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MAINTENANCE AND PRODUCING OF THE NUCLEOLUS (BREEDER'S SEED) OF GIZA 45 EGYPTIAN COTTON CULTIVAR

Badeaa A. Mahmoud

Cotton Research Institute, ARC, Giza, Egypt

ABSTRACT

The breeding program of the cultivar Giza 45 was conducted at Sakha Agricultural Research Station, Kafr El-Sheikh district during 2015 -2018 growing seasons to initiate a nucleolus. In 2014 season forty five type plants were selected from the breeding field of Giza 45 cultivar and provided fifty four progenies (increase A) in 2015. From increase A, seventeen families were selected to establish increase B in 2017. According to the statistical analysis of yield trial which included the eighteen families and comparisons of the latest two lines in cultivation of Giza 45, four elite families were selected and the seeds were carefully massed together to form the nucleolus (breeder's seed) in 2019 season. The results obtained indicated that, the pure line method in the sense of pedigree selection for renewing annually Giza 45 breeder's seed could produce high genetically pure seeds and meantime, prevent genetic deterioration. Meanwhile, the selection technique for producing breeder's seed of the cv. was valid and proved to be effective in holding this cv. according to the standard type of Giza 45.

Key words: ***Maintenance, Cotton, (Gossypium barbadense L.), Giza 45.***

INTRODUCTION

Egyptian cotton (*Gossypium barbadense* L) is considered a distinctive type of cotton that is characterized by high quality, and gained a world-wide reputation as being of the highest lint quality among world cottons. Its fineness, strength and superior characteristics, have positioned its products as the world's finest. This reputation in the course of time was attributed to the maintenance procedure followed by Department of Varietal Maintenance in Cotton Research Institute, to maintain the genetic purity and identity standard characteristics of Egyptian cotton cultivars. There is a general agreement among cotton breeders that any cotton cv. will degenerate, unless considerable efforts were made to maintain and improve it (El-Mansy *et al* (2008) and Abd El-Salam *et al* (2015)) Pedigree selection method has become the most common plant breeding procedure. All Egyptian cotton cvs. are maintained by this method. Both of pedigree selection and independent culling levels were used in maintenance and renewing Egyptian cotton cultivars. Lewis (1970) indicated that Egyptian cotton varietal maintenance consider essential in breeding program to maintain high quality properties and prevent any deterioration for these traits. Maintenance of Egyptian cotton varieties have been reported by many researchers Ware (1959), Turner (1963), Walker (1964) and Riggs (1967). They studied the bulk model system designed to stabilize a variety. They concluded that this system could be considered for cotton variety maintenance.

Al-Didi (1974) stated that it was advantageous to mass the seed of the chosen families in which the seed mixture may respond differently to environmental variation and if genotype x environment effects were significant, mixture of seeds might show less fluctuation in yield and quality than individual progenies However, El-Akkad *et al* (1982), El-Kilany and Yousef (1985), Younis *et al* (1993), Lasheen (1997) and Al-Ameer (2014) reported that the pure seed and production of cotton cultivar using pedigree selection method is essential to produce renew and maintain the breeder˒s seed of the cotton cultivars in the commercial use. This method based on massing selfed seeds of homogeneous type of families, according to their performance in evaluation with the latest nuclei. Cotton Varietal Maintenance Department is the responsible of maintaining and renewing breeder's seed of the commercial cultivars and the further seed production steps are carried out with the collaboration with Central Administration for Seed Production and Central Administration for Seed Certification.

The main objective of this work is to follow the procedure of renewing and maintaining to produce pure breeder˒s seed of Giza 45.

MATERIALS AND METHODS

Giza 45 cotton variety is a commercial Egyptian cotton cultivar cultivated at north delta region and classified as extra-long staple. This cultivar was derived by the pedigree selection method from the cross between Giza 28 x Giza 7 and released commercially in 1958**.** The present study was carried out at Sakha Agricultural Research Station, Cotton Res., Inst., during three seasons from 2015 to 2019.

The basic materials for this study were the individual elite plants selected based on field evaluation and laboratory determination from breeding plot of 2014 season. At harvest each selected individual plant in the breeding plot was picked separately. The plants were screened for yield, yield components as well as fiber properties. In 2015 season, fifty-four plants representing the type of Giza 45 cultivar were selected to form the increase lines A.

In 2017 season, the selfed seeds of the progenies of the 54 selected type plants were grown in number of rows as the amount of seed allowed conveniently named increase line A, as well as the natural pollinated seeds of the same 54 selected type plants were grown adjacent progeny three rows to be increased for using it in yield trial in the next year. According to the field and laboratory tests of phenotypic yield and yield components and fiber properties, 18 families were selected from increase A

In 2018 season, the selefed seeds of the 18 families were grown in increase B. A yield trial included the 18 selected families as well as the three latest strains of Giza 45 were used as controls. The design of yield trail was a randomized complete block design with four replications. The 18 selected families as well as the three latest control strains of G 45 were evaluated for yield, yield components and fiber properties.

In 2019 season, according to the results of yield trail, the best four families representing the type of Giza 45 cultivar were selected from increase B and their selfed seeds were carefully massed together to form the new nucleolus (breeder's seed) and propagated in 2019 under the name of season (Giza 45 nucleolus/2019) in about 3 feddans at Sakha farm.

Data of the following traits were recorded:

Yield and yield component traits are:

1. Seed cotton yield (SCY) in K/Fed.(one feddan = 4200m^2)
2. Lint cotton yield (LCY) in K/Fed.,
3. Lint percentage (L %).
4. Boll weight (BW) in g.
5. Seed index (SI) in g.
6. Lint index (LI) in g.

Fiber properties:

1. Fiber length at 2.5% Span length (2.5%SL) in mm.
2. Uniformity index (UI %).
3. Fiber strength; Pressley index (PI), strength (ST) (g/tex) and yarn strength (YS).
4. Elongation (E %).
5. Micronaire value (MV).
6. Maturity ratio (MR)
7. Brightness (Rd %).
8. Yellowness (+b).

Mean of the selected families and comparison, standard error and coefficient of variability (CV%) were calculated for all the studied traits, also analysis of variance were carried out for all the studied traits in the yield trail. All these computation were performed by using SPSS Computer Procedures (1995).

RESULTS AND DISCUSSION

Ideal type plants in 2015 season

Mean of yield components characters and fiber properties for the selected 54 type plants of Giza 45 cultivar in 2015 season, are shown in Table (1).

Table 1. Means of yield components and fiber properties of the 54 selected type plants of Giza 45 from 2015 season that will form the increase A in 2017 season.

No.	No. Selected progeny	BW g	L %	SI g	LI g	2.5 % SL mm	PI	MV
1	1 / 2014 – 2	3.0	33.9	11.5	5.9	36.2	11.5	2.9
2	2 / 2014 -8	2.6	32.4	11.6	5.6	36.6	11.6	2.6
3	4 /2014 – 27	2.7	33.6	12	6.1	36.9	12.0	2.7
4	5 / 2014 -11	2.9	31.9	10.8	5.1	36.9	11.6	2.6
5	6 / 2014 – 25	3.2	32.4	10.6	5.1	36.4	11.5	3.5
6	8 / 2014 – 15	2.4	32.5	10.1	4.9	37.3	10.1	2.9
7	9 / 2014 – 9	2.7	33.9	11.2	5.7	37.1	11.2	3.0
8	10 / 2014 – 22	2.2	33.6	10.6	5.4	34.9	11.5	2.7
9	11 / 2014 – 19	3.0	32.6	10.5	5.1	37.7	9.5	3.0
10	12 / 2014 – 4	2.9	32.9	10.5	5.1	37.2	11.6	3.9
11	12 / 2014 – 27	2.5	33.2	10	5.0	37.2	10.0	2.8
12	13 / 2014 – 25	2.8	33.5	10.5	5.3	37.0	10.5	3.0
13	14 / 2014 – 28	3.0	34	11.8	6.1	36.6	11.8	3.2
14	15 / 2014 – 15	2.8	33.5	11	5.5	38.5	11.0	2.6
15	16 / 2014 – 27	3.0	34.3	10.6	5.5	37.0	10.6	3.2
16	17 / 2014 – 25	2.9	32.8	10.9	5.3	37.1	10.9	2.5
17	19 / 2014 – 12	2.9	32.2	11.5	5.5	37.4	11.5	2.5
18	20 / 2014 – 11	2.7	32.7	10.6	5.2	37.5	10.6	2.7
19	21 / 2014 – 10	2.3	33.2	10.8	5.4	36.9	10.8	2.5
20	22 / 2014 – 4	2.9	34.2	11.1	5.8	36.9	11.1	2.7
21	23 / 2014 – 30	2.5	36.8	10.6	6.2	38.3	11.3	3.3
22	24 / 2014 – 16	3.1	33.5	10.7	5.4	38.5	10.7	3.2
23	26 / 2014 – 20	3.1	33.8	10.1	5.2	36.9	10.1	3.2
24	27 / 2014 – 29	2.4	35.1	10.5	5.7	37.1	10.8	2.9
25	28 / 2014 – 25	2.6	32.3	10.5	5.0	36.7	10.8	2.9

Table 1. Cont.

No.	No. Selected progeny	BW g	L %	SI g	LI g	2.5 % SL mm	PI	MV
26	29 / 2014 – 1	3.0	33.5	10.7	5.4	36.5	10.7	2.9
27	30 / 2014 – 13	2.9	34.2	10.5	5.5	36.1	10.5	2.5
28	31 / 2014 – 6	2.3	33.4	11.2	5.6	37.8	11.2	2.8
29	32 / 2014 – 22	2.7	32.7	10.8	5.2	36.1	10.8	2.5
30	33 / 2014 – 9	2.9	33.9	10.8	5.5	36.9	10.8	2.9
31	34 / 2014 – 17	3.1	34.1	10.6	5.5	36.4	10.6	2.5
32	35 / 2014 – 30	2.6	34.1	10	5.2	37.5	10.0	3.0
33	36 / 2014 – 14	2.5	33.6	10.4	5.3	35.6	10.9	2.8
34	37 / 2014 – 28	2.6	32.1	10.3	4.9	35.4	10.3	2.9
35	38 / 2014 – 26	2.2	32.6	11.1	5.4	36.3	11.1	2.5
36	39 / 2014 – 20	3.0	33.7	10.3	5.2	37.8	10.3	3.0
37	40 / 2014 – 3	2.7	33	10.5	5.2	37.9	10.5	3.2
38	41 / 2014 – 30	2.9	32	10.2	4.8	37.6	10.2	2.9
39	43 / 2014 – 22	2.8	33.6	10.8	5.5	36.5	10.8	3.0
40	44 / 2014 – 6	2.9	33.1	10.5	5.2	36.5	10.5	2.7
41	45 / 2014 – 11	2.3	32.6	11.2	5.4	36.7	11.2	2.5
42	46 / 2014 – 5	2.9	33.4	11.6	5.8	36.9	11.6	3.0
43	47 / 2014 – 6	2.7	33.6	10.8	5.5	35.6	10.2	2.5
44	48 / 2014 – 27	2.7	33.2	11	5.5	37.0	11.0	2.9
45	49 / 2014 – 26	3.0	33.6	10.4	5.3	36.3	10.4	2.6
46	50 / 2014 - 6	2.2	32.8	10.2	5.0	36.9	10.2	2.7
47	51 / 2014 – 29	2.4	34.6	11	5.8	35.9	11.0	2.4
48	52 / 2014 -17	2.4	33.1	10.4	5.1	36.3	10.4	2.7
49	54 / 2014 – 21	3.0	32.2	12	5.7	35.6	12.0	2.8
50	56 / 2014 – 10	2.8	33.4	10.1	5.1	36.7	10.1	2.9
51	57 / 2014 – 12	2.5	31.8	11.6	5.4	36.0	11.6	2.7
52	58 / 2014 – 27	2.3	33.3	10.9	5.4	35.0	10.9	2.8
53	59 / 2014 – 21	2.2	33.3	10.8	5.4	35.7	10.4	2.5
54	60 / 2014 – 18	2.9	34.9	10.4	5.6	35.7	10.4	2.9
Mean of selected progenies		2.7	33.3	10.8	5.4	36.7	10.8	2.8
Mean of comparisons		2.2	33.8	9	4.6	34.8	11.1	3.1
SE		0.04	0.12	0.07	0.04	0.11	0.08	0.04
CV %		3.0	1.0	6.0	1.7	0.7	7.4	2.9

SE = Standard Error. CV= Coefficient of Variability

Where; Seed cotton yield (SCY) in K/Fed,Lint cotton yield (LCY) in K/Fed,Lint percentage (L %), Boll weight (BW) in g, Seed index (SI) in g, Lint index (LI) in g, Fiber length at 2.5% Span length (2.5%SL) in mm,Uniformity index (UI %), Fiber strength; Pressley index (PI), strength (ST) (g/tex) and yarn strength (YS), Elongation (E%), Micronaire value (MV), Maturity ratio (MR), Brightness (Rd %) and Yellowness (+b).

Small values of SE indicate that the sample means is more accurate reflecting the actual Giza 45 population mean. Whereas, coefficients of variability were low for L%., 205% 2.5% SL and pressley index indicating less dispersion for these traits, however, coefficient of variability were relatively high for BW, SI, LI and MV. This could be due to environmental effects on these traits. Similar results were obtained by Abo-Arab *et al* (1995), El-Disouqi (2001), Abd Al-zaher (2004) and Mohamed (2013).

The relative lower values of standard error (SE) and the coefficient of variability (CV%) indicate the high homogeneity between the selected type plants. These results indicated that the selected characters are demonstrating the standard characteristics of Giza 45 cultivar and its behavior across generations.

Increase A (2017 season)

Mean values of yield components and fiber properties of the 54 families were compared with the three latest commercial strains of Giza 45.The results are presented in Table (2).

Table 2. Means of yield components and fiber properties for the 54 selected progeny (increase A) in 2017 growing season.

No.	No. Selected progeny	BW g	LP%	SI g	LI g	2.5 % SL mm	UI %	ST (g/tex)	YS	MV	E%	+ b	Rd %
1	1 / 2014 - 2	3.0	33.1	10.6	5.2	36.4	84.2	45.1	2800	3.6	6.1	8.6	72.1
2	2 / 2014 -8	2.4	34.7	10.1	5.3	37.7	87.1	43.5	2980	3.5	6	7.5	75.4
3	4 /2014 - 27	2.5	34.2	10.4	5.4	35.9	84.7	44	2560	3.6	6	9.1	72.3
4	5 / 2014 -11	2.5	34.8	10.1	5.4	35.4	85.2	44.5	2560	3.5	6	8.4	71.9
5	6 / 2014 - 25	2.6	33.4	9.9	5.0	37.3	84.9	44.1	2380	3.5	6.1	8.6	71.3
6	8 / 2014 - 15	2.4	33.3	11.3	5.6	37.3	88.2	44.5	2680	3.4	6	8.2	71.1
7	9 / 2014 - 9	2.8	33.7	10.0	5.1	37.8	85.1	44.8	2800	3.6	6.2	8.5	74.9
8	10 / 2014 - 22	2.5	32.8	10.1	4.9	38	86.5	44.2	2500	3.3	6	8.6	70.2
9	11 / 2014 - 19	2.4	33.8	10.5	5.3	36.3	87.4	44.6	3040	3.3	6.1	8.4	72.8
10	12 / 2014 - 4	2.6	34.7	10.4	5.5	37.4	85.6	45	2920	3.2	6.1	8.1	71.8
11	12 / 2014 – 27	2.5	34.6	10.0	5.3	34.5	84.3	43.3	2680	3.5	6	8.3	72.2
12	13 / 2014 – 25	2.7	33.4	10.5	5.2	38.7	86.5	42.5	2920	3.4	6	8.4	71.4
13	14 / 2014 – 28	2.7	33.5	10.2	5.1	37.7	86.1	45.5	2860	3.5	6.1	8.6	73.1
14	15 / 2014 – 15	2.7	34.3	9.9	5.2	36.5	85.8	45.5	2680	3.6	6.1	7.9	74.2
15	16 / 2014 – 27	2.5	33.1	10.8	5.3	34.7	84.5	43.5	2500	3.4	6	9	73

Table 2. Cont.

No.	No. Selected progeny	BW g	LP%	SI g	LI g	2.5 % SL mm	UI %	ST (g/tex)	YS	MV	E%	+ b	Rd %
16	17 / 2014 – 25	2.3	34.8	9.2	4.9	34.8	86.2	43	2620	3.4	6.1	8.8	75
17	19 / 2014 – 12	2.4	33.7	10.2	5.2	35.5	85.9	44.3	2740	3.4	6.1	8.4	70.7
18	20 / 2014 – 11	2.7	34.1	10.6	5.5	35.6	86.7	44	2620	3.8	6.1	9	70.4
19	21 / 2014 – 10	2.5	33.5	10.4	5.2	36.9	85.5	44	2920	3.3	6.1	8.9	69.7
20	22 / 2014 – 4	2.7	33.6	10.2	5.1	35.3	86.2	44	2620	3	6.1	8.8	71
21	23 / 2014 – 30	2.6	34.2	10.2	5.3	35.4	85.3	42.1	2740	4.6	6	8.3	72.7
22	24 / 2014 – 16	2.6	32.8	10.2	5.0	33.4	82	44.3	2800	3.2	6	8.7	74.6
23	26 / 2014 - 20	2.7	32.8	10.3	5.0	35.7	85.1	43.8	2760	3.2	6	8.9	73.7
24	27 / 2014 - 29	2.9	33.8	10.5	5.3	36.2	85.3	45.5	2860	3.5	6.2	8.5	79.8
25	28 / 2014 - 25	2.5	32.6	10.4	5.0	36.8	84.8	46	2920	3.3	6	8.9	73.1
26	29 / 2014 - 1	2.2	34.2	9.5	4.9	36.2	84.2	44.5	2860	3	6	9.4	68.5
27	30 / 2014 - 13	2.4	32.3	9.9	4.7	36.5	85.6	48	3040	3.3	6.1	9.2	71.4
28	31 / 2014 - 6	2.6	33.6	11.1	5.6	37	86.1	46.9	2980	3.4	6.1	7.5	71.5
29	32 / 2014 - 22	2.5	34.6	11.0	5.8	37.1	85.5	44.7	2860	3.6	6.1	9.4	68.8
30	33 / 2014 - 9	2.4	32.9	9.9	4.8	37.8	86.5	44.4	3040	3.7	6	8.7	73.2
31	34 / 2014 - 17	2.6	34.1	11.2	5.8	36.4	84.8	43.7	2620	3.1	6	8.2	71.1
32	35 / 2014 - 30	2.8	34.2	10.5	5.5	37.8	86.3	45	2820	3.7	6	8.4	74.6
33	36 / 2014 - 14	2.4	34.3	11.1	5.8	37.7	86.8	44.3	2860	3.5	6	8.3	71.2
34	37 / 2014 - 28	2.6	34.3	11.8	6.1	36.7	87.1	44.3	2920	3.4	6	8.8	69.4
35	38 / 2014 - 26	2.5	33.1	10.3	5.1	36.5	86.6	44.5	2800	3.5	6.1	9	73.3
36	39 / 2014 - 20	2.6	34.2	11.3	5.8	35.2	82.7	45.5	2860	3.4	6.1	8.5	72.9
37	40 / 2014 - 3	2.6	33.6	10.7	5.4	37.5	87	44.8	2380	3.3	6	8.1	76.7
38	41 / 2014 - 30	2.8	34	12.1	6.2	37.3	86.6	46.3	2680	3.1	6.1	8.6	73.3
39	43 / 2014 - 22	2.7	34.3	11.8	6.1	35.3	86.6	44.7	2320	3.1	6	9	74.4
40	44 / 2014 - 6	2.5	33	10.2	5.0	36	86.6	45.1	2980	3.1	6.1	8.3	72.5

Table 2. Cont.

No.	No. Selected progeny	BW g	LP%	SI g	LI g	2.5 % SL mm	UI %	ST (g/tex)	YS	MV	E%	+ b	Rd %
41	45 / 2014 - 11	2.4	33.2	10.1	5.0	37.2	88.4	43.7	2920	3.6	6	8.1	68.4
42	46 / 2014 - 5	2.7	34	11.6	6.0	36.1	85.7	43.7	2620	3.4	6.1	8.8	70.8
43	47 / 2014 - 6	2.6	33	11.2	5.5	37.1	87.3	43.7	2800	3.6	6	8.6	71.7
44	48 / 2014 - 27	2.6	34.2	11.1	5.8	35.4	86	44.4	2860	3.4	6	9.3	69.5
45	49 / 2014 - 26	2.6	34.3	11.0	5.7	37.4	86.9	43.8	2740	3.6	6.1	8.5	74.8
46	50 / 2014 - 6	2.5	33.9	10.7	5.5	37.5	87	43.8	2680	3.5	6.2	8.5	73.2
47	51 / 2014 - 29	2.7	33.5	11.3	5.7	36	86.8	42.3	2800	3.5	6.1	7.9	72.8
48	52 / 2014 -17	2.6	33.6	10.8	5.5	35.7	87	44.2	2440	3.3	6.1	8.1	72.7
49	54 / 2014 - 21	2.4	34.4	10.1	5.3	36.7	85.4	44.1	2740	3.3	6.1	7.8	68.8
50	56 / 2014 - 10	2.6	34.4	11.1	5.8	36.9	83.7	42.9	2860	3.4	6.2	9.1	74.5
51	57 / 2014 - 12	2.7	33.9	11.3	5.8	34.7	83.8	44.5	2980	3.3	6	7.5	66.4
52	58 / 2014 - 27	2.5	33.7	11.0	5.6	35.7	86	44.5	2920	3.1	6	8.5	69.5
53	59 / 2014 - 21	2.6	34.3	11.0	5.7	36.6	86.9	43.5	2920	3.1	6.1	7.8	70.7
54	60 / 2014 - 18	2.5	33.5	10.6	5.3	35.7	84.8	44.9	2980	3.2	6.1	8.9	71
Mean of selected		2.6	33.8	10.6	5.4	36.4	85.8	44.4	2773	3.4	6.1	8.5	72.1
Mean of		2.4	33.5	10.1	5.1	37.1	86.7	44.2	2965	3.5	6.1	8.4	74.9
SE		0.02	0.08	0.08	0.05	0.15	0.17	0.14	24.4	0.03	0.01	0.06	0.31
CV %		5.8	1.8	5.6	6.6	2.9	1.5	2.4	6.5	7.3	1.0	5.4	3.2

SE = Standard Error. CV= Coefficient of Variability

Where; Seed cotton yield (SCY) in K/Fed,Lint cotton yield (LCY) in K/Fed,Lint percentage (L %), Boll weight (BW) in g, Seed index (SI) in g, Lint index (LI) in g, Fiber length at 2.5% Span length (2.5%SL) in mm,Uniformity index (UI %), Fiber strength; Pressley index (PI), strength (ST) (g/tex) and yarn strength (YS), Elongation (E %), Micronaire value (MV), Maturity ratio (MR), Brightness (Rd %) and Yellowness (+b).

It could be noticed that, the mean of progenies (increase A) slightly differed from the mean comparisons for most traits. Also SE and CV values were relatively low for all traits. These results indicate gene fixation and homogeneity of the studied Giza 45 families. In this regard Mahrous (2017) the performance of increase A were superior as compared with the latest strain for most studied traits.

Application of independent culling levels selection for increase A, revealed 18 families were selected according to Giza 45 standard characteristics to form increase B families, these families were compared in yield trail in 2018 season.

Increase B (2018 season)

The 18 families selected in 2017 season were grown in 2018 season in number of rows according to seed quantity. These families were evaluated in yield trail with the latest tow strains. Table 3 shows the mean values of these families for yield, yield components and fiber properties. Analysis of variance for yield and yield components showed that there were no significant differences among these families for these traits. Standard error and CV were relatively low for all the studied traits except CV for SCY and LCY, were relatively high. Low SE and CV values revealed the homogeneity among all families in increase (B), these results were in agreement 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) and Al-Ameer (2014).

Table 3. Means of yield, yield components and fiber properties of the 18 selected families (increase B) in 2018 growing season furnishing nucleolus in 2019 season.

No.	No. Selected progeny	SCY K/Fed	LCY K/Fed	BW g	PL %	SI g	LI g	2.5 % SL mm	UI %	ST(g/tex)	MV	E%	+ b	MR	Rd %
1	6/2015 - 25	7.2	7.8	2.8	34.2	9.9	5.1	35.5	86.1	44.5	0.87	6.5	7.8	3.1	74.3
2	8 / 2015 -15	5.8	6.2	2.7	33.7	10.0	5.1	35.6	86.5	41.9	0.91	6.4	8	3	76.2
3	10/2015 -22	5.9	6.4	2.7	34.5	9.9	5.2	35.9	86	45.4	0.88	6.4	8	2.9	72
4	11/2015 -19	5.9	6.3	2.8	34.3	10.1	5.3	35.3	84.5	43.7	0.86	6.5	8.4	3	74.5
5	12/ 2015 -4	6.8	7.3	2.6	34.4	9.8	5.1	35.2	83.1	45.3	0.86	6.3	8.3	3	74.6
6	14/2015 -28	6.1	6.5	2.5	33.7	9.5	4.8	35.4	87.2	46	0.88	6	8.2	3.1	76.1
7	21/2015 -10	5.3	5.6	2.7	33.4	10.0	5.0	34.9	84	42.5	0.85	6.4	8.3	3	76.8
8	27/2015 -29	6.9	7.3	2.6	33.8	10.1	5.1	34.9	85.2	45	0.89	6.4	8.9	3	74.4
9	28/2015 -25	6.8	7.2	2.6	33.8	9.6	4.9	34.9	84.2	44.6	0.86	6.4	8.1	2.9	74.7
10	29/2015 -1	5.7	6.2	2.5	34.4	9.8	5.2	34.9	83.8	45.8	0.86	6.4	8.8	3	73.2

Table 3. Cont.

No.	No. Selected progeny	SCY K/Fed	LCY K/Fed	BW g	PL %	SI g	LI g	2.5 % SL mm	UI %	ST(g/tex)	MV	E%	+ b	MR	Rd %
11	30 / 2015 -13	6.2	6.5	2.7	33.4	10.1	5.1	34.4	83.6	42.9	0.89	6	9.1	3	72.9
12	31 / 2015 -6	6.3	6.6	2.5	33.7	9.4	4.8	34.8	86.2	45	0.89	6.4	8.6	3.3	73.8
13	36 / 2015 -14	6.2	6.6	2.6	33.8	10.3	5.2	34.8	86	44.5	0.86	6.1	8.4	3	72.2
14	37 / 2015 -28	5.7	6.1	2.7	33.7	9.9	5.0	34.6	83.5	43.8	0.85	6.3	9.1	2.9	73
15	38 / 2015 -26	6.4	6.7	2.7	33.3	10.2	5.1	34.9	85.4	42.8	0.88	6.4	8.3	3.2	72.9
16	40 / 2015 -3	7.3	7.8	2.7	33.7	10.3	5.3	34.5	83.8	41.5	0.84	6.2	8.4	2.8	75.2
17	41 / 2015 -30	6.6	6.9	2.5	33.4	10.2	5.1	35.2	83.1	45.5	0.88	6.1	8.1	3.1	74.4
18	54 / 2015 -21	6.8	7.2	2.4	33.9	9.8	5.1	35	84.1	43	0.88	6.4	8.8	3.3	74.7
Mean of selected families		6.3	6.7	2.6	33.8	9.9	5.1	35.1	85.3	42.4	0.86	6.5	8.7	3.1	74.6
Mean of comparisons (control)		7.3	7.8	2.7	33.9	10.4	5.3	35.2	83.3	43.8	0.88	6.5	8.0	3	76.5
SE		0.13	0.14	0.03	0.09	0.06	0.03	0.09	0.30	0.33	0.004	0.04	0.09	0.03	0.32
CV %		8.9	8.9	4.3	1.1	2.6	2.8	1.1	1.5	3.1	2.1	2.5	4.6	4.4	1.8

SE = Standard Error. CV = Coefficient of Variability

Where; Seed cotton yield (SCY) in K/Fed,Lint cotton yield (LCY) in K/Fed,Lint percentage (L %), Boll weight (BW) in g, Seed index (SI) in g, Lint index (LI) in g, Fiber length at 2.5% Span length (2.5%SL) in mm,Uniformity index (UI %), Fiber strength; Pressley index (PI), strength (ST) (g/tex) and yarn strength (YS), Elongation (E %), Micronaire value (MV), Maturity ratio (MR), Brightness (Rd %) and Yellowness (+b).

Table 4. Means of yield, yield components and fiber properties of the 4 families selected from increase B in 2018 growing season to form new nucleolus of Giza 45 in 2019 season.

No.	No. Selected progeny	SCY. K/Fed	LCY. K/Fed	BW g	L%	SI g	LI g	2.5 % SL mm	U.I %	ST(g/tex)	MV	E%	+ b	MR	Rd %
1	6/2015 - 25	7.2	7.8	2.8	34.2	9.9	5.1	35.5	86.1	44.5	0.87	6.5	7.8	3.1	74.3
3	10/2015-22	5.9	6.4	2.7	34.5	9.9	5.2	35.9	86	45.4	0.88	6.4	8	2.9	72
5	12/2015 -4	6.8	7.3	2.6	34.4	9.8	5.1	35.2	83.1	45.3	0.86	6.3	8.3	3	74.6
17	41/2015 - 30	6.6	6.9	2.5	33.4	10.2	5.1	35.2	83.1	45.5	0.88	6.1	8.1	3.1	74.4
Mean of selected progenies		6.6	7.1	2.7	34.1	10.0	5.1	35.5	84.6	45.2	0.9	6.3	8.1	3.0	73.8
Mean of Comparisons (control)		7.3	7.8	2.7	33.9	10.4	5.3	35.2	83.3	43.8	0.88	6.5	8.0	3.0	76.5
SE		0.27	0.30	0.06	0.25	0.09	0.03	0.17	0.85	0.23	0.00	0.09	0.10	0.05	0.61
CV %		8.2	8.4	4.9	1.5	1.7	1.0	0.9	2.0	1.0	1.1	2.7	2.6	3.2	1.7

SE = Standard Error. CV = Coefficient of Variability.

Where; Seed cotton yield (SCY) in K/Fed,Lint cotton yield (LCY) in K/Fed,Lint percentage (L %), Boll weight (BW) in g, Seed index (SI) in g, Lint index (LI) in g, Fiber length at 2.5% Span length (2.5%SL) in mm,Uniformity index (UI %), Fiber strength; Pressley index (PI), strength (ST) (g/tex) and yarn strength (YS), Elongation (E %), Micronaire value (MV), Maturity ratio (MR), Brightness (Rd %) and Yellowness (+b).

Application of independent culling levels selection for (increase B) revealed 4 families were selected according to Giza 45 standard characteristics to form nucleolus; these families were homogeneous between them and with control in yield, yield components and fiber properties. Pure seeds of the 4 selected families were massed together to form the breeder's seed stock of Giza 45 cultivar in 2019 season, under name (Giza 45 nucleolus/ 2019). Table 4 shows the characters of the selected families. The breeder's seed (nucleolus) was grown in 2019 season in 3 feddans at Sakha farm.

These results provide good evidence that the pure seed stock released by the cotton breeder would be maintained pure as the stock and exclusively remained under the upper hand of the breeder. Being then the breeder's seed (nucleolus) is further increased to produce foundation seed as a cultivar strain carrying the number of the year of its propagation.

On the other hand, deterioration may occur in cotton varieties in general cultivation through contamination by mechanical mixing of different seeds, out crossing with foreign cultivars and off-types which could result in genetic changes of the cultivar. These results were similar to those obtained by Abdel-Bary and Bisher (1969), Abdel-Al (1976), El-Akkad *et al* (1982), El-Kilany and Yossef (1985) and Al-Ameer (2014).

The pure line method in the sense of pedigree selection method for renewing Giza 45 breeder's seed depends on independent culling level selection for most traits. This means that the selection technique for producing breeder's seed of Giza 45 cultivar was valid and proved to be effective in holding this cultivar according to the standard type of Giza 45. This may be due to the pedigree selection method used to develop Giza 45 materials during breeding and maintenance period (ca. 61 years) which exhausted the variations due to major genes effects. However, minor genes have too small effects to be individually distinguished and segregation occurs at a large number of loci affecting a trait. This conclusion is in agreement with those obtained by Al-Hibbiny (2015) and Hamed (2016). Thus, the gene frequency changes caused by selection pressure exerted by the breeder, and loss of heterozygosity (due to segregation of heterozygotes remaining even in the most highly breed cultivar), could create some genetic modifications which nay be considered the main reason for appearance of off-type plants in the program. For these reasons continuous selfing and selection procedures carried out every season and considered essential in maintaining program to maintain genetic purity and eliminate any off-type plants from Giza 45 highly breed population.

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المحافظة و انتاج النوية (بذرة المربي) لصنف القطن المصري جيزة ٤٥

بديعة أنور محمد محمود

معهد بحوث القطن – مركز البحوث الزراعية – مصر

يهدف هذا البحث لإنتاج بذرة المربي في برنامج المحافظة على الصنف جيزة ٤٥ الذي يعد من طبقة الأقطان فائقة الطول والمتانه و ناتج عن طريق التهجين بين جيزة ٢٨ x جيزة ٧ . اجري هذا البحث بمحطة البحوث الزراعية بسخا خلال المدة من ٢٠١٥ – ٢٠١٨ حيث تم: ١- انتخاب أربع و خمسون نبات من طراز الصنف جيزة ٤٥ من موسم ٢٠١٥ حيث بينت النتائج التجانس التام بين هذة النباتات. ٢- في موسم ٢٠١٧ تم زراعة نسل هذ ه النباتات مكون إكثارات (أ) و في نهاية الموسم و بناء على صفات هذة العائلات تم انتخاب ١٨ عائلة من إكثارات (أ) مكونة إكثارات (ب). ٣- في موسم ٢٠١٨ زرعت البذرة الذاتي لل ١٨ عائلة المنتخبة في إكثارات (ب) كل عائلة في مساحة حسب كمية البذرة المتاحة وبالنسبة للبذرة الطبيعي زرعت مع احدث سلالتين كمقارنه في تجربة القطاعات الكاملة العشوائيه من اربع مكررات عام ٢٠١٨. في نهاية الموسم وبناء على نتائج الإختبارات المحصولية والغزلية تم انتخاب أربعة عائلات نموذجية تمثل الصنف جيزة ٤٥ في صفاته المحصولية و التكنولوجية وتماثل البذرة، ثم مزجت بذرتها الذاتي بعناية لتكوين النوية الجديدة (بذرة المربي) و زرعت موسم ٢٠١٩ في ثلاث افدنه بمزرعة سخا بقطاع الإنتاج بمحافظة كفر الشيخ. و تدل النتائج المتحصل عليها على كفاءة الطريقة المستخدمه في المحافظة على النقاوة الوراثية للصنف جيزة٤٥و ذلك بمزج بذرة الانسال الأربعة المنتخبه معا. و تعتبر طريقة الإنتخاب المنسب هي أفضل الطرق المستخدمه في تربية القطن و كذلك المحافظة على الأصناف بعد انتاجها للحصول على تقاوي عالية النقاوة الوراثية ومطابقة لصفات الصنف الرئيسية. و يرجع نجاح هذه الطريقة في التربية والمحافظة على الأصناف على اساس انه اثناء مراحل التربية والإنتخاب المختلفة يتم انهاك او استهلاك جميع الجينات الرئيسية غير المرغوبة حتى تصل الأصناف الى درجة عالية من الأصاله الوراثية و لكن تبقي الجينات الطفيفة التي لا يمكن ان تحسب و بالتالي اي تأصيل لهذه الجينات او اعادة الإتحاد فيما بينها عن طريق استمرار التلقيح الذاتي قد يظهر بعض الطرز المغايرة للصنف وعلية تستطيع طريقة سجل النسب و الإنتخاب على مستويات من التخلص من هذه التراكيب المغايرة فور ظهورها في برامج المحافظة على الأصناف محتفظة بذلك على النقاوة الوراثية للصنف جيزة ٤٥ لأطول فترة ممكنه دون ظهور اي تدهور في صفاته.

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