Zagazig J. Agric. Res., Vol. 49 No. (2) 2022 181-191

Plant Production Science

Available online at http://zjar.journals.ekb.eg
http:/www.journals.zu.edu.eg/journalDisplay.aspx?Journalld=1&queryType=Master

SELECTION FOR SEED COTTON YIELD, BOLL WEIGHT AND LINT PETRECENTAGE IN SEGREGATING POPULATION (GIZA 80 X GIZA 85) OF EGYPTIAN COTTON (*Gossypium barbadense* L.)

Barakat H. Ahmed* and M.H. Haridy

Agron. Dept., Fac., Agric., Assiut, Al-Azhar Univ., Egypt

Received: 20/03/2022 ; Accepted: 03/04/2022

ABSTRACT: Two cycle of direct selection were accompanied with two selection intensities, *i.e*, 5% and 10% one in improving seed cotton yield/plant, boll weight and lint percentage of the cotton cross Giza 80 x Giza 85. Selection was made by one method, *i.e*. pedigree selection (PSM) from F_2 to F_4 generation. Comparing mean performance of F_2 with those of F_3 and F_4 generations revealed increase in mean values for all traits with advanced generations from F_2 to F_4 indicating an accumulation of increasing alleles. F_2 generation registered high GCV and PCV values than those of the succeeding generations for the studied traits. The closer magnitude of GCV and PCV in F_3 and F_4 generations indicated that genotype had played greater role rather than environment for boll weight, lint percentage, number of bolls per plant and seed cotton yield per plant. Heritability estimates in broad sense improved considerably for all traits from F_2 to advance F_3 and F_4 generations. The predicted advance at two selection intensities in F_4 generation achieved highly genetic gain from selection for boll weight, seed cotton yield/plant and number of bolls /plant. The results indicated that the predicted and actual genetic advances were of high values for boll weight, seed cotton yield/plant, lint percentage and bolls/ plant at both 5% and 10% selection intensity. The selection intensity at 5% gave a highly improvement in the most selected traits in F_3 and F_4 generations for expected and actual genetic advances due to accumulation of useful alleles. Families number 1, 9,155, 29 and 156 were the best genotypes for relevant yield characters. These families surpassed the better parent, chick varity and gave best values for most characters. The breeder may exploit such families in breeding programs aiming to improvement yield characters.

Key words: Selection, pedigree selection, seed cotton.

INTRODUCTION

Cotton as a commercial crop has played an important role in boosting national economy of several countries and provides fiber and oil for people as well as live stock **(Ahmad *et al.*, 2005)**. Therefore, selection pressure usually placed on boll weight and lint percentage for their great influence on seed and cotton yield. Plant breeders are continuously searching for a more effective and efficient selection method. Although several selection methods were used for improving several traits in cotton, pedigree selection method has become the most popular of plant breeding procedures. **Mahdy *et al.* (2001)** practiced two cycles of pedigree and selection with inter mating to improve seed cotton yield in F_4 of populations Giza 83-x Dandara and Giza 83-x Giza 45. Selection was practiced at early and late plantings and the selected families of the second cycle were evaluated at early and late plantings. In the base populations (F4) seed cotton yield/plant ranged from 20.94 to 128.20 and from 15.84 to 183.88 g/plant in early planting in p_{op} 1. and p_{op} 11, respectively. **Abdel-Hafez *et al.* (2003)** estimated genetic advance from selection indices in two populations and found that the genetic

*** Corresponding author: Tel. :**+2001003758057
E-mail address: mokhtar001212@gmail.com

gains from selection for lint percentage in population (I) was large and appeared important in the improvement of lint percentage. **Okaz *et al.* (2014)** found that for improving boll weight, the use of single cross (G 85X Aust) or the triple crosses which used Giza 85 as a female parent at selection intensity %5 was the best way. Also, for improving lint percentage the use of single cross (G 91X Aust) or the triple crosses which used Giza 91 as a female parent at selection intensity %5 was the best way. **Ramdan *et al.* (2014)**using direct selection were accompanied with two selection intensities *i.e.* %5 at %10 were utilized to improve productivity with acceptable fiber quality characters in population (Giza 88 x Pima s.6). The predicted and realized advances were high for boll weight, lint yield and lint index in F_2 generation, while the actual advance in F_3 generation at two selection intensities had higher values for lint yield/plant, seed cotton yield/plant, lint index and boll weight. There were close agreement between predicted and realized advances for lint yield / plant, lint index, lint percentage and seed index, which may be due to the predominance of additive gene effects. The selection intensity at %5 achieved highly improvement in most selected characters in F3and F 4generations for predicted and actual genetic advance .The retained genetic variability after pedigree selection was larger than that after selection and intermitting. In general, selection and intermitting was better than pedigree selection. The two methods of selection for seed cotton yield/ plant delayed to first flower and increased the other correlated traits *i.e.* lint yield/plant, seed index and number of bolls/plant. The phenotypic and genotypic coefficient of variation are important parameters for plant breeders in breeding programs, particularly aiming for selecting better types from populations (**Meena *et al.*, 2001**). **Sruor *et al.* (2010)** obtained highest predicted genetic advance in F_3 generation for cotton yield, boll weight and lint percentage relative to other selected traits in two populations. Therefore, the main objectives of the present investigation were to estimate some breeding parameters *i.e.* variability, heritability, predicted and actual gain from selection for boll weight, lint percentage and seed cotton yield/plant in the F_3 and F_4 generations of the cross population Giza 80 x Giza 85.

MATERIALS AND METHODS

The present investigation was carried out at the Experimental Farm of Faculty of Agriculture, Al-Azhar University, Assiut Branch during three successive summer seasons of 2018, 2019 and 2020. The objective of this study was to estimate genetic variability, heritability and genetic advance in segregating generations of Egyptian cotton cross (*Gossypium barbadense* L.). The breeding materials which used in this experiment were the F_2, F_3 and F_4 generations of the cross Giza 80 x Giza 85. Pedigree (PSM) was used to study previous genetic parameters.

In the first season (2018), the F_2 of the one population, their original parents and check (Giza 95) were grown on March 15th in no replicated rows of 6.0 meter long adopting a spacing of 60 cm between rows and 25 cm between the plants in the row. One plant was left per hill at thinning time. Each F_2 plant was grown and selfed pollination to produce F_3 plants. Recommended agricultural practices and need based plant protection measures were followed. 2000 guarded plants for each of F_2 populations were picked up separately. Boll weight and lint percentage, were recorded for all F_2 plants in the population. The selection intensity was applied on two level 5% and 10% to select 100 and 200 plants, respectively on the basis of group's boll weight and lint percentage.

In 2019 season, all the selfed seeds of 200 F_3families of the population were evaluated, beside local check (Giza 95) and parental genotypes in a randomized complete block design with three replications for each family from population for the two groups boll weight and lint percentage. The F_4 generation which contain 10 and 20 families was tested at two selection intensities 5% and 10%, respectively.

In 2020 season, all the selfed seeds from the best plants from each planted to represent the F_4 families, in a randomized complete block design with three replications for each family from population for the two group's boll weight and lint percentage.

Table 1. Analysis of variance and expected mean squares

Source of variance	d.f	M.S	Expected mean square	
			Variance	Covariance
Replications	r–1	M_3	$\sigma^2e + g\sigma^2r$	
Genotypes	g-1	M_2	$\sigma^2e + r\sigma^2g$	Cov.e + r Cov.g
Error	(r-1)(g-1)	M_1	σ^2e	Cov.e

Where: r and g are number of replications and genotypes, respectively.
σ^2e and cov.e are error variance and covariance, respectively and σ^2g and cov.g are genetic variance and covariance, respectively.

The phenotypic (σ^2P) and genetic (σ^2g) variances were calculated according to the following formula:

$$\sigma^2P = \sigma^2g + \sigma^2e/r$$

$$\sigma^2g = (M2-M1)/r$$

Heritability in broad sense was calculated as follow:

Heritability in F_2 (H) = (VF2-((VP_1+ VP_2) /2)) / VF_2) X 100

Heritability in F_3 and F_4 (H) = (σ^2g / σ^2p) x100

Statistical Analysis

Expected gain from selection (EGS%)

The expected genetic advance (GA) expressed as a percentage of the mean value with an assumed 5% intensity of selection pressure was computed by the formula given by **Allard (1960)** as:

$$\text{EGS\%} = k.\ \text{H}\sqrt{\sigma^2 P}$$

Where:

k = 2.06 and 1.75 constant for 5% and 10% selection intensity (*i.e.* the highest-performing 5 and 10% are selected), respectively.

H = broad-sense heritability and

σ^2P = Phenotypic variance of the population.

Expected genetic gain represented as percentage of grand mean for the trait.

ΔG % = (ΔG/$\acute{X}$) .100

Where: $\acute{X}$= Grand mean for the trait.

Realized gain from selection (RGS%)

$$\text{RGS\%} = (\overline{X}_0 - \overline{XP}) \times 100 / \overline{XP}$$

RGS% the realized advance in one generation of selection, $\overline{X}_0$ is the mean phenotype of the offspring of selected parents, $\overline{XP}$ the mean phenotype of the whole parental generation.

The phenotypic and genotypic coefficients of variation are computed according to **Burton (1952).**

$$PCV = (\sqrt{VP} / \overline{X})100$$

$$GCV = (\sqrt{VG} / \overline{X})100$$

Where:

PCV, GCV are phenotypic and genotypic coefficients of variation, respectively; VP, VG are corresponding variances;

The relative values of these two types of coefficients give an idea about the magnitude of variability presented in a population. Interpretation of variability in terms is given below **(Singh and Singh, 1975).**

RESULTS AND DISCUSSION

Description of the Base Populations

The characteristics of the base populations (Table 2) indicated sufficient coefficient of variability in the F_2 population (21.79%), (12.47%) and (47.42%) in the criterion of selection; boll weight, lint percentage and seed cotton yield /plant, respectively. These results indicated to feasibility selection for these traits. Otherwise, the CV of all traits of the two parents was very low, which belongs to the high purity of the parents. Similar results were found by **El-Hashash (2004), Mahrous (2012), Okaz *et al.***

(2014), Ramdan *et al.* (2014), Yehia and Hassan (2015), Soliman (2018), Abd El-Sameea *et al*. (2020) and Mabrouk (2020). Broad sense heritability estimates were high for all traits in population. The analysis of variance indicates a highly significant between families for all traits under study in both F_3 and F_4 generations in Table 3.

Mean Performance

Means of the three generations of cross for boll weight (B.W g), lint percentage (L%), number of bolls per/plant (B/P) and seed cotton yield/plant (SCY/P), in F_2, F_3 and F_4 generation of the population are shown in Tables 3.

These results indicate that the means increased by different degrees from generation after generation, the means of selected families for boll weight, seed cotton yield/plant, number of bolls per plant and lint percentage were higher compared to check variety in F_4 generation in population, indicating an accumulation of increasing alleles. These results are in agreement with those of **Mahrous (2012)**, **El-Hashash (2004), Okaz *et al.* (2014), Ramdan *et al* (2014), Yehia and Hassan (2015), Abd El-Sameea *et al.* (2020), Ahmed (2020) and Mabrouk (2020)**. On the other hand, **El-Zanaty *et al.* (2011)** found highly significant differences between genotypes far all traits except boll weight and lint percentage.

PCV, GCV and Heritability for Boll Weight

PCV% and GCV% for boll weight in the F_2, (F_3 and F_4 at 5 and 10%) families selected for boll weight in the population are presented in Table 3. Under selection for boll weight, the PCV% was 21.81% in F_2, (16.93 and 18.39%) in F_3 and (8.47 and 11.45%) in F_4 in population at 5 and 10%, respectively. The GCV% in the population valued 10.15% (9.59 and 8.77% and (2.01 and 1.82%) in the same respective order. Estimates of PCV% and GCV% indicated the presence of variability for boll weight. This variability suggests that selection among the F_3 families may produce change in boll weight. In general, PCV% was relatively higher than GCV%. Similar results were found by **El-Zanaty *et al.* (2011)**, **Mahrous (2012)**, **El-Hashash (2004)**, **Okaz *et al.* (2014), Ramdan *et al.* (2014), Yehia and Hassan (2015) and Ahmed (2020)**. **Mahdy (2009a,b)** found decrease in variability in SCY/P, boll weight and number of boll/plant after two cycles of selection in segregating populations.

Heritability as assessed from the expected mean squares was high with values of 89.62% and 79.05% at 5% and 10% in population, respectively. In general, high estimates of heritability indicated that the selection is effective and the environmental effects are small compared to the genetic effects. These results are in agreement with those of **Younis (1998)**, **An *et al.* (2008)**, **Okaz *et al.* (2014) and Soliman (2018).** On the other hand, **Pole *et al.* (2007)**, **Ali *et al.* (2009) and Desalegn *et al.* (2009), El-Lawendey *et al.* (2011) and Okaz *et al.* (2014)** reported low heritability for boll weight and lint yield/plant. **Khan *et al.* (2009),** reported that, high broad sense heritability and genetic gain for bolls /plant (0.96 and 6.63), boll weight of (0.96 and 0.64 g) and seed cotton yield /plant (0.98 and 643.16 kg), respectively.

El-Zanaty *et al.* (2011) found low broad sense heritability for boll weight and lint percentage. **Gibely *et al.* (2015)** displayed high heritability value for seed cotton yield /plant and moderate value for boll weight. **Ahmed (2020)** showed high heritability values over 50% for (seed cotton yield/plant and number of bolls/ plant), except lint yield /plant and boll weight in F_4 generation. High to moderate broad sense heritability estimates were observed for most all traits in both F_4 and F_5 generations.

PCV, GCV and Heritability for Lint percentage

PCV% and GCV% for lint percentage in the F_2, (F_3 and F_4 at 5 and 10%) families selected for lint percentage in population are presented in Table 3. Under selection for lint percentage, the PCV% was 12.47% in F_2 as well as (10.63 and 9.86%) and (2.16 and 2.03%) in F_3 and F_4 at 5% and 10%, respectively in the population. Estimates of GCV% in population were 10.15% in F_2 as well as (9.59 and 8.77% and (2.01 and 1.82%) in F_3 and F4 at 5% and 10%, respectively. Assessments of PCV% and GCV% indicated the presence of variability for lint percentage. This variability suggests that selection among the F_3 families may

Table 3. Some breeding estimates for boll weight, lint percentage and seed cotton yield/plant in F_2, F_3 and F_4 generations of the cross population Giza 80 x Giza 85

Generation	Traits	Mean	Range	VP	VG	PCV%	GCV%	H^2b
F2		2.07	1.03-3.15	0.2.4**	0.128**	21.81	17.28	62.87
F3 5%		2.34	1.63-3.37	0.156*8	0.140**	16.93	16.02	89.62
F3 10%	**B.W.G**	2.28	1.25- 3.37	0.142	0.112	18.39	16.35	79.05
F4 5%		2.71	2.31-3.24	0.053**	0.052**	8.47	8.55	98.16
F4 10%		2.49	2- 3.18	0.083**	0.081**	11.54	11.43	98.11
F2		36.64	26.44-41.73	20.90**	13.84**	12.47	10.15	66.25
F3 5%		37.61	30-42.96	14.28**	1.018**	10.36	9.59	91.13
F3 10%	L%	37.22	29.41-42.96	11.52**	10.29**	9.86	8.77	89.39
F4 5%		39.51	38.24-42	0.729**	0.632**	2.16	2.01	86.66
F4 10%		38.86	37.12-40.18	0.624**	0.501**	2.03	1.82	80.35
F2		18.18	7-40.51	49.14	38.43	38.55	34.12	78.31
F3 5%		21.26	13-42	43.38	40.50	30.97	29.92	93.37
F3 10%	B/P	20.66	11-42	41.00	38.23	31.00	29.94	93.25
F4 5%		31.53	18-38	15.79	13.31	12.60	11.57	84.29
F4 10%		27.88	13.85-35.33	36.64	32.68	21.70	20.50	89.19
F2		33.05	18.21-100.66	245.68	199.51	47.42	42.73	81.21
F3 5%		51.74	21.18- 106.78	169.13	158.91	25.15	24,36	93.82
F3 10%	**SCY/P**	45.13	19.36-111,65	197.67	177.63	31.15	29.53	89.86
F4 5%		65.26	55.46-77.18	69.43	66.79	12.76	12.52	96.19
F4 10%		53.95	32.51-75.77	157.41	148.70	22.29	23.25	94.46

produce change in lint percentage. In general, PCV% was relatively higher than GCV%. Similar results were found by **Mahrous (2012)**, **El-Hashash (2004)**, **Okaz *et al.* (2014), Ramdan *et al*. (2014) and Yehia and Hassan (2015)**.

Heritability estimates were high and valued 91.13 and 89.39% at 5% and 10% in population, respectively. Hence, the selection is effective in raising the level of lint percentage in the early stages of the breeding program. These results are in agreeing with those of **Pole *et al.* (2007), Aziza *et al.* (2017) and Al-Hibbiny *et al.* (2019).** Meanwhile, **Younis (1998)** reported high heritability estimates for number of bolls/plant and lint percentage. Most characters showed improve broad sense heritability estimates from F_3 to F_4 generations. This is due to an increase in the portion of variance due to genetic influence to total variance, attributes to genetic changes that occurred in the two cycles of selection.

PCV, GCV and Heritability for SCY/P

High PCV and GCV values were observed for seed cotton yield/plant in both F_3 and F_4 generations. This suggested sufficient amount of variation of the trait for the studied generations. In general, PCV% was relatively higher than

GCV%. The closer magnitude of GCV and PCV in F_3 and F4 generations indicated that genotype had played greater role rather than environmental one for all traits. These results agreed with those reported by **El-Lawendey *et al.* (2008), Mahrous (2012)**, **El-Hashash (2004)**, **Okaz *et al.* (2014) and Yehia and Hassan (2015)** found that phenotypic and genotypic coefficient of variability values were high for number of bolls/plant and seed cotton yield/plant in the two cotton crosses.

High heritability in broad sense was more than 60% for SCY/P and number of boll/plant at 5% and 10% in population. Generally, high estimates of heritability showed that the environmental effects were small compared to the genetic effects. These results are in agreement with those of **An *et al.* (2008), Okaz *et al.* (2014) and Ali *et al.* (2021). Pole *et al.* (2007)**, **Ali *et al*. (2009) and Desalegn *et al.* (2009)** recorded low heritability for boll weight and seed cotton yield/plant.

The Predicted and Actual Gain from Selection

Predicted and actual genetic advances in F_3 and F_4 generations of four selected traits are presented in Tables 4 and 5 were high for boll weight and lint percentage, bolls per plant and seed cotton yield/plant in F_2 generation.

The predicted and actual genetic advances were differed for boll weight, seed cotton yield/ plant, lint percentage and bolls/ plant at both 5% and 10 % selection intensity. On the same time, the predicted and actual genetic advances at 5% selection intensity surpassed the rest intensity, this was due to accumulation of desirable alleles. Similar results were found by **Srour *et al.* (2010), Okaz *et al.* (2014) and Ramadan *et al.* (2014**). The gain from selection for six selected characters for B.W.g., SCY/P, LCY/P, L.P.%, S.I.g and L.I.g were high in both F_3 and F_4 generations as compared with F_2 due to high genetic variance to environmental variance therefore, increased heritability in broad sense. This is clear with the improvement in mean values of yield traits in F_3 and F_4 generations due to accumulation of favorable alleles. **El-Harony (1998**) showed that the direct selection for high lint percentage may be improved by both boll weight and seed index traits. **Okaz *et al*. (2014)** indicated that, for improving boll weight and lint percentage the use of single cross or the triple crosses at selection intensity 5% was the best way. **Ramadan *et al.* (2014**) reported that the predicted and actual genetic advances were high for boll weight, lint yield /plant and lint index in F2 generation, while the actual advance in F_3 generation at two selection intensities had higher for lint yield/ plant , seed cotton yield/plant, lint index and boll weight. There were close agreement between predicted and actual advances for lint yield/plant, lint percentage and seed index, which may be due to the predominance of additive genetic effect. **Gibely (2021)** found that the response to selection was to be positive for all traits during F_2 and F_3 generations.

The predicted advance at two selection intensities in F_4 generation are presented in Table 6. Highly genetic gain from selection was achieved for boll weight, seed cotton yield /plant and number of bolls /plant.

Means of the selected 8 families from F_4 generation (Table 7) recorded highest values in most studied traits similar to better parent (Giza 85) and check variety (Giza 95). Families number 1, 9,155, 29 and 156 were the best genotypes for relevant yield traits. These families surpassed the better parent, check variety and gave best values for most characters. The breeder may exploit such families in breeding programs aiming to improve cotton yield.

Results of phenotypic correlation coefficient between SCY/P with the other four components and also among the LCY/P, B/P, B.W and L% themselves were done and existing in Table 8. SCY/P was highly significant and positively associated with three traits namely LY/P (0.989), boll weight (0.991) and lint percentage (0.962). While, number of bolls/plant recorded negative and low correlation with SCY/P (-0.369). LY/P was highly significant and positively correlated with two traits boll weight (0.982) and lint percentage (0.976). But, lint yield/plant was negatively correlated with number of bolls/ plant (-0.448). Moreover, boll weight was positively

Table 4. Means, predicted and actual gains by selection in the F_2 and F_3 generations for B.W, L%, B/P and SCY/P at 5% and 10% selection intensity

Traits	Mean in F2	Mean in F3 generation		Predicted from F2 at 5%		Actual from F3 generation			
		5%	10. %	Pred.	S.A.%	Actual	Actual%	Actual	Actual%
						%5		%10	
B.W	2.07	2.34	2.28	0.585	28.23	0.128	5.51	10.1	4.44
L%	36.64	37.61	37.21	6.23	18.18	0.97	2.57	0.58	1.55
B/P	18.18	20.66	21.26	11.31	62.22	3.08	14.50	2.48	12.01
SCY/P	33.05	51.74	45.13	19.17	58.00	18.12	54.82	12.08	36.55

Table 5. Predicted and actual advanced of yield traits in F_3 and F_4 generations of the cross population Giza 80 x Giza 85

Traits	Check in F_4	Mean F_4 5%	Predicted	Selection advance S.A. %	Mean F_4 10%	Predicted	Selection advance
			5% S.In			10% S.In	
B.W.	2.36	2.71	0.468	17.30	2.49	0.497	19.93
L%	37.16	39.51	1.52	3.86	38.86	1.11	2.87
B/P	27.55	31.53	6.90	48.32	27.88	9.50	34.97
SCY/P	55.68	65.26	16.51	25.29	53.95	20.85	38.64

Table 6. Predicted advances of yield traits in F_4 generation of the cross population Giza 80 x Giza 85

Traits	Mean in F_3	Mean F_4	Predicted from F_3 at 5%		Actual from F_4		Predicted from F_3 at 10%		Actual from F_4	
	5%		Pred.	S.A%	Actual	Actual%	Pred.	Pred.%	Actual	Actual%
					5%		10%		10%	
B.W	2.34	2.71	0.730	31.25	0.38	14.02	0.524	23.00	0.215	8.62
L%	37.61	39.51	7.09	18.86	1.90	4.81	6.25	16.79	1.65	4.25
B/P	20.66	26.5	12.66	59.58	5.84	22.03	10.50	50.86	1.22	5.59
SCY/P	51.74	65.25	25.15	48.61	13.52	26.13	22.23	49.25	8.82	19.52

Table 7. The superiority of best selected families from the cross population Giza 80 x Giza 85 based on seed cotton yield/plant, boll weight, lint percentage and bolls /plant under the selection intensity (5%) in 2020 growing season

Families	Boll weight	Seed cotton yield/plant	Lint Percentage	Bolls /Plant
1	3.05**	55.46	40.94**	32.67**
9	3.03**	56.59**	41.46**	21.33
155	3.24**	57.09**	41.82**	33.67**
29	3.11**	75.78**	43.04**	35.33**
26	2.92**	70.20**	42.21**	32.67**
125	3.09**	66.45**	37.13	29.74**
177	3.36**	77.19**	35.21	34.74**
156	3.12**	62.33**	36.38	32.44**
200	3.31**	72.83**	39.40**	32.41**
73	3.11**	58.74**	37.89	30.33**
Generation Mean F4	3.13	65.26	39.13	31.53
Mean of the best 8 families.	3.15	67.57	39.51	32.66
Point start(M.F2gen.)	2.07	33.05	36.64	18.18
Giza 85(better parent)	2.46	49.66	36.28	17.35
Giza 95 (check Varity)	2.87	55.68	37.16	27.55
LSD 5%	0.215	4.62	3.05	5.68
LSD 1%	0.308	6.59	4.35	7.59
Act.(M.F4-M.F2)	0.64	14.48	2.97	32.21

Table 8. Estimates of phenotypic correlation coefficient in F_4 generation between all pairs of studied traits of the cross population Giza 80 x Giza 85

Traits	S.C.Y / P	L.Y/P	B/P	B.W	L%
S.C.Y / P	1	0.989**	-0.369	0.991**	0.962**
L.Y/P		1	-0.448	.0.982**	0.976**
B/P			1	0.273	0.916**
B.W				1	0.631**
L%					1

correlated with number of bolls/plant (0.273). But, boll weight was significant and positive correlated with lint percentage (0. 916). However, number of bolls/plant showed positively and significant correlation with lint percentage (0.631). These results are in agreeing with the findings of **Mohamed (2006), An *et al.* (2008), Desalegn *et al*. (2009), Khan *et al.* (2009, El-Lawendy *et al*. (2011), Mahrous *et al.* (2012)**, **Baloch *et al.* (2014 -a)**, **Erande *et al.* (2014), El-Mansy (2015), Al-Hibbiny *et al.* (2019).** On the other hand, **Ahmed *et al.* (2008)** reported that there were negatively correlated between B.W with S.C.Y/P**. Baloch *et al.* (2014b)** revealed that bolls plant was highly and positively associated with seed cotton yield.

REFERENCES

Abdel-Hafez, A.G., M.Sh. El-Keredy, A.F.H. El-Okia, H.A. El-Harouni and B.M. Ramadan (2003). Improvement of earliness index, boll weight and lint percentage using indirect selection in Egyptian cotton. Egypt. J. Plant Breed, 7(1): 512-533.

Abd El-Sameea, A.A., M.M. Ibrahim, M.S.H. Ahmad and S.A. El-Tahan (2020). Pedigree selection for lint yield in two segregating populations of Egyptian cotton (*G. barbadense*. L). Warld J. Agric. and Siol Sci., 5 (4):1-8.

Ahmad, R.D., A. Malik, G. Hassan and M. Subhan (2005). Estimation of combining ability of seed cotton yield and its components in inter-varietal crosses of cotton *(Gossypium hirsutum* L.*).*Gomal Univ. Joetic variability virus epidemic. The Pak. Cotton, 40: 80-90.

Ahmad, S., S. Ahmad, M. Ashraf, N. Khan and N. Iqbal (2008). Assessment of yield-related morphological measures for earliness in upland cotton (*Gossypium hirsutum* L.). Pak. J. Bot., 40: 1201-1207.

Ahmed, B.H. (2020). Response to selection, correlation and path analysis in Egyptian cotton (*Gossypium. barbadense*. L). Crop Sci. -16th Int. Conf. With Cooperation Egypt. Soc. Agron., 23-35.

Al-Hibbiny, Y.I.M., A.H. Mabrouk and B.A. Mahmoud (2019). Line x tester analysis for yield components and fiber properties in some cotton crosses of (*G. barbadense*. L). Menoufia J. Plant Prod., 4: 505-525.

Ali, M.A., A. Abbas, M. Younas, T.M. Khan and H.M. Hassan (2009). Genetic basis of some quantitative traits in upland cotton (*Gossypium hirsutum* L.). Plant Omics, 2 (2): 91-97

Ali, M.A., M.S. Hassan, A.A. Mohamed and A. Abbas (2021). Pedigree selection for number of bolls/plant in two segregating populations of basis of Egyptian cotton (*Gossypium barbadense* L.). SVU- Int. J. Agric. Sci., 3 (3):131-144.

Allard, R.W. (1960). Principles of plant breeding. John wiley and Sons, Inc. New York

An, D.T.H., R. Ravikesavan and K. Lyanar (2008). Genetic advance and heritability as a selection index for improvement of yield and quality in cotton. J. Cotton Res. and Devel., 22: 14-18.

Aziza, M. Soultan and H.A.El-Hoseiny (2017). Response to selection for some yield components and fiber properties in some Egypt cotton crosses. Egypt. J. Agric. Res., 95 (3): 1251-1266.

Baloch, A., J.H. Sahito, G.A. Baloch, S. Abro, S.A. Channa, A. Baloch, G.H. Baloch and G.M. Baloch (2014-a). Assocation analysis of yield and fiber traits in advance Pakistani upland cotton cultivars (*Gossypium hirsutum* L.). Acta Advances in Agric. Sci., 2 (12): 73-80.

Baloch, M.J., C. Kumar, W.A. Jatoi and I.H. Rind (2014-b). Phenotypic correlation and regression analysis of yield and fiber traits in upland cotton (*G. hirsutum* L.). Pak. J. Agric. Agrll. Eng., Vet. Sci., 30(2): 135-146.

Burton, G.W. (1952). Quantitative inheritance in grasses. Proc. 6th Int. Grassland Cong., 1: 227-283.

Desalegn, Z., N. Ratanadilok and R. Kaveeta (2009). Correlation and heritability for yield and fiber quality parameters of Ethiopian cotton (*Gossypium hirsutum,* L.) estimated from 15 (diallel) crosses. Kasetart. J., 43 : 1-11.

El-Harony, H.A. (1998). Direct and indirect selection for some yield and some fiber properties in Giza 77 Egyptian cotton variety .Ann. Agri. Sci. Moshtohor, 36: 713-718.

El-Hashash, E.F.M (2004).Possibility of improving Egyptian cotton through hybridization with Egyptian-American cotton. M.Sc. Thesis Fac., Agric. Al-Azhar Univ., Cairo, Egypt.

El-Lawendey, M.M., Y.A. Soliman, A.M.R. Abd El-Bary and Y.M. El-Mansy (2008). Using fourteen selection procedures to evaluate predicted and realized genetic gain the cotton cross Giza86 x Suvin. Egypt. J. Plant Breed, 12(1):157-175.

El-Mansy, Y.M. (2015). Relative efficiency of direct and indirect selection with selection indices for improving some economic characters in cotton (*G. barbadense* L.). J. Agric. Res. Kafr El-Sheikh Univ., 41 (1): 192-215.

El-Zanaty, A.M. (2011). Detection of genetic diversity in Egyptian cotton (*G. barbadense* L.) varieties using RAPD markers and morphological traits. J. Ame. Sci., 7 (12): 1107 - 1115.

Erande, C.S., H.V. Kalande, D.B. Deosarkar, S.K. Chavan, V.S. Patil, J.D. Deshmukh, V.N. Chinchane, A. Kumar, U. Dey and M.R. Puttawar (2014). Genetic variability, correlation and path analysis among different traits in desi cotton (*Gossypium arboreume* L.). Afr. J. Agric. Res., 9(29): 2278-2286.

Gibely, H.A.R. (2021). Variability, genetic components and selection response in segregating generations among some Cotton crosses. J. Sus. Agric. Sci., 47(1):1-12.

Gibely, H.A.R., A.M. Soultan, H.A. El-Hoseiny and E.A. Amer (2015).Assessment of genetic variability and stability for some cotton genotypes. Egypt. J. Plant Breed., 19 (6): 1783- 1801.

Khan, N.U., G. Hassan, I.A. Khan and W. Ahmad (2009). Genetic variability and heritability in upland cotton. Pak. J. Bot., 41: 1695- 1705.

Mabrouk, A.H. (2020). Application of some selection procedures for improving of some economic characters in cotton (*G. barbadense*. L). Menoufia J. Plant Prod., (5): 365-383.

Mahdy, E.E., A.A. Ismail, H.Y. Awaad and A.A. Mohamed (2001). The relative merits of pedigree and modified recurrent selection in improving seed cotton yield in two segregating populations of Egyptian cotton (*G. barbadesnse* L.). The Second plant Breed. Conf., October, 2:61-80.

Mahdy, E.E., G.M.K. Hemaida, F.M.F. Abd El-Motagally and A. Mostafa (2009-a). Response to selection for yield under late sowing in two populations of Egyptian cotton. Assiut J. Agric. Sci., 40 (Special Issue) (1-25).

Mahdy, E.E., G.M.K. Hemaida, F.M.F. Abd El-Motagally and A. Mostafa (2009-b). Pedigree selection for lint yield, lint percentage and earliness index in late planting in two populations of Egyptian cotton. Minia J. Agric. Sci. 29: (1-25).

Mahrous, H. (2012). Selection for earliness index and correlated response in Egyptian cotton. Assiut J. Agric. Sci., 43(3): 41-54.

Meena, R.A., M.N. Mishra and R.G. Dani (2001). Genetic variability and correlation for seed- quality parameters in upland cotton (*G.hirsutum* L.). Indian J. Agric. Sci., 71 (6): 417-420.

Mohamed, A.A. (2006).The relative importance of some yield attributes on lint and seed cotton yields in upper Egypt. Minia J. Agric. Res. and Develop., 26 (3): 471-483.

Okaz, A.M.A., H.E. Yassien, G.M. Hemida and A.H.M. Darweesh (2014). Selection efficiency in single and triple crosses segregating generations for improving boll weight and lint percentage in Egyptian cotton. Al-Azhar. J. Agric. Res. 21: 49-64.

Pole, S.P., S.B. Borgaonkar and V. Thombre (2007). Study of gene action in cotton (*Gossypium hirsutum*, L.). Int. J. Plant Sci., (Muzaffarnagar) 2: 45 -46.

Ramadan, B.M., Y.M. El-Mansy, M.A. Al-Ameer and M.A. Abou El-Yazied (2014). Improvement of some economic characters through direct selection in Egyptian cotton. Egypt. J. Plant Breed, 18(4):783-797.

Singh, U. and P. Singh (1975). Estimates of genetic and environmental variability in Lentil (*Lens esculenta*, Moench.). Madras Agric. J., 62 (9):575-578.

Soliman, A.M. (2018). Efficiency of selection index in improvement yield and yield components in segregating population of Egyptian cotton. Archives Agric. Sci. J., 1 (1): 129-141.

Srour, M.S.M., M.A. Hager, E.I. Zaazaa and E.F. El-Hashash (2010).Genetic analysis for some yield and fiber quality traits using F2 and F3 populations in cotton. J. Plant Prod. Mansoura Univ., Vol. 1 (12): 1593-1604.

Walker, J.T. (1960). The use of a selection index technique in the analysis of progeny row data. Emp, Cott' Gr. Rev' 37: BL-107.

Yehia, W.M.B. and S.S. Hassan (2015). Genetic analysis of yield and its component of some Egyptian cotton crosses (*Gossypium barbadense*, L). Alex. J. Agric. Res., 60 (3): 173-181.

Younis, F.G. (1998). Relative importance of gene effects in the inheritance of yield components and some fiber properties in an Egyptian cotton cross (*Gossypium barbadense*, L). Egypt. J. Appl. Sci., 13 : 197-205.

.

الانتخاب للمحصول ووزن اللوزة ومعدل الحليج في عشيرة انعزالية لهجين القطن المصري (جيزة 80 × جيزة 85)

بركات حسن أحمد - مختار حسن هريدي

قسم المحاصيل – كلية الزراعة – جامعة الأزهر– فرع أسيوط – مصر

تم إجراء دورتين من الانتخاب المباشر مع استخدام شدتى انتخاب 5% و 10% وذلك لتحسين صفات المحصول . أجرى هذا البحث خلال ثلاثة مواسم صيفية من 2018-2020 فى مزرعة تجارب كلية الزراعة - جامعة الازهر -فرع اسيوط. وكانت المواد المستخدمة عبارة عن عشيرة انعزالية من الجيل الثاني (جيزة 80 X جيزة 85) ناتجة من التهجين بين صنفي القطن المصري. وكان الهدف من هذا البحث تقدير الإستجابة المباشرة لدورتين للانتخاب تحت شدتى الانتخاب 5% و 10%، وكانت اهم النتائج المتحصل عليها كما يلي: أظهرت مقارنة متوسطات الصفات للجيل الثانى مع متوسطات الجيلين الثالث والرابع زيادة فى قيم متوسطات الصفات مع التقدم فى الاجيال من الثانى الى الرابع ويرجع ذلك لتجمع الاليلات المفيدة والمؤثرة فى زيادة قيم الصفات. أشارت النتائج ارتفاع قيم معامل الاختلاف المظهري والوراثي فى الجيل الثاني مقارنة مع الجيلين الثالث والرابع. كانت قيم معامل الاختلاف المظهري والوراثي متقاربة فى الجيلين الثالث والرابع مما يدل أن معظم الاختلافات وراثية وتأثيرها أكبر من الاختلافات البيئية. أظهرت قيم درجة التوريث بمعناها الواسع ارتفاعاً كبيراً فى درجة التوريث لكل الصفات مع التقدم فى الاجيال من الثانى الى الرابع. كانت الاستجابة للانتخاب عند تطبيق شدة انتخاب 5% أعلى من شدة انتخاب 10% فى الجيلين الثالث والرابع. أمكن الحصول فى الجيل الرابع على افضل العائلات (1، 9، 155، 26، 156) فى الصفات المدروسة وتمتاز هذه العائلات عن أفضل الاباء جيزة 85 والصنف التجاري جيزة 95، ويمكن استخدام هذه العائلات فى برامج التربية لتحسين القطن المصري.

المحكمـــــون:

1- أ.د. نبيل احمد محمد علي يونس أستاذ بقسم المحاصيل - كلية الزراعة - جامعة الأزهر.

2- أ.د. حســــن عـــوده عــــواد أستاذ المحاصيل – كلية الزراعة – جامعة الزقازيق.