 16 and 28 were high yielding comparable the bulk sample (Table 9). Selection for seed cotton yield resulted in insignificant increased for number of branches/plant than the bulk sample and insignificant increased for lint percentage compared to the better parent. While, the rest traits showed decreased compared to the bulk and better parent as a result to selection for seed cotton yield in F_4-generation (Table 9). Similar results are found by Mahdy et al. (2001a), Mahdy et al. (2006) and Mahdy et al. (2007)

2- Observed and correlated response to selection for seed cotton yield.

After two generations from selection for seed yield cotton per plant, seven selected families out yielded significant ($p \le 0.01$) the un selected bulk sample in F_4-generation by 29.75, 19.94, 42.41, 37.34, 54.75, 57.59 and 40.19% of families no 1, 4, 13, 17, 18, 20 and 25, respectively (Table 10). Five selected families from them of no.1, 13, 17 18 and 25 surpassed significant ($p \le 0.01$) the bulk for lint yield plant^{-1} and bolls number plant^{-1} by (25.76 and 47.42%), (31.28 and 61.31%), (37.04 and 52.86%), (48.40 and 65.55%) and (42.80 and 80.74 %), respectively, Families no. 1 and 25 were higher significant ($p \le 0.05$) than the bulk for fiber strength by 6.06 and 5.89%, respectively (Table 10). For bolls number plant^{-1}, three selected families no. 3, 9 and 20 surpassed the unselected bulk sample by 31.75%, 39.20 % and 63.45 %, respectively. Family no. 4 was exceeded the bulk sample by 19.94 %, 37.38% and 14.29 % of seed cotton yield, number of bolls per plant and fiber fineness. Family no. 20 exceeded the bulk sample by 57.59, 63.45% and 9.82% for SCY/P, NB/P and FF, respectively. Family no. 8 was exceeded the bulk sample by 14.29% of MIC and 5.22% of PI and family no. 7 exceeded significant ($p \le 0.05$) the bulk simple by 5.39% of PI. The two selected families no. 2 and 20 were surpassed significant ($p \le 0.05$) the bulk sample by 3.98% of fiber length (Table 10). These results were in harmony with those reported by Soomro et al. (2010), Hassaballa et al. (2012), Kazerani (2012) and Soliman (2018).

Table 9. Means of the studied characters for the 30 selected families, bulk and two parents in F_4-generation

Fam. no	SCY/P	LY/P	LP/%	BW	NB/P	SI/g	LI/g	MIC	PI	UHM	UI%
1	136.67	50.93	37.28	1.77	77.70	7.87	4.69	4.00	10.50	31.17	83.80
2	99.33	36.07	36.32	1.57	63.40	7.73	4.41	4.03	9.92	31.82	84.18
3	120.00	38.10	31.74	1.73	69.44	7.87	3.70	4.00	10.30	31.52	84.67
4	126.33	43.70	34.49	1.77	72.41	7.63	4.07	4.27	10.08	30.77	84.72
5	90.00	33.03	36.77	1.63	55.14	7.73	4.50	3.77	10.05	31.52	83.45
6	97.33	38.37	39.32	1.70	57.28	7.40	4.81	3.83	10.12	31.02	84.33
7	53.33	19.73	37.01	1.53	34.79	7.60	4.47	3.83	10.43	30.18	84.83
8	88.67	33.60	37.72	1.77	50.56	7.77	4.74	4.27	10.42	31.48	84.45
9	118.33	42.87	36.23	1.63	73.37	7.87	4.48	4.03	10.08	31.20	84.73
10	76.00	28.27	37.17	1.83	41.19	7.60	4.50	3.87	10.15	31.18	83.93
11	62.33	24.83	39.85	1.70	36.67	7.43	4.93	3.87	9.98	31.43	84.63
12	94.67	36.27	38.37	1.93	49.15	7.60	4.77	3.70	10.28	30.95	84.75
13	150.00	53.17	35.51	1.80	85.02	7.90	4.36	3.87	10.03	30.95	84.22
14	75.00	26.50	35.29	1.77	43.25	7.57	4.16	3.87	10.40	31.75	84.13
15	73.00	28.63	39.31	1.67	43.69	7.87	5.10	3.57	10.17	31.27	84.13
16	105.67	33.70	32.14	1.70	62.48	8.03	3.82	3.73	9.97	31.37	84.48
17	144.67	55.50	38.32	1.80	80.57	7.80	4.85	3.93	9.95	31.22	85.02
18	163.00	60.10	37.01	1.87	87.26	7.90	4.65	3.93	10.07	31.72	83.95
19	62.00	23.30	37.61	1.53	40.75	7.87	4.75	3.70	10.28	31.55	84.60
20	166.00	61.57	37.07	1.93	86.15	7.80	4.60	4.10	10.13	31.82	84.38
21	77.67	27.00	34.84	1.80	43.88	7.70	4.13	3.80	10.15	30.98	84.63
22	82.67	27.57	33.82	2.07	40.21	7.60	3.93	4.07	9.68	30.95	84.57
23	64.67	25.67	39.90	1.67	39.15	7.57	5.06	4.00	10.07	30.92	82.93
24	75.67	27.83	36.91	1.67	45.42	7.60	4.43	3.97	9.98	31.22	84.07
25	147.67	57.83	39.20	1.57	95.26	7.30	4.70	3.60	10.48	31.42	84.92
26	95.00	36.60	38.41	1.50	63.67	7.57	4.74	3.77	9.92	31.25	85.48
27	90.33	32.43	35.86	1.77	52.36	7.57	4.23	3.67	10.12	31.02	83.92
28	111.67	43.10	38.59	1.73	64.49	7.37	4.64	4.00	9.92	30.22	84.73
29	75.67	27.23	36.19	1.63	47.03	7.67	4.37	3.93	9.95	30.17	84.03
30	99.33	38.43	38.67	1.63	61.02	7.57	4.77	3.90	10.07	30.00	83.80
Average	100.76	37.06	36.90	1.72	58.76	7.68	4.51	3.90	10.12	31.13	84.35
Bulk	105.33	40.50	38.46	2.00	52.71	7.83	4.90	3.73	9.90	30.60	84.27
G80	110.27	37.53	34.08	1.73	64.20	7.33	3.81	4.03	9.97	30.23	83.03
G90	123.63	42.00	34.04	2.00	62.02	7.83	4.09	3.93	10.07	31.43	84.00
LSD 5%	14.88	7.29	5.43	0.30	12.02	0.54	0.98	0.34	0.51	1.18	1.15
LSD 1%	20.05	9.82	7.32	0.41	16.19	0.73	1.33	0.46	0.69	1.59	1.55

Table 10. Observed and correlated responses to selection seed cotton yield (F_4) based on the bulk; season 2021

F.N	SCY/P	LY/P	LP	BW	NB/P	SI	LI	MIC	PI	UHM	UI%
1	29.75**	25.76**	-3.08	-11.67	47.42**	0.43	-4.26	7.14	6.06*	1.85	-0.55
2	-5.70	-10.95	-5.56	-21.67**	20.29	-1.28	-10.01	8.04	0.17	3.98*	-0.10
3	13.92	-5.93	-17.47*	-13.33	31.75**	0.43	-24.39*	7.14	4.04	3.00	0.47
4	19.94**	7.90	-10.33	-11.67	37.38**	-2.55	-16.86	14.29**	1.85	0.54	0.53
5	-14.56*	-18.44*	-4.39	-18.33*	4.61	-1.28	-8.13	0.89	1.52	3.00	-0.97
6	-7.59	-5.27	2.24	-15.00	8.68	-5.53	-1.79	2.68	2.19	1.36	0.08
7	-49.37**	-51.28**	-3.76	-23.33**	-33.99**	-2.98	-8.78	2.68	5.39*	-1.36	0.67
8	-15.82*	-17.04	-1.93	-11.67	-4.08	-0.85	-3.32	14.29**	5.22*	2.89	0.22
9	12.34	5.84	-5.80	-18.33*	39.20**	0.43	-8.58	8.04	1.85	1.96	0.55
10	-27.85**	-30.21**	-3.36	-8.33	-21.85	-2.98	-8.17	3.57	2.53	1.91	-0.40
11	-40.82**	-38.68*	3.61	-15.00	-30.43*	-5.11	0.70	3.57	0.84	2.72	0.44
12	-10.13	-10.45	-0.23	-3.33	-6.75	-2.98	-2.66	-0.89	3.87	1.14	0.57
13	42.41**	31.28**	-7.66	-10.00	61.31**	0.85	-10.99	3.57	1.35	1.14	-0.06
14	-28.80**	-34.57**	-8.24	-11.67	-17.94	-3.40	-15.18	3.57	5.05	3.76	-0.16
15	-30.70**	-29.30**	2.20	-16.67*	-17.11	0.43	4.20	-4.46	2.69	2.18	-0.16
16	0.32	-16.79	-16.43*	-15.00	18.54	2.55	-21.92*	0.00	0.67	2.51	0.26
17	37.34**	37.04**	-0.38	-10.00	52.86**	-0.43	-1.05	5.36	0.51	2.02	0.89
18	54.75**	48.40**	-3.78	-6.67	65.55**	0.85	-5.17	5.36	1.68	3.65	-0.38
19	-41.14**	-42.47**	-2.21	-23.33**	-22.68	0.43	-3.11	-0.89	3.87	3.10	0.40
20	57.59**	52.02**	-3.61	-3.33	63.45**	-0.43	-6.00	9.82*	2.36	3.98*	0.14
21	-26.27**	-33.33**	-9.41	-10.00	-16.74	-1.70	-15.70	1.79	2.53	1.25	0.44
22	-21.52**	-31.93**	-12.06	3.33	-23.72*	-2.98	-19.82	8.93	-2.19	1.14	0.36
23	-38.61**	-36.63**	3.76	-16.67*	-25.71*	-3.40	3.27	7.14	1.68	1.03	-1.58*
24	-28.16**	-31.28**	-4.03	-16.67*	-13.83	-2.98	-9.58	6.25	0.84	2.02	-0.24
25	40.19**	42.80**	1.92	-21.67**	80.74**	-6.81	-4.01	-3.57	5.89*	2.67	0.77
26	-9.81	-9.63	-0.13	-25.00**	20.79	-3.40	-3.19	0.89	0.17	2.12	1.44*
27	-14.24*	-19.92*	-6.75	-11.67	-0.65	-3.40	-13.59	-1.79	2.19	1.36	-0.42
28	6.01	6.42	0.34	-13.33	22.35	-5.96	-5.31	7.14	0.17	-1.25	0.55
29	-28.16**	-32.76**	-5.89	-18.33*	-10.77	-2.13	-10.84	5.36	0.51	-1.42	-0.28
30	-5.70	-5.10	0.54	-18.33*	15.78	-3.40	-2.71	4.46	1.68	-1.96	-0.55
Average	-4.35	-8.48	-4.06	-13.89	11.48	-1.99	-7.90	4.35	2.24	1.74	0.10
LSD5%	14.13	17.99	14.12	15.21	22.80	6.95	20.10	9.15	5.16	3.85	1.37
LSD1%	19.04	24.25	19.03	20.49	30.72	9.37	27.09	12.33	6.95	5.19	1.84

***, ** significant at 0.05 and 0.01 level of probability, respectively.**

Only one family on. 26 was exceeded significant ($p \leq 0.05$) the bulk by 1.44% of UI%. Average of the 30 selected families in F_4-generation showed in significant increase in percentage the bulk for traits; number of bolls /plant, fiber fineness, fiber strength, fiber length and uniformity index by 11.48%, 4.35%, 2.24%, 1.74% and 0.10%, respectively. Selection for SCY in F_4-generation were

Average the 30 selected families in F_4-generation was showed insignificant increase for lint percentage, lint index, fiber strength and uniformity index by 8.28 %, 10.30%, 0.55% and 0. 42% in percentage the better parent (Table 11)

For SCY and lint yield plant^{-1}, five families no. 13, 17, 18, 20 and 25 were showed significant ($P \leq 0.01$) increase by (21.33 and 26.59%), (17.02 and 32.14%), (31.85 and 43.10%), (34.27 and 46.59%) and (19.44 and 37.70), respectively. In addition family no. 1 was showed insignificant increase by 10.54% of SCY/P and significant increase by 21.27 % of lint yield per plant.

For lint percentage, two selected families no. 11 and 23 were showed significant increase by 16.93 and 17.09% compared the better parent (Table 11). While, the rest selected families were showed insignificant increase for LP ranged from 1.20% of family no. 4 to 15.02% of family no. 25, with exception three families no. 3, 16 and 22 were showed insignificant decrease for LP by -6.86%, -5.69% and -0.76%, respectively. Similar results are found by Shaheen et al. (2000), El-Defrawy and El-Ameen (2004) and El-Okkiah et al. (2008) found similar results.

Average of observed direct and correlation response to selection for the selection criterion SCY/P in percentage the batter parent resulted in highly decrease for SCY/P (-18.50) and negative response to selection for the correlated traits by

resulted in insignificant decrease in traits SCY/P, LY/P, LP%, BW, SI and LI by -4.35%, -8.48%, -4.06%, -13.89%, -1.99% and -7.90%, respectively. For the traits of lint percentage, bolls weight, seed and lint indices, all families showed significant or insignificant increase ($p \leq 0.05$ or 0.01) or insignificant decrease in percentage the unselected bunk sample (Table 10). Mabrouk (2020) reported similar results.

-11.75 % of LY/P, -13.89 % of BW, -8.47% of NB/P, -1.99 % of SI, -3.42% of MIC and -0.95% of UHM. For boll weight, seed index, MIC,UHM and UI all families showed insignificant positive or negative response to selection in percentage the better parent (Table 11).

For bolls number plant^{-1}, five selected families no. 1, 17, 18, 20 and 25 were showed highly significant increase by 21.03, 25.50, 35.92, 34.19 and 48.38% in percentage the better parent.

For lint index, only one family no. 15 surpassed the better parent by 24.80% while, the others families were showed insignificant increase ranged from 0.97% of family no. 21 to 23.68% of family no 23. For fiber length all selected families were showed insignificant increase or decrease except four families no 2, 13, 18 and 20 were exceeded significant ($p \leq 0.05$) the better parent by 4.56, 4.34, 4.23 and 4.56%, respectively. For uniformity index, only family no. 26 was surpassed the better parent by 1.77 compared to the rest selected families (Table 11). Similar results are found by Shaheen et al. (2000), El-Defrawy and El-Ameen (2004) and El-Okkiah et al. (2008) It's worth noted that, the four selected families of no. 13, 17, 18 and 26 were showed highly significant increase compared to both the bulk and better parent for the two traits seed cotton yield and lint yield plant^{-1}.

Table 11. Observed and correlated responses to selection seed cotton yield (F4) based on the better parent; season 2021

F.N	SCY/P	LY/P	LP	BW	NB/P	SI	LI/g	MIC	PI	UHM	UI%
1	10.54	21.27*	9.38	-11.67	21.03*	0.47	14.67	-0.74	4.27	2.42	-0.24
2	-19.65**	-14.13	6.58	-21.67**	-1.24	-1.23	7.78	0.08	-1.52	4.56*	0.22
3	-2.94	-9.29	-6.86	-13.33	8.17	0.47	-9.44	-0.74	2.28	3.57	0.79
4	2.19	4.05	1.20	-11.67	12.79	-2.51	-0.43	5.87	0.13	1.11	0.85
5	-27.20**	-21.35*	7.89	-18.33*	-14.11	-1.23	10.03	-6.53	-0.20	3.57	-0.65
6	-21.27**	-8.65	15.38	-15.00	-10.78	-5.49	17.63	-4.88	0.46	1.93	0.40
7	-56.86**	-53.02**	8.61	-23.33**	-45.81**	-2.94	9.25	-4.88	3.61	-0.81	0.99
8	-28.28**	-20.00*	10.68	-11.67	-21.25*	-0.81	15.80	5.87	3.44	3.46	0.54
9	-4.28	2.06	6.31	-18.33*	14.28	0.47	9.49	0.08	0.13	2.53	0.87
10	-38.53**	-32.70**	9.06	-8.33	-35.84**	-2.94	9.98	-4.05	0.79	2.48	-0.08
11	-49.58**	-40.87**	16.93*	-15.00	-42.89**	-5.07	20.61	-4.05	-0.86	3.30	0.75
12	-23.43**	-13.65	12.60	-3.33	-23.45*	-2.94	16.58	-8.19	2.12	1.71	0.89
13	21.33**	26.59**	4.21	-10.00	32.43**	0.89	6.61	-4.05	-0.36	1.71	0.26
14	-39.34**	-36.90**	3.56	-11.67	-32.63**	-3.36	1.59	-4.05	3.28	4.34*	0.16
15	-40.95**	-31.83**	15.34	-16.67*	-31.95**	0.47	24.80*	-11.50**	0.96	2.75	0.16
16	-14.53*	-19.76*	-5.69	-15.00	-2.68	2.60	-6.49	-7.36	-1.03	3.08	0.58
17	17.02**	32.14**	12.43	-10.00	25.50**	-0.38	18.51	-2.40	-1.19	2.59	1.21
18	31.85**	43.10**	8.59	-6.67	35.92**	0.89	13.58	-2.40	-0.03	4.23*	-0.06
19	-49.85**	-44.52**	10.36	-23.33**	-36.52**	0.47	16.04	-8.19	2.12	3.68	0.71
20	34.27**	46.59**	8.77	-3.33	34.19**	-0.38	12.58	1.74	0.63	4.56*	0.46
21	-37.18**	-35.71**	2.23	-10.00	-31.65**	-1.66	0.97	-5.71	0.79	1.82	0.75
22	-33.13**	-34.37**	-0.76	3.33	-37.37**	-2.94	-3.97	0.91	-3.84	1.71	0.67
23	-47.69**	-38.89**	17.09*	-16.67*	-39.01**	-3.36	23.68	-0.74	-0.03	1.60	-1.27
24	-38.80**	-33.73**	8.31	-16.67*	-29.26**	-2.94	8.30	-1.57	-0.86	2.59	0.08
25	19.44**	37.70**	15.02	-21.67**	48.38**	-6.77	14.97	-10.67*	4.10	3.24	1.09
26	-23.16**	-12.86	12.71	-25.00**	-0.83	-3.36	15.94	-6.53	-1.52	2.69	1.77*
27	-26.93**	-22.78*	5.23	-11.67	-18.44	-3.36	3.50	-9.02*	0.46	1.93	-0.10
28	-9.68	2.62	13.23	-13.33	0.45	-5.92	13.41	-0.74	-1.52	-0.70	0.87
29	-38.80**	-35.16**	6.20	-18.33*	-26.75**	-2.09	6.79	-2.40	-1.19	-0.87	0.04
30	-19.65**	-8.49	13.46	-18.33*	-4.95	-3.36	16.52	-3.23	-0.03	-1.41	-0.24
Average	-18.50**	-11.75	8.28	-13.89	-8.47	-1.99	10.30	-3.42	0.55	-0.95	0.42
LSD5%	12.04	17.35	15.94	15.21	18.72	6.95	24.07	8.47	5.07	3.75	1.37
LSD1%	16.22	23.38	21.48	20.49	25.23	9.37	32.44	11.42	6.84	5.05	1.85

***, ** significant at 0.05 and 0.01 level of probability, respectively.**

3- Effect of selection on correlations among traits in F_4-generation.

Phenotypic and genotypic correlations among the studied traits after two generations from selection for SCY in F_4 are shown in Table 12.

Seed cotton yield plant^{-1} was showed positive genotypic and phenotypic correlation coefficients ranged from medium with bolls weight (0.51 and 0.25) to strong with lint yield plant^{-1} (1.00 and 0.96) and bolls number plant^{-1} (1.00 and 0.93). While, negative correlations were found between SCY/P and each of lint percentage (-0.22 and -0.11) and lint index (-0.19 and -0.60) on genotypic and phenotypic levels, respectively (Table 12). Concerning correlations with the fiber quality traits, the genotypic and phenotypic correlations were positive and ranged from low 0.04 of fiber strength to medium 0.50 of fiber length on genotypic level while on the phenotypic level the correlation between SCY/P and the fiber quality parameters were low and positive. Lint yield plant^{-1} showed positive genotypic and phenotypic correlations with ranged from low for BW (0.32 and 0.28) to strong positive with bolls number plant^{-1} by (1.00 and 0.87) on genotypic and phenotypic levels. Similar results are found by Younis (1999), El-Okkiah et al. (2008), Mahrous and Soliman(2017).

Lint percentage was showed strong positive correlations with lint index and fiber strength, while with the other traits showed negative correlations on genotypic and or phenotypic levels. Positive genotypic Correlation coefficients were observed between bolls weight and each of bolls number plant^{-1} (0.43), seed index (0. 27), fiber fineness (1.27) and fiber length (0.66) (Table 12).

Number of bolls plant^{-1} was showed positive genotypic and phenotypic correlation with each of SI (0.14 and 0.15), MIC (0.08 and 0.10), PI (0.18 and 0.05) UHM (0.44 and 0.14) and uniformity index (0.43 and 0.06).

Table 12. Coefficients of genotypic (rg) and phenotypic (rp) correlation among the studied traits in F_4-generation.

	r	LY/P	LP	BW	NB/P	SI	LI	MIC	PI	UHM	UI%
SCY/P	rg	1.00	-0.22	0.51	1.00	0.19	-0.19	0.26	0.04	0.50	0.26
	rp	0.96	-0.11	0.25	0.93	0.16	-0.06	0.08	0.03	0.14	0.11
LY/P	rg		-0.13	0.32	1.00	0.15	-0.08	0.22	0.10	0.43	0.21
	rp		0.17	0.28	0.87	0.07	0.20	0.04	0.06	0.12	0.13
LP	rg			-2.14	0.04	-0.38	1.33	-0.30	0.71	-0.64	-0.45
	rp			0.10	-0.16	-0.28	0.95	-0.15	0.04	-0.03	-0.02
BW	rg				0.43	0.27	-3.77	1.27	-1.13	0.66	-1.01
	rp				-0.11	0.00	0.12	-0.02	-0.04	-0.02	0.19
NB/P	rg					0.14	0.24	0.08	0.18	0.44	0.43
	rp					0.15	-0.12	0.10	0.05	0.14	0.06
SI	rg						-0.95	0.02	0.19	0.58	-0.44
	rp						-0.03	-0.02	-0.03	0.08	0.10
LI	rg							-0.34	1.72	-0.40	-1.58
	rp							-0.17	0.04	0.00	0.03
MIC	rg								0.37	-0.29	0.11
	rp								-0.15	0.04	-0.16
PI	rg									0.97	-0.57
	rp									0.05	0.08
UHM	rg										0.00
	rp										0.01

Seed index was showed negative correlation with lint index by -0.95 on and -0.03 on genotypic and phenotypic levels, and converted to positive correlation with fiber length by 0.58 and 0.08. Lint index showed positive correlation with fiber strength (1.72 and 0.04) on genotypic and phenotypic bevels. Similar results are found by Younis (1999), El-Okkiah et al. (2008), Mahrous and Soliman (2017).

Positive genotypic correlation between fiber fineness and each of fiber strength 0.37 and uniformity index 0.11 converted to negative phenotypic correlation between them -0.15 and -0.16, respectively. Fiber strength and length were showed positive genotypic and phenotypic correlation by 0.97 and 0.05.

CONCLUSION

The four selected families of no. 13, 17, 18 and 26 were showed highly significant increase compared to both bulk and better parent for the two traits seed cotton yield and lint yield plant^{-1}.

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كفاءة الانتخاب لمحصول القطن الزهر تحت ظروف الاراضي حديثة الاستصلاح

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الملخص

أجريت هذه الدراسة في مزرعة غرب المنيا تحت ظروف الاراضي الجديدة خلال ثلاث مواسم زراعيه 2019 ، 2020 ،2021 وذلك لدراسة كفاءة الانتخاب لصفة محصول القطن الزهر للنبات للأجيال الجيل الثاني والثالث والرابع لعشيرة القطن (جيزه 80 * جيزه 90) وكانت النتائج كالتالي :- كان متوسط مربعات الانتخاب لصفة محصول القطن الزهر للنبات معنويه وعالية المعنوية في الجيل الثالث والرابع. كما كان هناك انخفاض لقيم التباين الوراثي والمظهري للجيل الثالث والرابع للمقارنة بالجيل الثاني لصفة محصول القطن الزهر للنبات. أظهرت العائلات المنتخبة ارقام 26.18.17.13 بأنها عالية المعنوية بالمقارنة بكل من عينات الاجمالي وكذلك الاب الافضل لصفتي محصول القطن الزهر للنبات ومحصول القطن الشعر للنبات كان الانتخاب في الاتجاه الموجب لصفة محصول القطن الزهر بالنسبة لمعامل التباين الوراثي والمظهري لصفات وزن اللوزة ومحصول الشعر للنبات وعدد اللوز على النبات بينما كان فى الاتجاه السالب لصفتي تصافي الحليج ومعامل الشعر.

الكلمات الدالة: الانتخاب- القطن المصري- العشائر- التباين الوراثي