J. Plant Production, Mansoura Univ., Vol. 9 (12): 1197 - 1202, 2018

A New Egyptian Long Staple Cotton Cross

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ABSTRACT

New promising cotton cross {[(Giza 89 X Karshinky) X Giza 86] X Giza 94} belonging to *G. barbadense* L., accompanied with combinations of excellent fiber traits and higher yield potential and possessing strong tolerance to Fusarium wilt developed by Cotton Breeding Department, Cotton Research Institute, Agricultural Research Center, Giza, Egypt. It is under the varietal approval process and will be named Giza 97 for general cultivation. It was developed through artificial pollination of diversified parents utilizing pedigree selection technique. F_1 population resulting from the parental crossways advanced by using pedigree method and selection beginning in the F_2 generation. The superior families were selected from F_5 generation based on yield potential, fiber quality and overall better performance over standard varieties. The regional trial conducted of five growing seasons from 2014 to 2018 in different six locations representing the cultivated zone of this cotton category, the promising cross is out yielded significantly all the standard varieties. The new cross is widely adapted and fulfills the requirements of both cotton growers by high yielding and spinners by high lint percentage and good fiber quality as a long staple cotton variety. The new cross was recommended to be released as a new cotton variety.

Keywords: Egyptian cotton, pedigree method, regional trial, yield traits, fiber quality.

INTRODUCTION

Cotton fiber is the world's most important natural textile fiber. Egyptian cotton (*Gossypium barbadense* L.,) is an economically important cash crop in Egypt. Egyptian cotton varieties produced by intraspecific hybridization except Dandara and classified into two categories: extra-long and long staple cotton category (Al-Didi, 1972). The Egyptian long staple cotton varieties are an economically important in Egypt, which represent nearly 85% of total cotton production during the two growing seasons 2017 and 2018. This category had two commercial varieties Giza 86 and Giza 94.

The cotton research institute (CRI) released 96 cotton verities until now. The varietal improvement work in Egyptian cotton started as early as in 1822 by individual efforts. When Egyptian Agricultural Society was established in 1898 the breeding works go ahead on a scientific base of plant breeding. It was further strengthened in 1919 when the Cotton Research Board was established (now the Cotton Research Institute) launched a new varieties. Since 1921 the Egyptian cotton breeder has used artificial hybridization and pedigree method to develop new Egyptian cotton varieties, the first cross between Ashmouni and Sakel to produced wafer. Since this date all the Egyptian varieties have originated from artificial hybridization except Dandara produce by direct selection from Ashmouni field (Ware, 1959 and Al Didi, 1972 and 1982). *Gossypium barbadense* L., is known as long, extra long, fine and strong fiber quality. Cotton breeding remained a continuous objective of the development of new varieties and sustainable seed cotton yield.

The pedigree method describes a selection protocol utilized during the inbreeding of populations of self and cross pollinated species in the development of homozygous lines. Superior single plants are selected in successive generations and a record is maintained of the parent progeny relationships (which may extend to grand-parent, great-grandparent, or more ancestral generations). Selections are based on visual evaluations of high heritability traits (Fehr, 1987). Pedigree method is a detailed record of the relationship between the selected plants and their progenies and maintained as a result of each progeny in every generation can be traced back to the F2 plant from which it originated.

The main objectives of Egyptian cotton breeding program is the development of new cotton varieties characterize by high yield productivity, early maturity, resistant to disease and pests, homogeneous in lint color and seeds fuzz, long length, fiber strength, fiber fineness and increasing lint yield to seed cotton yield ratio (Al-Didi, 1972 and 1982). Hence, the release of new high yielding, resistant to Fusarium wilt variety with good fiber quality traits would boost up the sustainable cotton productivity in Egypt.

The cotton breeder must test the new breeding materials in regional or advanced trial (LB). In these experiments, the changes in the relative behavior of genotype in different environments are usually observed. This phenomenon is called genotype x environment interaction (GEI), which makes selection in breeding programs more difficult, because the breeders need to select the high yield genotypes which is the most stable or widely adaptability to multienvrionments (Farias *et al*., 2016).

It is common inspection that the varieties, almost immediately after release start losing identity, showing deterioration and low production potential. The usual causes behind this include mechanical factors like mixing during farm operations, genetically factors like crosspollination, gene frequency changes, natural gene mutation and disease epidemics. There is fundamental need to develop a variety with passage of time which performs well in all types of disease epidemic conditions (Iqbal *et al*., 2014).

This promising cross produced by artificial pollination then used pedigree selection method. Evaluation in regional trial was done during five growing seasons to study genotype x environment interaction and to indentify the adaptability and compared with the two commercial varieties in this category. Also, produce breeder seeds from isolated field.

MATERIALS AND METHODS

Development of this promising cross is a result of crossing between two cotton genotypes belonging to *Gossypium barbadense* L., [(Giza 89 x Karshinky) x Giza 86] as the female parent characterize by high fiber strength and early maturity with Giza 94 as a male parent which superior by seed cotton yield and lint percentage in the growing season 2007 at Giza Experimental Station, Cotton Research Institute, Agricultural Research Center, Giza, Egypt during the routine work of Egyptian cotton breeding program. Then all the later generations, isolated field and production of breeder seeds were grown at Sakha Experimental Station, Kafr El-Sheikh governorate

F_1 generation was planted in the next season as individual plants and in flowering stage self pollination was done to obtain selfed seeds. The F_1 plants were picked and planted in the next season 2009 as individual plants to produce F_2 plants. Also, self pollination was done at flowering stage. At maturity, all self and natural pollinated bolls of desirable single plants were picked from whole F_2 population. After laboratory work, selection based on high yielding and good fiber quality plants. The natural bolls of the selected F_2 plants were planted as bulked families and selfed bolls of the same plant were planted as individual plants to produce F_3 generation in 2010 growing season. At maturity, all self and natural pollinated bolls of desirable single plants were picked and bulk family of the selected F_3 population. After laboratory work, the superior families were select beside their individual plants based on high yielding and good fiber quality. Then, the selected individual plants from each family were planted as individual plants from selfed bolls and open pollinated bolls as bulk families to produce F_4 generation. The cotton breeder repeated the same selection process to promote for next generations. Bulk family grown in a plot consists of three rows set of 4m length, 70cm apart and distance between plants within rows was 30cm. While, individual plants grown in two replicates each one consists of two rows set of 7m length, the distance between rows and plants was 70cm. Regular agronomic and cultural practices recommended for cotton crop production were adopted during the growing seasons.

The preliminary trial A (LA) was planted during the growing season 2013 to compare this new promising cross with the commercial varieties in a Randomized Complete Block Design (RCBD) with six replications at Sakha experimental station, Kafr El-Sheikh governorate. The seeds of the selected breeding lines from this experiment will be sown in the advanced or regional trial in the next season. Regional or advanced Trial B (LB) were growing during the growing seasons from 2014 to 2018 at six Egyptian governorates; Kafr El-Sheikh, El-Behera, El-Dakahlia, El-Monofyia, El-Sharquia and El-Gharbia. These locations represented the most important cotton production area for long staple cotton category. The experimental design was a Randomized Complete Block Design (RCBD) with six replications in each location. Each entry was grown in a plot of five rows set of 4m length, distance was 70cm between rows and 30cm within plants. General agronomic and agricultural practices recommended for cotton crop production were adopted at each location during the growing seasons.

From the results of regional or advanced trials (LB), the surpassed families from this cross for the two successive seasons 2014 and 2015 were selected to be the nuclei of the isolated field. The isolated field was at least 500 meters distance from other cotton fields from all directions to avoid cross pollination and started only with the selfed seeds of the selected families as individual plants. The selected selfed plants divided into two groups the first one the selfed seeds will make individual plants and natural bolls make bulk families and the second group; the selfed seeds make self nucleolus and the natural bolls make natural nucleolus. The selfed and natural nucleolus was grow as bluk families in three rows set of 4m length, 70cm apart and distance between plants within rows was 30cm. the best natural nucleolus selected to establish the experimental yield trial. The experimental yield trial design was a Randomized Complete Block Design (RCBD) with six replications. Each entry was grown in a plot of five rows set of 4m length, distance was 70cm between rows and 30cm within plants.

At harvest, fifty bolls were collected from the two outer rows to measure average boll weight (BW) in grams. While, the three inner rows were harvested to estimate seed cotton yield (SCY) and lint yield (LY) which expressed in Kantar/Feddan (Kantar of seed cotton yield =157.5 Kg, Kantar of lint yield=50 Kg and Feddan=4200 m^2). Fiber quality characters were estimated at Cotton Technology Laboratory, Cotton Research Institute, Agricultural Research Center, Giza, Egypt.

Yield data were subjected to analysis of variance (ANOVA), which was done for each location separately. Also, combined analysis of variance was done using the mean data of each location for regional or advanced trial (LB). Bartlett test was used to determine the homogeneity of error variances between environments to determine the validity of the combined analysis of variance on the data as described by Gomez and Gomez 1984.

RESULTS AND DISCUSSION

Cotton Research Institute developed a new promising cross namely {[(Giza 89 x Karshinky) x Giza 86] x Giza 94} belonging to long staple cotton category. It will be recommended for general cultivation in Delta region in Egypt for its high yield productivity, high lint percentage, early maturity, good fiber quality and resistance to Fusarium wilt.

The cotton breeders select the higher plants from F_2 populations to form the F_3 families. During the segregating generation's start from F_3 to F_5 selection was done between families to select the higher yielding families with good fiber quality traits, then selection within families to select the most superior plants within each family. Starting from replicated trials selection for superior families was depending on the cross superiority over the two commercial varieties Giza 86 and Giza 94. Selection of individual plants is continued till the progenies show no segregation. At this stage selection is done among families, because there would be no genetic variation within families (Fehr, 1987). El-Mansy, 2005 and 2015 and Abdelmoghny, 2016 reported that selection within families is more efficient in early segregating generations and selection between families is main target for cotton breeder in later generations among some Egyptian cotton crosses.

A regional or advanced trial (LB) was conducted during the two grown seasons 2014 and 2015 at farmer’s fields. The new cross was compared with the two commercial varieties Giza 86 and Giza 94 in six locations represented the cultivated area of this cotton category in Egypt. The results obtained from Table 1the breeding families had higher yield than commercial variety Giza 86 during the two growing seasons. Seed cotton yield was 10.62 K/F, 8.14 K/F in the growing season 2014 and 10.80

K/F and 9.02 K/F during 2015 for the promising cross and Giza 86, respectively. While, lint yield was 13.36 K/F and 10.25 K/F in 2014 and 13.65 K/F and 11.02 K/F during 2015 for the promising cross and Giza 86, respectively. Lint percentage was nearly 40% for this promising cross compared to Giza 86 (38.5%) during the five growing seasons across six environments. On the other hand, the new cross maintains fiber quality traits as long stable cotton category.

Hence, on the basis of regional trial, it was indicated that this cross has good adaptability in different ecological zones. However, the genotype x environment interaction analysis does not provide complete and accurate information about the behavior of each genotype across varying environments. Therefore, it is necessary to analyze adaptability or phenotypic stability, to identify genotypes with predictable behavior that are responsive to environmental variation in specific or general conditions (Farias *et al*., 2016).

Table 1. Comparative between new cotton cross, other genotypes and two commercial varieties in regional or advanced trial during the growing seasons from 2014 to 2018 over six locations

Genotypes	SCY K/F	LY K/F	L %	BW g	EI %	FL mm	UR %	FS g/tex	FF mic	+b	M	YS
					2014							
F_5 529/2012	11.34	14.46	40.48	3.2	79.4	32.7	84.2	44.1	4.2	9.7	0.93	2166
F_5 530/2012	11.34	14.58	40.74	3.3	79.4	31.9	83.2	43.9	4.4	9.6	0.95	2306
F_5 533/2012	11.49	14.54	40.18	3.4	76.9	34.1	83.7	43.1	4.1	9.6	0.93	2259
F_5 534/2012	11.49	13.55	40.27	3.3	79.1	32.0	82.7	43.7	4.4	9.6	0.94	2245
F_5 537/2012	10.68	13.45	40.27	3.2	79.8	33.8	84.7	43.3	4.1	9.5	0.93	2415
Mean	10.62	13.36	40.32	3.24	76.39	33.16	84.21	43.57	4.3	9.6	0.93	2262
Giza 94	9.84	12.69	40.63	3.1	65.0	34.3	85.6	43.0	4.1	9.6	0.92	2212
Giza 86	8.14	10.25	39.70	3.2	75.1	33.3	85.4	43.9	4.5	9.3	0.94	2233
Mean	10.62	13.36	40.32	3.24	76.39	33.16	84.21	43.57	4.26	9.56	0.93	2262
SE	0.47	0.58	0.13	0.04	2.00	0.37	0.41	0.16	0.06	0.05	0.00	30.16
LSD at 0.05	1.27	1.61			0.16							
LSD at 0.01	1.67	2.12			0.21							
					2015							
F_6 556/2013	11.12	14.10	40.29	3.0	77.0	32.3	85.0	45.7	4.8	8.8	0.98	2486
F_6 558/2013	11.08	14.02	40.20	3.0	78.4	32.9	84.4	47.2	4.8	8.6	0.98	2539
F_6 559/2013	10.98	13.87	40.12	3.0	75.0	32.9	84.8	46.4	4.8	8.9	0.98	2504
F_6 561/2013	10.51	13.23	40.04	3.1	76.6	33.6	83.6	47.4	4.7	8.6	0.98	2651
F_6 562/2013	10.59	13.41	40.32	3.1	77.8	32.9	85.3	45.6	4.6	8.8	0.96	2546
F_6 565/2013	10.50	13.26	40.20	3.0	80.2	33.3	84.8	46.3	4.8	8.6	0.97	2536
Mean	10.80	13.65	40.20	3.03	77.50	32.98	84.65	46.43	4.8	8.7	0.98	2544
Giza 94	10.58	13.48	40.51	3.2	74.7	33.3	86.0	40.9	4.5	8.5	0.90	2404
Giza 86	9.02	11.02	38.90	2.9	71.5	33.7	86.2	43.8	4.7	8.1	1.00	2520
Mean	10.55	13.30	40.07	3.04	76.40	33.11	85.01	45.41	4.71	8.61	0.97	2523
SE	0.24	0.35	0.17	0.03	0.94	0.16	0.30	0.76	0.04	0.09	0.01	24.36
LSD at 0.05	1.30	1.61			0.15							
LSD at 0.01	1.71	2.12			0.21							
					2016							
{[(Giza 89 x Karshinky) x Giza 86] x Giza 94}	12.56	16.04	40.6	3.1	59.7	32.8	86.4	43.4	4.1	8.8	0.95	2360
Giza 94	11.82	14.93	40.1	3.2	54.2	32.7	86.6	42.1	4.2	8.6	0.93	2356
Giza 86	10.02	12.26	38.7	3.1	49.0	32.1	86.7	43.5	4.2	8.5	0.94	2506
Mean	11.47	14.41	39.80	3.13	54.30	32.53	86.57	43.00	4.17	8.63	0.94	2407
SE	0.75	1.12	0.57	0.03	3.09	0.22	0.09	0.45	0.03	0.09	0.01	49.35
LSD at 0.05	1.87	2.27			0.22							
LSD at 0.01	2.35	2.99			0.29							
					2017							
{[(Giza 89 x Karshinky) x Giza 86] x Giza 94}	13.70	17.05	39.46	3.6	54.18	32.6	84.0	44.8	4.3	8.4	0.95	2400
Giza 94	12.55	15.34	38.81	3.3	54.69	33.6	84.4	45.7	4.3	8.5	0.94	2412
Giza 86	11.45	13.68	37.93	3.2	40.73	33.0	84.4	44.6	4.4	8.2	0.95	2352
Mean	12.57	15.36	38.73	3.37	49.87	33.07	84.27	45.03	4.33	8.37	0.95	2388
SE	0.65	0.97	0.44	0.12	4.57	0.29	0.13	0.34	0.03	0.09	0.00	18.33
LSD at 0.05	0.34	0.42										
LSD at 0.01	0.45	0.56										
					2018							
{[(Giza 89 x Karshinky) x Giza 86] x Giza 94}	15.93	20.9	40.69	3.5	66.64	32.6	83.96	44.8	4.3	8.4	0.95	2400
Giza 94	14.15	18.1	40.10	3.2	63.32	33.6	84.44	45.7	4.3	8.5	0.94	2412
Giza 86	12.20	14.8	38.71	3.1	51.08	33.0	84.42	44.6	4.4	8.2	0.95	2352
Mean	14.09	17.90	39.66	3.27	60.35	33.07	84.27	45.03	4.33	8.37	0.95	2388
SE	1.08	0.76	0.42	0.12	4.73	0.29	0.16	0.34	0.03	0.09	0.00	18.33
LSD at 0.05	0.14	0.18										

So, Abd El-Moghny and Max, 2015; Saleh, 2016 and Ail, 2017 used different phenotypic stability techniques and reported that this new cross has wide adaptability under a wide range of environments.

The difference and increasing ratio between the new cross and the two commercial varieties from regional trials during five growing seasons is presented in Table 2. The increasing ratio was higher 2.54, 2.25 and 1.78 for seed cotton yield and 3.78, 3.37 and 3.73 for lint yield during the three growing seasons 2016, 2017 and 2018 between new cross and Giza 86. On the other hand, less increasing 1.15, 1.15 and 1.00 for seed cotton yield and 1.11, 1.71 and 2.60 for lint yield between the new cross and Giza 94. The results showed that the increasing ratio was higher between new promising cross and Giza 86 (25.35%, 19.65% and 14.59% for seed cotton yield and 30.83%, 24.63% and 25.20% for lint yield) than Giza 94 (9.73%, 9.16% and 7.07% for seed cotton yield and 7.43%, 11.15% and 14.36% for lint yield) during three seasons 2016, 2017 and 2018, respectively as presented in Table 2.

Based on the regional or advanced trial (LB) results the cotton breeders decided to isolate this cross. The isolated field starting with selfed seeds only of the selected families in the growing season 2016. The main task of isolation is to produce breeder seeds and maintain purification and uniformity. At this stage the breeder should have no variation between or within families.

Table 2. Difference and increasing ratio % between new promising cross and two commercial varieties in regional or advanced trial (LB) during the growing seasons from 2014 to 2018

Yield traits	Seed cotton yield K/F				Lint yield K/F			
	Giza 86		Giza 94		Giza 86		Giza 94	
	Difference	Increasing ratio%	Difference	Increasing ratio%	Difference	Increasing ratio%	Difference	Increasing ratio%
2014								
F_5 529/2012	3.20	39.31	1.50	15.24	4.21	41.07	1.77	13.95
F_5 530/2012	3.20	39.31	1.50	15.24	4.33	42.24	1.89	14.89
F_5 533/2012	3.35	41.15	1.65	16.77	4.29	41.85	1.85	14.58
F_5 534/2012	3.35	41.15	1.65	16.77	3.30	32.20	0.86	6.78
F_5 537/2012	2.54	31.20	0.84	8.54	3.20	31.22	0.76	5.99
2015								
F_6 556/2013	2.10	23.28	0.54	5.10	3.08	27.95	0.62	4.60
F_6 558/2013	2.06	22.84	0.50	4.73	3.00	27.22	0.54	4.01
F_6 559/2013	1.96	21.73	0.40	3.78	2.85	25.86	0.39	2.89
F_6 561/2013	1.49	16.52	-0.07	-0.66	2.21	20.05	-0.25	-1.85
F_6 562/2013	1.57	17.41	0.01	0.09	2.39	21.69	-0.07	-0.52
F_6 565/2013	1.48	16.41	-0.08	-0.76	2.24	20.33	-0.22	-1.63
2016								
{[(Giza 89 x Karshinky) x Giza 86] x Giza 94}	2.54	25.35	1.15	9.73	3.78	30.83	1.11	7.43
2017								
{[(Giza 89 x Karshinky) x Giza 86] x Giza 94}	2.25	19.65	1.15	9.16	3.37	24.63	1.71	11.15
2018								
{[(Giza 89 x Karshinky) x Giza 86] x Giza 94}	1.78	14.59	1.00	7.07	3.73	25.20	2.60	14.36

The first replicated experimental yield trial for this new cross was grown in 2017. The mean performance of the two experimental yield trials in the growing seasons 2017 and 2018 are presented in Tables 3 and 4, respectively. The nuclei had higher seed cotton yield, lint yield and lint percentage coupled with good fiber quality for this cotton category. The mean sum of squares for these trials showed non-significant differences between these nuclei as shown in Table 5 during 2017 and 2018. So, the cotton breeders select the best four nuclei No. (1, 6, 7 and 19) and the best five No. (1, 2, 3, 4 and 5) and mixed it to produce breeder seed 1 in the first season and breeder seed 2 in the next season, respectively. These nuclei showed homogeneity in seed fuzz, lint color and uniformity plant type in the field coupled with high yield and good fiber quality traits. These results indicate that the cotton breeder successes to hide genotypic variation and increase homogeneity between these nucleus. The same results obtained by Abd El-Bary *et al*., 2010 and 2012; Orabi *et al*., 2012 and 2016 for the new promising long staple cotton crosses (Giza 89 x Giza 86); (10229 x Giza 86); (Giza 75 x Sea) and Giza 94, respectively.

The estimation of Fusarium wilt incidence rate in cotton and fiber disease department, plant pathology institute, was done annually to all the breeding families started from F_3 generation (season 2010). The breeding families showed good genetic tolerance to Fusarium wilt. Regarding to fiber quality traits provided by Cotton Technology Laboratory, Cotton Research Institute that fiber quality is acceptable (33mm fiber length, 4.5 fiber fineness, 45g/tex fiber strength and uniformity ratio (UR) 87.65 %. These traits are in the same trend of the long staple cotton category for spinner desire.

Table 3. Mean performance for the twenty four nucleus of the new promising cross during the growing season 2017

Nucleus	SCY K/F	LY K/F	L%	BW g	EI %	FL mm	UR %	FS g/tex	FF mic	+b	M	YS
F_{10}1/17	13.7	17.3	40.11	3.4	53.4	32.6	86.5	48.2	4.7	8.6	0.99	2400
F_{10}2/17	13.2	16.8	40.37	3.2	58.6	33.4	85.5	49.4	4.7	8.9	1.0	2520
F_{10}3/17	13.0	16.1	39.55	3.4	60.2	31.6	81.0	43.2	4.5	8.0	0.98	2400
F_{10}4/17	13.5	17.0	40.10	3.3	56.6	31.7	83.4	47.0	4.7	9.1	1.0	2280
F_{10}5/17	13.1	16.6	40.21	3.4	57.0	33.7	84.3	43.8	4.6	9.5	0.98	2400
F_{10}6/17	14.7	18.7	40.34	3.3	54.2	31.9	84.0	48.0	4.7	9.1	0.99	2400
F_{10}7/17	14.4	18.1	39.72	3.3	60.5	30.9	80.5	42.3	4.6	9.1	0.97	2100
F_{10}8/17	13.2	16.8	40.34	3.3	53.5	33.3	84.0	41.8	4.5	8.9	0.94	2400
F_{10}9/17	10.1	13.3	41.83	3.5	45.5	32.3	86.3	40.0	4.8	9.4	0.99	2400
F_{10}10/17	10.1	12.8	40.24	3.5	57.4	30.1	82.6	45.2	4.7	9.1	1.0	2400
F_{10}11/17	11.2	14.4	40.79	3.2	53.5	31.2	85.6	41.0	4.8	9.1	1.0	2280
F_{10}12/17	12.5	15.8	40.16	3.3	54.3	31.6	83.8	43.3	4.7	9.5	0.98	2400
F_{10}13/17	12.4	15.8	40.45	3.2	47.5	32.3	83.9	41.0	4.7	8.1	0.97	2400
F_{10}14/17	13.5	17.0	40.11	3.4	55.3	31.3	83.6	41.5	4.7	8.3	0.97	2400
F_{10}15/17	13.2	16.8	40.40	3.3	54.6	31.6	83.7	42.7	4.8	9.0	0.97	2460
F_{10}16/17	13.5	17.0	40.13	3.5	56.1	33.3	85.8	44.5	4.7	8.6	0.96	2400
F_{10}17/17	11.4	14.4	40.25	3.5	54.8	34.6	87.1	49.0	4.8	8.8	0.97	2320
F_{10}18/17	13.0	16.3	39.83	3.5	56.4	33.7	82.5	46.4	4.8	9.8	0.98	2460
F_{10}19/17	14.5	17.8	39.09	3.5	56.1	33.2	83.8	45.0	4.7	8.4	0.98	2580
F_{10}20/17	11.7	14.7	39.88	3.5	56.2	34.8	85.5	48.2	4.8	9.1	0.97	2400
F_{10}21/17	12.8	16.3	40.48	3.3	58.0	32.2	84.8	45.6	4.7	9.4	0.97	2520
F_{10}22/17	12.1	15.0	39.22	3.6	59.2	34.5	87.3	49.4	4.7	8.4	0.98	2340
F_{10} 3/17	11.2	14.0	39.82	3.4	62.0	32.7	85.3	44.9	4.9	8.6	0.98	2580
F_{10}24/17	13.4	16.5	39.14	3.3	60.4	31.3	86.3	48.1	4.8	9.9	0.97	2100
Mean	12.72	16.07	40.11	3.4	55.89	32.49	84.46	44.98	4.57	8.99	0.98	2389
Variance	1.56	2.24	0.31	0.01	14.32	1.55	3.09	8.70	0.04	0.25	0.00	13773
SE	0.25	0.31	0.11	0.02	0.77	0.25	0.36	0.60	0.04	0.10	0.00	23.96
Min	10.11	12.85	39.09	3.21	45.50	30.10	80.50	40.00	4.20	8.00	0.94	2100
Max	14.72	18.71	41.83	3.56	62.00	34.80	87.30	49.40	4.80	9.80	1.00	2580
Rang	4.61	5.86	2.75	0.35	16.50	4.70	6.80	9.40	0.60	1.90	0.06	480
LSD 0.05	1.06	1.28		0.30								
LSD 0.01	1.43	1.96		0.41								

Table 4. Mean performance for the fifteen nucleus plus breeder seed 1 of the new promising cross during the growing season 2018

Nucleus	SCY K/F	LY K/F	L %	BW g	EI %	FL mm	UR %	FS g/tex	FF mic	+b	M	YS
F_{11}1/18	16.9	21.028	39.40	3.5	51.8	33.7	85.3	43.2	4.3	9.3	0.94	2400
F_{11}2/18	16.3	20.576	40.18	3.3	57.6	32.4	86.8	44.5	4.3	8.8	0.94	2340
F_{11}3/18	17.6	21.829	39.47	3.5	57.4	33.4	86.0	42.8	4.3	9.1	0.92	2460
F_{11}4/18	17.0	21.104	39.45	3.2	53.5	31.2	85.0	43.4	4.4	9.1	0.93	2400
F_{11}5/18	17.9	22.053	39.06	3.3	58.7	33.9	85.2	43.8	4.3	9.3	0.94	2400
F_{11}6/18	17.5	21.837	39.52	3.5	54.4	33.3	85.7	43.5	4.2	9.3	0.92	2460
F_{11}7/18	16.0	19.978	39.65	3.4	53.2	34.3	83.5	43.3	4.3	9.6	0.93	2580
F_{11}8/18	16.5	20.891	40.14	3.3	47.1	33.9	87.1	43.2	4.3	8.4	0.93	2400
F_{11}9/18	17.3	21.188	38.94	3.3	51.6	33.5	84.1	43.0	4.2	8.8	0.96	2460
F_{11}10/18	16.4	20.563	39.70	3.5	49.3	33.5	85.6	44.6	4.3	8.8	0.94	2520
F_{11}11/18	15.3	19.412	40.23	3.5	48.3	34.7	85.9	45.5	4.2	8.7	0.95	2460
F_{11}12/18	14.3	18.120	40.34	3.1	49.1	33.2	84.7	43.1	4.2	8.8	0.93	2340
F_{11}13/18	16.1	20.439	40.18	3.6	46.3	35.4	84.7	45.5	4.1	8.5	0.94	2400
F_{11}14/18	16.6	21.345	40.74	3.5	53.2	32.1	84.3	44.8	4.3	8.7	0.94	2400
F_{11}15/18	13.8	17.227	39.58	3.2	52.4	34.6	85.8	44.9	4.3	8.4	0.94	2400
Breeder seed 1	15.0	19.020	40.35	3.1	52.0	33.0	83.8	45.3	4.3	9.9	0.94	2460
Mean	16.28	20.41	39.81	3.36	52.24	33.51	85.22	44.03	4.27	8.97	0.94	2430
Variance	1.38	1.86	0.26	0.03	13.44	1.07	1.03	0.93	0.00	0.18	0.00	3840
SE	0.29	0.34	0.13	0.04	0.92	0.26	0.25	0.24	0.02	0.11	0.00	15.49
Min	13.80	17.2	38.94	3.10	46.30	31.20	83.50	42.80	4.10	8.40	0.92	2340
Max	17.90	22.1	40.74	3.60	58.70	35.40	87.10	45.50	4.40	9.90	0.96	2580
Rang	4.10	4.8	1.80	0.50	12.40	4.20	3.60	2.70	0.30	1.50	0.04	240
LSD 0.05	0.68	0.55		0.54	8.868							
LSD 0.01	0.51	0.67		0.41	6.634							

Table 5. Mean sum of squares of experimental yield trial for the new promising cotton cross during the two growing seasons 2017 and 2018

S. O. V	d.f	Mean sum of squares						
		2017				2018		
		BW g	SCY KF	LY K/F	d.f	BW g	SCY KF	LY K/F
Replications	3	0.039	2.668	4.212	5	0.218	0.233	0.371
Nucleus	23	0.047^{ns}	0.389^{ns}	0.560^{ns}	15	0.140^{ns}	0.233^{ns}	0.310^{ns}
Error	69	0.042	0.520	0.831	75	0.131	0.206	0.325

ns; non significant

The promising cross {[(Giza 89 x Karshinky) x Giza 86] x Giza 94} is characterized by:

1. Erect main stem.
2. The shape of the leaves is large size with deep lobes and leather fell.
3. The sympodial branches ranged from medium to long.
4. The node of the first fruiting branch ranged from 6-7.
5. Boll weight 3.5g.
6. Lint percentage 39.63%.
7. Earliness around 21 days earlier than the commercial variety which gave chance to best exploits of the land with previous crop.
8. Fiber characters: fiber length 33 mm, micronaire reading 4.3 and fiber strength reach 45 g/tex.
9. White lint color.
10. Salinity tolerant (North Delta).
11. Resistance to Fusarium wilts and pest.

REFERENCES

Abd El-Bary, A. M. R.; H. M. E. Hamoud; W. M. B. Yehia and ,M. S. M. Srour; Samia, E. Ali, and Eman, M. R. Saleh, 2010. The long staple Egyptian cotton promising cross Giza 89 x Giza 86. J. Agric. Chemistry and Biotechnology, 1(6): 325-339.

Abd El-Bary, A. M. R.; H. M. E. Hamoud; W. M. B. Yehia and M. H. M. Orabi. 2012. The long staple Egyptian cotton promising cross 10229 x Giza 86. The 1st Alex. Inter. Cotton Conf. 17-18 Apr.

Abd El-Moghny, A. M. 2016. Genetic analysis and prediction of new recombination in some cotton (*G. barbadense* L.) crosses. J. Agric. Res. Kafr El-Sheikh Univ. A. Plant Production, 42 (3): 319-335.

Abd El-Moghny, A. M. and Max, S. Mariz. 2015. Genotypic stability and phenotypic adaptability for some yield traits in some long staple cotton genotypes Egypt. J. Agric. Res., 93 (1): 85-100.

Al Didi, M. A. 1972. History of Egyptian cotton varieties. Egypt Cotton Gazette, 58: 36-56.

Al Didi, M. A. 1982. The Egyptian cotton crop 1950-1980. XXXXI Plenary Meeting of the International Cotton Advisory Committee (ICAC). Cairo, Egypt.

Ali, E. Samia. 2017. Stability and genetic diversity for yield and yield components in some Egyptian cotton genotypes. Egypt. J. Agric. Res., 95(4): 1613-1629.

El-Mansy, Y. M. 2005. Using genetic components for predicting new combination in some cotton cresses (*Gossypium barbadense* L.,). Ph. D. Thesis, Fac., Agric., Mansoura Univ., Egypt.

El-Mansy, Y. M. 2015. Impact of mating system on genetic variability and correlation coefficients in cotton (*G. barbadense* L.,). Minufiya J. Agic. Res. 40(1): 119-129.

Farias, F. J. C.; L. P. Carvalho; J. L. Filho and P. E. Teodoro. 2016. Biplot analysis of phenotypic stability in upland cotton genotypes in Mato Grosso. Genetics and Molecular Res. 15 (2): 1-10.

Fehr, W. 1987. Principles of Cultivar Development: Theory and Technique (Vol.1). Hardcover.

Gomez, K. A. and A. A. Gomez. 1984. Statistical Procedures for Agricultural Research. 2nd Ed. John Wiley & Sons, NY, Chichester, Brisbane, Toronto and Singapore.

Iqbal, M.; M. Naeem; A. Mehmood; M. Ijaz and M. A. Khan. 2014. Release of New Cotton Variety "IUB 222. J. Appl. Environ. Biol. Sci., 4(8S): 331-338.

Orabi, M. H. M.; Samia, E. Ali; Eman, M. R. Saleh and M. S. M. Srour. 2012. The long staple Egyptian cotton promising cross Giza 75 X Sea. The 1st Alex. Inter. Cotton Conf 17-18 Apr. 2: 231-256.

Orabi, M. H. M.; Samia, E. Ali and Eman, M. R. Saleh. 2016. The long staple Egyptian cotton variety Giza 94. Egypt. J. Plant Breeding 20(6): 1063-1091.

Saleh, M. R. Eman. 2016. Evaluation of some Egyptian cotton genotypes by using trial A and B under different environments. Egypt. J. Plant Breeding,

Ware, J. O. 1959. Plan for breeding, maintenance and propagation of Egyptian cotton varieties. A Report Submitted to the Ministry of Agriculture, Egypt.

هجين جديد من طبقة الاقطان المصرية طويلة التيلة

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يعتبر الهجين المبشر [(جيزة 89 x كاراشنكي) x جيزة 86] x جيزة 94 والذي ينتمى إلى النوع *G. barbadense* L. هجين متميز وواعد. يتميز الهجين بوجود العديد من الصفات الممتازة من حيث الانتاجية العالية وصفات الجودة المتميزة ،كما انه مقاوم لمرض الذبول الفيوزاريومي. تم استنباط هذا التركيب الوراثي من خلال قسم بحوث تربية القطن ، معهد بحوث القطن ، مركز البحوث الزراعية ، الجيزة ، مصر. كما ان هذا الهجين المبشر يخضع حاليا لاجراءات تسجيل الأصناف وسوف يتم تسميته بالصنف جيزة 97. تم انتاج هذا الهجين عن طريق التلقيح الصناعي لآباء متباعدة وراثيا بعدها تم اجراء الانتخاب المنسب له في جميع الاجيال. تم الحصول على الجيل الاول كنتيجة للتهجين بين التركيب الوراثي [(جيزة 89 x كاراشنكي) x جيزة 86] كام والذي يتميز بصفات الجودة الممتازة وبخاصة المتانة والتبكير والصنف جيزة 94كاب والذي يتميز بصفات المحصول العالية وبخاصة صفة تصافي الحليج ، ثم بدات عملية الانتخاب بداية من الجيل الثانى باستخدام طريقة النسب. ثم تم اختيار العائلات المتميزة من الجيل الخامس لتقييمها فى التجربة الاولية (أ) ثم فى التجارب المتقدمة (ب) فى بيئات مختلفة هى ستة محافظات هي كفر الشيخ، الدقهلية، الشرقية، المنوفية، البحيرة والغربية. وهذه المحافظات تمثل مناطق زراعة هذه الطبقة من الاقطان في مصر. وتم ذلك خلال خمسة مواسم متتالية بداية من 2014 إلى 2018. وقد اثبت هذا الهجين تفوق ملحوظ بشكل كبير على الصنفين التجاريين لهذه الطبقة وهما جيزة 86 وجيزة 94. الهجين الجديد له قدرة عالية على التأقلم على نطاق واسع في العديد من البيئات، ومقاوم لمرض الذبول الفيوزاريومى الي جانب احتفاظه بصفات جودة التيلة العالية التي تلبي الاحتياجات الصناعية والانتاجية العالية التي تلبي احتياجات المزارع. ويوصى باطلاق هذاالهجين الجديد كصنف قطن جديد ليزرع علي نطاق واسع.