

RESPONSE TO SELECTION FOR YIELD UNDER LATE SOWING DATE IN TWO POPULATIONS OF EGYPTIAN COTTON

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Abstract: Two cycles of pedigree selection for seed cotton yield/plant, boll weight and number of bolls/plant were completed at late planting date in two F₂-populations of Egyptian cotton. Population I stemmed from the cross Giza-91 x (Giza-80 x Pima S6) and population II from Giza-80 x Dandara. One experiment for each population of 200 families (F₃) was grown in RCBBD of two replications in 2006 season. The second selection cycle was evaluated in 2008 season. Selection for seed cotton yield/plant resulted in two superior families from population I; No.144 and 147, which showed highly significant observed gain in seed cotton yield/plant (37.18 and 42.21%), lint yield/plant (55.38 and 65.34%), lint percentage (13.74 and 16.66%) and earliness index (14.12 and 9.54%) respectively. In population II; family No. 151 significantly out-yielded the better parent in seed cotton yield (93.80%), lint yield/plant (107.56%), boll weight (27.78%), number of bolls/plant (51.79%), seed index (13.13%), lint index (25.20%), earliness index (9.35%) and days to first flower (-4.12%) and could be considered the best selected family. When selection was practiced for boll weight in population I; two families (No. 108 and 147) showed highly significant observed gain in boll weight from the

mid parent. These two promising families showed highly significant favorable correlated response in seed cotton (29.27 and 24.21%), lint yields/plant (18.05 and 65.34%) and earliness index (-6.81 and 9.54%). With respect to population II; the best family No.73 showed significant favorable observed gain for the correlated traits; seed cotton yield/plant (39.88%), lint yield/plant (58.61%), lint percentage (12.70%), number of bolls/plant (11.15%), seed index (6.16%), lint index (29.37%), earliness index (6.78%) and days to first flower (-3.05%). Selection for number of bolls/plant in population I; resulted in one family (No.144) that showed significant response in number of bolls/plant (43.88%), and showed highly significant favorable correlated response in seed cotton (37.18%), lint yields/plant (55.38%), lint percentage (13.74%), lint index (18.40%) and earliness index (14.12%). This family could be considered as promising family for yield and earliness. In population II; family No. 150 showed significant or highly significant favorable correlated response in seed cotton yield/plant (25.21%), lint yield/plant (31.06%) and seed index (7.32%) in percentage of the better parent.

Key words: cotton, pedigree selection, late sowing and populations

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Introduction

The cotton production in Egypt faces some constraints, notably the apparent delay by farmers in sowing cotton to gain a complete winter crop before cotton. Date of planting has been delayed for at least one month beyond March; the optimum time for sowing. Egyptian varieties need at least six months from March to September to mature. Looking for earlier varieties adapted to early planting has been one of the main objectives in Egyptian cotton breeding programme since the rise of scientific research on cotton in the early 1920's. However, selection for early lines adapted to late planting in Egypt is lack. Pedigree selection method has become the most popular of plant breeding procedures. Most of Egyptian cotton varieties were produced through this method. Plant breeders prefer it because it is versatile, relatively rapid and makes possible the conducting of genetic studies along with the plant-breeding work. Mahdy (1983) showed that after two cycles of pedigree line selection, the corresponding increase was 8.4 and 6.3% for the two populations, Simultaneous increases for number of bolls/plant, number of seeds/boll and lint/seed were observed. A substantial amount of residual genetic coefficient of variability for lint yield/plant, number of bolls/plant and lint/seed was

remained in the two populations after the two types of selection. Singh *et al.* (1985) found that the pedigree method was better than progeny-bulk selection and mass selection in improving yield; boll number, boll weight and ginning out-turn in (Pusa 595B) Upland cotton. Ten high-yielding progenies with 55.5% more yield than the standard, (Bikaneri Narma) were obtained. Singh *et al.* (1986) showed 6-9% improvement in yield because of improvements in boll number per plant and boll weight. Konoplyya (1991) suggested that the most useful trait on which to base selection to increase yield was number of bolls per plant. Awaad and Hassan (1996) found that direct selection for seed cotton yield per se was effective in three crosses. Echekwu (2001) reported that it might be more profitable to practice direct selection for seed cotton yield compared to select for seed cotton yield through any of the other traits. Esmail *et al.* (2004) noted that boll number per plant had the highest direct effect on seed cotton yield followed by boll weight at 3 sowing dates.

Materials and methods

The present investigation was carried out at Assiut Univ. Exp. Farm during the four summer seasons of 2005 - 2008. The basic materials consisted of two F₂- populations stemmed from crosses between three Egyptian cotton varieties (*Gossypium*

barbadense L.). Population I stemmed from the cross Giza-91 x (Giza-80 x Pima S6) and population II from Giza-80 x Dandara.

Season 2005, F₂-generation:

The present work started in season 2005; the two aforementioned populations in the F₂ generation were sown on May 5th in spaced plants; thousand plants from each of population I and population II. Two hundred single plants were selected from each population according to their lint yield and earliness index.

Season 2006, F₃- generation:

Two hundred families from each population along with the two parents and the unselected bulk sample were sown on May, 6th for pedigree selection for seed cotton yield, boll weight and number of bolls/plant under late planting date conditions. Randomized complete block design of two replications was used for each population. The plot size was one row, 4 m long, 60 cm apart and 40 cm between hills within a row. After full emergence, seedlings were thinned to one plant per hill (10 plants/ row). The recommended cultural practices were adopted throughout the growing season. The studied traits were seed cotton yield (g), lint yield (g), lint percentage (%), boll weight (g), number of bolls/plant, seed index

(g), lint index (g), earliness index (first pick/the two picks) and days to first flower (days). The best 30 families for three selection criteria (seed cotton yield/plant, number of bolls/plant and boll weight) were determined, and the best plant from each family was saved (first cycle selection).

Season 2007, F₄- generation:

The sowing date was May, 15th, 2007. One experiment for each population was sown using the same experimental design and the same plot size of the previous season. Total number of families in population I accounted for 40 and 38 for population II for the three selection criteria. The data were recorded as the previous season. The best 10 plants from the best 10 families for each of seed cotton yield; boll weight and number of bolls/plant were saved in the two populations (second cycle selection).

Season 2008, F₅- generation:

Sowing date was May, 15th, 2008. Experimental design and the plot size were as the previous season. One experiment for each population was raised to evaluate the selected families for all traits after two cycles of pedigree selection. The experiment involved the two parents and the unselected bulk sample. Estimate of genotypic variances (Al-Jibouri *et al.*, 1958), realized

heritability (h^2) (Falconer 1989), genotypic coefficients of variation were calculated (Burton, 1952). Revised L.S.D (El Rawi and Khalafalla 1980) was used to compare between means.

Results and Discussion

Genetic variability in the F_3 -families in season 2006:

The genotypic (gcv) coefficient of variability for 200 families (F_3) from the two populations for all the studied traits is shown in Table 1. High gcv values was observed in seed cotton yield/plant (43.71 and 61.88%), lint yield/plant (48.65 and 68.03%) and number of bolls/plant (34.87 and 49.72%) in populations I and II, respectively. However, lint percentage, boll weight, days to first flower, seed and lint index showed moderate variability. Mahdy *et al.* (2001) and Mohamed (2001) showed that the genotypic coefficient of variability was greatly depleted after two cycles of pedigree or inter mating in the population "Giza-83 x Dandara" and the gcv values were lower than the pcv in all the studied traits. It could be noticed that the differences between families in the two populations were large enough, and selection for seed cotton yield/plant, boll weight and number of bolls/plant could be feasible in the F_3 families.

Means:

Two hundred families in the F_3 generation from each of the two populations were planted on May 5th and ranges of the best 30 families in seed cotton yield/plant, boll weight and number of bolls for the two populations are presented in Table 1. Mean seed cotton yield/plant of the selected families from population I ranged from 116.27 to 164.10 g with an average of 76.85 g. Fairly, the same trend was obtained in population II, in which seed cotton yield/plant ranged from 99.70 to 176.5 g with an average of 58.66 g.

Mean boll weight of the families from population I ranged from 2.58 to 3.49 with an average of 2.78 g (Table 1). The range in population II was wider than in population I, in which boll weight ranged from 1.95 to 3.58 with an average of 2.57g (Table 1). It could be noticed that the differences between families in the two populations were large enough, and selection for boll weight could be feasible. Singh *et al.* (1985) found that the pedigree method was better than progeny-bulk selection and mass selection in improving yield; boll number, boll weight and ginning out-turn.

Table(1): Ranges, means and genotypic coefficient of variability (gcv) of the selected families from the two populations in the F₃-generation (season 2006) for the three selection criteria and correlated traits.

Pop.	Traits		Seed cotton yield/plant, g.	Lint yield/plant, g.	Lint percentage	Boll weight, g.	Number of bolls/plant	Seed index, g.	Lint index, g.	Earliness index	flowering
Population I	SCY	Range	116.27-164.1	34.37-67.37	28.93-41.1	2.58-3.49	35.1-57.79	7.34-10.58	3.27-7.19	11.91-71.64	65.17-81.46
	BW		70.37-157.64	24.73-60.57	27.67-41.95	2.85-3.49	21.13-47.41	7.64-10.99	3.05-7.80	17.44-98.81	61.09-82.53
	NB		79.31-164.10	30.19-67.37	28.93-41.86	2.05-3.48	37.03-57.79	8.01-10.58	3.27-7.39	11.91-71.64	63.54-82.11
		Mean	76.85	27.47	35.07	2.78	26.94	9.47	5.26	51.65	72.83
		gcv %	43.71	48.65	12.62	16.91	34.87	9.87	26.81	41.14	8.42
		Giza-91	71.42	25.61	35.86	2.85	25.06	10.44	5.84	65.12	68.5
		Giza-80 x P. S6	65.73	24.87	37.84	2.8	23.48	9.35	5.69	75.23	71.42
Population II	SCY	Range	99.65-176.5	31.37-63.39	26.24-41.99	1.95-3.58	30.29-58.18	8.05-10.99	3.22-7.69	10.84-61.32	65.65-86.02
	BW		61.03-176.50	21.08-63.39	26.24-41.94	3.19-3.58	18.92-51.02	8.33-10.93	3.15-7.57	10.84-61.32	65.65-84.00
	NB		74.74-176.50	28.30-63.39	26.24-42.07	1.95-3.58	32.90-58.18	8.05-10.99	3.22-7.69	10.84-68.03	65.65-86.02
		Mean	58.66	20.79	34.10	2.57	21.65	9.61	5.09	43.69	77.1
		gcv %	61.88	68.03	13.04	20.59	49.72	8.22	25.67	52.80	7.36
		Dandara	62.43	21.52	34.47	2.37	26.34	9.21	4.84	73.45	68.24
		Giza-80	57.82	22.68	39.23	2.45	23.6	9.65	6.23	62.34	71.85

Mean number of bolls/plant of the families ranged from 35.1 to 57.79 with an average of 26.94 and from 30.29 to 58.18 with an average of 21.65 (Table 1) in population I and II, respectively. It could be noticed that the differences between families in the two populations were large enough, and selection for number of bolls/plant could be feasible. Mahdy (1983) achieved increase in number of bolls/plant through pedigree selection in two populations of Egyptian cotton. Simultaneous increases for number of bolls/plant, number of seeds/boll and lint/seed were observed. Singh *et al.* (1986) showed 6-9% improvement in yield because of improvements in boll number per plant and boll weight.

Evaluation of the second cycle of pedigree selection in season 2008:

1- Genetic variability and realized heritability:

Data presented in Table 2 revealed that, after two cycles of selection, genotypic coefficient of variability decreased rapidly compared to F₃ generation and accounted for 24.15 and 32.10% for seed cotton yield/plant, 11.21 and 12.28% for boll weight and 28.10 and 25.93% for number of bolls/plant in population I and II, respectively. However, this remained genetic variability was sufficient in the criteria of selection for further cycles.

Realized heritability (h^2) was estimated for seed cotton yield/plant, boll weight and number of bolls/plant and all the correlated traits in the two populations, it was medium for seed cotton yield/plant and accounted for 47.60 and 43.74%, 33.93 and 30.41% for boll weight and 29.69 and 21.04% for number of bolls/plant in populations I and II, respectively (Table 2).

2- Means and observed gain after two cycles of selection (season 2008):

A- Selection for seed cotton yield/plant

Means of the selected families for seed cotton yield/plant after two cycles of pedigree selection in population I are shown in Table 3, selection resulted in six families (No. 73, 87, 128, 144, 147 and 184) which significantly out-yielded the high yielding parent (Giza-80 x Pima S6). Two families (No. 73 and 144) were significantly higher than the better parent in lint yield/plant and number of bolls/plant. Only three families were late in maturity as measured by earliness index. Awaad and Hassan (1996) noted that direct selection for seed cotton yield per se was effective in three crosses. The observed direct response to selection for seed cotton yield/plant after two cycles of pedigree selection are shown in Table 4, two cycles of selection

Table(2): Realized heritability (h^2 %) and gcv after two cycles of selection in the two populations in season 2008.

Pop.	Criterion of selection	Traits	Studied traits								
			Seed cotton yield /plant (g)	Lint yield /plant (g)	Lint percentage	Boll weight (g)	No. of bolls /plant	Seed index (g)	Lint index (g)	Earliness index	Days to first flower
Population I	Seed cotton yield /plant	gcv	24.15	25.13	4.60	10.65	28.77	7.31	8.28	9.02	4.39
		h^2 %	47.60	4.28	8.30	10.70	4.41	6.23	21.11	14.96	22.25
	Boll weight	gcv	25.41	28.09	6.69	11.21	26.62	9.14	7.43	16.20	3.74
		h^2 %	12.90	16.45	11.36	33.93	12.49	9.37	7.93	16.88	15.44
	No. of bolls /plant	gcv	24.61	24.59	2.79	10.70	28.10	7.77	6.60	9.47	4.09
		h^2 %	6.37	6.12	8.00	10.87	29.69	9.98	15.65	12.83	10.57
Population II	Seed cotton yield /plant	gcv	32.10	33.13	N.S.	5.55	29.66	7.76	7.05	22.16	3.15
		h^2 %	43.74	5.24	N.S.	9.52	5.21	12.10	9.84	14.40	12.55
	Boll weight	gcv	26.10	27.78	5.30	12.28	35.03	8.33	15.72	17.92	3.77
		h^2 %	11.64	19.63	6.85	30.41	5.63	10.20	4.51	21.85	15.91
	No. of bolls /plant	gcv	18.94	18.49	N.S.	9.09	25.93	8.04	5.82	21.74	2.70
		h^2 %	9.96	14.07	N.S.	4.72	21.04	12.61	8.47	19.18	10.93

N.S. = not significant.

Table(3): Means of the selected families for seed cotton yield/plant and correlated traits from population I in season 2008 after two cycles of selection.

Families	Seed cotton yield /plant (g)	Lint yield /plant (g)	Lint percentage	Boll weight (g)	No. of bolls /plant	Seed index (g)	Lint index (g)	Earliness index	Days to first flower
73	105.41	38.52	36.53	2.88	37.28	9.73	5.60	74.59	65.18
87	80.54	27.95	34.71	2.92	27.55	8.82	4.71	68.33	60.27
111	46.83	16.86	35.97	2.73	17.21	9.84	5.54	80.15	63.94
121	61.82	21.56	34.79	3.20	19.33	10.95	5.87	79.05	65.85
128	65.86	25.65	38.88	2.58	25.53	10.07	6.42	69.02	57.08
139	63.79	21.49	33.61	3.11	20.54	9.34	4.74	81.39	65.17
144	82.97	31.76	38.29	2.34	35.72	9.74	6.04	90.34	63.30
147	86.01	33.80	39.28	3.25	26.51	8.65	5.59	86.72	60.78
176	52.10	20.05	38.42	3.25	16.01	9.13	5.70	85.24	65.25
184	75.15	28.11	37.40	3.39	22.20	8.74	5.24	78.17	65.31
Mean	72.05	26.57	36.79	2.97	24.79	9.50	5.54	79.30	63.21
Bulk	37.24	13.86	37.22	2.55	14.60	9.32	5.53	75.79	62.40
G.80 x P. S6	60.48	20.44	33.67	2.44	24.83	10.04	5.10	69.38	63.06
G.91	57.54	19.09	33.18	3.01	19.13	9.68	4.83	79.16	62.59
M.P	59.01	19.77	33.42	2.73	21.98	9.86	4.97	74.27	62.82
Rev. LSD _{0.05}	4.54	3.10	3.92	0.34	3.35	0.44	0.93	2.37	2.24
Rev. LSD _{0.01}	6.17	4.20	5.35	0.45	4.56	0.59	1.29	3.22	2.98

Table(4): Observed direct and correlated responses after the second cycle of pedigree selection for seed cotton yield/plant and correlated traits measured in percentage of the better parent in population I (season 2008).

Families	Seed cotton yield /plant (g)	Lint yield /plant (g)	Lint percentage	Boll weight (g)	No. of bolls /plant	Seed index (g)	Lint index (g)	Earliness index	Days to first flower
73	74.29**	88.42**	8.50	-4.31	50.16**	-3.15	9.66	-5.78**	4.14*
87	33.17**	36.72**	3.12	-2.99	10.95	-12.15**	-7.80	-13.69**	-3.71
111	-22.57**	-17.52	6.85	-9.51	-30.69**	-1.99	8.57	1.25	2.16
121	2.21	5.44	3.34	6.31	-22.16**	9.03**	14.99	-0.14	5.21*
128	8.90	25.46**	15.49**	-14.27*	2.84	0.30	25.70**	-12.82**	-8.80**
139	5.47	5.12	-0.15	3.10	-17.28*	-6.97**	-7.14	2.81	4.12*
144	37.18**	55.38**	13.74*	-22.46**	43.88**	-3.05	18.40*	14.12**	1.13
147	42.21**	65.34**	16.66**	7.74	6.75	-13.84**	9.57	9.54**	-2.90
176	-13.86**	-1.92	14.11*	7.96	-35.53**	-9.09**	11.71	7.68**	4.25*
184	24.25**	37.51**	11.08*	12.39*	-10.58	-12.98**	2.68	-1.26	4.34*
LSD _{0.05}	8.94	18.03	10.67	11.18	16.09	4.74	16.80	3.57	3.90
LSD _{0.01}	12.16	24.50	14.50	15.19	21.87	6.44	22.84	4.85	5.31

* = significant and ** = highly significant

resulted in positive and highly significant observed gain in seed cotton yield/plant for five families (No. 73, 87, 144, 147 and 184) in percentage of the better parent. Two of them (No. 73 and 144) showed highly significant observed gain in lint yield /plant (88.42 and 55.38%) and in number of bolls/plant (50.16 and 43.88%) of the better parent, respectively.

Family No. 147 could be considered the best selected family, which showed highly significant observed gain in seed cotton yield/plant (42.21%), lint yield/plant (65.34%), lint percentage (16.66%) and earliness index (9.54%). However, selection for seed cotton yield/plant decreased significantly seed index of this family (No. 147). Echekwu (2001) noted that it might be more profitable to practice direct selection for seed cotton yield compared to selection for seed cotton yield through any of the other traits. In population II; means of the selected families for seed cotton yield/plant (Table 5) resulted in five families (No. 110, 123, 146, 151 and 163) which significantly out-yielded the high yielding parent Giza-80 and also they were significantly heavier than the better parent in boll weight, four families of them (No. 123, 146, 151 and 163) significantly exceeded the better parent in lint yield/plant. Moreover, three of them were significantly earlier

than the earlier parent Dandara in earliness index. Family No. 151 significantly exceeded the better and earlier parent in all the studied traits.

The observed direct responses to selection for seed cotton yield/plant after two cycles of pedigree selection in population II are shown in Table 6. Selection resulted in highly significant observed response for four families (No. 123, 146, 151, and 163) in percentage of the better parent. These families showed highly significant favorable correlated response in lint yield/plant and boll weight in percentage of the better parent, two families of them (No. 146 and 151) showed highly significant observed gain in lint yield/plant (35.44 and 107.56%), boll weight (15.24 and 27.78%) and in number of bolls/plant (11.66 and 51.79%) of the better parent.

Family No. 151 significantly out-yielded the better parent in seed cotton yield (93.80%), lint yield/plant (107.56%), boll weight (27.78%), number of bolls/plant (51.79%), seed index (13.13%), lint index (25.20%), earliness index (9.35%) and days to first flower (-4.12%) and could be considered the best selected family.

Murthy *et al.* (2004) found highly significant differences among different genotypes for various traits. When variability,

Table(5): Means of the selected families for seed cotton yield/plant and correlated traits from population II in season 2008 after two cycles of selection.

Families	Seed cotton yield /plant (g)	Lint yield /plant (g)	Lint percentage	Boll weight (g)	No. of bolls /plant	Seed index (g)	Lint index (g)	Earliness index	Days to first flower
91	43.20	15.90	36.68	3.02	14.32	9.17	5.33	82.74	72.04
110	65.17	24.67	37.83	3.11	20.97	10.23	6.23	85.16	68.00
123	69.70	26.82	38.44	3.03	23.00	9.41	5.89	88.61	69.88
138	44.78	17.99	40.16	3.02	14.87	8.34	5.61	89.67	72.14
146	77.59	29.97	38.61	3.00	25.90	9.11	5.77	62.87	69.33
151	116.97	45.92	39.25	3.33	35.20	10.40	6.73	90.04	65.27
163	67.86	26.98	39.76	3.39	20.04	9.97	6.58	80.78	69.79
164	63.35	25.57	40.32	2.80	22.62	10.30	6.98	41.60	67.08
172	57.32	21.46	37.44	3.15	18.18	9.71	5.81	83.96	71.38
182	51.35	18.98	36.94	3.34	15.38	10.92	6.40	54.80	71.14
Mean	65.73	25.43	38.54	3.12	21.05	9.76	6.13	76.02	69.60
Bulk	53.24	17.22	36.70	2.46	21.64	10.18	5.90	73.57	64.23
Dandara	54.35	20.08	36.90	2.57	21.18	9.19	5.38	82.34	69.00
Giza 80	60.36	22.12	36.61	2.60	23.19	8.89	5.15	80.12	68.07
M.P	57.35	21.10	36.75	2.59	22.19	9.04	5.26	81.23	68.54
Rev. LSD _{0.05}	3.70	2.93	N.S.	0.15	1.90	0.35	1.03	2.65	1.33
Rev. LSD _{0.01}	4.92	3.90	N.S.	0.20	2.53	0.46	1.45	3.53	1.78

N.S. = not significant.

Table(6): Observed direct and correlated responses after the second cycle of pedigree selection for seed cotton yield/plant and correlated traits measured in percentage of the better parent in population II (season 2008).

Families	Seed cotton yield /plant, g.	Lint yield /plant, g.	Lint percentage	Boll weight, g.	No. of bolls /plant	Seed index, g.	Lint index, g.	Earliness index	Days to first flower
91	-28.43**	-28.13**	-0.58	16.01**	-38.27**	-0.29	-0.82	0.48	5.83**
110	7.98*	11.50	2.53	19.46**	-9.56*	11.24**	15.93	3.42	-0.11
123	15.49**	21.24**	4.19	16.52**	-0.84	2.36	9.58	7.61**	2.65*
138	-25.80**	-18.68*	8.85	16.01**	-35.90**	-9.28**	4.33	8.90**	5.97**
146	28.55**	35.44**	4.64	15.24**	11.66*	-0.87	7.29	-23.64**	1.85
151	93.80**	107.56**	6.39	27.78**	51.79**	13.13**	25.20**	9.35**	-4.12**
163	12.44**	21.96**	7.75	30.09**	-13.60**	8.41**	22.38*	-1.89	2.52*
164	4.96	15.59*	9.28	7.68*	-2.46	12.04**	29.87**	-49.48**	-1.46
172	-5.04	-3.02	1.47	21.13**	-21.59**	5.62*	8.12	1.97	4.85**
182	-14.93**	-14.22	0.11	28.30**	-33.67**	18.78**	19.09*	-33.45**	4.51**
LSD _{0.05}	7.06	15.24	N.S.	6.46	9.43	4.48	17.41	3.71	2.11
LSD _{0.01}	9.59	20.72	N.S.	8.78	12.82	6.09	23.66	5.04	2.87

* = Significant, ** = highly significant and N.S. = not significant.

heritability and genetic advance were considered together, seed cotton yield per plant might be the best reliable trait that could be exploited for hybridization and selection for improvement.

B- Selection for boll weight

Means of the selected families for boll weight from population I after two cycles of pedigree selection are shown in Table 7. Selection resulted in one family No. 108 which was significantly heavier than the better parent Giza-91. This family significantly out-yielded the better parent in seed cotton yield/plant and lint yield/plant. There are five families from this set (No. 94, 129, 136, 147 and 169) were significantly higher than the better parent in seed cotton and lint yield/plant and they were significantly earlier than the earlier parent Giza-91 in earliness index. Two families (No. 69 and 94) out-yielded the better parent significantly in seed cotton yield/plant, lint yield/plant and were earlier than the earlier parent Giza-91 in flowering.

The observed direct responses to selection for boll weight after two cycles of pedigree selection are shown in Table 8. The response in boll weight was positive and significant for family No. 108 from the better parent. Also, this family showed positive and significant or highly significant favorable correlated response in seed cotton and lint

yields/plant from the better parent.

Means of the selected families for boll weight from population II are shown in Table 9. Selection resulted in seven families (No. 73, 91, 106, 110, 123, 164 and 172) which significantly exceeded the better parent Giza-80. Family No. 73 significantly exceeded the better parent in all the studied traits. Two of these families (No. 73 and 123) were significantly out-yielded the high yielding parent in seed cotton and lint yields/plant. Five families (No. 73, 106, 110, 164 and 172) significantly exceeded the better parent in seed index; two families (No. 73 and 164) exceeded significantly the better parent in lint index. Moreover, four families were higher in earliness index than the better parent. The observed direct responses to selection for boll weight after two cycles of pedigree selection are shown in Table 10. Significant observed gain in boll weight from the better parent was found in seven families (No. 73, 91, 106, 110, 123, 164 and 172). Two promising families (No. 73 and 123) were obtained. The best one was family No. 73 which showed significant favorable observed gain for the correlated traits; seed cotton yield/plant (39.88%), lint yield/plant (58.61%), lint percentage (12.70%), number of bolls/plant (11.15%), seed index (6.16%), lint index (29.37%), earliness

Table(7): Means of the selected families for boll weight and correlated traits from population I in season 2008 after two cycles of selection.

Families	Seed cotton yield /plant (g)	Lint yield /plant (g)	Lint percentage	Boll weight (g)	No. of bolls /plant	Seed index (g)	Lint index (g)	Earliness index	Days to first flower
69	73.95	25.48	34.44	2.88	26.27	11.29	5.95	45.64	58.64
94	93.22	34.09	36.52	2.89	32.31	9.20	5.31	83.38	59.08
108	78.17	24.13	30.87	3.44	22.75	9.46	4.23	73.77	63.11
123	54.98	17.99	32.65	2.94	18.71	9.68	4.71	79.38	65.27
129	71.12	25.78	36.17	2.20	32.37	9.45	5.37	84.92	61.82
136	74.97	26.03	34.73	2.78	26.95	9.40	5.00	87.38	62.65
142	37.48	12.16	32.33	2.85	13.13	11.17	5.34	91.90	63.33
147	86.01	33.80	39.28	3.25	26.51	8.65	5.59	86.72	60.78
169	93.98	33.48	35.63	2.65	35.53	9.36	5.18	82.08	61.20
185	53.39	20.41	38.22	2.59	20.73	8.76	5.44	81.06	65.92
Mean	71.73	25.33	35.08	2.85	25.52	9.64	5.21	79.62	62.18
Bulk	37.24	13.86	37.22	2.55	14.60	9.32	5.53	75.79	62.40
G.80 x P.S6	60.48	20.44	33.67	2.44	24.83	10.04	5.10	69.38	63.06
G.91	57.54	19.09	33.18	3.01	19.13	9.68	4.83	79.16	62.59
M.P	59.01	19.77	33.42	2.73	21.98	9.86	4.97	74.27	62.82
Rev. LSD _{0.05}	3.76	2.91	3.97	0.33	2.74	0.44	0.95	1.75	1.90
Rev. LSD _{0.01}	5.00	3.88	5.57	0.44	3.64	0.59	1.35	2.33	2.55

Table(8): Observed direct and correlated responses after the second cycle of pedigree selection for boll weight measured in percentage of the better parent in population I (season 2008).

Families	Seed cotton yield /plant (g)	Lint yield /plant (g)	Lint percentage	Boll weight (g)	No. of bolls /plant	Seed index (g)	Lint index (g)	Earliness index	Days to first flower
69	22.27**	24.65**	2.31	-4.42	5.81	12.41**	16.48*	-42.35**	-6.30**
94	54.14**	66.75**	8.47	-4.20	30.12**	-8.40**	4.10	5.32**	-5.60**
108	29.24**	18.05*	-8.32	14.05*	-8.36	-5.81*	-17.20*	-6.81**	0.83
123	-9.10*	-12.01	-3.02	-2.43	-24.66**	-3.58	-7.77	0.27	4.28*
129	17.59**	26.09**	7.44	-26.88**	30.36**	-5.91*	5.24	7.27**	-1.23
136	23.96**	27.32**	3.16	-7.63	8.55	-6.44*	-1.99	10.38**	0.10
142	-38.03**	-40.53**	-3.96	-5.31	-47.14**	11.18**	4.66	16.09**	1.18
147	42.21**	65.34**	16.66**	7.74	6.75	-13.84**	9.57	9.54**	-2.90
169	55.39**	63.80**	5.84	-12.17*	43.08**	-6.80*	1.51	3.68**	-2.22
185	-11.72**	-0.14	13.53*	-14.16*	-16.53*	-12.81**	6.49	2.40	5.32**
LSD _{0.05}	7.16	16.39	10.70	11.18	12.69	5.02	15.80	2.54	3.28
LSD _{0.01}	9.73	22.28	14.55	15.19	17.25	6.83	21.48	3.45	4.46

* = Significant and ** = highly significant.

Table(9): Means of the selected families for boll weight and correlated traits from population II in season 2008 after two cycles of selection.

Families	Seed cotton yield /plant (g)	Lint yield /plant (g)	Lint percentage	Boll weight (g)	No. of bolls /plant	Seed index (g)	Lint index (g)	Earliness index	Days to first flower
73	84.43	35.09	41.58	3.28	25.78	9.76	6.95	87.92	66.00
84	85.07	28.42	33.40	2.56	33.26	11.33	5.68	80.62	65.31
91	43.20	15.90	36.68	3.02	14.32	9.17	5.33	82.74	72.04
106	51.49	18.94	36.85	3.15	16.34	10.55	6.18	76.62	70.05
110	65.17	24.67	37.83	3.11	20.97	10.23	6.23	85.16	68.00
123	69.70	26.82	38.44	3.03	23.00	9.41	5.89	88.61	69.88
132	103.08	40.62	39.40	2.39	43.23	10.44	6.80	81.30	65.00
164	63.35	25.57	40.32	2.80	22.62	10.30	6.98	41.60	67.08
172	57.32	21.46	37.44	3.15	18.18	9.71	5.81	83.96	71.38
183	60.79	23.90	39.32	2.26	26.93	8.37	5.42	94.13	71.48
Mean	68.36	26.14	38.13	2.88	24.46	9.93	6.13	80.26	68.62
Bulk	53.24	17.22	36.70	2.46	21.64	10.18	5.90	73.57	64.23
Dandara	54.35	20.08	36.90	2.57	21.18	9.19	5.38	82.34	69.00
G.80	60.36	22.12	36.61	2.60	23.19	8.89	5.15	80.12	68.07
M.P	57.35	21.10	36.75	2.59	22.19	9.04	5.26	81.23	68.54
Rev. LSD _{0.05}	3.86	2.60	3.46	0.13	1.79	0.33	0.89	2.60	1.74
Rev. LSD _{0.01}	5.13	3.45	4.85	0.17	2.38	0.43	1.22	3.45	2.32

Table(10): Observed direct and correlated responses after the second cycle of pedigree selection for boll weight measured in percentage of the better parent in population II (season 2008).

Families	Seed cotton yield /plant (g)	Lint yield /plant (g)	Lint percentage	Boll weight (g)	No. of bolls /plant	Seed index (g)	Lint index (g)	Earliness index	Days to first flower
73	39.88**	58.61**	12.70**	25.86**	11.15*	6.16**	29.37**	6.78**	-3.05*
84	40.95**	28.44**	-9.48*	-1.66	43.42**	23.28**	5.72	-2.09	-4.06**
91	-28.43**	-28.13**	-0.58	16.01**	-38.27**	-0.29	-0.82	0.48	5.83**
106	-14.68**	-14.39*	-0.12	21.13**	-29.54**	14.76**	15.04	-6.95**	2.90*
110	7.98*	11.50	2.53	19.46**	-9.56*	11.24**	15.93	3.42	-0.11
123	15.49**	21.24**	4.19	16.52**	-0.84	2.36	9.58	7.61**	2.65
132	70.78**	83.58**	6.79	-8.32*	86.42**	13.60**	26.43**	-1.26	-4.51**
164	4.96	15.59*	9.28*	7.68*	-2.46	12.04**	29.87**	-49.48**	-1.46
172	-5.04	-3.02	-1.47	21.13**	-21.59**	5.62**	8.12	1.97	4.85**
183	0.72	8.02	6.57	-13.32**	16.14**	-8.96**	0.89	14.31**	5.01**
LSD _{0.05}	7.35	13.51	8.52	6.46	8.88	4.09	15.94	3.63	2.75
LSD _{0.01}	9.99	18.37	11.57	8.78	12.07	5.56	21.67	4.94	3.74

* = Significant and ** = highly significant.

index (6.78%) and days to first flower (-3.05%),

C- Selection for number of bolls/plant

Means of the selected families for number of bolls/plant from population I after two cycles of pedigree selection are shown in Table 11. Selection resulted in three families (No. 73, 92 and 144) which significantly exceeded the better parent (Giza-80 x Pima S6) in number of bolls/plant. These three families significantly out-yielded the better parent in seed cotton and lint yields/plant, and one family of them (No. 144) was significantly higher than the better parent in lint percentage and in earliness index. Only one family from this set (No. 128) was significantly earlier than the earlier parent Giza-91 in the days to first flower and significantly out-yielded the high yielding parent in seed cotton and lint yields/plant. Esmail *et al.* (2004) noted that number of bolls per plant had the highest direct effect on seed cotton yield followed by boll weight at 3 sowing dates. The observed direct responses to selection for number of bolls/plant after two cycles of pedigree selection are shown in Table 12.

Highly significant direct observed gain from the better parent in number of bolls/plant was found for three families (No. 73, 92 and 144) followed by

highly significant correlated response from the better parent in seed cotton and lint yields/plant. Family No. 144 showed also favorable significant response in lint percentage, lint index and earliness index. This family could be considered a promising family for yield and earliness. Generally, pedigree selection for number of bolls/plant reduced boll weight and seed index.

Means of the selected families for number of bolls/plant in population II are shown in Table 13.

Selection resulted in two families (No. 146 and 150) which significantly exceeded the better parent Giza-80 in number of bolls/plant, one of the two families (No. 146) significantly exceeded the better parent in seed cotton yield/plant, lint yield/plant and boll weight, the second family No. 150 was significantly higher than the better parent in seed cotton yield/plant, lint yield/plant, seed index and earliness index. The observed direct responses to selection for number of bolls/plant after two cycles of pedigree selection are shown in Table 14.

Two families (No. 146 and 150) showed observed gain in number of bolls/plant which was significantly higher than the better parent. Also, family No. 146 showed highly significant favorable correlated response in seed cotton yield/plant, lint yield/plant and boll weight in

Table(11): Means of the selected families for number of bolls/plant and correlated traits from population I in season 2008 after two cycles of selection.

Families	Seed cotton yield /plant (g)	Lint yield /plant (g)	Lint percentage	Boll weight (g)	No. of bolls /plant	Seed index (g)	Lint index (g)	Earliness index	Days to first flower
73	105.41	38.52	36.53	2.88	37.28	9.73	5.60	74.59	65.18
87	80.54	27.95	34.71	2.92	27.55	8.82	4.71	68.33	60.27
92	90.84	33.21	36.54	2.92	31.18	8.98	5.18	80.09	62.66
111	46.83	16.86	35.97	2.73	17.21	9.84	5.54	80.15	63.94
121	61.82	21.56	34.79	3.20	19.33	10.95	5.87	79.05	65.85
128	65.86	25.65	38.88	2.58	25.53	10.07	6.42	69.02	57.08
144	82.97	31.76	38.29	2.34	35.72	9.74	6.04	90.34	63.30
175	64.19	22.41	34.97	2.61	24.63	10.69	5.78	89.82	63.21
176	52.10	20.05	38.42	3.25	16.01	9.13	5.70	85.24	65.25
184	75.15	28.11	37.40	3.39	22.20	8.74	5.24	78.17	65.31
Mean	72.57	26.61	36.65	2.88	25.66	9.67	5.61	79.48	63.20
Bulk	37.24	13.86	37.22	2.55	14.60	9.32	5.53	75.79	62.40
G.80 x P. S6	60.48	20.44	33.67	2.44	24.83	10.04	5.10	69.38	63.06
G.91	57.54	19.09	33.18	3.01	19.13	9.68	4.83	79.16	62.59
M.P	59.01	19.77	33.42	2.73	21.98	9.86	4.97	74.27	62.82
Rev. LSD _{0.05}	4.96	3.03	4.26	0.34	3.59	0.38	1.09	2.54	2.50
Rev. LSD _{0.01}	6.59	4.03	6.05	0.46	4.77	0.49	1.54	3.38	3.36

Table(12): Observed direct and correlated responses after the second cycle of pedigree selection for number of bolls/plant measured in percentage of the better parent in population I (season 2008).

Families	Seed cotton yield /plant (g)	Lint yield /plant (g)	Lint percentage	Boll weight (g)	No. of bolls /plant	Seed index (g)	Lint index (g)	Earliness index	Days to first flower
73	74.29**	88.42**	8.50	-4.31	50.16**	-3.15	9.66	-5.78**	4.14*
87	33.17**	36.72**	3.12	-2.99	10.95	-12.15**	-7.80	-13.69**	-3.71
92	50.21**	62.47**	8.55	-2.99	25.57**	-10.55**	1.42	1.17	0.11
111	-22.57**	-17.52*	6.85	-9.51	-30.69**	-1.99	8.57	1.25	2.16
121	2.21	5.44	3.34	6.31	-22.16*	9.03**	14.99	-0.14	5.21*
128	8.90	25.46**	15.49**	-14.27*	2.84	0.30	25.70**	-12.82**	-8.80**
144	37.18**	55.38**	13.74*	-22.46**	43.88**	-3.05	18.40*	14.12**	1.13
175	6.13	9.62	3.87	-13.38*	-0.80	6.47**	13.20	13.46**	0.99
176	-13.86**	-1.92	14.11*	7.96	-35.53**	-9.09**	11.71	7.68**	4.25*
184	24.25**	37.51**	11.08*	12.39*	-10.58	-12.98**	2.68	-1.26	4.34*
LSD _{0.05}	9.44	17.06	10.73	11.18	16.63	4.10	18.05	3.69	4.11
LSD _{0.01}	12.82	23.19	14.58	15.19	22.61	5.58	24.53	5.02	5.59

* = Significant and ** = highly significant.

Table(13): Means of the selected families for number of bolls/plant and correlated traits from population II in season 2008 after two cycles of selection.

Families	Seed cotton yield /plant (g)	Lint yield /plant (g)	Lint percentage	Boll weight (g)	No. of bolls /plant	Seed index (g)	Lint index (g)	Earliness index	Days to first flower
110	65.17	24.67	37.83	3.11	20.97	10.23	6.23	85.16	68.00
128	44.31	17.54	39.56	3.34	13.27	8.63	5.65	89.88	73.10
138	44.78	17.99	40.16	3.02	14.87	8.34	5.61	89.67	72.14
146	77.59	29.97	38.61	3.00	25.90	9.11	5.77	62.87	69.33
150	75.57	29.00	38.38	2.51	30.15	9.87	6.15	79.41	67.95
163	67.86	26.98	39.76	3.39	20.04	9.97	6.58	80.78	69.79
164	63.35	25.57	40.32	2.80	22.62	10.30	6.98	41.60	67.08
172	57.32	21.46	37.44	3.15	18.18	9.71	5.81	83.96	71.38
179	62.88	23.38	37.11	3.40	18.50	9.34	5.55	82.80	70.29
182	51.35	18.98	36.94	3.34	15.38	10.92	6.40	54.80	71.14
Mean	61.02	23.55	38.61	3.11	19.99	9.64	6.07	75.09	70.02
Bulk	53.24	17.22	36.70	2.46	21.64	10.18	5.90	73.57	64.23
Dandara	54.35	20.08	36.90	2.57	21.18	9.19	5.38	82.34	69.00
G.80	60.36	22.12	36.61	2.60	23.19	8.89	5.15	80.12	68.07
M.P	57.35	21.10	36.75	2.59	22.19	9.04	5.26	81.23	68.54
Rev. LSD _{0.05}	3.47	3.07	N.S.	0.12	1.67	0.50	1.14	1.91	1.33
Rev. LSD _{0.01}	4.62	4.08	N.S.	0.16	2.22	0.66	1.62	2.51	1.78

* = Significant, ** = highly significant and N.S = not significant.

Table(14): Observed direct and correlated responses after the second cycle of pedigree selection of the selected families for number of bolls/plant measured in percentage of the better parent in population II (season 2008).

Families	Seed cotton yield /plant (g)	Lint yield /plant (g)	Lint percentage	Boll weight (g)	No. of bolls /plant	Seed index (g)	Lint index (g)	Earliness index	Days to first flower
110	7.98*	11.50	2.53	19.46**	-9.56*	11.24**	15.93	3.42*	-0.11
128	-26.59**	-20.74**	7.22	28.30**	-42.76**	-6.09*	5.14	9.15**	7.39**
138	-25.80**	-18.68*	8.85	16.01**	-35.90**	-9.28**	4.33	8.90**	5.97**
146	28.55**	35.44**	4.64	15.24**	11.66**	-0.87	7.29	-23.64**	1.85
150	25.21**	31.06**	4.01	-3.71	30.03**	7.32*	14.47	-3.56*	-0.19
163	12.44**	21.96**	7.75	30.09**	-13.60**	8.41**	22.38*	-1.89	2.52*
164	4.96	15.59*	9.28	7.68*	-2.46	12.04**	29.87**	-49.48**	-1.46
172	-5.04	-3.02	1.47	21.13**	-21.59**	5.62	8.12	1.97	4.85**
179	4.19	5.66	0.58	30.60**	-20.24**	1.60	3.32	0.56	3.25**
182	-14.93**	-14.22	0.11	28.30**	-33.67**	18.78**	19.09*	-33.45**	4.51**
LSD _{0.05}	6.62	14.96	N.S.	6.46	8.30	5.79	17.96	2.67	2.11
LSD _{0.01}	9.00	20.33	N.S.	8.78	11.28	7.87	24.41	3.63	2.87

* = Significant, ** = highly significant and N.S = not significant.

percentage of the mid- or better parent. Family No. 150 showed significant or highly significant favorable correlated response in seed cotton yield/plant, lint yield/plant, seed and lint indices in percentage of the mid- or better parent except for lint index respect to the better parent. Selection for number of bolls/plant delayed maturity and conversely affected boll weight for all families except family No. 146. Mostly, the decrease in number of bolls/plant in this population increased boll weight and decreased yield. Konoplya (1991) suggested that the most useful traits on which to base selection to increase yield were number of bolls per plant.

The response to selection after two cycles of pedigree selection to improve yield in the two populations under late planting date were completed using three selection criteria i.e. seed cotton yield, boll weight and number of bolls/plant. Selection isolated superior families in yield and earliness and adapted to late planting date which could be used in isolating a new varieties adapted to late planting (first of May), after winter crops so that, we can have a complete winter crop before cotton in the same year.

References

- Al-Jibouri, H.A., P.A. Miller, and H.F. Robinson. 1958. Genotypic and environmental variances and covariance in an Upland cotton cross of interspecific origin. *Agron. J.* 50: 633-636.
- Awaad, H.A., and E.E. Hassan. 1996. Gene action, prediction and response to selection for yield and its contributing character in six cotton crosses. *Zagazig J. Agric. Res.* 23: 217-237.
- Burton, G.W. 1952. Quantitative inheritance in grasses. 6th Internat. Grassland Cong. Proc. 1: 227-238.
- Echekwu, C.A. 2001. Correlations and correlated responses in upland cotton (*Gossypium hirsutum* L.). *Tropicultura* 19 (4): 210-213.
- El Rawi, K. and A.M. Khalafalla. 1980. Design and Analysis of Agricultural Experiments, El Mousel Univ., Iraq, 19.
- 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. Mosh.* 36 (2): 713-718
- Esmail, R.M., M.A.M. Gomaa, and A.M. Abdel-Hamid. 2004. Evaluation of 32 F₅ families derived from two interspecific cotton crosses for late planting. *Bull. Nat. Res. Cen. Cairo.* 29 (6): 717-736.

- Falconer, D.S. 1989. Introduction to Quantitative Genetics, 3rd Ed. Longman. John Wiley & Sons, New York.
- Konoplya, S.P. 1991. Establishing the most effective characters for selection for increased yield using path and discriminant analysis in cotton. Genet. Selekt. Iss. Turk. 25-37.
- Mahdy, E.E. 1983. Relative effectiveness of pedigree line and recurrent selection for improving lint yield in cotton (*G. barbadense L.*). Assiut J. of Agric. Sci., 14: 315-325.
- Mahdy, E.E., A.A. Ismail, H.Y. Awad and A.A. Mohamed. 2001. The relative merits of breeding and modified recurrent selection in improving earliness in two segregating populations of Egyptian cotton (*G. barbadense L.*). The 2nd Plant Breed. Conf. Oct. 2, 2001: 80-101.
- Mahdy, E.E., A.A. Mohamed, M.Z. Elhifny, and H. Mahrous. 2007. Selection for seed cotton yield in early and late sowing dates of Egyptian cotton. Minia J. of Agric. Res. & Devolp. 27: 1-22.
- Mohamed, A.A. 2001. Breeding for earliness and yield components in some Egyptian cotton crosses. Ph. D. thesis, Assiut Univ., Egypt.
- Murthy, J. S. V. S., S. R Kumari, and N. Chamundeswari. 2004. Genetic variation in yield and yield component in desi cotton (*Gossypium herbaceum*). J. Cott. Res. Dev. 18 (1): 36-37.
- Mustafa, F.S., M.M. Awaad, and S.I.S. Abou-Zahra. 1995. Evaluation of some strains of long stable cotton hybrids at different locations in Egypt in 1993 season: lint cotton yield and fiber properties. Proceedings Beltwide Cotton Conferences, San Antonio, TX, USA, January 4-7, 1995. (1): 586-587.
- Singh, M., V.P. Singh, and K. Paul. 1985. Selection for yield and quality of (*Gossypium hirsutum L.*). Indian J. Agri. Sci. 55: 521-525.
- Singh, M., V.P. Singh, and K. Paul. 1986. Improvement of yield and quality in Upland cotton through progeny bulk selection. Indian J. Agri. Sci. 56: 562-566.
- Younis, F.G. 1986. Comparative studies on selection procedure in cotton. Ph. D. Thesis, Assiut Univ., Egypt.

الاستجابة للانتخاب للمحصول في ميعاد الزراعة المتأخر في عشيرتين من القطن المصري

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أجريت هذه الدراسة في مزرعة كلية الزراعة جامعة اسيوط خلال أربعة مواسم صيفية من ٢٠٠٥ إلى ٢٠٠٨. وكانت المواد المستخدمة عبارة عن عشيرتين قاعديتين في الجيل الثاني ناتجة من التهجين بين أصناف من القطن المصري و هما العشيرة الأولى جيزة ٩١ X (جيزة ٨٠ X بيما س - ٦) و العشيرة الثانية (جيزة ٨٠ X دندرة).

في موسم ٢٠٠٦ وباستخدام ٢٠٠ عائله في تصميم القطاعات الكامله العشوائيه في مكررتين تم عمل دورتين من الانتخاب لتحسين الاستجابة للانتخاب للمحصول في كلا العشيرتين تحت ظروف الزراعة المتأخرة باستخدام طريقة الانتخاب المنسب واستخدمت ثلاث صفات انتخابية هي محصول القطن الزهر ووزن اللوزة وعدد اللوز علي النبات. وتم تقييم الدور الثانيه من الانتخاب في موسم ٢٠٠٨ كانت النتائج المتحصل عليها كالتالي:

١- أدى الانتخاب لمحصول القطن الزهر الى عزل ثلاث عائلات متميزة (العائلتين ١٤٤،١٤٧ في العشيره الاولى و العائله رقم ١٥١ في العشيره الثانيه) في الاستجابة للانتخاب لمحصول القطن الزهر وعدد من الصفات المرتبطه بهذه الصفه والتي تمت دراستها.

٢- أدى الانتخاب لوزن اللوزة الى عزل ثلاث عائلات متميزة (العائلتين ١٠٨ و ١٤٧ في العشيره الاولى و العائله رقم ٧٣ في العشيره الثانيه) في الاستجابة للانتخاب لوزن اللوزة الزهر وعدد من الصفات المرتبطه بهذه الصفه والتي تمت دراستها.

٣- أدى الانتخاب لعدد اللوز علي النبات الى عزل عائلتين متميزتين (العائلة رقم ١٤٤ في العشيره الاولى و العائله رقم ١٥٠ في العشيره الثانيه) في الاستجابة للانتخاب لعدد اللوز علي النبات وعدد من الصفات المرتبطه بهذه الصفه والتي تمت دراستها.

وقد أمكن الحصول على عائلات متفوقة يمكن عزل أصناف جديدة منها يمكن زراعتها في شهر مايو بعد محصول شتوي مبكر. وبذلك يمكن الحصول على محصول شتوي بالإضافة إلى محصول القطن في نفس العام الزراعي .