Minufiya J. Agric. Res. Vol. 28 No. 1: 23 - 30 (2003)

PRODUCTION OF GIZA 89 COTTON VARIETY BREEDER'S SEED UNDER TWO DIFFERENT LOCATIONS OF ITS VARIETAL ZONE

A.F. Lasheen
Cotton Res. Inst., Agric. Res. Center

(Received: Nov., 10, 2002)

ABSTRACT: Twenty-six Giza 89 progenies were evaluated under two different locations of its cultivation areas in 2000 season. Significant mean squares of the progenies and locations were detected for all the studied characters except for lint yield of the progenies, while genotypes by locations interaction was significant only for lint yield. The twenty one best progenies having the variety type were chosen in each location. Nineteen of them were common in both locations which associate in 90.4% of its breeder's seed. However, no detectable differences occurred in the mean performance of the selected best progenies over both locations regarding agronomic and fiber characters, indicating that Giza 89 cultivar adapted well to its cultivated areas in the middle delta zone.

Key words: Breeder's seed, cotton and Giza 89.

INTRODUCTION

Cotton breeders in many parts of the world successfully maintain cotton cultivars by different procedures. In Egypt, varietal maintenance program, which is the breeding of successive waves of new breeder's stock seeds (BS), genetically typical to the variety, provide periodically, as fresh supply of BS which is used to start another wave of seed increases. The scheme is based on the pure line method-pedigree selection for renewing the breeder's stock seed of the cotton cultivars in commercial use (Abdel-Al 1976). Lewis 1970 reported that maintenance procedures did not necessarily imply a constant genetic gain, it could mean only that an attempt to prevent genetic loss. Similar conclusion was reached by El-Kilany, 1976 and 1986 by using different selection procedures for maintaining genetic purity of both G. 69 and Dandara varieties.

Many workers design their testing procedures to minimize the environmental and interaction effects relative to the genotypes by evaluating their materials in more than one environment before making selection, El-Gharabawy *et al.*, 1983; El-Moghazy *et al.*, 1983; Abou-Zahra *et al.*, 1989 and Hemida *et al.*, 2000. This view was adopted by many other researchers who concluded that actual gains estimated across environments were the only accurate criteria for comparing the relative values of selection procedures.

This investigation was carried out on Giza 89 cotton cultivar; early maturing variety allocated to areas in middle delta zone, as best suited to its growth, uniformity, and development with regard to yield and quality, to evaluate its breeding materials for renewing and producing the breeder's stock seed under two sowing locations at Gemmeiza (Gharbiya Governorate) and Tala (Minufiya Governorate).

MATERIALS AND METHODS

The materials used in the present study were raised from breeding plot of Giza 89 cultivar at Gemmeiza Agricultural Research Station. Two selection cycles were made. The first selection cycle was carried out in 1999 season on 60 individual plant selections and their preliminary progeny lines. Selection was operated to choose the best lines, which meet the variety standard's breeder's level, on the basis of visual field evaluations; growth and fruiting behavior and further screened at the laboratory testing for agronomic characters and fiber properties. Twenty-six Giza 89 type progenies out of the 60 ones were selected in the second selection cycle, and became the starting population to select better ones regarding yield trials which held in both Gemmeiza (Gharbiya Governorate) and Tala (Minufiya Governorate), one for each location, in 2000 season. For evaluating the selected twenty-six progenies along with Giza 89/98 and Giza 89/99 strains as controls, a randomized complete block design with four replicates in each location was used. Each progeny plot consisted of five rows, five meters long, 65 cm wide. The hills were spaced 25 cm. a part in the row. The hills were thinned to two plants after full emergence. Harvesting was carried out for three middle rows of each plot. A representative random sample of 25 sound bolls was taken from the first and fifth rows of each plot. data were recorded on a plot mean basis for the determination of:

1. Agronomic characters: Lint yield (L.Y.); estimated as the weight of lint in Kentar per fed. 'K/f", lint percentage % (L.P.%), seed index (S.I. gm) and boll weight (B.W. gm.).
2. Fiber properties: Span length; (S.L. 2.5%) and (S.L. 50%), maturity ratio, micronaire reading (Mic.) and yarn strength (Y.ST.). The analysis of variance for each experiment and the combined analysis for both locations and F-test calculated for the agronomic characters by the appropriate methods recommended by Snedecor 1956.

To test fiber properties, the same routine used at the cotton technology Research Lab. (Cotton Research Institute) at Giza for comparing lint cotton samples in fiber properties was follows. Therefore, a difference in a range of $\pm$ 1/32 inch in fiber length and $\pm$ 5% in yarn strength was neglected (Abo-Sehly, 1959). The twenty one better progenies out of the twenty-six ones were

selected in each experiment (location) on the basis of standard levels of the controls, according to their superiority in varietal type, uniform and development.

RESULTS AND DISCUSSIONS

The analysis of variances of the selected Giza 89 genotypes over two experiments, carried out at Gemmeiza and Tala locations in 2000 season, and the combined data along with the magnitudes of genotypic variances as well as genotypes by locations interaction variances, for the studied agronomic traits, are presented in Table (1).

Progeny mean squares were found to be significant for lint percentage in the combined data, seed index at both Gemmeiza and the combined data and boll weight at Gemmeiza and the combined data, while genotypes by locations interaction was significant only for lint yield.

These results revealed that the behavior of some Giza 89 genotypes, regarding some yield components and fiber properties seemed to be more consistent over its cultivated area. While other Giza 89 genotypes were relatively influenced by environmental fluctuations over the locations for yield, suggesting the importance of evaluating the genetic materials of the variety over more than one location of its variety zone before renewing and producing breeder's stock seed. The actual response to selection procedure according to the standard's variety level (control's mean) applied on G. 89 progenies to select the better ones, in each experiment, are presented in Tables 2 and 3 for agronomic and fiber characters, respectively. However, twenty one better progenies having varietal type, were chosen in each location, nineteen progenies out of the twenty one were common in both locations, under the serial numbers of 1, 3, 5, 6, 7, 10, 11, 12, 14, 16, 17, 18, 19, 20, 21, 22, 23, 24 and 26. These findings indicated that massing the pure seed of the better-selected progenies to produce the breeder's seed in each location would associate in 90.4% of their materials as the results of these experiments variability estimates, of G. 89 selections, measured in terms of means, ranges and coefficient of variability (C.V.%) are presented in Table 4 C.V. values were relatively low in magnitudes for most studied characters over the selection cycles. Lint yield exhibited somewhat high C.V. estimates followed by boll weight.

Table (1): The analysis of variance of yield and some of its components in single location and the combined analysis in 2000 season.

Sources	d.F.		Lint yield (k/f)			Lint percentage %			Seed index (gm)			Boll weight (gm)		
	Single	Comb.	Gem.	Tala	Comb.	Gem.	Tala	Comb.	Gem.	Tala	Comb.	Gem.	Tala	Comb.
Progenies (P)	27	27	0.120	0.043	0.058	0.654	1.568	1.340*	0.363**	0.424	0.581**	0.031*	0.0159	0.027**
Locations (L)	-	1	-	-	95.72**	-	-	123.46**	-	-	25.72**	-	-	5.434**
P. x L.	-	27	-	-	0.104*	-	-	0.881	-	-	0.206	-	-	0.020
Replicates	3	6	0.517**	0.6**	0.558**	1.227**	1.49	1.358*	0.11	0.52*	0.315	0.043**	0.027**	0.035**
Error	81	162	0.105	0.029	0.067	0.417	1.217	0.817	0.109	0.316	0.212	0.018	0.011	0.014

*, ** significant at 0.05 and 0.01 levels, respectively.

Table (2): Performance of yield and its contributing variables of Giza 89 progenies and controls grown over two different locations and their combined in 2000 season.

No.	Progenies	Lint yield (k/f)			Lint percentage %			Seed index (gm)			Boll weight (gm)		
		Gem.	Tala	Comb.	Gem.	Tala	Comb.	Gem.	Tala	Comb.	Gem.	Tala	Comb.
1	1/98-13#*	20.35	19.07	19.71	38.3	37.6	38.0 bc	13.1 a	11.6	12.4 b	3.4 c	3.2	3.3 c
2	398-5#	19.7	16.15	17.93	37.8	37.5	37.7 c-f	12.8 bc	12.0	12.4 b	3.4 c	3.3	3.4 b
3	3/98-7#*	17.96	17.20	17.58	37.8	37.4	37.5 ef	12.2 e-g	11.3	11.8ef	3.3 d	3.3	3.3 c
4	3//98-10	16.28	14.51	15.40	36.9	37.8	37.4 f	12.6 cd	12.5	12.6 a	3.4 c	3.1	3.3 c
5	6/98-15#*	20.03	19.18	19.61	38.3	37.8	38.1 ab	12.4 de	11.6	12.0 cd	3.3 d	3.0	3.2 d
6	6/98-19#*	18.48	17.66	18.07	37.4	37.6	37.5 ef	12.4 de	11.5	12.0 cd	3.3 d	3.0	3.2 d
7	7/98-14#*	17.25	18.13	17.69	37.6	37.5	37.6 d-f	12.7 bc	11.9	12.3 b	3.5 b	3.0	3.3 c
8	10/98-5#	17.89	15.44	16.67	38.2	37.3	37.8 b-e	12.4 de	11.6	12.0 cd	3.5 b	3.0	3.3 c
9	17/98-1 *	16.67	17.78	17.23	37.8	37.5	37.7 c-f	12.6 cd	12.2	12.4 b	3.4 c	3.1	3.3 c
10	17/98-3#*	18.35	19.30	18.83	37.6	37.7	37.7 c-f	12.6 cd	11.9	12.3 b	3.4 c	3.1	3.3 c
11	17/98-5#*	18.86	18.00	18.43	38.3	37.4	37.8 b-e	12.1 fg	11.8	12.0 cd	3.3 d	3.1	3.2 d
12	17/98-9#*	17.18	19.42	18.30	38.1	38.0	38.1 ab	12.4 de	11.4	11.9 de	3.4 c	3.1	3.3 c
13	17/98-10 *	16.21	18.00	17.11	38.7	38.0	38.4 a	12.4 de	11.7	12.1 c	3.5 b	3.0	3.3 c
14	17/98-17#*	18.41	18.13	18.27	38.1	37.7	37.9 b-d	12.7 bc	11.5	12.1 c	3.7 a	3.2	3.5 a
15	19/98-1	16.21	19.18	17.70	37.7	38.3	38.0 bc	12.8 bc	11.9	12.4 b	3.4 c	3.2	3.3 c
16	18/98-7#*	19.25	17.31	18.28	38.0	37.9	38.0 bc	12.0 g	11.7	11.9 de	3.3 d	3.1	3.2 d
17	18/98-10#*	18.48	17.43	17.96	37.2	37.8	37.5 ef	12.7 bc	11.9	12.3 b	3.5 b	3.0	3.3 c
18	18/98-15#*	17.70	17.78	17.74	37.7	37.8	37.8 bc	12.9 ab	12.5	12.7 a	3.4 c	3.0	3.2 d
19	19/98-3#*	19.25	17.43	18.34	38.2	37.9	38.1 ab	12.4 de	11.7	12.1 c	3.4 c	3.0	3.2 d
20	24/98-7#*	17.25	17.56	17.40	38.0	37.4	37.6 d-f	12.6 cd	12.2	12.4 b	3.4 c	3.2	3.3 c
21	25/98-6#*	17.96	19.18	18.57	37.4	38.4	37.9 b-d	12.3 ef	11.7	12.0 cd	3.3 d	3.0	3.2 d
22	26/98-9#*	19.57	18.25	18.91	37.6	37.5	37.5 ef	12.0 g	11.8	11.9 de	3.4 c	3.0	3.2 d
23	26/98-13#*	18.48	17.08	17.78	37.4	37.8	37.8 d-f	12.2 e-g	11.6	11.9 de	3.4 c	3.0	3.2 d
24	26/98-14#*	18.15	18.36	18.26	37.5	37.7	37.6 d-f	12.4 de	11.4	11.9 de	3.4 c	3.0	3.2 d
25	31/98-1	17.83	16.26	17.05	38.1	37.0	37.6 d-f	11.7 h	11.6	11.7 fg	3.3 d	3.0	3.2 d
26	31/98-15#*	17.57	17.31	17.44	38.0	37.6	37.8 b-e	12.0 g	11.2	11.6 g	3.4 c	3.0	3.2 d
27	G89/98(cont.)	17.51	18.25	17.88	37.8	37.6	37.7 c-f	12.2 e-g	11.6	11.9 de	3.3 d	3.1	3.2 d
28	G89/99 (cont.)	17.44	17.08	17.26	37.4	37.8	37.6 d-f	12.3 ef	11.5	11.9 de	3.3 d	3.1	3.2 d

#, * selected at Gemmeiza and Tala, respectively.

Table (3): Performance of fiber properties of G. 89 progenies and controls grown over two different locations in 2000 season.

No.	Progenies	Spain length 2.5%		Spain length 50%		Maturity %		Micronaire		Yarn St.	
		Gem.	Tala	Gem.	Tala	Gem.	Tala	Gem.	Tala	Gem.	Tala
1	1/98-13#*	33.5	32.4	16.5	16.0	89	87	4.5	4.5	2060	2240
2	398-5#	34.0	31.8	17.0	15.6	88	87	4.4	4.3	2285	2370
3	3/98-7#*	32.0	33.0	16.0	16.3	87	85	4.5	4.4	2140	2270
4	3//98-10	32.5	32.0	16.0	15.6	88	83	4.5	4.3	2105	2240
5	6/98-15#*	33.0	30.8	15.6	15.3	89	85	4.6	4.4	2180	2240
6	6/98-19#*	32.2	32.0	15.6	16.0	90	84	4.6	4.4	2150	2260
7	7/98-14#*	32.5	32.5	16.2	15.7	89	79	4.5	4.4	2115	2200
8	10/98-5#	32.0	32.8	16.0	15.9	89	81	4.7	4.	2040	2275
9	17/98-1 *	33.0	32.5	16.2	15.7	89	81	4.4	4.2	2225	2075
10	17/98-3#*	33.0	30.6	16.3	15.5	86	83	4.4	4.4	2120	2060
11	17/98-5#*	33.5	32.0	16.8	16.0	84	84	4.5	4.4	2285	2170
12	17/98-9#*	33.5	32.2	16.5	16.0	84	84	4.6	4.4	2320	2070
13	17/98-10 *	32.8	32.2	16.5	16.0	84	85	4.6	4.4	2240	2270
14	17/98-17#*	33.0	32.0	16.3	16.0	85	82	4.5	4.3	2335	2280
15	19/98-1	33.0	31.8	16.5	15.5	84	85	4.5	4.3	2390	2000
16	18/98-7#*	33.5	32.5	16.5	16.0	84	81	4.4	4.5	2490	2110
17	18/98-10#*	34.0	32.8	17.0	16.0	83	84	4.4	4.5	2380	2040
18	18/98-15#*	33.5	32.0	16.7	16.0	85	86	4.6	4.3	2310	2210
19	19/98-3#*	33.5	31.8	16.4	15.5	87	86	4.6	4.3	2285	2230
20	24/98-7#*	33.3	31.8	16.4	15.5	88	82	4.5	4.2	2275	2110
21	25/98-6#*	33.6	32.5	16.9	16.2	86	80	4.5	4.5	2355	2360
22	26/98-9#*	33.6	32.3	16.8	15.8	90	81	4.5	4.4	2305	2380
23	26/98-13#*	34.0	32.1	16.7	16.1	88	78	4.5	4.4	2140	2255
24	26/98-14#*	32.5	31.0	15.8	15.6	86	81	4.4	4.4	2220	2330
25	31/98-1	33.8	32.5	17.1	16.2	84	79	4.5	4.4	2305	2030
26	31/98-15#*	34.0	31.5	17.0	15.3	85	81	4.4	4.4	2180	23070
27	G89/98(cont.)	33.8	32.5	16.8	16.0	87	84	4.5	4.3	2265	2200
28	G89/99 (cont.)	33.5	32.0	16.7	15.8	85	80	4.5	4.3	2170	2225

#, * selected at Gemmeiza and Tala, respectively.

Table (4): Comparison between ranges, means and coefficient of variability values (C.V.%) of base G. 89 progenies (1999), their better selections (2000) and breeder's seed (BS) produced in 2001 seasons over two locations for:

A. Agronomic characters

Characters	Lint yield (k/f)		Lint percentage %		Seed index (g)		Boll weight (g)	
Location	Gem.	Tala	Gem.	Tala	Gem.	Tala	Gem.	Tala
Base pop. (60 pro. rows) in 1999								
Range			35.6-40.0		9.6-11.4		2.8-3.7	
X			37.4		10.4		3.2	
C.V. %			2.49		4.16		6.35	
Primarily selection cycle (26 pro.)								
Range	16.21-20.35	14.51-19.42	36.9-38.7	37.0-38.4	11.7-13.1	11.2-12.5	3.3-3.7	3.0-3.3
X	18.13	17.76	37.9	37.7	12.4	11.8	3.4	3.1
C.V. %	11.57	11.20	1.81	2.96	2.66	4.80	3.95	3.38
Secondary selection cycle (21 pro.) in 2000								
Range	17.18-20.35	17.08-19.42	37.2-38.3	37.4-38.4	12.0-13.1	11.2-12.5	3.3-3.7	3.0-3.3
X	18.48	18.07	37.8	37.7	12.4	11.7	3.4	3.1
C.V. %	5.00	4.15	0.92	0.65	2.47	2.68	2.79	2.97
Evaluated breeder's seed (BS) (New stock)	18.08	17.93	37.8	37.5	12.3	11.6	3.2	3.2

***K = kentar = 50 kg**

Table (4): Continued.

B. Fiber properties

Characters	Spain length (2.5%)		Spain length (50%)		Maturity %		Micronaire		Yarn St.	
Location	Gem.	Tala	Gem.	Tala	Gem.	Tala	Gem.	Tala	Gem.	Tala
Base pop. (60 pro. rows) in 1999										
Range	31.0-32.6		15.5-16.6		77-88		3.8-4.2		2000-2350	
X	31.9		16.0		82		4.0		2162	
C.V. %	1.13		1.61		2.84		4.38		3.95	
Primarily selection cycle (26 pro.)										
Range	32.0-34.0	30.6-33.0	15.6-17.0	15.3-16.3	83-90	78-87	4.4-4.7	4.1-4.5	2040-2490	2000-2380
X	33.2	32.1	16.5	15.8	86	83	4.5	4.4	2240	2198
C.V. %	1.83	1.77	2.34	1.74	2.50	3.02	1.76	2.19	4.83	4.94
Secondary selection cycle (21 pro.) in 2000										
Range	32.0-34.0	30.6-33.0	15.6-17.0	15.3-16.3	83-90	78-87	4.4-4.7	4.2-4.5	2040-2490	2040-2380
X	33.3	32.0	16.4	15.8	87	83	4.5	4.4	2237	2201
C.V. %	1.89	1.94	2.68	1.83	2.49	2.97	1.92	1.97	5.15	4.70
Evaluated breeder's seed (BS) (New stock)	32.8	32.0	16.4	16.0	87	86	4.0	4.0	2235	2185

Generally it is worth to notice that no detectable changes occurred in the mean performance of lint yield or any of its components and fiber properties due to selection, relative to the base population, carried out over two different locations of Giza 89 variety zone in 2000 season, indicating that Giza 89 cultivar was adopted well in its cultivated areas in middle delta zone.

These results are in line with the statements of Lewis 1970 who reported that maintenance procedures did not necessarily imply a constant genetic gain, it could mean only that an attempt have been made to prevent genetic loss. Also, in terms of utility in a breeding program for maintaining varietal purity for yield and its contributing variables as well as fiber properties, used by cotton varietal Maintenance Section, Cotton Res. Inst., for renewing and producing breeder's seed of cotton cultivars is valid and recommended.

REFERENCES

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

Abo-Sehly, A.H. (1959). Accuracy of instruments used in the routine work at cotton fiber and yarn testing section. 2nd Cotton Con. Book High. Res. Coun., Egypt; 7-9 Apr. 1958, p. 568-585 (In Arabic).

Abou-Zahra, S.I.S., H.Y. Awad and A.M. Khattab (1989). Evaluation of some strains of long staple cotton hybrids at different locations. Agric. Res. Rev., Egypt. 67(5): 687-693.

El-Gharabawy, M. A., M. El-Moghazy, H. Y. Awad and M. K. El-Taweel (1983). Evaluation of some strains of medium staple cotton hybrids compared with cultivated cultivars at different locations. 1- Seed cotton yield and its contributing variables. Agric. Res. Rev., Egypt, 61(9): 79-95.

El-Kilany, M.A. (1976). Comparative studies of selection techniques in developing and maintaining Egyptian cotton. Ph.D. Thesis, Fac. Agric. Univ. Cairo, Egypt.

El-Kilany, M.A. (1986). Selection procedures for maintaining Egyptian cotton, *Gossypium barbadense* L., Comm. Sci. Dev. Res. 15(176): 165-191.

El-Moghazy, M., M. A. El-Gharabawy, H. Y. Awad and M. K. El-Taweel (1983). Evaluation of some strains of medium staple cotton hybrids compared with cultivars at different locations. 2- Lint yield and fiber properties. Agric. Res. Rev., Egypt, 61(9): 97-111.

Hemida, G. M., M. A. Nagib and A. F Lasheen (2000). production of Giza 80 breeder's seed under two different locations of its varietal zone. Minufiya J. Agric. Res., Egypt, 25(3): 627-636.

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

Snedecor, G.W. (1956). Statistical methods. Iowa State Univ. Press, Ames, Iowa.

إنتاج بذره المربى لصنف القطن جيزه ٨٩ تحت ظروف منطقتين من مناطق زراعة الصنف

أنور فوزي لاشين

معهد بحوث القطن ــ مركز البحوث الزراعية

المخلص العربي

يقـام برنامج تجديد وإنتاج بذره المربى لصنف جيزه ٨٩ سنويا بمحطة البحوث الزراعية بالجميزه.

وتتضمن هذه الدراسة تقييم ٢٦ نسلا منتخبا من برنامج تجديد الصنف فى تجربة قطاعات كاملـة العشـوائية فـى ٤ تكرارات أقيمت فى كل من منطقتي الجميزة بمحافظة الغربية وتلا بمحافظة المنوفية موسم ٢٠٠٠م.

وتم انتخاب أفضل الأنسال فى كل تجربة لتكوين بذره المربى للصنف.

اشـتملت الدراسـة علـى تقييم صفات محصول الشعر ومكوناته ، ووزن اللوزة ومعامل الـبذرة ونسبة الحليج كما قدرت صفات طول التيله وقراءة الميكرونير والنضج ومتانة الشله. أجرى التحليل المشترك للمنطقتين لصفات المحصول ومكوناته كما تم تقسيم التباين الكلى على مكوناته وحساب التفاعل المشترك بين الأنسال والمناطق.

أظهـرت الدراسة معنوية الفروق بين المتوسطات للأنسال لمعظم الصفات المدروسة فيما عـدا صفة محصول القطن الشعر فى كلا المنطقتين كما أظهر التحليل المشترك معنوية التفاعل بين السلالات والمناطق لصفة محصول القطن والشعر.

أتبعـت طريقة الانتخاب المستقل للصفات المحصولية وصفات التيلة والغزل لاختيار أفضل الأنسال فى كلا المنطقتين. وقد تفوق ١٩ نسل مشتركة فى كلا المنطقتين من مجموع ٢١ نسلا متميزا تم انتخابهم في كل منطقة لتكوين بذره المربى للصنف موضحة أن بذره المربى الجديدة للصنف تكونت من أنسال أثبتت تفوقها فى كلا المنطقتين.

وبمقارنـة بـذره المربى التى تم إنتاجها مع أحدث سلالات الصنف موسم ٢٠٠١م إتضح بصفة عامة تماثل سلوك الصفات فى كلا من منطقتي زراعة الصنف.