Egypt. J. Plant Breed. 27(1):45– 59 (2023)

MAINTENANCE AND PRODUCING THE NUCLEOLUS (BREEDER'S SEED) OF GIZA 95 EGYPTIAN COTTON CULTIVAR, DURING 2019-2022 SEASONS

Heba H.E. Hamed
Cotton Research Institute, Agricultural Research Center, Giza - Egypt

ABSTRACT

The pure seed and production of long and extra-long staple varieties, rational are using the pedigree selection method necessary to produce the breeder's seed. Thus, breeding program of Giza 95 was conducted at Sids Agricultural Research Station, Beni-suef governorate district during 2019- 2022 growing seasons. In 2019 season sixty type plants were selected from the nursery field of the new Giza 95 cultivar and furnished sixty progenies (increase A) in 2020 season. From the later, seventeen families were selected to descend increase B in 2021 season. According to the statistical analysis of yield trial which included the seventeen families and comparisons of the three newest lines of Giza 95, eight elite families were selected and the selfed seeds were carefully massed together to form the nucleolus (breeder's seed) in 2022 season. Data obtained indicated that, the pure line method, in the sense of pedigree selection, for renewing annually Giza 95 breeder's seed could produce high genetically pure seeds and in the same time, prevent genetic contamination. Meanwhile, the selection technique for producing breeder's seed of Giza 95 cultivar was valid and proved to be effective in holding this cultivar according to the standard type of Giza 95.

Key word: Egyptian cotton, *Gossypium barbadense*, Pedigree selection method, Maintaining, System.

INTRODUCTION

Egyptian cotton (*Gossypium barbadense* L.) is remained as one of the most important crops in Egypt and considered the best quality among the world cottons. Supplying cotton seeds to farmers involves three separate activities, variety maintenance effort through breeding annually a new nucleolus (Breeder’s seed) carried out by the Cotton Varietal Maintenance Research Dept., Cotton Research Institute (C.R.I.), Seed increase administrated by the Central Administration for Seed Production (C.A.S.P.) and Seed certification administrated by the Central Administration for Seed Certification (C.A.S.C.). Varietal maintenance of the Egyptian cotton varieties played an important role in the breeding programs with the fact that high quality properties are the principal merit of Egyptian cotton. This quality will be deteriorated unless an effort is made to maintain it (Lewis 1970).

In Egypt, after new cotton variety was developed by Cotton Breeding Research Department, Cotton Research Institute (C.R.I.), it should be subjected to a scientific system for producing the new varieties. The scheme of breeding based on pure line theory using pedigree selection method for producing the breeder's seed of the new cotton varieties. In that respect, Cotton Varietal Maintenance Research Department is responsible of maintaining and renewing breeder's seed of commercial varieties.

Maintenance of the Egyptian cotton varieties have been reported by many workers (Ware 1959, Turner 1963, Walker 1964 and Riggs 1967) who studied a model bulk system designed to stabilize a variety. They concluded that this system could be considered as a good maintenance procedure for a variety already released. Besides, Al-Didi (1974) in Egypt stated that it was advantageous to mass the seed of chosen progenies in which the seed mixture may respond differently to environmental variation. He added that, if genotype x environment effects were significant, mixture of seeds might show less fluctuation in yield and quality than individual progenies. Also, El-Akkad *et al* (1982), El-Kilany and Youssef (1985), Younis *et al* (1993), Abo-Arab *et al* (1995), Lasheen (1997), El-Disouqi (2001), Nagib and Hemaida (2001), Abd Al-Zaher (2004) ,Mohamed (2013), Al-Ameer(2014), Al-Hibbiny (2015), Hamed (2016), Mahrous (2017), Mabrouk (2019), Mahmoud (2019) and Al-Hibbiny (2020) stated that the pure seed and production of long and/or extra-long staple varieties, using the pedigree selection method is necessary to produce, renew and maintain the breeder's seed of the cotton cultivars in commercial use.

The present method of maintaining Egyptian cotton varieties is the pedigree method based on massing selfed seeds of several type families, according to their performance in evaluation with the latest nuclei. Therefore, the main objective of the present study was to follow the steps of renewing and maintaining the breeder's seed of the new Egyptian cotton cultivar *G*iza 95.

MATERIALS AND METHODS

The cotton cultivar Giza 95 is cultivated in all governorates of Upper Egypt, which was classified as a long staple category, with a staple length (29.5–30.7 mm.). This variety was derived from the hybridization between Giza 80 and [(Giza 83 X (Giza 75 X 5844)] Egyptian cotton genotypes.

The base population used in the present study was the individual elite plants nursery selected through field evaluation and laboratory determinations from breeding plot in 2018 season.

At harvest, each individual plant in the breeding plot was picked separately. The plants were screened for testing yield and its components characteristics (boll weight, seed index and lint percentage) as well as fiber

properties (fiber length, uniformity index, fineness (micronaire reading) and strength (Pressley index). Sixty plants representing the type of Giza 95 variety were selected, in 2019 season to furnish the increase lines A in 2020 season.

In 2020 season, the selfed seeds of the progenies of the 60 selected type plants were grown in a number of ridges as the amount of seed allowed conveniently named increase lines A, as well as the natural pollinated seeds of the same 60 selected type plants were grown in adjacent progeny three ridges to be increased for using it in yield trial in the next year (2021 season).

According to the field and laboratory tests of phenotypic yield, yield components and fiber properties, 17 families were selected from increase A to form increase B families in the next year.

In 2021 growing season, 17 families' selfed seeds were grown as increase B. A yield trial included the seventeen selected families, as well as the three latest strains of Giza 95 namely G. 95/2019, G. 95/2020 in addition G. 95/2021 nuclei were used as check. This yield trial was conducted at Sids Agricultural Research Station. The design of yield trial was a randomized complete block design (RCBD) with four replications. These twenty entries (17 families and three controls) were evaluated for yield and its components as well as fiber quality properties.

In 2022 season, the best 8 families representing the type of Giza 95 variety were selected from increase B and their selfed seeds were carefully massed together to form the new nucleolus (breeder's seed) of that variety and propagated in 2022 under the name of season (G. 95 nucleolus/2022) in about 15 feddans at Sids Farm. The system used by cotton maintenance section, CRI, to maintain the Egyptian cotton varieties was described by Al-Didi (1974), Abdel-Al (1976) and Al-Ameer (2014).

Data recorded in this study were as follows

A-Yield components characters are:

1- Seed cotton yield (S.C.Y.).
2- 2- Lint cotton yield (L.C.Y.).
3- Boll weight (B.W.) in g.
4- 4- Lint percentage (L.%)
5- Seed index (S.I.) in g.
6- 6- Lint index (L.I.) in g.

B-Fiber properties traits are:

7- Fiber length (F.L.): (U.H.M.) mm.
8- 8-Uniformity index (U.I.).
9- Fiber strength (F.S.): Pressley index, Strength g/tex (Str.g/tex) and Yarn strength (Yarn stern.) measurements.
10- Fiber fineness (F.F.) Micronaire reading.
11- Elongation (Elon.).
12- Yellowness (+ b)
13- Brightness (RD%).

Analysis of variance was conducted for all the studied characters in the yield trial and tested for significance by "F" test. Mean of selected families, mean of comparisons, standard error and coefficient of variability (C.V.%) was executed for all characters.

RESULTS AND DISCUSSION

Means of agronomic characters and fiber properties for the selected 60 type plants of Giza 95 variety in 2019 season are presented in Table (1). Data indicated no substantial differences among all studied characters. Whereas, coefficients of variability were low in magnitude for most studied characters except for boll weight, lint index, and fiber fineness (micronaire reading).This could be due to environmental effects on these traits. These results are in agreement with those obtained by Abo-Arab *et al* (1995), El-Disouqi(2001), Abd Al-Zaher (2004), Mohamed (2013), Al-Ameer (2014), Al-Hibbiny (2015), Hamed (2016), Mahrous (2017), Mabrouk (2019), Mahmoud (2019) and Al-Hibbiny (2020)

Table 1. Means of agronomic and fiber properties for the 60 type plants selected from the nursery in 2019 to form increase A progenies in 2020 growing season.

Families No.	B. W. (g)	L.%	S. I. (g)	L. I. (g)	F. F.	P. I.	F. L. 2.5%	U. R. %
1/2019-2	3.40	40.90	9.20	6.37	4.00	9.60	32.90	86.00
1/2019-4	3.00	39.40	10.50	6.83	4.40	9.60	34.40	85.80
1/2019-16	3.80	41.50	9.50	6.74	4.00	9.00	30.80	85.10
1/2019-22	3.10	40.80	9.10	6.27	3.60	9.60	33.50	86.60
3 /2019-35	2.80	41.40	8.70	6.15	3.80	9.70	31.60	85.70
4/2019-1	3.60	42.60	9.50	7.05	3.60	9.60	31.40	83.60
4/2019-26	3.40	41.50	9.70	6.88	3.90	9.70	30.90	86.00
5/2019-3	3.20	41.00	8.90	6.18	4.50	9.80	31.40	84.80
5/2019-22	2.60	42.00	8.30	6.01	4.00	10.10	33.10	85.40
5/2019-35	3.10	42.50	9.00	6.65	3.90	9.50	30.40	83.60
7/2019-5	3.10	41.50	9.20	6.53	3.90	9.60	30.60	84.00
7/2019-8	2.80	41.50	9.80	6.95	4.10	9.70	32.10	83.90
7/2019-28	3.40	40.20	9.00	6.05	3.90	9.80	31.40	83.60
7/2019-31	3.00	39.80	8.80	5.82	4.20	10.10	32.20	84.20
8/2019-8	3.50	41.40	8.70	6.15	3.90	9.60	31.10	85.20
8/2019-12	3.10	40.00	9.30	6.20	4.20	9.90	32.20	85.10
11/2019-16	2.80	40.60	9.00	6.15	4.10	9.60	31.40	83.60
12/2019-13	3.00	39.90	9.60	6.37	4.40	9.50	31.00	84.60
13/2019-3	3.50	42.60	8.80	6.53	4.00	9.50	29.90	86.00
13/2019-12	3.30	40.70	9.30	6.38	4.30	10.10	32.80	86.10
13/2019-19	2.70	41.10	9.60	6.70	4.50	9.70	31.70	85.00
13/2019-24	2.70	43.80	8.40	6.55	4.00	10.00	33.30	86.20
13/2019-27	2.90	42.90	9.20	6.91	4.40	9.50	31.20	84.00
15/2019-12	3.50	40.50	10.50	7.15	4.30	9.90	32.70	85.60
16/2019-15	3.10	41.90	8.40	6.06	4.20	9.30	30.70	84.10
18/2019-14	2.90	42.30	9.50	6.96	4.20	9.70	30.90	84.00
18/2019-21	3.10	40.90	9.70	6.71	4.50	10.00	32.70	85.40
18/2019-40	3.30	41.40	10.70	7.56	3.90	9.70	31.40	84.30
24/2019-1	3.60	40.50	9.50	6.47	4.50	10.00	32.50	85.90
24/2019-9	3.70	41.50	10.70	7.59	4.50	9.40	32.80	86.20
24/2019-20	2.90	42.20	9.50	6.94	4.20	9.80	33.80	86.00
26/2019-10	3.50	41.20	9.30	6.52	4.00	9.60	33.00	84.90
28/2019-9	2.80	41.80	9.20	6.61	4.00	9.60	31.40	85.30

Table 1. Cont.

Families No.	B. W. (g)	L.%	S. I. (g)	L. I. (g)	F. F.	P. I.	F. L. 2.5%	U. R. %
28/2019-33	3.00	40.90	9.80	6.78	4.40	9.60	31.10	86.10
30/2019-20	2.90	40.00	9.80	6.53	4.50	9.60	29.80	86.00
30/2019-34	3.70	43.60	9.10	7.03	4.20	9.70	31.40	85.10
31/2019-12	3.10	41.10	9.50	6.63	4.50	9.80	31.10	86.00
31/2019-29	3.40	42.20	8.50	6.21	4.40	9.60	30.90	84.10
33/2019-40	2.60	43.30	9.00	6.87	4.20	9.60	30.70	85.40
34/2019-37	3.40	41.30	10.10	7.11	4.50	9.60	30.60	84.60
34/2019-39	2.40	42.50	9.70	7.17	4.00	9.70	31.90	84.40
34/2019-40	3.00	44.30	8.70	6.92	4.50	9.70	30.70	85.70
35/2019-21	2.80	43.90	8.80	6.89	4.00	9.50	31.40	85.50
35/2019-30	3.00	41.90	8.60	6.20	4.00	9.70	30.60	84.50
38/2019-1	2.60	42.20	9.50	6.94	4.20	9.90	31.90	84.50
38/2019-3	3.20	42.60	8.70	6.46	4.10	9.70	30.70	85.10
38/2019-7	3.00	42.70	8.60	6.41	4.00	9.60	32.80	85.00
38/2019-18	3.20	41.80	9.10	6.54	4.00	9.40	30.90	85.90
39/2019-2	3.80	40.60	8.50	5.81	4.40	10.10	30.10	85.10
39/2019-30	3.50	41.40	8.80	6.22	4.30	9.90	30.60	83.90
39/2019-37	3.10	41.60	8.60	6.13	4.20	9.50	31.30	85.10
45/2019-31	3.40	41.10	9.60	6.70	4.50	9.60	31.90	85.10
46/2019-24	2.80	42.40	8.80	6.48	4.10	9.60	30.20	85.70
47/2019-29	3.70	40.20	9.70	6.52	4.00	9.60	31.60	84.30
49/2019-29	3.10	42.80	9.00	6.73	4.30	9.40	32.70	85.40
54/2019-5	2.90	42.10	9.90	7.20	4.40	9.40	33.20	86.00
54/2019-19	3.50	43.70	8.70	6.75	4.40	9.50	30.60	83.40
55/2019-35	3.40	40.60	9.70	6.63	4.60	9.80	30.30	86.00
58/2019-21	3.70	40.50	10.40	7.08	4.50	9.90	33.10	85.90
60/2019-16	3.30	43.00	9.40	7.09	4.40	9.60	30.90	83.50
$\overline{X}$ families	3.16	41.64	9.28	6.62	4.19	9.67	31.60	85.05
$\overline{X}$ comparisons	3.10	41.60	9.30	6.62	4.20	9.70	31.20	84.50
SE	0.04	0.14	0.08	0.05	0.03	0.03	0.14	0.11
CV%	10.74	2.68	6.32	5.99	5.83	2.17	3.36	1.02

S. E. = Standard Error. C.V.% = Coefficient of variability. BW= boll weight, L%: lint percentage, SI=seed index, LI = lint index, FF = fiber fineness and F.L. (UHM) = fiber length (upper half mean).

The results also revealed that the lower values of coefficients of variability (C.V.%) reflected a lot of homogeneity within and between the selected type plants. Similar results were detected by Al-Ameer (2014), Al-Hibbiny (2015), Hamed (2016) and Mahrous (2017).In the context, these data indicated that there is a relationship between the selected characters in the different generations and they were constant, also there was no changes and no deviations in behavior of the studied characters from one generation to another because of an independent culling selection method was applied according to standard type of Giza 95 variety.

Means of agronomic and fiber properties of the 60 selected progenies (increase A) in 2020 season compared with the three latest strains of G.95 are given in Table (2). It could be noticed that, the means of the progenies (increase A) slightly exceeded the means of comparisons for all studied traits, as well as, exhibited by selection better values than the means of comparisons. Coefficients of variability (C.V.%) were decreased for most of the studied characters, indicating gene fixation and homogeneity of variety.

Results in Table (3) exhibited, means of yield, yield components and fiber properties for the 17 selected families (increase B) compared with the latest strains of G.95 (controls). The results showed no significant differences among the families and controls for all the studied characters. The results are in harmony with those obtained by Abdel-Al (1976), Abo-Arab *et al* (1995), Lasheen (1997), El-Disoqui (2001), Nagib and Hemaida (2001) , Abd Al-Zaher (2004), Mohamed (2013), Al-Ameer(2014), Hamed (2016), Mahrous(2017), Mabrouk (2019), Mahmoud (2019) and Al-Hibbiny (2020).

Regarding the results of the 8 selected families in Table (4) there were no significant difference compared with the control in yield and other agronomic traits and fiber properties. Pure seeds of the 8 selected families as the last step in such maintaining program, were massed together to form the breeders seed stock of *G*iza 95 variety in 2022 season, under name (Giza 95 nucleolus/2022). In that respect, Al-Didi (1974) believed that it is advantageous to mass the seed of chosen progenies to withstand the environmental variation .

Table 2. Mean of yield characters and fiber properties for the 60 Giza 90 selected increases A type families in final of 2020 growing season.

Families No.	B.W. (g)	L.%	S.I. (g)	L.I. (g)	F.F.	F. L. 2.5%	U.R.%	ST. g./tex	E. %	+ b	RD %	Y. S.
1/2019-2	3.30	42.30	8.70	6.38	4.30	30.90	86.80	40.20	8.40	12.70	63.80	2270
1/2019-4	3.50	40.40	8.90	6.03	4.30	31.40	85.80	40.10	8.20	13.00	63.50	2230
1/2019-16	2.90	40.40	9.00	6.10	4.30	31.00	86.20	40.40	8.40	12.40	65.30	2150
1/2019-22	3.20	41.20	9.60	6.73	4.30	30.40	85.50	40.30	8.50	12.00	64.20	2230
3 /2019-35	3.30	39.80	9.60	6.35	4.30	31.70	84.00	41.30	8.10	10.90	67.80	2230
4/2019-1	3.20	39.60	8.80	5.77	4.30	31.70	83.60	40.30	8.20	10.90	68.80	1950
4/2019-26	3.10	40.00	10.20	6.80	4.00	32.40	84.60	40.50	8.50	10.90	67.20	2110
5/2019-3	3.60	40.80	10.30	7.10	4.20	30.40	85.60	41.30	8.10	11.80	66.40	2030
5/2019-22	3.30	40.50	9.50	6.47	4.20	30.20	84.40	40.50	8.30	11.50	67.50	2150
5/2019-35	3.30	40.10	9.90	6.63	4.00	30.30	84.50	40.00	8.20	11.80	67.20	2190
7/2019-5	2.90	40.80	8.30	5.72	4.00	30.80	85.60	40.80	8.30	12.20	67.10	2230
7/2019-8	3.20	39.90	9.00	5.98	4.30	31.20	85.10	40.70	8.30	11.60	66.90	1990
7/2019-28	2.80	41.70	10.40	7.44	4.00	30.40	85.30	40.20	8.40	12.60	67.00	2190
7/2019-31	2.50	41.70	8.70	6.22	4.20	31.30	85.90	40.30	8.40	11.60	69.00	2270
8/2019-8	3.10	39.70	8.90	5.86	4.20	31.50	87.30	40.20	8.60	12.10	67.40	2350
8/2019-12	3.20	39.60	10.70	7.02	4.20	31.60	87.30	40.50	8.40	11.60	67.00	2230
11/2019-16	4.00	39.50	10.70	6.99	4.20	30.90	85.10	40.80	8.30	11.30	67.30	2270
12/2019-13	2.80	39.70	9.10	5.99	3.90	29.60	84.20	40.10	8.30	11.20	66.70	2190
13/2019-3	3.10	40.10	10.50	7.03	4.20	31.70	83.70	40.40	8.00	11.30	67.50	2150
13/2019-12	3.50	39.90	9.90	6.57	4.30	31.30	84.60	40.30	8.40	12.00	67.10	2230

Table 2. Cont.

Families No.	B.W. (g)	L.%	S.I. (g)	L.I. (g)	F.F.	F. L. 2.5%	U.R.%	ST. g./tex	E. %	+ b	RD %	Y. S.
13/2019-19	2.90	39.60	9.60	6.29	4.00	30.80	85.60	40.00	8.10	11.10	67.70	2270
13/2019-24	2.80	40.20	9.00	6.05	4.20	31.90	86.00	40.70	8.40	11.00	68.80	2190
13/2019-27	3.10	40.50	9.60	6.53	4.20	31.20	86.40	40.30	8.00	10.70	67.80	2110
15/2019-12	3.70	40.00	10.60	7.07	4.10	30.20	86.00	40.80	8.50	10.60	70.80	2190
16/2019-15	2.70	39.60	9.00	5.90	4.20	31.70	85.60	40.40	8.50	11.50	67.20	1830
18/2019-14	3.00	40.00	8.60	5.73	4.30	30.00	87.30	40.30	8.20	11.90	66.80	2230
18/2019-21	2.50	41.70	9.60	6.87	4.30	29.70	86.40	40.10	8.50	12.00	67.70	2070
18/2019-40	3.30	40.20	9.60	6.45	4.20	29.80	87.20	40.20	8.20	11.10	68.10	2190
24/2019-1	3.30	41.20	8.30	5.82	4.10	30.70	83.70	40.30	8.00	11.50	67.70	2070
24/2019-9	3.70	40.90	9.40	6.51	4.50	30.40	85.70	40.50	8.50	11.00	67.80	2190
24/2019-20	2.80	41.10	8.60	6.00	4.30	31.30	86.30	40.50	8.00	11.90	66.30	2030
26/2019-10	3.10	40.30	8.60	5.81	4.20	30.50	87.20	40.50	8.10	11.60	66.80	2030
28/2019-9	3.10	40.10	8.90	5.96	4.20	30.90	87.70	40.40	8.20	11.30	68.60	2230
28/2019-33	3.20	39.70	8.90	5.86	4.40	31.80	86.30	40.60	8.50	10.60	67.20	1830
30/2019-20	3.70	39.40	11.30	7.35	4.40	31.20	84.80	40.30	8.20	11.10	67.90	1990
30/2019-34	2.80	39.80	9.70	6.41	4.10	30.80	84.50	40.30	8.00	11.00	67.70	2030
31/2019-12	2.90	42.50	8.60	6.36	4.20	32.20	86.40	40.10	8.10	10.90	69.20	2030
31/2019-29	2.60	41.60	8.40	5.98	4.20	31.00	84.30	39.10	8.00	10.90	67.30	1950
33/2019-40	2.50	42.20	8.70	6.35	4.30	30.80	85.30	39.50	8.20	11.70	67.10	2110
34/2019-37	2.90	40.10	10.20	6.83	4.30	31.00	84.60	39.40	8.40	11.80	67.30	2070

Table 2. Cont.

Families No.	B.W. (g)	L.%	S.I. (g)	L.I. (g)	F.F.	F. L. 2.5%	U.R. %	ST. g/tex	E. %	+ b	RD %	Y. S.
34/2019-39	3.20	40.40	8.70	5.90	4.30	30.60	86.60	40.00	8.30	11.70	65.90	2030
34/2019-40	3.20	41.40	8.50	6.01	4.20	30.00	85.30	40.00	8.40	11.60	66.00	1870
35/2019-21	2.90	40.50	8.80	5.99	4.30	30.60	85.80	39.30	8.20	12.30	67.00	2190
35/2019-30	3.20	39.80	9.00	5.95	4.20	30.10	85.00	40.60	8.50	11.90	66.70	2190
38/2019-1	2.90	40.00	8.70	5.80	4.30	30.60	84.30	39.40	8.20	11.40	68.00	2110
38/2019-3	3.00	40.80	9.20	6.34	4.40	30.20	84.80	39.60	8.10	11.80	66.80	2230
38/2019-7	3.30	40.60	9.10	6.22	4.30	30.10	84.90	39.90	8.20	11.60	68.00	2190
38/2019-18	3.30	41.40	9.40	6.64	4.30	30.20	84.90	40.30	8.40	11.60	68.20	2230
39/2019-2	3.10	40.30	11.30	7.63	4.20	32.00	85.60	40.30	8.40	11.60	67.20	2030
39/2019-30	3.60	41.80	9.00	6.46	4.30	31.20	85.30	40.20	8.50	11.50	67.20	2150
39/2019-37	3.40	41.40	8.70	6.15	4.20	30.90	86.20	40.90	8.40	12.10	66.70	2110
45/2019-31	3.20	40.70	8.30	5.70	4.20	30.90	85.70	40.90	8.50	12.30	66.80	1990
46/2019-24	2.70	43.50	8.40	6.47	4.30	30.90	85.50	40.70	8.30	12.10	66.30	2030
47/2019-29	3.30	40.20	10.40	6.99	4.30	31.80	86.70	40.20	8.30	11.30	67.80	2070
49/2019-29	3.30	41.50	8.90	6.31	4.30	31.20	85.20	40.60	8.20	11.30	67.30	2190
54/2019-5	2.80	41.20	8.80	6.17	4.40	30.70	85.70	40.10	8.20	11.40	66.20	1870
54/2019-19	3.00	40.10	9.60	6.43	4.40	29.50	84.70	40.70	8.50	11.40	66.50	2190
55/2019-35	3.30	40.80	10.20	7.03	4.40	31.70	86.50	40.50	8.50	11.40	68.00	2070
58/2019-21	2.50	40.70	8.70	5.97	4.50	30.90	85.30	39.30	8.50	11.30	67.30	2150
60/2019-16	3.30	40.10	10.90	7.30	4.50	31.80	86.50	40.80	8.30	11.50	68.70	2190
$\bar{X}$ families	3.12	40.59	9.38	6.40	4.25	30.91	85.55	40.30	8.30	11.57	67.22	2123
$\bar{X}$ comparis	3.00	40.60	8.80	6.01	4.20	29.60	85.20	40.10	8.50	11.42	66.95	2080
SE	0.04	0.11	0.10	0.06	0.02	0.09	0.13	0.06	0.02	0.08	0.15	15.14
CV%	10.42	2.12	8.38	7.46	2.96	2.18	1.16	1.12	2.01	5.05	1.76	5.52

S.E. = Standard error, C.V% = coefficient of variability. BW= boll weight, L%: lint percentage, SI=seed index, LI=lint index, F.F. = fiber fineness, F.L. (UHM) = fiber length (upper half mean), U.I.= uniformity index, F.S.= fiber strength and RD% = Brightness.

Table 3. Means of yield, yield components and fiber prosperities for the 17 selected families (increase B) in 2021 season.

Families No.	SCY K/F	LCY K/F	B.W. (g)	L.%	S.I. (g)	L.I. (g)	F.F.	F. L. 2.5%	U.R. %	ST. g./tex	Elo. %	+ b	RD %	Y. S.
3/2018-35	7.00	9.24	3.30	39.80	9.60	6.30	4.30	31.70	84.00	41.30	8.10	10.90	67.80	2230
4/2018-26*	8.35	10.40	3.10	40.00	10.20	6.80	4.00	32.40	84.60	40.50	8.50	11.40	67.20	2110
5/2018-3	6.15	8.18	3.60	40.80	10.30	7.10	4.20	30.40	85.60	41.30	8.10	11.80	66.40	2030
5/2018-22*	6.12	7.73	3.30	40.50	9.50	6.50	4.20	30.20	84.40	40.50	8.30	11.50	67.50	2150
5/2018-35*	7.82	10.58	3.30	40.10	9.90	6.60	4.00	30.30	84.50	40.00	8.20	11.80	67.20	2190
11/2018-16	5.79	7.73	4.00	39.50	10.70	7.00	4.20	30.90	85.10	40.80	8.30	11.30	67.30	2270
13/2018-27	6.32	8.36	3.10	40.50	9.60	6.50	4.20	31.20	86.40	40.30	8.00	10.70	67.80	2110
15/2018-12	7.34	9.60	3.70	40.00	10.60	7.10	4.10	30.20	86.00	40.80	8.50	10.60	70.80	2190
18/ 2018-40*	7.54	9.78	3.30	40.20	9.60	6.50	4.20	30.30	87.20	40.20	8.20	11.10	68.10	2190
24/2018-9*	8.21	11.29	3.70	40.90	9.40	6.50	4.30	30.40	85.70	40.50	8.50	11.00	67.80	2190
28/2018-9	6.32	8.71	3.10	40.10	8.90	6.00	4.20	30.90	87.70	40.40	8.20	11.30	68.60	2230
30/2018-34	6.94	9.16	2.80	39.80	9.70	6.40	4.10	30.80	84.50	40.30	8.00	11.00	67.70	2030
38/2018-18	9.85	13.87	3.30	41.40	9.40	6.60	4.30	30.20	84.90	40.30	8.40	11.60	68.20	2230
39/2018-2*	7.39	9.33	3.10	40.30	11.30	7.60	4.20	32.00	85.60	40.30	8.40	11.60	67.20	2030
39/2018-30	6.91	9.33	3.60	41.80	9.00	6.50	4.30	31.20	85.30	40.20	8.50	11.50	67.20	2150
47/ 2018-29*	7.74	10.60	3.30	40.20	10.40	7.00	4.30	31.80	86.70	40.20	8.30	11.30	67.40	2070
60/2018-16*	8.15	10.42	3.30	40.10	10.90	7.30	4.50	31.80	86.50	40.80	8.30	11.50	67.30	2190
$\overline{X}$ families	7.29	9.67	3.35	40.35	9.94	6.72	4.21	30.98	85.57	40.51	8.28	11.29	67.74	2152
$\overline{X}$ compari	6.32	8.36	3.40	40.40	10.60	7.20	4.20	31.00	85.50	40.50	8.40	11.60	67.00	1990
CV%	14.13	15.55	8.72	1.46	6.81	6.03	2.89	2.35	1.24	0.92	2.06	3.16	1.38	3.57
F-test	N.S	N.S	N.S	N.S	N.S	N.S	--	--	--	--	--	--	--	--

C.V% = coefficient of variability. * Families selected, N.S: Non -Significant. C. V.% = Coefficient of variability, SCY=seed cotton yield, LY = lint yield, BW = boll weight, L%: lint percentage, SI=seed index, LI=lint index, F.F. = fiber fineness, FS = fiber strength, F.L.(UHM)= fiber length(upper half mean), U.I.: uniformity index, RD% = Brightness and + b = Yellowness.

Table 4. Mean of studied traits for 8 families selected from increases B families in 2021 growing season which are massed to form a new nucleolus (Breeder's seed) of G.95 in 2022 season.

Families No.	SCY K/F	LCY K/F	B.W. (g)	L.%	S.I. (g)	L.I. (g)	F.F.	F. L. 2.5%	U.R. %	ST. g./tex	Elo. %	+ b	RD %	Y. S.
4/2018-26	8.35	10.40	3.10	40.00	10.20	6.80	4.00	32.40	84.60	40.50	8.50	11.40	67.20	2110
5/2018-22	6.12	7.73	3.30	40.50	9.50	6.50	4.20	30.20	84.40	40.50	8.30	11.50	67.50	2150
5/2018-35	7.82	10.58	3.30	40.10	9.90	6.60	4.00	30.30	84.50	40.00	8.20	11.80	67.20	2190
18/2018-40	7.54	9.78	3.30	40.20	9.60	6.50	4.20	30.30	87.20	40.20	8.20	11.10	68.10	2190
24/2018-9	8.21	11.29	3.70	40.90	9.40	6.50	4.30	30.40	85.70	40.50	8.50	11.00	67.80	2190
39/2018-2	7.39	9.33	3.10	40.30	11.30	7.60	4.20	32.00	85.60	40.30	8.40	11.60	67.20	2030
47/2018-29	7.74	10.60	3.30	40.20	10.40	7.00	4.30	31.80	86.70	40.20	8.30	11.30	67.40	2070
60/2018-16	8.15	10.42	3.30	40.10	10.90	7.30	4.50	31.80	86.50	40.80	8.30	11.50	67.30	2190
$\bar{X}$ families	7.67	10.02	3.30	40.29	10.15	6.85	4.21	31.15	85.65	40.38	8.34	11.40	67.46	2140
$\bar{X}$ compariso	6.32	8.36	3.40	40.40	10.60	7.20	4.20	31.00	85.50	40.50	8.40	11.60	67.00	1990
CV%	9.24	10.90	5.61	0.72	6.76	6.09	3.90	2.98	1.27	0.62	1.42	2.30	0.49	2.96
F-test	N.S	N.S	N.S	N.S	N.S	N.S	--	--	--	--	--	--	--	--

*** Yield per feddan was calculated from the mean plot size. C. V.% = Coefficient of variability. S.C.Y. = seed cotton yield, L.Y. = lint yield, B.W. = boll weight, L%: lint percentage, S.I. = seed index ,L.I. = lint index, F.F. = fiber fineness, F.S. = fiber strength, F.L.(U.H.M.) = fiber length(upper half mean) and U.I. : uniformity index.**

At the end, breeder's seed (nucleolus) was grown in 2022 season in 15 feddans at Sids Farm. These results provide good evidence that the pure seed stock released by the cotton breeder would be maintained pure as the stocks and directly remained under the supervision of the breeder. The nucleolus (breeder's seed) is further increased to produce the foundation seed (nuclei) as a new cultivar strain carrying the number of the year of its propagation. On the other hand, deterioration may be occur in cotton varieties in general cultivation commercial areas through, contamination by mechanical mixing of seeds, out crossing with inferior, foreign cultivars, and off-types which could result in a genetic change of the variety. The

results are in agreement with those obtained by Abdel-Bary and Bisher (1969), Abdel-Al (1976), El-Akkad *et al* (1982), El-kilany and Youssef (1985), Younis *et al* (1993), Abo-Arab *et al* (1995), Lasheen (1997), El-Disoqui (2001), Nagib and Hemaida (2001), Abd Al-Zaher (2004), Mohamed (2013), Al-Ameer(2014), Al-Hibbiny (2015), Hamed (2016), Mahrous (2017), Mabrouk (2019), Mahmoud (2019) and Al-Hibbiny (2020)

Pure line method in the sense of pedigree selection for renewing Giza 95 breeder's seed depends on independent culling selection for most characters. This means that the selection technique for producing breeder seed of Giza 95 variety was valid and proved to be effective in holding this variety according to the standard type of Giza 95.

Finally, Cotton Varietal Maintenance Research Department, is responsible to produce the nucleolus annually by pedigree selection method as conventional breeding procedure, to maintain the variety on high genetic purity seeds and matching the specification and important characteristics of the variety.

ACKNOWLEDGEMENTS

Sincere thanks to all the staff of cotton Maintenance Research Section, Cotton research Institute, for their co-operation and offering all facilities during preparation of this study.

REFERENCES

Abd Al-Zaher, G.H. (2004). Maintenance and producing the nucleolus (breeder's seed) of Giza 83 Egyptian cotton variety, during 2000-2004 seasons. Egypt. J. plant Breeding 8: 77-86.

Abdel-Al, M.S.M. (1976). Some aspects of breeding method for maintaining Egyptian cotton varieties. Ph.D. Thesis Al-Azhar Univ.,Egypt

Abdel-Bary, A.A. and M.A. Bishr (1969). Evaluation of the new cotton variety Giza 69. Cott. Gr. Rev., 46: 98-104.

Abo-Arab, A.R., A.E. Ayoub and A.F. Lasheen (1995). Maintenance and producing the nucleolus (breeder's seed) of Giza 76 Egyptian cotton variety, during 1990-1992 seasons. Zagazig J. Agric. Res. 22 (2): 399-408.

Al-Ameer, M.A. (2014). Plan for breeding and maintenance for nucleolus (breeder's seed) of Giza 87 cotton variety. Egypt. J. of Agric. Sci. 31(10): 226-239.

Al-Didi, M.A. (1974). Methods of cotton breeding. Egypt. Cott. Giza, 62: 49-92.

Al-Hibbiny, Y.I.M. (2015). Producing new nucleolus (breeder's Seed) of Giza 90 Egyptian cotton cultivar, during 2011-2014 seasons. J. Agric. Res., Kafr EL- Sheikh Univ. 41 (1): 181 – 191.

AL-Hibbiny, Y.I.M. (2020) Maintenance and producing of the Nucleolus (breeder's seed) of Giza 86 Egyptian cotton cultivar during 2017-2020. Egypt. J. Plant Breed. 24(2):429– 444.

El–Akkad, M.H., A.F.H. El–Okkia, H.R. El-Hanafi and M.A. Abdel-Dayem (1982). Plan for maintenance and producing the nucleolus (breeder's seed) of "Giza 69" Egyptian cotton variety, during 1975–1979 seasons. Agic. Res. Rev. 60(9): 111–131.

El-Disouqi, A.E. (2001). Maintenance system of Giza 70 Egyptian cotton cultivar .J.Agric. Sci. Mansoura Univ., 26 (4):1853 – 1862.

El-Kilany, M.A. and S.M. Youssef (1985). Comparative study on six nuclei seeds of Dendera cotton cultivar and the corresponding farmer's seed in general use. Agric. Res .Rev. 63 (6): 53 -59.

Hamed, Heba H.E. (2016) Maintenance and producing the nucleolus (breeder's seed) of Giza 90 Egyptian cotton cultivar, during 2013-2016 seasons Egypt. J. of Appl. Sci. 31(10) 226-239.

Lasheen, A.F. (1997). Maintenance and producing the nucleolus (breeder's seed) of Giza 75 Egyptian cotton variety. Menofiya J. Agric. Res. 22 (5): 1279–1290.

Lewis, C.F. (1970). Concepts of varietal maintenance in cotton. Cott. Gr.Rev.47:272–284.

Mabrouk, A.H. (2019) Maintenance and producing of the Nucleolus (breeder's seed) of Giza 86 Egyptian cotton cultivar during 2016-2019. Egypt. J. Plant Breed. 23 (6):1125– 1136.

Mahmoud, Badeaa A. (2019) Maintenance and producing of the Nucleolus (breeder's seed) of Giza 45 Egyptian cotton cultivar. Egypt. J. Plant Breed. 23(8):1615– 1629.

Mahrous, H. (2017) Maintenance and producing the nucleolus (breeder's seed) of Giza 90 Egyptian cotton cultivar during 2014-2017 seasons. Egypt. J. Plant Breed. 21:567-576.

Mohamed, A.A. (2013). Maintenance and producing the nucleolus (breeder's seed) of Giza 90 Egyptian cotton variety, during 2009-2012 seasons. J. Agric. Res. Kafr El-Sheikh Univ., 39 (1): 79-91.

Nagib, M.A.A. and G.M. Hemaida (2001). Some aspects on cotton variety renewal and maintenance scheme of Giza 80. Minia J. of Agric. Res& Devolop. 21 (1): 67 -75.

Riggs, T. J. (1967). Response to model selection in Upland cotton in northern and eastern Uganda. Cott. Gr. Rev., 44: 176 – 183.

Turner, J.H. (1963). Breeding methods used in maintenance and improvement of Acala 4-42 variety of cotton. U.S. Dept. Ar. ARS Cotton Res. Sta. Shafter. Calif.: 34 – 51.

Walker, J.T. (1964). Model selection in Upland cotton. Heredity, 19: 559 - 583.

Ware, J.O. (1959). Plan for breeding, maintenance and propagation of Egyptian cotton varieties. A report submitted to the Ministry of Agri., Egypt.

Younis, F.G., E.M. Ghoneim and M.O. Ismail (1993). Producing the nucleolus (breeder's seed) of "Dendera" Egyptian cotton variety, during 1988 -1991 seasons. Egypt. J.Appl. Sci., 8 (2): 238 – 248.

إنتاج النوية (بذرة المربى) والمحافظة علي صنف القطن المصرى جيزة ٩٥ خلال المواسم من ٢٠١٩ -٢٠٢٢.

هبه حسين السيد حامد

معهد بحوث القطن - مركز البحوث الزراعية – الجيزة – مصر

يوضح هذا البحث إنتاج بذرة المربى في برنامج المحافظة على صنف القطن الجديد جيزة ٩٥ وهو من طبقة الأقطان الطويلة للوجه القبلى والمستنبط بطريقة الانتخاب المُنسب عن طريق التهجين بين (جيزة ٨٣ X جيزة 75 X ٥٨٤٤) والصنف جيزة ٨٠ وتم تسجيله كصنف تجارى عام ٢٠١٦ م. أُجرى هذا البحث في محطة البحوث الزراعية بسدس خلال الفترة من ٢٠١٩ - ٢٠٢٢ م حيث تم انتخاب ٦٠ نباتاً من طراز الصنف جيزة ٩٥ من موسم ٢٠١٩ ثم زُرع النسل موسم ٢٠٢٠ مكوناً إكثارات (أ). ثم اُنتخب منها ١٧ عائلةً في نهاية الموسم زُرعت مع ثلاث مقارنات هي أحدث سلالات الصنف في تصميم القطاعات الكاملة العشوائية من أربع مكررات عام ٢٠٢١ وزُرعت بذرتها الذاتية في مساحة مجاورة للتجربة،في نهاية الموسم وبناءاً على الاختبارات التي أجريت تم انتخاب أفضل ٨ عائلات نموذجية والتى تمثل نموذج الصنف جيزة ٩٥ في صفاتها المحصولية والتكنولوجية وجودة البذرة ثم مُزجت بذرتها الذاتية بعناية لتكوين النوية الجديدة (بذرة المربى) وزُرعت في موسم ٢٠٢٢ في مساحة ١٥ فداناً في المزرعة الحقلية والبحثية بمحطة بحوث سدس بمحافظة بنى سويف. تدل النتائج المتحصل عليها على كفاءة الطريقة المستخدمة في المحافظة على النقاوة الوراثية للصنف جيزة ٩٥ وذلك باستعمال أنسال عدة نباتات منتخبة فى إنتاج السلالة. ورغم أن طريقة إنتاج النوية(بذرة المربى) بطريقة الانتخاب المُنسب المُطبقة في برامج استنباط أصناف جديدة من القطن المصرى إلا أنها مُتبعة أيضا في برنامج وتكنيك قسم بحوث المحافظة لانتاج وتجديد سلالات الأصناف المصرية بمعهد بحوث القطن حيث أن المربى يستخدم ذات الطريقة للحصول على بذرة المربى بدرجة نقاوة وراثية عالية ومطابقة لمواصفات وصفات الصنف الرئيسية الهامة وذلك بالانتخاب المُنسب كل دورة بالاعتماد على نسل النباتات في كل جيل ودون أي اختلافات وراثية فيما بينها أو في العشيرة. ويتم الانتخاب للصفات على أساس (الانتخاب على مستويات) وبذلك يمكن إنتاج تقاوي بدرجة خاصة من النقاوة الوراثية والتماثل والتجانس التام والتخلص من التأثير الضار من الظروف البيئية وكذلك ملاحظة أي نباتات قد تظهربها اختلافات واستبعادها لأن الأصناف المصرية تُربى لكي تبقى أطول فترة ممكنة دون حدوث تغيير لصفاتها. كما تشير النتائج إلى أن السلالة الناتجة بهذه الطريقة تمثل المصدر الجيد للبذرة النقية وراثيا والمنتخبة بواسطة المربى والتي يمكن بواسطتها المحافظة على النقاوة الوراثية للصنف جيزة ٩٥.

المجلة المصرية لتربية النبات ٢٧(١): ٤٥- ٥٩ (٢٠٢٣)