

EVALUATION OF THE EXTRA LONG STAPLE EGYPTIAN COTTON VARIETY "Giza 88"

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Abstract

Giza 88 is an extra long staple Egyptian cotton variety. It has been introduced by the Cotton Breeding Research Section through artificial hybridization between the two parents Giza 45 and Giza 77 to combine their splendid economic qualities.

Giza 88 is characterized by its extra long staple with 35.0 - 36.1mm at 2.5% span length and 17.2 - 18.8 mm at 50% mean length, 4.3 - 4.5 micronair reading, 154-172 millitex (10-8 g/cm) for hair weight, 2680 -2980 (60s carded) yarn strength and 37.67 -39.24 lint percent. It is also high yielding with about 10.1 k/fed seed cotton yield and 11.36 k/fed lint cotton yield. Moreover, it is characterized by its resistance to *Fusarium oxysporum* and *F. vasinfectum*.

Giza 88 could be the best alternative to "Giza 70" and Giza "77" varieties.

INTRODUCTION

Ashmouni variety is considered the origin of most of the Egyptian cotton varieties since its introduction in 1860. Until 1920, the new Egyptian varieties were considered as off types, individually selected from it, as observed instantly by those concerned with cotton production at that period. Those varieties were Khallely, Hariri, Meet-Afifi, Zefeiry Abbasy, Younnovitch and Voltos ... etc.

In 1906, Sakel variety first appeared winning a high reputation over other Egyptian cotton varieties. It nearly covered the whole area grown with cotton in Delta within 1916-1925, which reached more than one million feddans. The main objective for selection at that time had been the high yield.

The first success achieved by the Ministry of Agriculture had been two varieties introduced by individual plant selection. Those varieties were Giza 7 and Sakha 4 and the later was characterized by its resistance against *Fusarium* wilt that attacked severely the Sakel variety.

Varietal hybridization was first employed in 1921 between Ashmouni and Sakel, which were the most important varieties then. The first hybrid was produced under the name of Giza 12 (Wafeer), that surpassed the variety Giza 7 in

yield and earliness but its fiber was inferior in quality.

The variety Giza 29 was produced by hybridization under the name "Karnak" where it had dominated Delta for 15 years and presided other long stapled varieties for its superiority over Sakel in yield. Afterwards, the variety Giza 36 (Menoufi) appeared and was propagated in 1942 to replace Giza 7, which began to decline, Menoufi was superior in length and strength (Al-Didi, 1972). Recently a series of extra long staple varieties have been produced, the latest of which are Giza 70, Giza 76, Giza 77, Giza 87 and Giza 88. In this investigation, the breeding and production of the new variety Giza 88 will be discussed.

MATERIALS AND METHODS

Breeding and production of the new variety Giza 88 depended mainly upon the use of hybridization through pedigree method described by Hays et al. (1955).

Hybridization between the two parental varieties; (Giza 45 and Giza 77) was carried out in 1977 at Giza Agricultural Experiment Station. The parental variety "Giza 77" is characterized by high strength, long fibers and high yield, whereas "Giza 45" variety is characterized by its highest extra long and extra fine fibers. The F1 hybrid seeds were grown in the second season. Beginning with the F2 till the F8 generations, selection had been carried out at Sakha Experimental Station. The selected families from the F5 generation of the hybrid were evaluated through trials A and B at Sakha and at different locations; Minofia, Sharkia, Kafr El Sheikh, Behraei, Gharbia and Demeata governorates of the Delta to select the promising ones that excelled the commercial varieties. Progeny of the promising maternal families in the later generations that were selected from the breeding field were grown in an isolated field to maintain the selected strains of the new variety. Comparisons among the new strains and the nuclei were included in a yield trial.

A randomized complete block design with six replications was used in each experiment with five rows in each plot. The row was four meters long, 60cm apart and 20cm between hills. The hills were thinned to two plants. The yield was obtained from the three middle rows of the plot.

In this investigation the following characters were considered:

1. Seed cotton yield (S.C.Y.C/F); estimated as the weight of seed cotton yield in cantars per feddan.
2. Lint cotton yield (L.C.Y.C/F); estimated as the weight of the lint in cantars per feddan.

3. Boll weight (B.W); the average weight, in grams, of 50 sound opened bolls, picked at random from the first and fifth rows of the plot.
4. Lint percent (L%) the amount of lint in seed cotton sample expressed in percentage.
5. Fiber fineness and maturity in Micronaire units (M.R.).
6. 2.5% and 50% span length (S.L.) in mm measured by fibrograph according to ASTM, D. 1447-63 T.
7. Hair weight (H.W.) in terms of millitex (10-8 gr/cm).
8. Yarn strength (Y.st.) is the product of "Lea strength x yarn count" (60s carded and 3.6 twist multiplier) measured by the Good Brand Tester.

The analysis of variance was calculated according to Snedecor (1956) and Leclerg *et al.* (1962).

Broad sense heritability values in individual location and combined analysis of locations were calculated as outlined by Allard (1960).

RESULTS AND DISCUSSION

In 1977 hybridization had been carried out between the two parents, whereas the F_1 hybrid seeds were planted in the second season at Giza Agricultural Experimental Station.

Selection through pedigree method had been applied starting from the F_2 generation and up till the F_8 in the breeding field at Sakha. The outcome results of the preliminary trial A, and the advanced trial B of crop evaluation at Sakha and different locations of lower Egypt, have proved that the four maternal families F8 824/86, 827/86, 833/86 and 846/86 had almost excelled other cultivated varieties. They showed a strong resistance against wilt disease. Moreover, all the selected families starting from F_3 generation had been undergone tests against Fusarium at the Cotton Disease Research Section. These families have proved their resistance to wilt disease.

The four selected families of the cross Giza 77 x Giza 45 in trial A in the previous season were grown in trial B in the same season 1988 representing the parental families in the 8th generation to have more information about their productivity and fiber quality and to study the genotype x locations interaction under different environments. They were evaluated in five different locations at the Delta including one experiment at the Experimental Station of Sakha (El-

Nataf). The combined data of trials B in five locations for seed cotton yield is presented in Table 1. Yield results showed that all the selected strains of the cross significantly surpassed the control variety Giza 45. The mean value of seed yield in the five locations significantly surpassed the parent Giza 45 by 1.26 to 2.35 C/F, moreover, the mean lint cotton yield was in agreement with those of seed cotton yield and surpassed Giza 45 by 1.96 to 2.97 C/F.

The results of lint percent are presented for four families and showed higher lint percent values compared with Giza 45 variety. The families F₈ 824/86 and F₈ 827/86 surpassed Giza 77 in lint percent. There were no significant differences between the four families and the other commercial varieties in all examined characters. All the families at different locations were in agreement with the combined date. Micronaire values of the four families were nearly the same and very close to Giza 45. All the families of the cross tended to be similar to the commercial variety Giza 77 (Table 1). All the families of the cross tended to be very close to the other commercial varieties in the fiber length as shown in Table 1. However, the yield results indicated that this promising cross may replace any of the extra long staple variety. The average mean of yarn strength results showed no significant difference between values of the four families and the two commercial varieties.

Breeding Methodology:

In the season 1997, 50 plants from the progeny lines of the variety Giza 88 were selected, representing the desired characteristics of the variety. Their selfed seed had been planted bulkily in 1998 season, forming 50 nucleoli/98 out of the 21 nuclei, and their natural seeds were propagated as well. In 1998 season there had been a number of 21 selected nuclei of the variety Giza 88, developed from the progeny of the maternal families F₈ 824/86, F₈ 827/86, F₈ 833/86 and F₈ 846/86. Those nuclei had been tested in a trial to compare their yield with that of the previous foundation seed of the variety (Giza 88/97, Giza 88/96 and Giza 88/95) circulated by the variety's propagation in Sakha farm. Five nuclei (1/98, 2/98, 5/98, 10/98 and 17/98), Table 2., were selected according to their vegetative, spinning and fiber qualities characteristics. The seeds of these nuclei were mixed to form the foundation seed of the variety in 1998 (Giza 88/98).

Fifteen nuclei/98 had been selected according to their vegetative, spinning and fiber qualities to form the nuclei for 1999. The natural propagation seeds of these nuclei/99 were tested along with the previous foundation seed of the variety (Giza 88/99, Giza 88/98, Giza 88/97, Giza 88/96 and Giza 88/95 seed belt), in a yield trial grown in the middle of the variety's propagation at Sakha farm in 1999 season. The selection limits of the nucleoli/98 forming nuclei/99

Table 1. Means of economic characteristics of the promising families of the cross Giza 77 x Giza 45 and commercial cultivars involved in the combined analysis of trials "B" at five different locations in 1988 season.

Family or variety	Parent	S.C.Y C/F	L.C.Y C/F	L%	B.W. gram (50 boll)	Fiber properties			Yarn str.	
						M.R	H.W. (millitex)	SL 50% (mm)		SL2.5% (mm)
F ₈ 824/86	F7 635/85	5.48	5.92	34	130	3.3	137	15.8	33.8	2726
F ₈ 827/86	F7 639/85	5.44	5.86	33.9	129	3.4	143	16.2	34.4	2759
F ₈ 833/86	F7 651/85	5.44	5.78	33.4	127	3.3	140	16.3	34	2765
F ₈ 846/86	F7 655/85	5.38	5.7	33.4	127	3.4	141	16.1	33.7	2793
Giza 45	G.28 x G.7	3.13	2.95	29.8	129	2.9	125	16.7	35	2804
Giza 77	G.70xG.68	5.4	3.76	33.8	129	3.4	145	16.9	34.7	2870

L.S.D. 0.05 1.11 1.17

0.01 1.47 1.55

Hirability% 78.82 86.55 26.68

were:

1. Spinning strength over 2650 units.
2. Fiber fineness range of 125 to 139 milltex. (H.W)
3. Staple length (50%) over 16 mm.
Staple length (2.5%) not less than 33.0 mm.
4. Lint percent not less than 34%.

In 1998, 50 plants of the progeny lines were selected to represent the desirable qualities of the variety forming the nucleoli in 1999. The selfed seeds of the selected nucleoli were planted to form the nuclei/99. Their selfed seeds were evaluated along with the foundation seed in season 2000. On the other hand, 50 plants from the progeny lines were selected, in the previous season 1998. These selected plants showed excellent fiber qualities and were used in forming the progeny lines in 1998. Their selfed seeds were planted in wide spaces, while the natural seeds had been bulkily planted. However, the selected superior plants, in 1998, that form the progeny in 1999 were 49 plants. Table 2 indicates 88/96 and Giza 88/95.

The analysis of variance showed insignificant differences indicating the genetic stability for strains of the variety Giza 88.

In 1999, there was a number of 20 nuclei of the variety Giza 88, which belonged to the parent family 827/86. Those nuclei had been evaluated in a yield trial along with the previous foundation seed, Giza 88/98, Giza 88/97, Giza 88/96 and Giza 88/95. The nuclei 1/99, 4/99, 5/99, 9/99 and 20/99 (Table 3) were selected on the same selection levels that were mentioned previously. Those nuclei belonged to the same maternal family F8 827/86. Their seeds were mixed to form the foundation seed of Giza 88/99 in 1999 season. Whereas, in 1998, fifty plants of the progeny lines of the variety Giza 88 representing the desired qualities were selected and their selfed-seeds had been planted bulkily in 1999, forming 50 nuclei/99. Whereas their natural seeds were propagated. They were selected on the basis of vegetative, spinning and fiber qualities, in order to form nuclei /2000. On the other hand, their natural propagated seeds were tested with the previous foundation seed of the variety Giza 88/99. Giza 88/98, Giza 88/97, Giza 88/96 and Giza 88/95 in a yield trial held amidst propagation of the variety in 2000 were:

1. Spinning strength out to be over 2220.
2. Fiber fineness range from 112 to 121 (H.W).
3. Staple length for 50% from 16.0 to 17.8.
Staple length for 2.5% from 33.0 to 35.5.
4. Lint percent not less than 33%.

Table 2. Comparison between the selected nuclei/1998 of Giza 88 variety and Giza 88 strains in 1998 season.

Nuclei and strain	L.C.Y C/F	S.C.Y C/F	L%	B.W. (50)	Mic	H.W. (millitex)	Staple Length		Y.st.
							50% (mm)	2.5% (mm)	
1/98	8.74	7.9	35.1	136	3.2	124	17	33.5	2810
2/98	8.92	8.19	34.6	131	3.5	131	17	33.5	2685
5/98	8.62	7.61	35.9	134	3.5	126	16.8	33.5	2645
10/98	8.69	7.85	35.2	134	3.6	130	17.1	33.8	2655
17/98	8.71	7.85	35.2	144	3.5	135	17.7	34.2	2775
Giza 88/97	7.77	7.04	35.1	138	3.5	131	16.6	33.1	2835
Giza 88/96	7.69	6.94	35.2	134	3.7	132	17.8	34.8	2920
Giza 88/95	7.17	6.53	34.9	136	3.8	132	16.3	33	2925

Fifty plants were selected from the progeny lines of the variety Giza 88 in season 1999 which proved to be excellent in their qualities. These selected plants formed the progeny lines in 2000, whereas their selfed seeds were widely planted and the natural seeds were bulky planted. Table (3) indicated the qualities of the five selected nuclei 1/99, 4/99, 5/99, 9/99 and 20/99 compared with the foundation seed Giza 88/98, Giza 88/97, Giza 88/96 and Giza 88/95.

In 2000, there was a number of 19 nuclei of the variety Giza 88. Those nuclei had been evaluated in a yield trial to compare them with the previous foundation seed plus Giza 88/99, amidst its propagation at Sakha farm. Four nuclei, 3/2000, 4/2000, 11/2000 and 13/2000, all of which were the progeny of the family F8 827/86, were selected on basis of vegetative, spinning and fiber qualities. The seeds of those four selected nuclei were mixed to form the foundation seed of Giza 88/2000 strain, and were delivered to the Cotton Maintenance Research Section.

On the other hand, in 1999, 50 plants of the progeny lines of Giza 88 were selected, representing the desired qualities of the variety. Their selfed seeds were planted bulky in 2000, forming 50 nuclei/2000, while their natural seeds were propagated as well. Twenty nuclei of which were selected due to their quality, in order to be used as nucleoli/2001. The natural propagation seeds of those nuclei were evaluated along with the previous foundation seed of Giza 88 strains in a yield trial amidst the variety propagation in 2001, the seeds were delivered to Cotton Maint. Research Section.

In selecting the nucleoli/2000 forming the nuclei/2001 the following selection limits were considered:

1. Spinning strength ought to be over 2650 unit.
2. Fiber fineness range from 150 to 170 millitex.
3. Staple length for 50% over 17.0.
Staple length for 2.5% over 35.0.
4. Lint percent not less than 37.00%.

Fifty plants of the progeny lines of the variety Giza 88 were selected in 2000, representing the desired qualities of the variety, in order to plant their selfed seeds in 2001, forming 50 nucleoli/2000. Their natural seeds were propagated as well to evaluate yield and quality later on the foundation seeds in 2001.

Moreover, 50 plants of the progeny lines of the variety had been selected in 1999, which were superb in their quality to form the progeny lines in 2000. Their selfed seeds were cultivated in wide spaces. The natural seeds were bulkily

Table 3. Comparison between the selected nuclei/99 of Giza 88 variety and Giza 88 strains in 1999 season.

Nuclei and strain	L.C.Y C/F	S.C.Y C/F	L%	B.W. (50)	Mic	H.W. (millitex)	Staple Length		Y. st.
							50% (mm)	2.5% (mm)	
1/99	11.36	10.73	33.63	125	2.7	116	17.8	35.4	2700
4/99	11.56	10.86	33.81	126	2.7	116	16.9	34.4	2450
5/99	11.29	10.77	33.3	122	2.9	118	16.1	33	2460
9/99	11.24	10.59	33.7	127	2.7	112	16.7	33	2510
20/99	11.66	10.63	34.84	127	2.9	121	17.6	34.8	2230
Giza 88/98	9.92	9.43	33.42	128	2.7	114	17.8	35	2220
Giza 88/97	10.99	10.31	33.86	130	2.7	119	16.6	33.1	2120
Giza 88/96	9.8	9.34	33.32	126	2.7	117	16.2	32.6	2250

planted. In 2000, the plants of the progeny lines of the variety were selected. These selected plants were excellent in their qualities to form the progeny lines in 2001. The seeds were delivered to cotton. Maintenance Research Section. Table 4. indicated the characteristics of the four selected nuclei: 3/2000, 4/2000, 11/2000 and 13/2000 compared with the foundation seeds of Giza 88 strains.

The analysis of variance showed no significant differences indicating the genetic stability of all the strains of Giza 88 variety and that they are of the same genotype.

Evaluation of the new variety:

Comparative studies were held between the new variety Giza 88 and the commercial varieties; Giza 70 and Giza 77 for lint yield, seed cotton yield and boll weight. The data were extracted from the yield trial B that had been grown at five different locations representing Lower Egypt in the three seasons 1998, 1999 and 2000. it is perceived from Table (5) that the variety Giza 70 recedes significantly in lint yield than the variety 88 with 2.11 met. cantars per feddan (22.76%) while Giza 88 had an excess of 3.60 met. cantars/feddan (46.33%) in average, over Giza 77. Giza 88 exceeded Giza 70 in all Governorates in three seasons. Seed cotton yield results showed an excess of Giza 88 (1.74 met cantars/f = 20.81%) over Giza 70 in average of the three seasons while an excess of (2.39 met. cantars/f = 26.50%) over Giza 77 in 1998 were achieved. Boll weight results showed inconsistent differences between Giza 88 and Giza 70. Moreover, these differences were insignificant, while in Giza 88 an excess of 15 gram over Giza 77 was obtained.

The present study of the new variety Giza 88 had proved its superiority over all other Egyptian cotton varieties, that belong to the category of extra long staple cotton varieties, concerning all economic characteristics particularly its lint yield. The variety Giza 88 could be the best alternative of Giza 70 and Giza 77, where its acreage reached 27,000 feddans in 2001 season. As perceived in this study, the variety Giza 88 has excelled Giza 70 in the average lint yield per feddan therefore, replacement of Giza 88 might lead to an increase in the yield of the extra long staple cottons.

Table 4. Comparison between the selected nuclei/2000 of Giza 88 variety and Giza 88 strains in 2000 season.

Nuclei and strain	L.C.Y C/F	S.C.Y C/F	L%	B.W. (50)	Mic	H.W. (millitex)	Staple Length		Y. st.
							50% (mm)	2.5% (mm)	
3/2000	9.97	8.09	39.11	146	4.4	167	18.5	36.1	2980
4/2000	10.25	8.29	39.24	150	4.4	158	18.5	35.8	2980
11/2000	10.3	8.56	38.22	150	4.3	154	18.8	36.5	2680
13/2000	10	8.18	38.82	151	4.3	165	18	35	2980
Giza 88/99	8.77	7.19	38.69	149	4.3	167	17.7	35	2810
Giza 88/98	8.04	6.67	38.26	151	4.4	165	17.2	35	2880
Giza 88/97	8.56	7.07	38.46	147	4.5	165	17.8	35.6	2910
Giza 88/96	9.33	7.73	38.32	148	4.5	165	18	35.5	2845

Table 5. Comparative studies between Giza 88 and the commercial varieties Giza 70 and Giza 77 concerning lint yield; seed cotton yield c/f, and the mean weight of 50 bolls at Kallobia, Menofia, Kafr El Sheikh, Beheira, Gharbia and Demiat governorates in 1998, 1999 and 2000 seasons.

Varieties	Characters	1998						1999						2000						G. mean
		L1	L2	L3	L4	L5	L6	L1	L2	L3	L4	L5	L6	L1	L2	L3	L4	L5	L6	
Giza 88	L.C.Y. C/f	11.17	8.64	9.03	7.03	11.21		9.28	10.04	7.96	16.09	17.67		12.41	11.79	10.36	15.03	14.81	9.35	11.36
Giza 70		8.55	6.76	5.83	6.27	9.07		6.12	9.12	5.99	12.11	13.51		10.69	10.52	8.32	13.2	11.22	10.82	9.26
Giza 77		9.95	7.83	7.04	5.19	8.82		*						*						7.77
S.E.		41																		
L.S.D. 0.05		0.33																		
L.S.D. 0.01		0.65																		
Giza 88		0.86																		
Giza 70		9.86	7.76	8.51	6.86	11.41		8.36	9.9	7.1	13.57	14.39		10.65	10.21	9.19	12.56	12.81	8.47	10.1
Giza 77		7.83	6.28	6.07	6.33	9.31		5.61	8.82	5.47	9.82	11.3		9.37	8.97	7.58	11.28	9.86	9.85	8.36
S.E.	S.C.Y. C/f	8.59																		
L.S.D. 0.05		7.04																		
L.S.D. 0.01		6.79																		
Giza 88		5.03																		
Giza 70		9.02																		
Giza 77		0.66																		
S.E.		1.29																		
L.S.D. 0.05		1.7																		
L.S.D. 0.01		0.37																		
Giza 88		0.72																		
Giza 70		0.95																		
Giza 77		150	132	131	117	128		133	122	144	149	145		151	151	146	155	153	147	141
S.E.		2.18																		
L.S.D. 0.05		4.27																		
L.S.D. 0.01		5.64																		
Giza 88		1.8																		
Giza 70		3.6																		
Giza 77		4.7																		
S.E.		1.2																		
L.S.D. 0.05		2.3																		
L.S.D. 0.01		3.1																		

* Giza 77 was discarded since 1999.

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REFERENCES

1. Al-Didi, M.A., 1972. History of Egyptian cotton varieties. *Egypt. Cott. Gaz.*, 58: 36-56.
2. El-Moghazi, M., A.A. Sallam and A.A. El-Gohary, 1981. Breeding behavior of lint yield and its contributing variables for some strains of long staple hybrids compared with cultivated cultivars at different environments. *Agric. Res. Rev. Egypt*, 59.
3. Hays, H.K., Immer and D.C. Smith, 1955. *Methods of plant breeding*, 2nd ed., McGraw-Hill Book Co., New York.
4. Leclerg, E.L., W.H. Leonard and A.G. Clark, 1962. *Field plot technique* Burgess Publ. Co.
5. Sendecor, G.W., 1956. *Statistical Methods*. Iowa State Univ. Press Ames, Iowa U.S.A.

تقييم الصنف الجديد جيزة ٨٨ من طبقة الأقطان المصرية فائقة الطول

هانم عبد السلام محمد - سيدة سعيد حسن الحلو - أحمد عبد الهادي محمد عوض - محمد
علاء الدين محمد علام

معهد بحوث القطن - مركز البحوث الزراعية - الدقى - الجيزة

يعتبر الصنف جيزة ٨٨ من أحدث أصناف القطن المصري التابعة لطبقة الأقطان فائقة الطول حيث استنبط بواسطة قسم بحوث تربية القطن التابع لمعهد بحوث القطن وذلك بواسطة تهجين بين الصنفين جيزة ٧٧ وجيزة ٤٥.

وقد تم عزل الهجين لأول مرة ١٩٨٨ وتم تقييم النتائج المتحصل عليها من القسم في السنوات ١٩٩٨، ١٩٩٩، ٢٠٠٠ وقد أظهرت نتائج سنة ٢٠٠٠ الآتي

- يتميز الصنف جيزة ٨٨ بأنه فائق الطول حيث تصل ول تيلته ٣٥-٣٦،١ ملليمتر عند متوسط طول ٢،٥٪، ١٧،٢-١٨،٨ ملليمتر عند متوسط طول ٥٪.

- قراءة الميكرونيير من ٣،٤-٤،٥

- متوسط وزن الشعرة ١٥٤-١٧٢ ميلليتكس.

- تتراوح متانة الغزل بين ٢٦٨٠-٢٩٨٠ وحدة عند عد ٦٠.

- تصافي الحليج من ٣٧،٦٧٪ - ٣٩،٢٤٪

- يعتبر الصنف جيزة ٨٨ أيضاً عالي المحصول حيث أظهرت تجارب المحصول في سنوات الدراسة الثلاثة أن متوسط محصول القطن الزهر نحو ١٠،١ قنطار/فدان ومتوسط محصول الشعر ١١،٣٦ قنطار/فدان.

- تعتبر الصنف جيزة ٨٨ بديلاً ممتازاً للأصناف جيزة ٧٠ وجيزة ٧٧.

- يتميز الصنف جيزة ٨٨ أيضاً بمقاومته لأمراض الفيوزاريوم.