

**SELECTION FOR SEED COTTON YIELD IN EARLY AND
LATE SOWING DATES OF EGYPTIAN COTTON**

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ABSTRACT

Two cycles of pedigree selection for seed index were completed in early and late analysis in two F_3 -populations of Egyptian cotton. Population I stemmed from a cross between Giza 83 and Dandara (long staple cultivars) and population II from a cross between Giza 83 (long) x Giza 45 (extra long). Two experiments in early (March) and two in late (May) sowings of fifty families from each, were grown in RCBD of three replications in 2001 season. The second cycle selection was evaluated in 2003 season.

Seed cotton yield/plant of population I (base population) ranged from 40.83 to 90.07 g in early sowing and from 35.23 to 88.03 g in the late sowing. The respective ranges in population II were 27.77 to 82.23 g and from 33.10 to 89.40 g. The genotypic coefficient of variability in seed cotton yield/plant was higher in the late sowing than in the early sowing in the two populations. However, after two cycles of selection, genotypic coefficient of variability was higher in early than in late sowing. Heritability estimates in broad sense were very high because evaluation of the selected materials was made at one location. After two cycles of pedigree selection, the observed gain in seed cotton yield/plant in percentage from the better parent in early sowing ranged from 16.92 to 56.99 % in population I, and from 16.71 to 24.36% in population II. But, it was correlated with the adverse effect on earliness index. In late sowing, only one family from population II insignificantly outyielded the better parent by 13.09%, and two families from population II significantly outyielded the better parent by 16.50 and 16.71%. However, deleterious decreases in lint percentage, lint index and earliness index were obtained.

INTRODUCTION

Sowing date plays an important role in the performance and yield of Egyptian cotton. Late sowing in May has an adverse effect on yield and yield components. Cotton breeders in Egypt pay a great attention to develop new cultivars adapted to late sowing and give good yields. This will enable the producers to grow early winter crops before cotton. Mahdy (1983a&b) indicated that the modified selection index was more efficient in improving lint yield and its components than conventional index and single trait selection. He observed an increases of 6.3-8.4% in lint yield in two populations after two cycles of pedigree selection. Singh *et al.* (1985) indicated that pedigree method was better than progeny-bulk selection and bulk selection in improving yield. In interspecific cotton population [*G. barbadense* (Ashmouni) x *G. hirsutum* (Deltapine 15)], Mahdy, *et al.* (1987a&b) observed gain in lint yield of 18.07% using selection index, and 7.18% after two cycles of pedigree selection for number of bolls/plant. The five superior hybrids of recurrent selection outyielded the mid-parent by 14.07%. However, in an intra-specific population, pedigree selection was the best followed by selection index and recurrent selection in improving lint yield.

Sohu and Chahal (1995) studied the efficiency of different selection criteria in early generations of two *G. hirsutum* L. crosses. Awaad and Hassan (1996) used direct selection for seed cotton yield in the F₂ and F₄ of six Egyptian cotton crosses, and found that selection for seed cotton yield was effective in three crosses.

Singh, *et al.* (1993 and 1995) used pedigree and selection index to improve seed cotton yield. Mahdy, *et al.* (2001) found that recurrent selection for seed cotton yield/plant was better than pedigree selection in early and late sowing of two populations of Egyptian cotton.

The present work aimed to improve seed cotton yield and correlated traits at early and late sowings of two Egyptian cotton populations using pedigree selection.

Selection for seed cotton yield

MATERIALS AND METHODS

The present study was carried out at Assiut Univ. Exp. Farm, Assiut, Egypt, during the three summer seasons of 2001, 2002-2003. The materials consisted of two-F₃ populations stemmed from crosses between three Egyptian cottons (*G. barbadense* L.) (Table 1).

Table 1. The pedigree and some quality attributes of the parents.

Variety	Pedigree	Span length		Pressley index	Micronaire reading	Lint %
		2.5%	50%			
Giza 83	Giza 67 x	29.50	14.60	9.60	4.0	39.0
	Giza 72	-30.70	-15.20	-9.80	-4.20	-40.0
Dandara	Selected from	28.7	13.0	9.0	4.2	34.0
	Giza 3	-30.1	-14.5	-9.20	-4.4	-35.0
Giza 45	Giza 28 x	34.0	17.7	11.0	2.9	30.0
	Giza 7	-36.0	-18.0	-11.5	-3.0	-32.0

Description of the materials:

1997 season:

- 500 plants in the F₄ generation of Pop. I (Giza 83 x Dandara) were sown in early (March) and another 500 plants in late (May).
- The same was for Pop. II (Giza 83 x Giza 45).
- The best 10 vigorous plants which carry the highest number of sympodid and flower buds were tagged in each sowing.
- Five flowers were emasculated on each tagged plant.
- Pollen grains of ten flowers (one from each plant) were mixed and used for pollination.
- The intermated bolls were picked separately to form 10 families in early and 10 in late sowings.

1998 season:

- The two sub-groups of 10 families each were raised in the two sowing dates for Pop. I and II.
- Another cycle of selection and intermating was done as in the previous season.

Season 1999: The F₁-hybrids were grown.

Season 2000: The F₂-generations were raised. The best 50 plants in seed cotton yield were saved for each group.

The present work started in season 2001 in the F₃-generation. Two experiments were sown on March 22nd, and another two on May 5th. Each experiment included 50 families from a population. The experimental design was RCBD of three replications. The plot size was one ridge, 4 m long, 60 cm apart and 40 cm between hills within ridge. After full emergence, seedlings were thinned to one plant/hill. The recommended cultural practices were adopted throughout the growing season. At the end of the season two pickings were made on individual plant basis. The best 20 plants from the best 20 families in seed cotton yield from each experiment were saved.

Season 2002, F₄-generation:

The sowing dates were March 22nd and May 5th. Two experiments of 20 families each were sown in each date using the same experimental design and the same plot size of the previous season. The twenty individual high yielding plants (second cycle of selection) were selected from each experiment.

Season 2003, F₅-generation (Evaluation after two cycles of selection)

Two experiments at each sowing date were conducted as the previous season. Each experiment included 20 selected families, the two parents and the unselected bulk sample; each was represented by one ridge.

Data were recorded on each individual plant. The characters were, seed cotton yield, lint yield, lint percentage, number of bolls, boll weight, seed index, lint index, earliness index (weight of the first pick/weight of the two picks), and days to first flower. Micronaire reading was measured (A.S.T.M.D. 1448-59) as the mean of two samples per plant. Fiber length in millimeter was measured using computerized HVI in Agric. Res. Center, Cotton Res. Inst., Giza. Two measurements of fiber length were taken, i.e., 50 and 2.5% span length. Uniformity ratio (U.R.) was determined as: $UR = (50\% S.L./2.5\% S.L.) \times 100$. Estimates of genotypic, phenotypic variances (Al-Jibouri *et al.*, 1958), heritability (H) in broad sense, phenotypic (pcv) and genotypic (gcv) coefficients of variation were calculated (Burton, 1952). Revised LSD (El-Rawi and Khalafalla, 1980) was used to compare between means.

Selection for seed cotton yield

RESULTS AND DISCUSSION

Genetic variability and heritability in the base population:

Fifty families from each of the two populations at each sowing date were evaluated in season 2001. In the early sowing sufficient genetic variability measured as gcv was observed in the criterion of selection; seed cotton yield/plant which accounted for 22.0 and 24.88% for pop. I and II, respectively, compared to 29.36 and 30.12% in the late sowing (Table 2). Furthermore, the correlated traits; lint yield, number of bolls/plant and earliness index showed also sufficient genetic variability. However, the genetic variability was narrow for lint percentage, boll weight, seed and lint indices. This could be due to lack of variability in these traits in the original parents. High estimates of broad sense heritability were obtained for seed cotton yield/plant, lint yield/plant, number of bolls/plant and earliness index. This could be due to evaluation at one location, in which all the interaction effects with families were confounded with families mean squares. In addition, the genetic variance included dominance and epistatic variances along with additive one. Mahdy, *et al.* (2001) reported that heritability estimates from the F₂-generation were generally high for seed cotton yield/plant because of the large portion of non-additive effects.

Means:

Mean seed cotton yield/plant in the base pop. I (Table 3) in the early sowing ranged from 40.83 to 90.07 g. Ten families (No. 6, 11, 14, 20, 25, 28, 31, 40, 44 and 50) significantly outyielded the better parent. But all of them except No. 6, 28 and 44 were late in maturity, indicating that selection for seed cotton yield/plant caused adverse effects on earliness and resulted in late mature families. Therefore, it will be feasible to look for earliness index when selection was practiced for yield. Seed cotton yield/plant in the base pop. II in the early sowing (Table 4) ranged from 35.23 to 88.03 g, and 12 families significantly outyielded the better parent Giza 83. Five out of these families were significantly earlier than the earlier parent in earliness index.

Table 2: Heritability (H%) in broad sense, p c v and g c v in early and late date of planting in the two populations selected for seed cotton yield/plant in season 2001.

Population	Planting date	Traits	Seed cotton yield/plant, g.	Lint yield/plant, g.	Lint percentage	No. of bolls/plant	Boll weight, g.	Seed index	Lint index	Earliness index
Pop I	Early	P.C.V%	22.34	23.73	-	20.14	5.70	6.16	6.38	25.57
		G.C.V%	22.00	23.33	-	19.40	4.38	3.56	3.94	24.38
		H %	97.01	96.69	-	92.74	59.09	33.33	38.13	90.90
	Late	P.C.V%	29.62	27.60	-	28.96	6.98	8.89	8.30	19.44
		G.C.V%	29.36	26.81	-	28.14	4.50	7.92	5.35	15.87
		H %	98.25	94.33	-	94.42	41.67	63.11	41.67	66.67
Pop II	Early	P.C.V%	25.12	26.31	4.39	24.06	-	5.10	10.01	28.38
		G.C.V%	24.88	25.79	2.55	22.89	-	4.54	7.35	27.39
		H %	98.09	96.02	33.65	90.51	-	36.41	53.93	93.10
	Late	P.C.V%	30.33	29.19	-	26.88	11.34	8.87	8.38	26.00
		G.C.V%	30.12	28.81	-	25.92	7.49	7.67	6.68	25.50
		H %	98.64	97.41	-	93.01	43.66	74.78	63.43	96.15

- Insignificant families mean square

Selection for seed cotton yield

Table 3. Means of the 20 selected families for seed cotton yield/plant from pop. I in the early date of planting in season 2001 and overall mean the 50 families.

Fam. No	Seed cotton yield/plant (gm)	Lint yield/plant (gm)	Lint percentage	No. of bolls/plant	Boll weight (gm)	Seed index	Lint index	Earliness index
2	65.60	22.67	34.57	25.23	2.60	11.03	5.63	0.52
6	72.73	23.87	32.80	26.77	2.73	10.83	5.27	0.87
8	64.73	21.73	33.60	23.67	2.73	11.33	5.77	0.62
11	80.10	30.70	34.07	30.73	2.93	11.00	5.67	0.43
14	74.87	26.57	35.33	27.10	2.77	10.73	5.90	0.62
16	56.77	19.20	33.73	22.53	2.53	10.60	5.37	0.51
17	63.70	21.97	34.37	22.43	2.83	10.93	5.77	0.49
20	72.33	25.80	33.43	25.60	2.83	10.87	5.50	0.48
25	76.63	28.07	34.97	30.30	2.53	9.43	5.13	0.56
26	67.40	23.33	34.63	25.93	2.63	10.33	5.40	0.83
28	83.23	28.20	33.90	31.83	2.63	10.40	5.47	0.89
31	90.07	28.07	31.03	27.73	2.90	12.03	5.67	0.65
32	68.47	22.40	32.67	25.37	2.70	10.37	5.03	0.53
39	58.67	20.50	34.90	23.47	2.43	8.80	4.70	0.62
40	77.17	29.20	37.90	27.00	2.87	10.30	6.20	0.56
42	71.63	25.50	34.17	29.97	2.50	10.27	5.33	0.50
44	89.47	30.70	34.27	34.87	2.57	10.20	5.27	0.90
48	66.50	21.80	32.80	26.30	2.53	10.90	5.30	0.31
49	57.27	19.53	34.17	22.67	2.53	9.10	5.23	0.54
50	87.73	29.60	33.73	33.80	2.60	10.43	5.33	0.71
Mean 50 Fam	59.03	20.19	33.79	22.71	2.60	10.48	5.38	0.58
Giza-83	66.50	24.80	37.30	25.60	2.60	11.20	6.70	0.76
Dandara	65.00	23.50	36.20	29.50	2.20	11.40	6.50	0.86
Rev. LSD_{0.05}	5.61	2.14	7.62	3.19	0.33	2.44	1.07	0.10
Rev. LSD_{0.01}	7.26	2.77	11.08	4.18	0.44	3.54	1.41	0.14

Table 4. Means of the 20 selected families for seed cotton yield/plant from pop. II in the early date of planting in season 2001 and overall mean of the 50 families.

Fam.No	Seed cotton yield/plant (gm)	Lint yield/plant (gm)	Lint percentage	No. of bolls/plant	Boll weight (gm)	Seed index	Lint index	Earliness index
1	62.57	21.27	33.97	27.37	2.30	9.90	5.10	0.82
4	57.40	19.63	33.23	23.07	2.57	10.87	5.43	0.83
6	73.70	25.40	34.50	31.33	2.37	9.47	4.97	0.47
8	87.63	29.67	33.93	29.57	2.50	10.60	5.43	0.65
10	73.30	25.10	34.27	28.20	2.60	11.43	5.97	0.90
12	62.40	21.63	34.63	25.70	2.47	11.07	5.93	0.86
16	64.93	22.03	33.90	27.60	2.37	10.23	5.27	0.52
20	74.47	26.63	35.73	31.67	2.37	9.27	5.10	0.73
21	56.37	19.10	34.00	23.17	2.43	9.37	4.87	0.62
25	72.10	25.70	35.63	29.23	2.47	10.83	6.00	0.87
28	83.40	27.83	33.33	36.67	2.30	9.43	4.70	0.52
30	56.13	18.60	32.70	26.77	2.10	8.17	4.00	0.36
32	71.13	23.60	31.83	31.10	2.30	9.87	4.63	0.50
36	69.87	21.83	31.00	26.13	2.70	11.20	4.87	0.89
38	65.10	20.73	31.83	26.07	2.53	10.63	4.97	0.29
40	68.47	23.77	34.80	25.40	2.70	10.50	5.60	0.88
43	88.03	31.57	35.73	35.43	2.50	9.73	5.37	0.86
45	80.37	25.93	31.93	32.60	2.47	9.40	4.47	0.56
46	61.40	21.90	35.70	20.83	2.63	10.83	6.30	0.75
49	72.67	26.33	35.87	24.23	3.00	11.10	6.33	0.74
Mean 50 Fam	55.78	18.89	33.68	22.84	2.44	10.12	5.16	0.60
Giza-83	60.50	23.29	38.50	22.45	2.70	10.70	6.70	0.75
Giza-45	55.90	19.91	35.60	22.35	2.50	10.20	5.60	0.55
Rev. LSD _{0.05}	4.76	2.48	5.61	4.38	0.76	2.89	1.26	0.10
Rev. LSD _{0.01}	6.16	3.24	8.12	5.74	1.10	4.18	1.69	0.13

Selection for seed cotton yield

In the late sowing wide range of variation in seed cotton yield/plant (27.77 to 82.23 g) was obtained in pop. I (Table 5) and nine families (No. 15, 18, 27, 30, 33, 36, 43, 45 and 50) significantly outyielded the better parent Dandara, one of them was comparable to the earlier parent Dandara, and the others were late in maturity. In pop. II in the late sowing (Table 6) 11 families significantly outyielded the high yielding parent Giza 83 by 29.15%, but were delayed in maturity by 9.21% than Giza 83. Generally, the high yielding families were late in maturity. These results are in agreement with those reported by Mahdy *et al.* (2001).

Evaluation of the second cycle selections in 2003 season:

Genetic variability and heritability:

The phenotypic coefficient of variability (pcv) was slightly higher in magnitude than gcv (Table 7) for all traits. Sufficient genetic variability in the F₅-generation remained after two cycles of selection for seed cotton yield and accounted for 22.87 and 14.02% in early and late sowings, respectively, in pop. I. Furthermore, sufficient genetic variability was observed for lint yield, number of bolls and earliness index. There was obvious decrease in gcv from early to late sowing in most traits, specially in seed cotton yield. This could be due to that the expression of a genotype would be maximum under optimum sowing date. The genetic variability in pop. II behaved the same as in pop. I. The remained genetic variability in the criterion of selection is still sufficient for further cycles of pedigree selection.

High estimates of broad sense heritability in the F₅-generation for seed cotton yield/plant accounted for 97.74 and 88.72% in pop. I, and 97.64 and 91.55% for pop. II in early and late sowings, respectively. Mahdy (1983b) noted a substantial amount of gcs in lint yield/plant, number of bolls and lint index in two cotton populations after two methods of selection.

Means and observed gain after two cycles of pedigree selection:

Two cycles of pedigree selection for seed cotton yield/plant resulted in 12 families significantly outyielded the better parent of pop. I (Table 8) at early sowing by 25.12%, ten of them were in the range of the parents in fiber quality, and eight significantly outyielded the better parent in lint yield/plant. The observed gain in seed cotton

yield (Table 12) of the best five families ranged from 25.12 to 56.99%, also ranged from 15.14 to 42.57% for lint yield, 11.12 to 23.24% for number of bolls and from 17.39 to 23.04% for boll weight. Four families showed slight increase in fiber length parameters. Selection for seed cotton yield adversely affected earliness index.

Selection in pop. II in the early sowing (Tables 9 and 12) resulted in six families significantly surpassed the high yielding parent Giza 83. Family No. 45 showed observed gain of 22.86, 14.40 and 46.93% in seed cotton yield, lint yield and number of bolls/plant. Furthermore, it gave 3.87 Micronaire reading compared to 3.8 for Giza 45 (the fineset Egyptian cultivar), and 34.17 mm at 2.5% span length compared to 34.20 mm for Giza 45. Therefore, family No. 45 could be considered a promising family characterized by high yielding ability and extra-staple length. The best selected family No. 8 showed observed gain of 24.36% in seed cotton yield, 13.55% in lint yield, 55.14% in number of bolls and 10.53% in earliness index and looks like Giza 45 in Micronaire reading.

In late sowing, selection for seed cotton yield/plant resulted in only one family (No. 40) which showed significant observed gain of 13.09% (Tables 9 and 12). It was similar to Dandara in fiber length and Micronaire reading. Selection in pop. II, resulted in four families (No. 5, 15, 24 and 27) which significantly outyielded Giza 83 in yield (Tables 11 and 12).

It could be concluded that selection for seed cotton yield/plant for two cycles resulted in high yielding families both in early and late sowings, however, it delayed maturity and reduced lint percentage and lint index. These results are in line with those reported by Mahdy (1983b), Mahdy *et al.* (1987b), Singh *et al.* (1993), Awaad and Hassan (1996) and Mahdy *et al.* (2001).

Selection for seed cotton yield

Table 5. Means of the 20 selected families for seed cotton yield/plant from pop. I in the late date of planting in season 2001 and overall mean of the 50 families.

Fam. No	Seed cotton yield/plant (gm)	Lint yield/plant (gm)	Lint percentage	No. of bolls/plant	Boll weight (gm)	Seed index	Lint index	Earliness index
1	53.73	19.33	35.73	24.10	2.23	8.17	4.53	0.81
3	60.47	20.90	33.63	27.13	2.23	8.53	4.33	0.66
7	57.93	19.93	34.33	28.07	2.07	8.83	6.13	0.52
10	57.60	19.40	33.53	25.57	2.27	9.23	4.63	0.65
12	60.97	20.83	34.20	23.80	2.43	9.93	5.17	0.62
15	72.63	24.13	34.10	29.47	2.47	10.00	5.20	0.44
18	82.23	23.10	33.37	36.40	2.27	10.13	5.03	0.67
20	62.77	21.36	34.40	27.67	2.27	9.27	4.87	0.86
23	55.00	18.50	33.60	23.67	2.33	9.00	4.57	0.59
27	71.40	22.97	31.97	30.67	2.33	9.33	4.40	0.50
30	72.27	23.90	33.13	35.77	2.03	9.53	4.67	0.62
33	75.87	25.73	33.97	33.03	2.33	9.67	4.97	0.94
35	52.77	16.53	33.20	27.50	1.93	8.30	4.17	0.70
36	70.57	23.93	33.93	32.77	2.17	9.67	4.97	0.51
40	62.73	21.00	33.43	25.80	2.43	10.13	5.10	0.80
43	71.40	26.23	36.80	32.23	2.23	10.00	5.80	0.56
45	80.37	26.77	33.30	35.83	2.27	9.33	4.50	0.78
46	51.20	18.30	35.73	24.23	2.13	9.37	5.33	0.61
49	55.23	18.50	33.50	29.13	1.90	8.97	4.47	0.69
50	68.30	24.00	35.17	30.47	2.27	8.73	4.53	0.54
Mean 50 Fam	49.57	16.95	34.45	22.61	2.22	8.31	4.94	0.63
Giza-83	60.00	22.00	36.60	26.20	2.30	9.60	5.50	0.80
Dandara	63.50	21.70	34.20	27.60	2.30	10.20	5.30	0.92
Rev. LSD _{0.05}	4.73	2.88	5.90	4.00	0.46	1.36	1.23	0.17
Rev. LSD _{0.01}	6.11	3.78	8.59	5.25	0.63	1.82	1.71	0.23

Table 6. Means of the 20 selected families for seed cotton yield/plant from pop. II in the late date of planting in season 2001 and overall mean of the 50 families.

Fam. No	Seed cotton yield/plant (gm)	Lint yield/plant (gm)	Lint percentage	No. of bolls/plant	Boll weight (gm)	Seed index	Lint index	Earliness index
2	89.40	29.00	32.33	32.37	2.77	10.40	5.00	0.72
5	67.20	23.07	34.40	28.00	2.40	8.70	4.57	0.71
6	53.13	18.67	35.10	22.43	2.37	9.30	5.00	0.77
10	88.60	30.33	34.23	31.37	2.83	10.23	5.30	0.73
15	67.60	23.17	34.27	30.80	2.20	8.77	4.57	0.51
18	63.60	22.73	35.73	27.30	2.37	9.47	5.27	0.55
20	74.90	27.03	35.93	31.10	2.43	9.13	5.13	0.66
24	55.73	19.87	35.60	27.97	2.20	9.77	5.40	0.54
25	62.93	20.80	33.03	25.20	2.50	10.33	5.13	0.54
27	86.53	30.07	31.43	32.47	2.67	10.17	5.13	0.89
28	71.00	26.17	36.97	35.47	2.03	8.63	5.03	0.53
32	52.80	16.13	30.57	18.63	2.83	10.77	4.73	0.65
33	83.03	28.57	34.37	37.43	2.23	8.67	4.53	0.62
35	63.93	21.90	34.30	32.30	2.07	9.63	4.50	0.92
36	53.57	17.97	33.47	21.47	2.47	9.67	4.87	0.33
38	68.77	25.43	36.77	27.43	2.53	10.27	5.97	0.57
40	86.80	29.27	33.70	32.67	2.67	10.17	5.13	0.83
45	63.92	21.93	34.23	22.17	2.57	11.63	6.07	0.78
46	54.63	18.13	33.20	24.23	2.27	9.30	4.60	0.75
48	82.80	26.47	31.93	32.97	2.53	10.03	4.70	0.91
Mean 50 Fam	53.36	18.56	34.72	22.92	2.35	9.42	4.99	0.62
Giza-83	61.00	21.80	35.82	25.37	2.40	9.80	5.50	0.77
Giza-45	55.00	19.10	34.78	19.63	2.80	9.11	4.90	0.57
Rev. LSD _{0.05}	4.65	2.14	5.50	4.21	0.79	1.28	0.82	0.10
Rev. LSD _{0.01}	6.01	2.77	7.98	5.53	1.10	1.69	1.10	0.14

Table 7 : Heritability (H%) in broad sense, p c v and g c v of the second cycle pedigree families at early and late date of planting in the two populations, selected for seed cotton yield/plant in season 2003.

And Planting date	Traits	Seed cotton yield/plant g.	Lint yield/plant g.	Lint percentage	No. of bolls/ plant	Boll weight g.	Seed index	Lint index	Earliness index	Micronaire reading	Fiber length		
											50%	2.5%	Uniformity ratio
Pop-I Early	P C V%	23.14	22.47	2.89	18.72	7.07	4.48	5.33	14.16	6.16	2.40	2.16	1.11
	G CV%	22.87	22.17	2.58	17.59	4.10	3.96	4.42	13.35	4.70	1.95	1.82	0.88
	H%	97.74	97.27	79.72	88.33	50.00	78.40	68.75	88.89	58.21	65.94	71.04	62.63
Pop. I Late	P C V%	14.88	15.82	2.55	8.40	8.27	-	4.80	18.20	5.58	5.60	4.63	1.15
	G CV%	14.02	15.49	2.17	8.17	7.26	-	3.48	17.54	4.00	4.22	3.69	0.95
	H%	88.72	95.94	72.20	89.24	77.08	-	52.63	92.86	51.47	85.57	64.58	68.23
Pop. II Early	P C V%	22.10	22.52	2.35	25.52	-	3.82	4.57	15.38	4.94	3.40	1.62	1.17
	G CV%	21.84	22.19	2.08	24.77	-	2.87	3.51	14.59	3.84	2.10	1.44	1.00
	H%	97.64	97.12	78.17	94.18	-	56.67	59.15	90.00	60.27	76.47	79.25	73.31
Pop. II Late	P C V%	15.00	15.91	2.13	15.93	-	3.85	5.40	17.12	5.98	2.96	2.46	-
	G CV%	14.38	15.14	1.70	14.30	-	2.85	4.44	16.39	4.37	2.64	2.32	-
	H%	91.55	90.59	63.23	80.68	-	54.86	67.53	91.67	53.73	82.64	89.32	-

- Insignificant families mean squares

Table 8. Means of the selected families after the second cycle of pedigree selection for seed cotton yield/plant from population I in the early date of planting in season 2003.

Fam. No.	Seed cotton yield/plant, g.	Lint yield /plant, g.	Lint percentage	No. of bolls/plant	Boll weight, g.	Seed index	Lint index	Earliness index	Micronaire reading	Fiber length		
										50%	2.5%	uniformity ratio %
2	105.23	35.50	33.67	35.90	2.83	11.73	5.97	0.63	4.70	26.40	29.63	89.00
6	82.30	27.73	33.70	31.70	2.60	11.60	5.93	0.58	4.80	26.50	30.53	86.63
8	67.00	23.93	35.70	24.63	2.73	10.53	5.87	0.54	4.40	27.87	31.67	87.90
11	85.90	29.10	33.87	33.53	2.57	11.13	5.73	0.84	4.20	27.83	31.30	89.10
14	88.77	30.10	33.97	32.60	2.73	11.83	6.10	0.67	4.17	27.03	30.97	87.40
16	55.00	18.37	33.43	20.60	2.70	10.83	5.43	0.60	3.97	28.20	32.10	88.73
17	78.37	26.53	33.83	31.80	2.47	10.57	5.40	0.72	3.97	27.60	31.13	88.60
20	54.07	19.23	35.57	21.04	2.57	11.40	6.23	0.73	4.00	27.40	31.37	87.30
25	61.43	21.60	35.17	24.67	2.53	10.30	5.53	0.59	4.03	26.73	30.80	86.87
26	82.13	28.07	34.13	31.83	2.60	10.47	5.43	0.66	3.97	28.30	32.17	88.00
28	79.37	26.77	33.77	30.70	2.60	10.77	5.47	0.74	3.90	27.75	31.67	87.67
31	60.80	20.73	34.37	26.80	2.30	11.10	5.83	0.58	3.63	28.40	32.37	87.77
32	83.87	28.77	34.33	31.10	2.70	11.63	6.07	0.81	3.93	28.03	31.60	88.80
39	75.23	25.57	33.97	29.80	2.53	12.17	6.23	0.53	3.90	27.90	31.63	88.17
42	51.77	17.37	33.57	22.87	2.27	11.10	5.63	0.83	3.87	27.60	31.27	87.43
43	74.13	25.57	34.50	29.27	2.53	10.80	5.70	0.72	3.93	26.90	30.90	87.03
44	75.60	25.03	33.17	29.13	2.63	11.50	5.70	0.71	4.00	25.90	29.70	87.23
48	83.27	28.37	33.13	30.57	2.73	11.50	5.70	0.59	4.27	27.73	31.20	88.90
49	86.37	28.67	33.23	32.37	2.70	11.95	6.00	0.68	4.23	27.00	30.67	88.10
50	50.03	17.23	34.47	20.43	2.50	10.70	5.60	0.60	4.03	27.50	31.60	87.00
Mean	69.57	23.85	34.30	27.26	2.54	11.17	5.81	0.67	4.10	27.43	31.21	87.88
Bulk	62.20	21.93	35.27	34.70	2.53	11.10	5.60	0.62	3.97	27.20	31.63	85.97
Giza-83	66.60	24.90	37.37	25.97	2.42	10.93	5.53	0.73	4.15	26.40	30.27	87.10
Dandara	67.03	24.00	35.80	29.13	2.45	11.37	5.37	0.86	4.13	26.50	30.37	87.30
Rev. LSD _{0.05}	6.02	2.20	1.30	4.78	0.51	0.67	0.54	0.10	0.55	1.20	1.13	2.01
Rev. LSD _{0.01}	7.17	2.88	1.73	6.31	0.74	0.89	0.73	0.13	0.75	1.61	1.51	2.76

Table 9: Means of the selected families after the second cycle of pedigree selection for seed cotton yield/plant from population II in the early date of planting in season 2003.

Fam. No.	Seed cotton yield/plant, g	Lint yield /plant, g	Lint %	No. of bolls/plant	Boll weight, g	Seed index g	Lint index g	Earliness index	Micronaire reading	Fiber length		
										50%	2.5%	uniformity ratio %
1	62.30	21.13	33.93	22.63	2.80	11.27	5.80	0.84	4.13	28.27	33.63	84.10
4	55.10	19.00	34.53	20.77	2.67	11.30	5.97	0.61	4.03	27.53	32.77	84.23
6	77.30	26.33	34.07	30.60	2.53	11.20	5.80	0.73	4.0	28.23	33.00	85.60
8	91.03	31.00	34.03	39.67	2.30	11.00	5.70	0.84	3.83	26.90	32.47	83.10
10	77.17	27.33	34.77	29.60	2.63	10.87	5.80	0.56	3.77	29.40	34.17	86.07
12	53.40	18.73	35.03	20.10	2.70	10.97	5.90	0.54	4.03	28.50	33.57	84.90
16	50.73	17.53	34.53	19.13	2.67	10.77	5.67	0.83	3.63	27.50	32.70	84.07
20	59.97	21.17	35.27	24.47	2.47	10.50	5.70	0.57	3.55	28.40	32.90	86.67
21	49.13	16.80	34.27	18.07	2.73	10.77	5.60	0.58	3.60	28.60	33.40	85.70
25	51.77	17.83	34.37	19.63	2.67	11.33	5.93	0.64	3.77	28.53	33.87	84.57
28	58.17	27.13	34.80	30.53	2.57	10.93	5.77	0.57	3.80	27.50	32.90	83.63
30	54.10	18.53	34.23	20.23	2.70	11.10	5.77	0.76	4.07	28.47	33.17	85.07
32	79.80	27.53	34.50	27.93	2.87	11.73	6.20	0.60	4.00	27.80	33.23	84.90
36	57.27	19.37	33.83	20.57	2.80	11.80	6.00	0.54	4.07	28.90	33.67	84.10
38	58.57	19.23	32.80	23.90	2.50	11.00	6.37	0.79	3.87	27.50	32.37	84.23
40	54.73	18.93	34.60	19.40	2.83	11.83	6.23	0.56	3.63	28.47	33.00	85.60
43	85.43	29.57	34.53	30.90	2.77	11.77	6.23	0.68	3.70	27.37	32.47	83.10
45	89.93	31.23	34.67	37.57	2.40	11.47	6.07	0.59	3.87	28.27	34.17	86.05
46	88.37	30.10	34.03	37.50	2.37	11.33	5.83	0.78	4.13	28.63	33.53	84.90
49	79.57	26.97	33.87	28.37	2.83	11.50	5.90	0.59	4.23	28.0	32.70	84.07
Mean	65.53	22.61	34.45	25.02	2.65	11.11	5.83	0.65	3.89	28.14	33.18	84.37
Bulk	65.13	22.60	34.53	22.77	2.87	10.80	5.77	0.60	3.90	27.53	32.90	86.70
Giza-83	73.20	27.30	37.30	25.57	2.87	10.80	6.47	0.76	4.23	28.90	33.40	85.70
Giza-45	63.67	22.57	35.43	23.30	2.73	10.67	5.80	0.62	3.80	29.50	34.20	86.20
Rev. LSD _{0.05}	5.53	2.15	1.10	3.83	0.68	0.93	0.58	0.10	0.39	0.95	0.71	1.59
Rev. LSD _{0.05}	7.23	2.81	1.47	5.53	1.00	1.28	0.80	0.13	0.53	1.26	0.95	2.14

Table 10: Means of the selected families after the second cycle of pedigree selection for seed cotton yield/plant from population I in the late date of planting in season 2003.

Fam. No.	Seed cotton yield/plant, g.	Lint yield /plant, g	Lint %	No. of bolls/plant	Boll weight, g	Seed index g	Lint index g	Earliness index	Micronaire reading	Fiber length		
										50%	2.5%	uniformity ratio %
1	54.47	18.33	33.70	19.07	2.87	10.03	5.10	0.74	3.07	25.53	30.93	82.60
3	56.77	18.87	33.27	19.87	2.87	9.97	4.97	0.62	3.27	25.93	31.23	83.07
7	63.90	22.40	35.00	23.53	2.77	9.60	5.17	0.53	3.47	23.70	28.77	82.33
10	54.63	18.67	34.20	21.53	2.57	9.43	4.90	0.59	3.13	24.30	29.50	82.30
12	72.03	24.03	33.33	25.17	2.87	9.63	4.80	0.83	3.47	23.73	28.70	82.77
15	63.53	21.23	33.43	22.73	2.80	9.70	4.90	0.64	3.27	24.03	29.00	82.77
18	49.93	16.80	33.50	17.47	2.87	9.33	4.73	0.59	3.13	24.23	29.20	83.03
20	54.57	18.83	34.50	18.17	3.00	9.90	5.20	0.54	3.00	23.90	29.00	82.47
23	48.77	16.20	33.23	17.07	2.87	10.07	5.03	0.57	3.07	26.23	30.70	84.30
27	49.00	17.27	35.23	18.90	2.60	9.30	5.07	0.77	3.07	24.50	30.27	83.90
30	54.50	19.33	35.47	20.70	2.63	9.20	5.03	0.67	3.27	26.93	30.60	84.80
33	66.23	22.93	34.03	24.63	2.70	9.87	5.10	0.68	2.93	27.20	31.83	84.60
35	64.53	22.47	34.83	26.93	2.40	9.20	4.93	0.57	2.80	25.23	31.53	83.63
36	71.87	24.00	33.37	26.63	2.70	9.50	4.77	0.59	2.87	26.10	30.60	84.47
40	74.83	25.97	34.73	30.43	2.47	9.77	5.20	0.76	2.93	25.57	30.50	83.43
43	71.37	24.33	34.13	24.70	2.90	10.30	5.33	0.87	3.47	22.93	29.00	82.60
45	66.10	22.40	33.93	26.23	2.53	9.43	4.83	0.58	3.07	23.10	27.70	81.53
46	63.53	16.77	33.43	17.77	2.83	9.60	4.83	0.51	3.07	23.83	28.77	83.00
49	46.80	15.87	33.90	17.80	2.63	9.13	4.70	0.61	3.20	24.10	34.20	82.37
50	52.83	18.07	34.13	20.93	2.53	9.23	4.80	0.62	3.00	24.90	27.97	81.87
Mean	59.14	20.01	34.09	22.30	2.65	9.60	4.97	0.65	3.13	24.80	30.00	83.09
Bulk	62.53	21.37	34.17	23.40	2.70	9.70	5.03	0.59	3.13	25.73	31.00	83.83
Giza-83	63.23	23.07	36.47	25.37	2.50	9.67	5.63	0.87	3.20	24.80	30.27	82.00
Dandara	66.17	22.57	34.17	25.63	2.60	9.70	5.03	0.87	3.13	25.93	30.77	84.50
Rev. LSD _{0.05}	8.11	1.62	1.43	2.87	0.29	0.97	1.88	0.09	0.42	1.18	2.87	1.68
Rev. LSD _{0.01}	10.70	2.12	1.92	3.99	0.39	1.40	2.62	0.13	0.59	1.56	3.82	2.26

Table 11: Means of the 20 selected families after the second cycle of pedigree selection for seed cotton yield/plant from population II in the late date of planting in season 2003.

fam. No.	Seed cotton yield/plant, g.	Lint yield /plant, g.	Lint percentage	No. of bolls/plant	Boll weight, g.	Seed index	Lint index	Eariness index	Micronaire reading	Fiber length		
										50%	2.5%	uniformity ratio %
2	65.23	24.70	34.10	25.40	2.50	9.43	4.87	0.56	3.27	24.80	29.80	83.03
5	70.00	22.57	33.80	28.57	2.47	9.47	4.83	0.59	2.93	25.90	31.00	82.83
6	54.27	20.90	35.20	23.20	2.37	10.10	5.50	0.87	3.60	25.90	31.50	82.37
10	54.87	18.30	33.03	21.87	2.53	9.70	4.83	0.69	3.07	26.10	31.40	83.20
15	73.20	25.57	34.90	28.47	2.63	10.03	5.37	0.80	3.07	25.47	30.63	82.80
18	47.43	16.27	34.27	19.07	2.50	10.00	5.23	0.56	3.07	26.13	31.43	83.10
20	62.30	21.43	34.50	24.70	2.53	10.03	5.27	0.56	3.33	26.53	32.03	83.20
24	72.40	24.70	34.17	30.00	2.43	9.80	5.10	0.89	3.07	26.33	31.40	82.97
25	65.73	22.57	34.30	24.07	2.73	9.43	4.93	0.57	3.07	25.90	30.97	82.57
27	73.33	24.77	33.77	26.97	2.73	9.63	4.93	0.61	3.07	25.13	30.50	82.30
28	53.00	18.13	34.43	21.13	2.53	10.00	5.23	0.56	3.27	25.80	31.00	83.27
32	52.10	17.93	34.47	18.90	2.80	10.43	5.47	0.77	3.07	25.90	31.13	83.33
33	50.07	17.00	33.93	18.40	2.73	9.40	4.83	0.57	3.00	26.20	31.40	83.43
35	54.77	19.37	35.40	21.23	2.60	10.53	5.77	0.65	3.40	26.03	31.10	83.80
36	54.87	18.57	33.63	20.73	2.67	9.90	5.00	0.62	3.00	26.70	31.93	83.53
38	51.60	17.30	33.53	18.57	2.80	10.30	5.20	0.57	3.20	26.60	31.60	83.93
40	49.77	16.60	33.33	18.93	2.63	10.30	5.17	0.78	3.00	25.37	31.17	81.50
45	50.67	17.17	33.80	18.27	2.80	9.97	5.30	0.53	3.13	27.50	32.60	83.93
46	55.37	18.73	33.83	20.07	2.77	9.90	5.03	0.60	3.00	26.10	31.57	82.63
48	55.83	18.83	33.77	20.93	2.70	10.40	5.30	0.77	3.13	25.57	31.00	82.60
Mean	56.87	19.57	34.22	22.02	2.60	9.85	5.14	0.64	3.13	26.00	31.26	83.02
Bulk	53.60	18.43	34.43	21.23	2.53	9.77	5.13	0.58	3.27	26.50	31.20	84.90
Giza-83	62.83	23.03	36.47	24.03	2.63	9.93	5.73	0.78	3.40	24.50	29.13	84.00
Giza-45	55.53	18.27	34.77	21.13	2.63	9.83	5.00	0.59	2.73	27.63	32.43	85.20
Rev. LSD _{0.05}	6.17	2.37	1.49	4.49	0.68	0.91	0.48	0.09	0.47	0.92	0.63	4.03
Rev. LSD _{0.01}	8.59	3.30	2.05	5.97	1.00	1.28	0.64	0.13	0.65	1.22	0.87	5.92

Table 12 : Observed direct and correlated response after the second cycle of pedigree selection for seed cotton yield/plant measured in percentage of the better parent.

A - Pop.I in the early planting date .

Fam. No.	Seed cotton yield/plant, g.	Lint yield /plant, g.	Lint percentage	No. of bolls/ plant	Boll weight, g.	Seed index	Lint index	Earliness index	Micronaire reading	Fiber length		
										50%	2.5%	Uniformity ratio
2	56.9**	42.57**	-9.90**	23.24**	23.04*	3.17	7.96	-26.74**	13.80	-0.38	-2.44	1.95
11	2815**	16.87**	-9.37**	15.10	11.74	-2.11	3.62	-2.33	1.69	5.02*	3.06	2.05*
14	31.43**	20.88**	-9.10**	11.91	18.70*	4.05	10.31*	-22.09**	0.97	2.00	1.98	0.11
32	25.12**	15.54*	-8.13**	6.76	17.39	2.29	9.76	-5.81	-4.84	5.77	4.05	1.72
49	18.85**	15.14*	-11.08**	11.12	17.39*	5.10	8.50	-20.93**	2.42	1.89	0.99	0.92

B - Pop.II in the early planting date .

8	24.36**	13.55*	-8.77**	55.14**	-19.86**	1.85	-11.90*	10.53	0.79	-8.81**	-5.06**	-3.03**
32	9.02*	0.84	-7.51**	9.23	0.00	8.61*	-4.17	-21.05*	5.26	-5.76**	-2.84**	-0.93
43	16.71**	8.32	-7.43**	20.84*	-3.48	8.98*	-3.71	-10.53	-2.63	-7.22**	-5.06**	-3.03**
45	22.86**	14.40**	-7.05**	46.93**	-16.38*	6.20	-6.18	-22.37**	1.84	-4.17*	-0.09	0.41
46	20.72**	10.26*	-8.77**	46.66**	-17.42*	4.91	-9.89*	2.63	8.68	-2.95	-1.96	-0.93

C - Pop.I in the late planting date .

12	8.86	4.16	-8.61**	-1.79	10.38	-0.72	-14.74**	-4.60	15.67**	-8.48**	-6.73	-2.05*
36	8.61	4.03	-8.50**	3.90	3.85	-2.06	-15.28**	-32.18**	-4.33	0.66	-0.55	-0.04
40	13.09*	12.57**	-4.77**	18.73**	-5.00	0.72	-7.64	-12.64	-2.33	-1.39	-0.88	-1.27
43	7.86	5.46	-6.42**	-3.63	11.54*	6.19	-5.33	0.00	15.67**	-11.57**	-5.75	-2.25*

D - Pop.II in the late planting date .

2	3.82	7.25	-6.50**	5.70	-4.94	-5.04	-15.01**	-28.21**	19.78*	-10.24**	-8.11**	-2.55
5	11.41*	-2.00	-7.32**	18.89*	-6.08	-4.63	-15.71**	-24.36**	7.33	-6.26**	-4.41**	-2.78
15	16.50**	11.03	-4.30*	18.48*	0.00	1.01	-6.28	2.56	12.45	-7.82**	-5.55**	-2.82*
24	15.23**	7.25	-6.31**	24.84**	-7.60	-1.31	-10.99**	14.10	12.45	-4.71**	-3.18**	-2.62
27	16.71**	7.56	-7.40**	12.23	3.80	-3.02	-13.96**	-21.79**	12.45	-9.05**	-5.95**	-3.40*

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

Selection for seed cotton yield

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الانتخاب لمحصول القطن الزهر في ميعادى الزراعة المبكر والمتأخر في القطن المصرى

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أجريت دورتين من الانتخاب المنسب لصفة معامل البذرة في عشيرتين من القطن المصرى في الجيل الثالث في ميعادين للزراعة مختلفين (مبكر ومتأخر). نتجت العشيرة الأولى من التهجين بين صنف القطن جيزة ٨٣ والصنف دندرة (أصناف طويلة التيلة) ، فى حين العشيرة الثانية فهى ناتجة من التهجين بين الصنف جيزة ٨٣ (طويل التيلة) والصنف جيزة ٤٥ (فائق الطول).

أجريت الدراسة في موسم ٢٠٠١ بتجربتين فى كل ميعاد للزراعة؛ المبكر (مارس) والمتأخر (مايو) وذلك بـ ٥٠ عائلة فى كل ميعاد للزراعة فى تصميم القطاعات

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الكاملة العشوائية في ثلاث مكررات وتم تقييم الدورة الثانية من الانتخاب في موسم ٢٠٠٣م.

وكانت النتائج المتحصل عليها كالتالي :-

١. تراوح محصول القطن الزهر/للنبات في العشيرة الأولى (العشيرة القاعدية) من ٤٠,٨٣ إلى ٩٠,٧ جم ومن ٣٥,٢٣ إلى ٨٨,٠٣ جم وذلك في ميعادى الزراعة المبكر والمتأخر على التوالي.
٢. كان معامل الاختلاف الوراثى لمحصول القطن الزهر/النبات أعلى لميعاد الزراعة المتأخر عن الميعاد المبكر بينما ارتفع لميعاد الزراعة المبكر عن المتأخر بعد دورتين من الانتخاب المنسب.
٣. كانت تقديرات معامل التوريث بالمعنى الواسع عالية جدا بسبب تقييم المنتخبات فى منطقة واحدة.
٤. أظهرت النتائج أن المتحصل عليه بعد دورتين من الانتخاب المنسب كنسبة من أحسن الإباء لمحصول القطن الزهر/للنبات تراوح من ١٦,٩٢ إلى ٥٦,٩٩ % ومن ١٦,٧١ إلى ٢٤,٣٦ % للعشيرة الأولى والثانية على التوالي فى ميعاد الزراعة المبكر ولكن تلك الزيادة ارتبطت بتأثير عكسى على معامل التكبير.
٥. أظهرت النتائج أن محصول إحدى العائلات فى العشيرة الثانية فى ميعاد الزراعة المتأخر كلن غير معنوى بحوالى ١٦,٠٩ % عن الأب الأفضل وان هناك عائلتين كان محصولهم يتفوق معنويا عن الأب الأفضل بحوالى ١٦,٥٠ إلى ١٦,٧١ % ، بينما انخفض الضرر بالنسبة لصفات تصافى الحليج ومعامل الشعر ومعامل التكبير.