RESULTS AND DISCUSSION

The results reported in this investigation include the evaluation of twelve Egyptian cotton cultivars and three promising strains tested in the three year (1992, 1993 and 1994) at ten different locations in order to study their genotype x environment interaction, heritability, genetic coefficient of variability and degree of genotypic stability.

I- Mean squares of genotypes, years, locations and the interactions between them on :-

I. A. yield and yield components :-

The combined analysis of variance for 15 Egyptian cotton genotypes in 30 environment (ten locations and three years) is presented in Table (3). It is clear that environment exhibited highly significant effect on seed cotton yield and its components (boll weight, number of bolls per plant, lint percentage, lint index and seed index). It is clear that environmental influence associated with locations and years contributed more than genotypes to variation of seed cotton yield, boll weight, number of bolls per plant and seed index. The location effect was significant for seed cotton yield and lint yield and highly significant only for lint percentage, but non significant for the other characters (boll weight, number of bolls per plant, lint index and seed index). On the other hand, years effect was significant or highly significant for all traits except number of bolls per plant and lint percentage.

The first-order interactions of genotypes x years and genotypes x locations were insignificant only for boll weight, indicating that locations and years had no consistent location effect or year effects on differential varietal response. However, the significant first-order interactions of genotypes by years and genotypes by locations for the other characters, indicated that genotypes tended to rank consistently different in the ten locations of testing in different years.

Table 3 . Mean squares for yield and yield components for 15 genotypes grown at ten locations for three years (1992 to 1994).

Source of variation	Seed cotton yield (K/Fed.)	Lint yield (K/Fed.)	Boll weight (g)	Number of bolls/plant (NO.)	Lint percentage %	Lint index (g)	Seed index (g)
Location (L.)	173.40*	203.88*	3.84	388.52	264.35**	22.70	33.69
Years (Y.)	298.39*	516.73**	13.49*	638.90	140.64	119.99**	241.97**
Loc. X Y.	59.68**	79.33**	2.68**	207.69**	60.73**	10.14**	15.82**
Reps in exper.	6.80**	9.39**	0.06**	8.81**	1.16**	0.26**	0.75**
Genotype (G.)	98.64**	239.56**	1.94**	97.39**	689.95**	58.97**	24.96**
G. X Y.	5.56**	7.31**	0.06	8.71**	4.88**	0.52**	1.27**
G. X L.	7.49**	10.96**	0.09	9.78**	2.07*	0.28	0.82*
G. X L. X Y.	2.75**	3.97**	0.08**	4.45**	1.59**	0.25**	0.57**
Error	1.10	1.58	0.03	1.66	0.72	0.12	0.31
STABILITY MEASUREMENTS							
Environment (Env.)	111.44**	148.15**	3.79**	293.56**	129.39**	21.62**	36.96**
G. X Env.	4.42**	6.37**	0.08**	6.40**	1.97**	0.28**	0.70**
Env. + (G.X Env.)	11.55	15.82	0.32	25.54	10.47	1.70	3.11
Env. (Linear)	3231.57	4296.20	109.84	8513.11	3751.89	626.92	1071.91
G. X Env. (Linear)	5.51	7.03	0.08	12.62*	5.74**	0.70**	1.08
Pooled deviation	4.08**	5.92**	0.07**	5.76**	1.72**	0.25**	0.64**
Pooled Error	1.48	2.10	0.03	2.14	0.75	0.13	0.34

* , ** Significant at the 0.05 and 0.01 probability levels, respectively .

The second-order interactions of genotypes x locations x years were highly significant for all traits of seed cotton yield and yield components. This means that significant portion of the interaction exhibited by these traits was not attributable to years or locations alone and that it is essential to test cotton genotypes over a number of different environments (years and locations) in the growing areas to obtain reliable estimates of genotypes relative performances for these traits.

These results confirm the findings of **Miller *et al.* (1958, 1959 and 1962), Abou El-Fittouh *et al.* (1969), El-Sanhoury (1970), Murray and Verhalen (1970), Meredith and Bridge (1973), Turner *et al.* (1976), El-Kadi *et al.* (1978), El-Marakby *et al.* (1986), El-Shaarawy *et al.* (1988), Bader (1992) and Idris (1995).** These results indicated that cotton as well as other crop varieties often showed differential responses when grown under different locations.

I. B. Fiber properties :-

The combined analysis of variance for 15 Egyptian cotton cultivars studied in 30 environments (ten locations and three years) is presented in Table (4). It is clear that environments exhibited highly significant effects on fiber properties (micronaire reading, fiber strength and fiber length). The location effects were significant for fiber strength and fiber length (2.5 % and 50 % span length), but nonsignificant for micronaire reading. Whereas, years effect was highly significant for all traits, except fiber strength trait.

The first-order interactions; genotypes x years and genotypes x locations were significant for all fiber properties, indicating that most of genotypes tended to rank consistently different in the ten locations of testing in different years.

The second-order interactions of genotypes x locations x years were highly significant for micronaire reading and fiber strength. This means that significant portion of the interaction exhibited by these traits was not attributed to years or to locations alone, that it is essential to test cotton genotypes over a number of different environments in the growing areas to obtain reliable estimates of genotypes relative

Table 4 . Mean squares for fiber properties for 15 genotypes grown at ten locations for three years (1992 to 1994).

Source of variation	Micronaire Reading	Fiber strength Pressley index	Fiber length (mm.) 2.5% S.L .	50% S.L .
Location (L.)	5.047	9.174**	43.156**	17.134**
Years (Y.)	32.081**	3.307	215.456**	233.875**
Loc. X Y.	3.561**	3.130**	7.125**	5.342**
Reps in exper.	0.147**	1.157**	1.634**	1.507**
Genotype (G.)	11.886**	53.136**	370.879**	87.449**
G. X Y.	0.195**	0.971**	1.628**	1.618**
G. X L.	0.151**	0.683*	1.841**	0.759**
G. X L. X Y.	0.097**	0.496**	0.743	0.489
Error	0.040	0.246	0.715	0.429
	STABILITY MEASUREMENTS			
Environment (Env.)	5.987**	4.998**	32.776**	24.763**
G. X Env.	0.120**	0.588**	1.135**	0.650**
Env. + (G.X Env.)	0.511	0.882	3.247	2.258
Env. (Linear)	173.634	144.937	950.790	718.051
G. X Env. (Linear)	0.244**	0.630	1.950*	1.626**
Pooled deviation	0.108**	0.547**	1.034**	0.575**
Pooled Error	0.047	0.307	0.776	0.501

* , ** Significant at the 0.05 and 0.01 probability levels, respectively .

performance for these traits. The significant genotypes x environments interaction indicates that these genotypes should be grown in the most suitable locations. It is also essential to determine the degree of genotypic stability for each genotype separately.

The significant genotype x environment interactions for fiber properties observed in the present data are in agreement with previous reports by **Miller *et al.* (1958, 1959 and 1962), Abou El-Fittouh *et al.* (1969), El-Sanhoury (1970), Murray and Verhalen (1970), El-Marakby *et al.* (1986), Abou-Alam *et al* (1988), Abo El-Zahab *et al.* (1992 b), Badr (1994) and Idris (1995).**

II- Averages of cotton genotypes, locations, years and the interactions between these factors :-

II . A . Effect of genotypes :-

II . A . 1 . *Varietal effect on yield and yield components* :-

Results shown in Table (3) revealed that varieties had highly significant effect on all traits. With reference to table (5), it is clear that means of genotypes over locations and over years showed that the highest seed cotton yield was recorded by the promising strain Giza 75 x Rus. 6022 and Giza 85 (7.97 and 7.94 K/F), respectively and the differences between them were not significant. The lowest seed cotton yield (4.80 K/F) was produced by Giza 45 with significant differences between it and other genotypes.

Regarding lint yield character, the highest values were obtained by Giza 83, Giza 85 and the promising strain Giza 75 x Rus. 6022 with 9.92, 9.58 and 9.28 K/F, respectively. The change in ranks of varieties between seed yield and lint cotton yield was due to differences in lint percentage. The Giza 83 variety possessed the highest lint percentage among the examined cultivars (table 5), but Giza 45 gave the lowest lint yield (5.06 K/F).

Regarding boll weight character, it was obvious that the commercial varieties; Giza 85, Giza 75 and Giza 86 surpassed the other varieties and gave boll weight values of 2.91, 2.90 and 2.88 gm, respectively, while Giza 45 and Giza 84 exhibited the lowest boll weight (2.52 and 2.56 gram, respectively). Concerning the number of bolls per plant, the promising strain Giza 75 x Rus. 6022 gave the highest boll number (12.67), while Giza 45 still had the lowest number of bolls. From these results it can be seen that seed cotton yield was affected by boll weight and/or number of bolls per plant because the two high yielding genotypes Giza 75 x Rus. 6022 and Giza 85 were characterized by high boll weight and/or high number of bolls per plant. While the low yielding genotype Giza 45 had low boll weight and low number of bolls per plant.

With respect to lint percentage, the 15 genotypes could be classified into three groups. The first group included Giza 83 and Giza 80 having the highest value of lint percentage (41.4 and 40.9%, respectively). The second group contained Dendera, Giza 70, Giza 75, Giza 77, Giza 81, Giza 85, Giza 86, (Giza 75 x Rus. 6022) and Giza 77 x Giza 45B with average values in the range of 36.4 to 38.9 % and the third group included Giza 45, Giza 76, Giza 84 and Giza 77 x G.45 A having the lowest values of lint percentage (32.8 to 35.o %).

Regarding lint index character, Giza 80 gave the highest value (7.11 g.). Giza 77 x Giza 45A genotype exhibited the lowest value (4.85 g.) and this could explain the low lint percentage obtained by this genotypes.

Apparently, Giza 86, Dendera and Giza 75 cultivars had the highest values of seed index 10.91, 10.81 and 10.77 g, respectively.

These results are in agreement with those obtained by **Kalsy and Singh (1974), El-Kadi *et al.* (1978), Abd El-Wahid (1987), Abd El-Rahman and El-Mazar (1987), Abou-Alam *et al.* (1988), Abo El-Zahab *et al.* (1992) and Badr (1994)**. They stated that seed cotton yield and boll weight were significantly affected by genotype. Results were also in agreement with those of **Hosny (1974), Thomson and Cunningham (1979), Abou-Alam et al (1988), Badr (1994) and Idris (1995)**, they reported that the genotype had significant effect on lint percentage. **Miller *et al.* (1958), Meredith and Bridge (1973), Abou-Tour *et al.* (1991), Abo El-Zahab *et***

Table 5 . Mean varietal performance for eleven yield and fiber traits averaged over ten locations and three years, (1992 to 1994) .

Genotypes	Seed cotton yield (K./Fed.)	Lint yield (K./Fed.)	Boll weight (g)	Number of bolls/plant (No.)	Lint percentage (%)	Lint index (g)	Seed index (g)	Micronaire reading unit	Fiber strength (Pressley)	Fiber length 2.5% (mm.)	Fiber length 50% (mm.)
Dendera	6.90	8.01	2.61	11.60	36.96	6.34	10.81	3.61	9.26	30.02	14.84
Giza 45	4.80	5.06	2.52	9.30	33.68	5.19	10.21	3.02	10.44	34.49	16.95
Giza 70	5.82	6.69	2.67	10.21	36.38	5.64	9.84	3.42	10.92	34.68	17.11
Giza 75	7.27	8.55	2.90	11.24	37.50	6.46	10.77	3.92	10.59	31.59	15.77
Giza 76	5.53	6.06	2.66	9.84	35.01	5.17	9.59	3.15	10.85	34.05	16.82
Giza 77	6.45	7.55	2.63	11.08	37.32	5.87	9.83	3.36	10.72	34.08	16.99
Giza 80	7.10	9.08	2.82	11.25	40.89	7.11	10.25	3.82	9.51	31.04	15.26
Giza 81	6.87	8.25	2.81	10.99	38.34	6.25	10.04	3.83	10.28	31.12	15.37
Giza 83	7.66	9.92	2.77	12.10	41.36	6.81	9.64	3.61	8.90	30.44	14.92
Giza 84	7.15	7.75	2.56	12.11	34.59	5.36	10.12	3.21	11.01	32.98	16.60
Giza 85	7.94	9.58	2.91	11.93	38.49	6.60	10.54	3.62	9.91	29.85	15.13
Giza 86	7.43	9.06	2.88	11.43	38.85	6.94	10.91	3.78	10.40	33.15	16.50
Giza 75 X Rus. 6022	7.97	9.28	2.70	12.67	37.21	5.65	9.52	3.77	9.85	31.64	15.57
Giza 77 X Giza 45 A	6.03	6.23	2.58	10.65	32.83	4.85	9.89	2.92	10.79	34.44	16.88
Giza 77 X Giza 45 B	6.78	7.93	2.68	11.31	37.31	5.85	9.80	3.37	10.98	33.97	16.85
Mean	**6.78**	**7.93**	**2.71**	**11.18**	**37.11**	**6.01**	**10.12**	**3.49**	**10.29**	**32.50**	**16.10**
L.S.D. 0.05	0.42	0.51	0.07	0.54	0.32	0.13	0.19	0.08	0.18	0.22	0.18

al. (1992 a) and **Badr (1994)**, reported similar results for lint index, **Meredith and Bridge (1973), Turner *et al.* (1976) and Seyam *et al.* (1994 a)** for seed index and **Gill and Singh (1982) and Shafshak *et al.* (1993 a)** for number of bolls per plant.

II . A .2 ***Varietal effect on fiber properties*** **:-**

Results presented in table (4) indicated that all studied fiber properties were significantly affected by genotypes.

With reference to table (5), it can be seen that the highest micronaire reading was recorded by Giza 75 (3.92), while the lowest value was obtained by Giza 77 x Giza 45A (2.92) and the difference between these two genotypes was significant.

The promising strain Giza 77 x Giza 45 B, Giza 70 and Giza 84 genotypes had the highest values for pressely index. They attained a fiber strength of 10.98, 10.93 and 11.01 respectively, while Giza 83 gave the lowest value of fiber strength (8.90).

With respect to fiber length, the commercial genotypes Giza 70 and Giza 45 produced the longest fiber length with (34.68 and 34.49 mm.) for 2.5 % and (17.11 and 16.95 mm.) for 50 % span length, respectively. While Dendera and Giza 85 had the shortest fiber length of 30.02 and 29.85 mm. for 2.5 % respectively. Dendera and Giza 83 gave the lowest 50 % span length, which averaged 14.84 and 14.92 mm. respectively.

From the previous presentation, it is evident that each cultivar possessed a distinct characteristics in almost all fiber properties. The significant differences observed in the above traits are due to the genetical differences between genotypes.

These results go in line with those obtained by Hosny (1974), **Eweida *et al.* (1984), Gutierrez and El-Zik (1992), shafshak *et al.* (1993 b) and Idris (1995)** who concluded that the micronaire reading and fiber strength were significantly affected by the genotypes.

Miller ***et al.*** **(1959), Murray and Verhalen (1970), Hosny (1974), Ewieda** ***et al.*** **(1984), Abo El-Zahab** ***et al.*** **(1992 b), Badr (1994) and Idris (1995)** who concluded that the 2.5 % and 50 % span length were significantly subject to varietal differences.

II. B. Effect of years on :-

II. B. 1. ***yield and yield components*** **:-**

Results presented in Table (3) revealed that the years had significant effect on the studied characters, except numbers of bolls per plant and lint percentage. Results in Table (6) are the averages of the three years of the study. Evidently some characters, namely, seed cotton yield, lint yield, boll weight, lint index and seed index were significantly variable across years. The highest mean values occurred in the second year (1993). while, the lowest values were recorded in the third year (1994). Non significant differences between the three years were found for number of bolls per plant and lint percentage.

The significant differences in the studied traits may be due to difference in the environmental elements; temperature and humidity between the three years. The attained results were in agreement with those found by **Abou-Zahra** ***et al.*** **(1986) Gutierrez and El-Zik (1992), Badr (1994) and Idris (1995)** for seed cotton yield and boll weight. **El-Sanhoury (1970) and Hosny (1974)** for lint percentage. **Abo El-Zahab** ***et al.*** **(1992 a) and Badr (1994)** for seed index.

II . B . 2 . Fiber properties :-

Results in Table (6) present the averages of the three years of study. Higher mean values for micronaire reading and 50% span length, occurred in the second year (1993), while the lowest values were for the characteristics of the third year (1994). Insignificant differences between the three years were found in fiber strength.

From the previous results it could be concluded that the environmental conditions significantly affected most of the investigated fiber properties.

Table 6 . Effect of years on eleven yield and fiber traits average over ten locations and three years, (1992 to 1994) .

Genotypes	Seed cotton yield (K./Fed.)	Lint yield (K./Fed.)	Boll weight (g)	Number of bolls/plant (No.)	Lint percentage (%)	Lint index (g)	Seed index (g)	Micronaire reading unit	Fiber strength (Pressley)	Fiber length 2.5% (mm.)	Fiber length 50% (mm.)
1992	6.86	8.16	2.67	11.19	37.58	6.07	10.03	3.52	10.32	32.90	16.38
1993	7.44	8.73	2.88	12.21	37.14	6.42	10.79	3.71	10.21	32.80	16.54
1994	6.04	6.92	2.59	10.14	36.62	5.53	9.53	3.25	10.34	31.81	15.39
Mean	**6.78**	**7.93**	**2.71**	**11.18**	**37.11**	**6.01**	**10.12**	**3.49**	**10.29**	**32.50**	**16.10**
L.S.D. 0.05	0.94	1.08	0.20	------	------	0.39	0.48	0.23	-----	0.32	0.28

The present results are in agreement with those reported by **Gutierrez and El-Zik(1992) and Idris (1995)** for micronaire reading and fiber strength. **Badr (1994)** and **Idris (1995)** for fiber length.

II . C . Effect of locations on :-

II . C . 1 . *yield and yield components* :-

Results presented in Table (3) revealed that the locations had significant effect on seed cotton yield, lint yield and lint percentage.

Results in Table (7) indicate the averages of seed cotton yield and some related characters of cotton as affected by different locations. Overall average combined over the 15 genotypes as well as over the three years showed that the highest seed cotton yield and lint yield were produced at El-Faiyum (8.21 and 9.67 K/F, respectively). On the other hand, El-Minia gave the lowest production being 5.10 and 5.93 K/F for seed cotton yield and lint yield, respectively. Seed cotton and lint yields were higher at El-Faiyum than at El-Minia location by 61%, respectively. With respect to boll weight, El-Faiyum and El-Beheira gave the highest weight of boll (2.96 and 2.94 g.) respectively, while the lowest value of this trait was 2.53 g. at Assuit.

The number of bolls character ranged from 9.4 bolls at El-Minia to 13.6 bolls at El-Faiyum. With respect to lint percentage, it can be seen that the highest lint percentage was produced at Dakahlia (38.9%) and the lowest value was produced at Assuit (35.2%). Lint percentage was higher at Dakahlia than at Assuit by 10.4%.

Lint index reached 6.54 g. at El-Beheira and was as low as 5.46 g. for Assuit but higher for El-Beheira than that at Assuit by 19.8%.

With regard to seed index, it varied from 9.56 g. at Kafr El-Sheikh to 10.84 g. at El-Faiyum, and was higher at El-Faiyum than that at Kafr El-Sheikh by 13.4%.

From the pervious results, it could be noticed that among locations studied El-Faiyum excelled other locations for most seed cotton yield and yield components characters.

Table 7 . Effect of the ten locations on eleven traits for 15 genotypes over three years,(1992 to 1994) .

Locations	Seed cotton yield (K./fed.)	Lint yield (K./fed.)	Boll weight (g)	Number of bolls/plant (No.)	lint percentage %	Lint index (g)	Seed index (g)	Micronaire reading unit	Fiber strength (Pressley)	Span length 2.5% (m.m.)	Span length 50% (mm.)
Sohag	7.55	8.54	2.69	12.79	35.74	5.86	10.49	3.73	10.73	33.25	16.45
Assuit	7.16	8.03	2.53	11.66	35.21	5.46	9.97	3.40	10.34	32.91	16.15
El - Minia	5.10	5.93	2.61	9.41	36.64	5.79	9.97	3.28	9.93	32.40	15.79
El - Faiyum	8.21	9.67	2.96	13.60	37.10	6.43	10.84	3.74	10.52	33.03	16.49
Gharbia	6.53	7.75	2.74	10.58	37.38	6.11	10.16	3.48	10.29	32.36	15.98
El - Sharkeih	7.77	8.49	2.73	12.67	35.95	5.61	9.92	3.28	10.13	31.64	15.55
Dakahlia	7.28	8.93	2.76	11.25	38.88	6.38	9.95	3.58	10.30	32.40	16.15
Domiatta	5.70	6.92	2.58	10.49	38.28	5.97	9.60	3.37	10.18	31.93	15.84
El - Beheira	6.09	7.31	2.94	9.56	37.82	6.54	10.69	3.60	10.13	32.72	16.29
Kafr El - Sheikh	6.42	7.78	2.59	9.79	38.14	5.92	9.56	3.47	10.40	32.39	16.34
Mean	**6.78**	**7.93**	**2.71**	**11.18**	**37.11**	**6.01**	**10.12**	**3.49**	**10.29**	**32.50**	**16.10**
L.S.D. 0.05	1.71	1.97	-----	-----	1.72	-----	-----	----	0.39	0.59	0.51

Data on soil fertility (Table 1) encouraged the production of the high yield in this location.

These results confirm the findings of **kalsy and Singh (1974), El-Kadi *et al.* (1978), Gill and Singh (1982), El-Marakby *et al.* (1986), Abo El- Zahab *et al.* (1992 a), Gutierrez and El-Zik (1992) and Idris (1995)** for seed cotton yield and lint yield. **Abo El-Zahab *et al.* (1992 a), Shafshak *et al.* (1993 a) and Idris (1995)** reported similar results for lint percentage.

II . C . 2 . <u>Fiber properties</u> :-

Results tabulated in Table (4) reveale that locations had significant effect on the studied characters, except micronaire reading character.

Result in Table (7) showed averages of fiber properties as affected by different locations. The overall averages over genotypes and over years showed that the highest fiber properties (micronaire reading, fiber strength, 2.5% span length and 50% span length) were observed at El-Faiyum and Sohag, while the lowest values were observed at El-Minia and Sharkeih locations.

It was clear that there were differences between locations in regard to these cotton properties (Table 7) indicating that the environment of each location stimulated the expression of fiber properties.

Results are in agreement with **El-Sanhoury (1970), Eweida *et al.* (1984), Abd El-Salam *et al.* (1985), Badr (1994) and Idris (1995)** for fiber length. **Abd El-salam *et al.* (1970), El-Sanhoury (1970), Hosny (1974), Eweida *et al.* (1984), Badr (1995) and Idris (1995)** reported similar results with fiber fineness and fiber strength.

II . D . <u>Effect of (location x year) interaction on</u> : -

II - D. 1 . *yield and yield components* : -

Resultes reported in Table (3) show that there were statistical significant effects due to the interaction of locations and years on seed cotton yield, lint cotton yield, boll weight, number of bolls per plant, lint percentage, lint index and seed index. This shows that the interaction of locations by years affected these characters. With reference to the results in Table (8), the greatest seed cotton yield and lint yield were obtained by growing cotton at Sohag in 1993 year and at El-Faiyum in 1992 year whereas, the lowest yields were obtained at El-Minia in 1994 and El-Gharbia in 1994 year.

With respect to boll weight El-Gharbia in 1993 year, El-Sharkeih in 1993 and El-Beheira in 1993 year produced the highest boll weight (3.10, 3.10 and 3.13 g., respectively), while El-Gharbia in 1994 year recorded the lowest (2.23 g.).

Regarding number of bolls per plant, it could be seen that Sohag in 1993 was the highest in this trait, while El-Minia in 1994 year exhibited the lowest number of bolls per plant.

Two environments gave the highest lint percentage, these were Dakahlia in 1993 year and Damiatta in 1992 year. On the other hand, Assuit in 1993 year and El-Sharkeih in 1992 year gave the lowest lint percentage.

Regarding lint index, Dakahlia in 1993 year and El-Beheira in 1993 year gave the highest lint index, while Assuit in 1993 year, El-Sharkeih in 1992 and 1994 years gave the lowest values.

Seed index character was high at El-Sharkeih in 1993 year and was low at El-Gharbia in 1994 year, El-Sharkeih in 1994 and Damiatta in 1994 year.

These results are in agreement with those reported by **Abo El-Zahab *et al.* (1992 a) Badr (19994) and Idris (1995)** for seed cotton yield, lint yield, boll weight, lint percentage, lint index and seed index.

II . D . 2 . *Fiber properties* : -

Results reported in Table (4) show that there were statistical significance interaction of locations and years for micronaire reading, fiber strength and fiber length.

Table 8 . Averages of eleven characters combined over 15 genotypes grown at ten locations and three years, (1992 to 1994) .

Character Locations	years	Seed cotton yield (K./fed.)	Lint yield (K./fed.)	Boll weight (g)	Number of bolls/plant (No.)	lint percentage %	Lint index (g)	Seed index (g)	Micronaire reading unit	Fiber strength (Pressley)	Span length 2.5% (m.m.)	Span length 50% (mm.)
Sohag	1992	6.16	6.88	2.45	10.14	35.40	5.82	10.58	3.67	10.89	34.24	16.97
	1993	9.36	10.67	2.81	17.48	36.18	6.19	10.86	4.08	10.60	33.16	16.66
	1994	7.12	8.07	2.82	10.73	35.64	5.56	10.02	3.46	10.69	32.35	15.72
Assuit	1992	7.72	9.03	2.54	12.93	36.88	6.01	10.26	3.35	10.42	33.50	16.28
	1993	7.14	7.67	2.36	11.64	33.84	5.10	9.90	3.59	10.23	32.90	16.41
	1994	6.63	7.39	2.70	10.41	34.92	5.27	9.75	3.26	10.37	32.35	15.74
El - Minia	1992	4.83	5.85	2.48	9.40	38.05	5.88	9.55	3.11	9.77	32.44	15.75
	1993	6.64	7.46	2.83	11.77	35.49	5.94	10.75	3.58	10.17	32.78	16.45
	1994	3.83	4.48	2.51	7.07	36.38	5.54	9.61	3.16	9.86	31.96	15.18
El - Faiyum	1992	9.21	10.98	2.86	15.69	37.66	6.53	10.76	3.73	10.37	33.52	16.89
	1993	7.90	9.33	2.99	12.94	37.25	6.60	11.08	3.92	10.41	33.28	16.86
	1994	7.53	8.69	3.02	12.17	36.40	6.14	10.69	3.56	10.77	32.29	15.73
Gharbia	1992	7.66	9.14	2.89	10.57	37.74	6.59	10.81	3.49	10.24	32.94	16.45
	1993	8.12	9.65	3.10	13.60	37.56	6.65	11.02	3.96	9.98	32.78	16.50
	1994	3.80	4.46	2.23	7.57	36.85	5.08	8.66	3.00	10.64	31.36	15.00
El - Sharkeih	1992	6.97	7.54	2.65	11.80	34.11	5.01	9.65	3.11	9.91	31.31	15.18
	1993	8.05	9.52	3.10	12.78	37.42	6.83	11.38	3.72	9.95	32.34	16.19
	1994	8.29	8.42	2.43	13.44	36.31	5.00	8.73	3.02	10.53	31.26	15.27
Dakahlia	1992	7.05	8.80	2.76	10.75	39.47	6.41	9.78	3.53	10.55	33.03	16.80
	1993	7.42	9.27	2.73	11.52	39.64	7.01	10.64	4.05	10.33	32.71	16.61
	1994	7.36	8.73	2.78	11.48	37.54	5.70	9.45	3.16	10.02	31.47	15.03
Domiatta	1992	6.33	7.95	2.54	12.12	39.81	6.11	9.23	3.58	10.27	32.21	16.18
	1993	6.38	7.54	2.89	10.83	37.56	6.56	10.86	3.50	10.13	32.45	16.41
	1994	4.39	5.25	2.31	8.51	37.48	5.25	8.72	3.02	10.14	31.14	14.93
El - Beheira	1992	6.27	7.63	2.98	8.31	38.28	6.53	10.47	3.80	10.09	33.05	16.60
	1993	6.23	7.52	3.13	10.05	38.15	6.91	11.17	3.59	10.05	33.00	16.64
	1994	5.77	6.78	2.72	10.32	37.02	6.17	10.44	3.43	10.23	32.10	15.63
Kafr El - Sheikh	1992	6.42	7.80	2.50	10.17	38.43	5.79	9.25	3.87	10.73	32.75	16.72
	1993	7.16	8.67	2.85	9.45	38.34	6.38	10.23	3.11	10.28	32.58	16.65
	1994	5.67	6.87	2.40	9.75	37.64	5.59	9.20	3.43	10.19	31.84	15.65
Mean		**6.78**	**7.93**	**2.71**	**11.18**	**37.11**	**6.01**	**10.12**	**3.49**	**10.29**	**32.50**	**16.10**
L.S.D. 0.05		0.60	0.72	0.10	0.76	0.45	0.18	0.27	0.11	0.25	0.31	0.25

Averages of the interaction between locations and years (Table 8) showed that Sohag in 1993 year and Dakahlia in 1993 year gave highest micronaire reading, while the lowest micronaire reading was obtained at El-Gharbia in 1994 year and Damiatta in 1994 year. Three environments exhibited the highest fiber strength values, these were Sohag in 1993 year, El-Faiyum in 1994 year and Kafr El-Sheikh in 1992 year, while El-Minia in both 1992 and 1994 years, El-Sharkeih in both 1992 and 1993 years gave the lowest fiber strength.

Concerning the 2.5% span length, Sohag in 1992 recorded the highest value, while the lowest values were found at El-Gharbia in 1994, El-Sharkeih in 1992 and 1994 and Damiatta in 1994 year. Also, for 50 % span length, Sohag in 1992 year gave the highest value, in addition to El-Faiyum in 1992 and 1993 and Dakahlia in 1992 year. On the other hand, the lowest values for the 50% span length were found at El-Minia in 1994 , El-Gharbia in 1994 , El-Sharkeih in 1992 and Dakahlia in 1994 years.

From the previous results, it could be concluded that the mean values of different traits varied from location to another according to the year of production.

These results coincide with the findings of **Badr (1994) and Idris (1995)** for micronaire reading and fiber strength. **El-Kadi *et al.* (1978), Badr (1994) and Idris (1995)** reported similar results with fiber length.

II . E . <u>Effect of genotype x year interaction on</u> : -

II . E . 1 . *yield and yield components* : -

Results shown in Table (3) demonstrate that the variety x year interaction had significant effect on the studied traits, except boll weight. With regard to Table (9), it can be seen that the highest seed cotton yield was achieved by Giza 85 and Giza 75 x Rus. 6022 in the second year (8.80 and 8.41 K/F), respectively. Whereas, the lowest seed cotton yield was produced by Giza 45 in the third year.

Regarding lint cotton yield, results show that Giza 85 and Giza 83 produced the highest lint cotton yield in 1993 year with no significant difference between them.

Table 9 . Effect of cotton genotypes X years interaction on the studied traits over three years combined over ten locations .

Characters	Seed cotton yield (K./Fed.)			Lint yield (K./Fed.)			Boll weight (g)			Number of bolls/plant (No.)			lint percentage %			Lint index (g)		
Genotypes years	1992	1993	1994	1992	1993	1994	1992	1993	1994	1992	1993	1994	1992	1993	1994	1992	1993	1994
Dendera	6.64	7.57	6.50	7.76	8.82	7.44	2.52	2.79	2.51	11.23	12.74	10.82	37.16	37.05	36.67	6.35	6.78	5.90
Giza 45	4.87	5.55	3.99	5.15	5.88	4.15	2.48	2.68	2.39	9.34	10.42	8.15	33.60	33.73	33.69	5.18	5.48	4.91
Giza 70	5.64	6.59	5.22	6.47	7.64	5.97	2.65	2.81	2.53	9.80	11.42	9.40	36.53	36.60	36.02	5.73	6.08	5.11
Giza 75	7.51	8.04	6.28	9.05	9.44	7.18	2.86	3.12	2.72	11.46	12.20	10.05	38.06	37.32	37.11	6.53	6.90	5.96
Giza 76	5.84	6.29	4.48	6.47	6.92	4.80	2.58	2.82	2.58	10.20	10.96	8.36	35.23	35.09	34.71	5.11	5.53	4.88
Giza 77	6.55	7.47	5.33	7.77	8.83	6.05	2.65	2.76	2.49	10.87	12.74	9.62	37.63	37.56	36.77	5.98	6.29	5.35
Giza 80	7.11	7.51	6.70	9.20	9.71	8.35	2.80	2.98	2.68	11.15	12.00	10.61	41.07	41.18	40.42	7.14	7.63	6.54
Giza 81	7.41	7.32	5.87	9.07	8.80	6.87	2.67	3.00	2.76	11.78	11.62	9.58	38.86	38.20	37.94	6.15	6.63	5.96
Giza 83	7.42	7.80	7.76	9.80	10.24	9.72	2.76	2.91	2.64	11.75	12.54	12.02	42.07	41.78	40.24	6.95	7.30	6.18
Giza 84	7.06	7.90	6.48	7.79	8.59	6.88	2.50	2.73	2.43	11.89	13.24	11.20	35.02	34.56	34.18	5.45	5.83	4.79
Giza 85	7.42	8.80	7.60	9.16	10.55	9.04	2.86	3.07	2.79	11.28	13.12	11.38	39.19	38.02	38.27	6.66	7.05	6.07
Giza 86	7.53	8.17	6.58	9.39	9.98	7.82	2.82	3.04	2.76	11.44	12.55	10.30	39.48	38.69	38.37	7.00	7.42	6.39
Giza 75 X Rus. 6022	8.25	8.41	7.24	9.89	9.74	8.22	2.64	2.89	2.58	12.91	13.38	11.74	38.13	36.82	36.68	5.77	5.89	5.28
Giza 77 X Giza 45 A	6.60	6.82	4.67	6.99	7.12	4.58	2.54	2.75	2.46	11.21	11.93	8.81	33.63	33.09	31.78	5.07	5.24	4.24
Giza 77 X Giza 45 B	7.06	7.38	5.88	8.43	8.72	6.65	2.64	2.85	2.54	11.51	12.27	10.14	38.07	37.46	36.41	5.96	6.21	5.38
Mean	**6.86**	**7.44**	**6.04**	**8.16**	**8.73**	**6.92**	**2.67**	**2.88**	**2.59**	**11.19**	**12.21**	**10.14**	**37.58**	**37.14**	**36.62**	**6.07**	**6.42**	**5.53**
L.S.D. 0.05		0.73			0.88			N.S			0.93			0.56			0.22	

Table 9 . Cont.

Characters	Seed index (g)			Micronaire reading Unit			Fiber strength Pressley			Span length 2.5%			Span length 50%		
Genotypes years	1992	1993	1994	1992	1993	1994	1992	1993	1994	1992	1993	1994	1992	1993	1994
Dendera	10.74	11.50	10.18	3.66	3.83	3.35	9.13	9.42	9.22	30.35	30.25	29.46	15.05	15.30	14.17
Giza 45	10.22	10.74	9.67	2.99	3.20	2.87	10.38	10.43	10.51	34.68	35.10	33.71	16.95	17.76	16.15
Giza 70	9.96	10.47	9.08	3.42	3.59	3.25	11.02	10.78	10.95	35.38	34.81	33.85	17.48	17.51	16.34
Giza 75	10.61	11.58	10.12	3.96	4.28	3.51	10.62	10.50	10.65	32.03	31.75	30.98	16.08	16.13	15.09
Giza 76	9.42	10.19	9.18	3.20	3.35	2.91	11.01	10.50	11.05	34.38	34.54	33.22	17.05	17.43	15.99
Giza 77	9.88	10.41	9.19	3.40	3.59	3.08	10.82	10.54	10.79	34.42	34.34	33.49	17.25	17.35	16.37
Giza 80	10.22	10.89	9.64	3.92	3.94	3.58	9.52	9.59	9.43	31.42	31.24	30.46	15.59	15.69	14.49
Giza 81	9.66	10.70	9.76	3.88	4.09	3.53	10.23	10.26	10.35	31.25	31.29	30.82	15.68	15.70	14.72
Giza 83	9.56	10.16	9.20	3.61	3.79	3.43	8.92	8.93	8.86	30.94	30.82	29.55	15.08	15.37	14.32
Giza 84	10.10	11.04	9.22	3.23	3.42	2.98	11.25	10.90	10.89	33.40	33.48	32.05	17.14	17.13	15.53
Giza 85	10.36	11.46	9.80	3.61	3.87	3.38	9.91	10.00	9.82	30.51	29.89	29.15	15.73	15.05	14.60
Giza 86	10.73	11.72	10.27	3.88	4.00	3.45	10.42	10.35	10.43	33.69	33.42	32.33	16.85	16.92	15.71
Giza 75 X Rus. 6022	9.35	10.10	9.12	3.79	4.01	3.53	9.83	9.78	9.95	31.96	31.87	31.09	15.81	15.88	15.01
Giza 77 X Giza 45 A	9.99	10.57	9.11	2.91	3.08	2.78	10.65	10.54	11.20	34.78	34.84	33.71	16.90	17.50	16.24
Giza 77 X Giza 45 B	9.70	10.32	9.37	3.39	3.61	3.11	11.17	10.71	11.05	34.29	34.32	33.30	17.11	17.35	16.10
Mean	**10.03**	**10.79**	**9.53**	**3.52**	**3.71**	**3.25**	**10.32**	**10.21**	**10.34**	**32.90**	**32.80**	**31.81**	**16.38**	**16.54**	**15.39**
L.S.D. 0.05		0.33			0.14			0.31			0.38			0.31	

While, the lowest value was recorded for the promising strain (Giza 77 x Giza 45A) and Giza 45 in the third year.

Regarding boll weight, the highest value was obtained by Giza 85, Giza 86 and Giza 81 in the second year. The lowest values were obtained by the new strain (Giza 77 x Giza 45A), Giza 84 and Giza 45 in the third year.

Results indicate that the long staple varieties Giza 83, Giza 85 and the promising strain (Giza 75 x Rus. 6022) produced higher seed cotton yield than the extra-long staple varieties (Giza 77 x Giza 45A and Giza 45). The differences in yield could be due to higher boll weight of long staple than extra-long staple.

As for number of bolls per plant, the highest value was obtained by the promising strain Giza 75 x Rus. 6022 in the two years 1992 and 1993 and Giza 84 in the second year, while the lowest values were recorded by Giza 76 and Giza 45 in the third year. The highest value of lint percentage was reached by Giza 83 in the first and second years, the lowest value was recorded by the promising strain (Giza 77 x Giza 45A) in the third year.

Regarding lint index, the highest value was reached by Giza 80 in the second year, while the lowest value was recorded by promising strain Giza 77 x Giza 45A in the third year. The highest value of seed index was obtained by Giza 86, Giza 75 and Dendera in the second year, but the lowest value was recorded by Giza 70, Giza 76, Giza 77, Giza 83, Giza 84, Giza 75 x Rus 6022 and Giza 77x Giza 45A in the third year and they were about equal in seed index.

The obtained results might be due to differences among genotypes and the variations in the environmental conditions in the three years. The significant interaction between variety and year indicates that these two factors are dependable on each other in their influence on yield components.

The present results were in agreement with those obtained by **El-Sanhoury (1970), Thomson and Cunningham (1979), Abd El-Wahid (1987) and Idris**

(1995) for seed cotton yield. **Hosny (1974), Abd El-latif** ***et al.*** **(1975), Thomson and Cunningham (1979) and Abo El-Zahab** ***et al.*** **(1992 a)** reported also similar result with lint percentage. **Abou-Tour** ***et al.*** **(1991), Abo El-Zahab** ***et al.*** **(1992 a), Badr (1994) and Idris (1995)** for lint index. **Abd El-Wahid (1987), Abo El-Zahab** ***et al*** **(1992 a) and Badr (1994)** found similar results with seed index.

II . E . 2 . ***Fiber properties*** **:-**

Results shown in Table (4) demonstrated that the variety x year interaction had significant effect on all fiber properties. It is clear from Table (9) that the highest micronaire reading was obtained by Giza 75 in the second year, whereas the lowest values were attained by Giza 45And Giza 77 x Giza 45A in the third year.

Results explain that long-staple varieties had coarser fibers and gave higher micronaire reading than extra - long varieties.

Regarding fiber strength, the highest value was obtained by Giza 84 and Giza 77 x Giza 45B in the first year and Giza 76, Giza 77x Giza 45A, Giza 77 x Giza 45B in the third year, while the lowest value of this trait was recorded by Giza 83 in the three years. It can also be seen from the table that extra-long staple varieties had stronger fiber than long staple varieties.

Regarding the 2.5% span length, the highest 2.5% span length was obtained by Giza 70 in the first year and Giza 45 in the second year, while the lowest 2.5% span length was obtained by Giza 85 and Dendera in the third year.

The highest 50% span length was recorded by Giza 70 in the first year and Giza 45, Giza 70 and Giza 77 x Giza 45A in the second year, while the lowest 50% span length was obtained by Giza 83 and Dendera in the third year.

The present results were in agreement with those obtained by **Miller** ***et al.*** **(1959), El-Kadi** ***et al.*** **(1978), Thomson and Cunningham (1979), Abd El-Salam** ***et al.*** **(1985) and Idris (1995)** for micronaire reading. **Miller** ***et al*** **(1959), Murray**

and Verhalen (1970) and Thomson and Cunningham (1979) reported similar results with fiber strength and fiber length.

II . F . Effect of variety x location interaction on : -

II . F . 1 . *Yield and yield components* : -

Results shown in Table (3) demonstrate that variety x location interaction had significant effect on the studied traits, except boll weight and lint index.

II . F . 1 . 1 . Seed cotton yield : -

Results in Table (10) of means of seed cotton yield, indicated the significant interaction between genotypes x locations that some varieties reacted differently in different locations. The average values of seed cotton yield ranged from 2.67 K/F for Giza 45At El-Minia to 10.0 K/F for Giza 85 at El-Faiyum.

Generally, the ten locations could be grouped into four regions according to the varietal performances in seed cotton yield; 1- the first region involved Sohag and Assuit governorates where Giza 80 was superior in seed cotton yield, 2- the second region included El-Minia and El-Faiyum governorates (Middle Egypt) where Giza 85 and Giza 83 produced the highest seed cotton yield, 3- the third region involved El-Gharbia and El-Sharkeih (South and Middle Delta), where Giza 75 x Rus. 6022 gave the highest seed cotton yield than the other genotypes, and 4- the fourth region involved Dakahlia, Damiatta , El- Beheira and Kafr El-Sheikh (North Delta), where Giza 85, Giza 86 and Giza 75 x Rus. 6022 genotypes were the highest productive.

From the results, it could be concluded that the long staple genotypes produced higher seed cotton yield than the extra-long staple genotypes at all locations.

These results were in agreement with those obtained by **Miller *et al.* (1958), El-Sanhoury (1970), Hosny (1974), Kalsy and Singh (1974), Abd El-latif *et al.* (1975), El-Kadi *et al.* (1978), Gill and Singh (1986), Abo El-Zahab *et al.* (1993 a), Shafshak *et al.* (1993 a), Badr (1994), Seyam *et al.* (1994 a) and Idris (1995).**

Table 10 . Averages of **seed cotton yield (K/fed.)** of 15 cotton genotypes grown at ten locations combined over three years (1992 to 1994).

Locations / Genotypes	Sohag	Assuit	El-Minia	El-faiyum	Gharbia	Sharkeih	Dakahlia	Domiatta	El-Beheira	Kafr El-Sheikh
Dendera	7.65	8.61	6.57	9.90	5.78	6.40	6.52	5.44	6.20	5.97
Giza 45	6.71	4.76	2.67	6.30	3.84	5.40	5.86	4.33	3.42	4.74
Giza 70	6.87	4.77	3.40	7.65	5.13	7.56	5.67	5.47	5.85	5.81
Giza 75	8.02	7.79	5.32	7.16	7.15	8.70	8.29	6.02	6.97	7.31
Giza 76	7.29	4.26	3.41	6.58	5.89	6.85	6.84	5.08	4.14	5.00
Giza 77	7.88	6.63	4.36	8.49	6.51	7.59	7.06	5.09	5.29	5.60
Giza 80	9.82	8.83	5.57	9.54	6.70	7.47	7.06	5.45	5.23	5.36
Giza 81	5.76	7.70	5.23	7.76	7.01	8.31	7.54	5.35	6.54	7.47
Giza 83	8.68	9.45	6.79	9.67	7.23	8.24	6.75	6.31	7.03	6.40
Giza 84	6.42	7.70	5.36	9.21	7.10	8.31	7.63	6.35	6.93	6.46
Giza 85	7.05	8.76	6.94	10.00	6.55	8.52	8.76	6.72	8.24	7.85
Giza 86	7.92	7.09	5.48	7.40	6.99	9.27	8.98	6.19	7.58	7.39
Giza 75 X Rus. 6022	7.41	9.04	6.56	8.63	8.07	9.36	8.49	6.82	7.58	7.73
Giza 77 X Giza 45 A	8.02	5.72	4.35	6.61	6.08	7.06	6.72	4.94	4.91	5.91
Giza 77 X Giza 45 B	7.69	6.29	4.47	8.28	7.87	7.51	6.96	5.94	5.47	7.28
Mean	**7.55**	**7.16**	**5.10**	**8.21**	**6.53**	**7.77**	**7.28**	**5.70**	**6.09**	**6.42**
L.S.D. 0.05	1.33									

II . F . 1 . 2 . Lint cotton yield : -

Results in Table (11) Show the average values of lint yield for 15 Egyptian cotton genotypes grown in ten locations. The significant interaction between genotypes x locations indicates that Giza 83 grown in El-Faiyum produced the highest lint yield (12.73 K/F). On the other hand, the lowest lint yield (2.79 K/F) was recorded for Giza 45 grown at El-Minia.

Generally, it could be noticed from Table (11) that Giza 80 was superior for lint yield in Upper Egypt (Sohag and Assuit), Giza 83 and Giza 85 in Middle Egypt (El-Minia and El-Faiyum), the promising strain Giza 75 x Rus. 6022 and Giza 86 in South and Middle Delta (El-Gharbia and El-Sharkeih) and the two genotypes Giza 85 and Giza 86 in North Delta (Dakahlia , Damiatta , EL-Beheira and Kafr El-Sheikh).

These results were in agreement with those obtained by **Miller *et al.* (1958), El-Sanhoury (1970), Hosny (1974), Kalsy and Singh (1974), El-Kadi *et al.* (1978), Thomson and Cunninghom (1979), Gill and Singh (1982), El-Moghazy *et al* (1983 b), El-Shaarawy *et al.* (1988 b), Shafshak *et al.* (1993 a), El-Shaarawy *et al.* (1994) and Idris (1995)**.

II . F . 1 . 3 . Boll weight :-

Results presented in Table (3) show that genotypes x locations interaction was non significant which indicates that the varieties when grown under different environments responded quite differently and there was no consistent location effect on differential varietial response. The average values of boll weight ranged from 2.28 g. for Giza 76 at Assuit, Dendera and Giza 45At Kafr El-Sheikh to 3.20 g. for Giza 85 at El-Faiyum (Table 12).

Generally, it could be noticed from Table (12) that Giza 75 was superior in boll weight in El-Minia and El-Gharabia, Giza 81 gave the highest boll weight compared to the other genotypes in El-Sharkeih and El-Beheira. However, Giza 85 gave the highest boll weight than the other genotypes in Sohag, Assuit, El-Faiyum and

Dakahlia. While, Giza 86 variety was the highly productive in terms of boll weight in Damiatta and Kafr El-Saheikh.

From these results, it could be concluded that long staple genotypes were better in boll weight character than extra-long staple at all locations.

This finding is in harmony with that of **Miller *et al.* (1985), Meredith and Bridge (1973), Abou-Zahra *et al* (1986), Abou-Tour *et al.* (1991) and Bing - Tang *et al.* (1993 a).**

II . F . 1 . 4 . Number of open bolls per plant :-

Results in Table (13) show the average values of number of bolls per plant for 15 Egyptian cotton genotypes grown in ten locations averaged over three years.

Regarding number of bolls per plant, there was significance between genotype and locations indicating that some varieties acted differently in the different locations.

Generally, it could be noticed from Table (13) that Giza 80 was superior for this trait in Sohag, Dendera and Giza 83 gave the highest number of bolls per plant in Assuit, El-Minia and El-Faiyum. However, in South and North Delta, the promising strain Giza 75 x Rus. 6022 gave the highest number of bolls per plant than the other genotypes.

As long staple genotypes Dendera, Giza 80 and Giza 83 normally grown in Upper Egypt, they gave the highest number of bolls per plant.

These results were in agreement with those obtained by **Miller *et al.* (1958), Gill and Singh (1982), El-Marakby *et al.* (1986), Bing - Tang *et al.* (1993 a) and Shafshak *et al.* (1993 a).**

Table 11 . Averages of **lint cotton yield (K/fed.)** of 15 cotton genotypes grown at ten locations combined over three years (1992 to 1994).

Locations / Genotypes	Sohag	Assuit	El-Minia	El-faiyum	Gharbia	Sharkeih	Dakahlia	Domiatta	El-Beheira	Kafr El-Sheikh
Dendera	8.77	9.59	7.52	11.59	6.84	7.00	7.92	6.43	7.34	7.07
Giza 45	6.70	4.75	2.79	6.72	4.14	5.20	6.59	4.88	3.64	5.19
Giza 70	7.60	5.09	3.80	8.68	5.97	8.11	6.82	6.50	6.88	7.45
Giza 75	9.19	8.82	6.10	8.51	8.45	9.50	10.33	7.37	8.40	8.89
Giza 76	7.49	4.21	3.73	7.15	6.58	7.07	8.11	5.90	4.67	5.74
Giza 77	8.95	7.41	4.99	9.94	7.86	8.24	8.77	6.16	6.44	6.71
Giza 80	12.33	11.00	7.12	12.33	8.66	8.72	9.52	7.25	6.88	7.03
Giza 81	6.80	8.94	6.19	9.44	8.54	9.27	9.40	6.69	8.03	9.19
Giza 83	10.96	11.84	8.76	12.73	9.51	10.01	9.08	8.56	9.19	8.58
Giza 84	6.89	8.ol	5.84	10.09	7.73	8.58	8.57	7.06	7.63	7.13
Giza 85	8.17	9.96	8.32	12.14	7.92	9.87	11.02	8.38	10.21	9.83
Giza 86	9.38	8.20	6.61	8.93	8.64	10.71	11.57	7.81	9.49	9.28
Giza 75 X Rus. 6022	8.21	9.91	7.50	10.04	9.60	10.19	10.40	8.32	9.14	9.52
Giza 77 X Giza 45 A	7.99	5.65	4.46	6.84	6.45	6.78	7.35	5.29	5.18	6.32
Giza 77 X Giza 45 B	8.66	7.07	5.22	9.85	9.35	8.17	8.58	7.17	6.53	8.75
Mean	**8.54**	**8.03**	**5.93**	**9.67**	**7.75**	**8.49**	**8.93**	**6.92**	**7.31**	**7.78**
L.S.D. 0.05	1.60									

Table 12 . Averages of **boll weight (in grams)** of 15 cotton genotypes grown at ten locations combined over three years (1992 to 1994).

Locations / Genotypes	Sohag	Assuit	El-Minia	El-faiyum	Gharbia	Sharkeih	Dakahlia	Domiatta	El-Beheira	Kafr El-Sheikh
Dendera	2.77	2.62	2.71	2.87	2.53	2.52	2.58	2.39	2.79	2.28
Giza 45	2.57	2.37	2.32	2.81	2.42	2.66	2.62	2.47	2.67	2.28
Giza 70	2.69	2.35	2.59	2.84	2.73	2.70	2.69	2.58	2.92	2.56
Giza 75	2.83	2.76	2.83	3.12	2.99	2.93	2.99	2.52	3.24	2.78
Giza 76	2.56	2.28	2.53	2.92	2.71	2.71	2.81	2.53	2.94	2.61
Giza 77	2.62	2.50	2.54	2.88	2.81	2.59	2.58	2.43	2.82	2.56
Giza 80	2.76	2.72	2.64	3.15	2.79	2.80	2.92	2.69	2.99	2.73
Giza 81	2.63	2.59	2.56	3.01	2.87	2.94	2.80	2.74	3.15	2.77
Giza 83	2.75	2.67	2.72	3.00	2.78	2.67	2.76	2.65	3.03	2.68
Giza 84	2.52	2.47	2.54	2.77	2.55	2.54	2.48	2.46	2.80	2.42
Giza 85	2.86	2.83	2.74	3.20	2.83	2.92	3.13	2.69	3.03	2.82
Giza 86	2.84	2.60	2.80	3.04	2.93	2.90	3.01	2.73	3.08	2.83
Giza 75 X Rus. 6022	2.65	2.50	2.63	2.98	2.73	2.59	2.72	2.67	2.99	2.54
Giza 77 X Giza 45 A	2.62	2.45	2.43	2.81	2.60	2.61	2.59	2.53	2.81	2.38
Giza 77 X Giza 45 B	2.73	2.32	2.53	2.93	2.82	2.78	2.67	2.60	2.87	2.54
Mean	**2.69**	**2.53**	**2.61**	**2.96**	**2.74**	**2.73**	**2.76**	**2.58**	**2.94**	**2.59**
L.S.D. 0.05	N.S.									

Table 13 : Averages of **number of open bolls per plant** (**No.**) of 15 cotton genotypes grown at ten locations combined over three years (1992 to 1994).

Locations / **Genotypes**	**Sohag**	**Assuit**	**El-Minia**	**El-faiyum**	**Gharbia**	**Sharkeih**	**Dakahlia**	**Domiatta**	**El-Beheira**	**Kafr El-Sheikh**
Dendera	12.72	13.15	10.88	16.15	10.27	11.55	10.77	10.64	10.13	9.72
Giza 45	12.39	9.30	6.76	11.62	8.12	9.96	9.91	8.98	7.23	8.74
Giza 70	12.23	9.25	7.35	13.31	9.05	12.53	9.53	10.19	9.43	9.21
Giza 75	12.87	11.77	9.20	11.86	10.55	13.10	11.72	11.08	9.99	10.22
Giza 76	12.92	8.51	7.51	11.69	9.98	11.53	10.70	9.85	7.42	8.32
Giza 77	13.56	11.23	8.77	14.24	10.47	12.96	11.66	10.13	8.81	8.97
Giza 80	15.23	13.06	9.77	14.50	10.64	11.99	10.54	9.85	8.62	8.32
Giza 81	10.34	12.19	9.79	12.91	10.71	12.64	11.53	9.89	9.54	10.38
Giza 83	13.99	13.94	11.20	15.21	11.33	13.56	10.80	11.01	10.43	9.53
Giza 84	11.87	12.56	9.97	15.57	11.85	14.05	12.53	11.66	10.70	10.33
Giza 85	11.52	12.54	11.40	14.97	10.53	12.79	11.72	11.38	11.75	10.68
Giza 86	12.74	11.54	9.42	12.26	10.53	13.79	12.25	10.67	10.87	10.24
Giza 75 X Rus. 6022	12.62	14.17	11.38	13.98	12.36	15.29	12.88	11.69	10.94	11.42
Giza 77 X Giza 45 A	13.90	10.23	8.92	12.02	10.35	12.18	11.04	9.62	8.47	9.77
Giza 77 X Giza 45 B	12.91	11.43	8.84	13.75	12.00	12.18	11.21	10.67	9.08	11.01
Mean	**12.79**	**11.66**	**9.41**	**13.60**	**10.58**	**12.67**	**11.25**	**10.49**	**9.56**	**9.79**
L.S.D. 0.05	1.70									

II . F . 1 . 5 . Lint percentage : -

With respect to lint percentage, there was significant interaction between genotypes and locations indicating that some varieties acted differently in different locations.

The average values of lint percentage (Table 14) ranged from 31.23 % for the promising strain Giza 77 x Giza 45A in Assuit to 42.77 % for Giza 83 in Dakahlia.

Generally, it could be noticed that Giza 80 and Giza 83 gave the highest lint percentage compared to the other genotypes in all locations, while two extra-long staple genotypes, Giza 45And the promising starins Giza 77 x Giza 45A gave the lowest lint percentages. The explanation of such results based on the fact that lint percentage is a complex character since it depends on two primary factors. These are weight of lint and weight of seed. It is expected to vary considerably according to the fluctuations in the two factors.

This finding is in harmony with that of **Miller *et al.* (1959 and 1962), El-Sanhoury (1970), Meredith and Bridge (1973), Hosny (1974), Abd El-Latif *et al* (1975), Thomson and Cunningham (1979), El-Marakby *et al.* (1986), Abou Alam *et al.* (1988), Abo El-Zahab *et al.* (1992 a) and Abd El-Rahman *et al.* (1994).**

II . F . 1 . 6 . Lint index : -

With respect to lint index , Table 15 shows that Giza 80 gave the highest lint index compared to other genotypes in all locations, while the promising strain Giza 77 x Giza 45A gave the lowest lint index.

The nonsignificant interaction between genotype and location indicates that varieties when grown under different environment responded quite similarly and there was a consistent location effect on varietial response for this trait (Table 3).

Table 14 . Averages of **lint percentage** (%) of 15 cotton genotypes grown at ten locations combined over three years (1992 to 1994).

Locations / Genotypes	Sohag	Assuit	El-Minia	El-faiyum	Gharbia	Sharkeih	Dakahlia	Domiatta	El-Beheira	Kafr El-Sheikh
Dendera	36.28	35.33	36.41	37.21	37.43	35.94	38.50	37.30	37.60	37.63
Giza 45	31.64	31.69	33.12	33.78	34.48	31.84	35.67	35.94	33.85	34.74
Giza 70	35.05	33.72	35.48	36.18	36.68	35.60	38.01	37.86	37.48	37.77
Giza 75	36.21	35.85	36.59	37.58	37.47	36.19	39.43	38.79	38.18	38.66
Giza 76	32.55	32.58	34.55	34.42	35.22	34.06	37.58	36.95	35.69	36.51
Giza 77	36.01	35.51	36.50	37.12	38.12	35.81	39.42	38.26	38.48	37.98
Giza 80	39.78	39.61	40.90	40.99	40.97	38.63	42.76	42.10	41.81	41.38
Giza 81	37.53	36.82	37.93	38.52	38.52	36.95	39.57	39.38	39.02	39.12
Giza 83	40.09	39.82	40.93	41.76	41.58	40.05	42.77	42.39	41.67	42.57
Giza 84	33.97	32.99	34.75	34.75	34.46	33.91	35.77	35.28	34.94	35.03
Giza 85	36.80	35.96	37.98	38.49	38.49	38.25	40.12	39.67	39.29	39.86
Giza 86	37.35	36.60	38.41	38.27	39.15	38.21	40.89	40.00	39.72	39.87
Giza 75 X Rus. 6022	35.20	35.08	36.47	36.96	37.46	36.14	38.83	38.66	38.27	39.04
Giza 77 X Giza 45 A	31.37	31.23	32.49	32.81	33.35	31.77	34.61	33.49	33.42	33.79
Giza 77 X Giza 45 B	36.26	35.42	37.08	37.73	37.38	35.83	39.30	38.20	37.80	38.13
Mean	**35.74**	**35.21**	**36.64**	**37.10**	**37.38**	**35.95**	**38.88**	**38.28**	**37.82**	**38.14**
L.S.D. 0.05	1.01									

Table 15 . Averages of **lint index (in grams)** of 15 cotton genotypes grown at ten locations combined over three years (1992 to 1994).

Locations / Genotypes	Sohag	Assuit	El-Minia	El-faiyum	Gharbia	Sharkeih	Dakahlia	Domiatta	El-Beheira	Kafr El-Sheikh
Dendera	6.19	5.93	6.50	6.79	6.34	5.90	6.58	6.18	6.93	6.09
Giza 45	5.19	4.64	4.88	5.62	5.29	4.81	5.66	5.39	5.42	5.01
Giza 70	5.40	4.77	5.44	5.93	5.89	5.47	5.88	5.66	6.34	5.65
Giza 75	6.57	6.04	6.25	7.01	6.58	5.94	6.93	6.10	6.89	6.31
Giza 76	5.04	4.42	4.81	5.61	5.21	4.98	5.63	5.20	5.64	5.19
Giza 77	5.60	5.39	5.36	6.08	6.21	5.40	6.39	5.82	6.71	5.76
Giza 80	6.99	6.62	6.79	7.66	7.17	6.44	7.70	7.15	7.64	6.89
Giza 81	5.97	5.83	5.72	6.79	6.58	5.90	6.52	6.20	6.87	6.12
Giza 83	6.69	6.39	6.78	7.34	6.75	6.19	6.99	6.76	7.47	6.76
Giza 84	5.15	5.01	5.25	5.67	5.34	5.04	5.52	5.40	5.92	5.26
Giza 85	6.25	5.99	6.33	7.19	6.68	6.29	7.26	6.42	7.01	6.54
Giza 86	6.83	6.30	6.81	7.16	6.89	6.72	7.40	6.79	7.49	6.97
Giza 75 X Rus. 6022	5.49	5.20	5.72	6.18	5.61	5.18	5.76	5.60	6.09	5.62
Giza 77 X Giza 45 A	4.77	4.36	4.69	5.19	4.92	4.51	5.11	4.95	5.20	4.79
Giza 77 X Giza 45 B	5.73	5.03	5.44	6.16	6.14	5.46	6.31	5.98	6.40	5.86
Mean	**5.86**	**5.46**	**5.79**	**6.43**	**6.11**	**5.61**	**6.38**	**5.97**	**6.54**	**5.92**
L.S.D. 0.05	N.S.									

These results are in harmony with those obtained by **Miller** ***et al.*** **(1958) and El-Shaarawy** ***et al.*** **(1988 b)**.

II . F . 1 . 7 . Seed index :-

The size of seed of the most cultivars varied from one location to another.

Results in Table (16) show that the average values of seed index ranged from 8.79 g. for Giza 75 x Rus. 6022 in Kafr El-Sheikh to 11.66 g. for Giza 75 in El-Faiyum.

Generally, it could be noticed that Giza 86 and Giza 75 gave the highest seed index compared to the other genotypes for all locations, while the promising strain Giza 75 x Rus. 6022 gave the lowest seed index in South and North Delta only (El-Gharbia, El-Sharkeih, Damietta, El-Beheira and Kafr El-Sheikh). It could also be noticed that in Upper and Middle Egypt higher values of seed index were obtained than South and North Delta. And this may be due to differences in the environmental elements such as temperature which is usually higher in Upper and Middle Egypt than South and North Delta, and humidity, which was mostly higher in South and North Delta than in Upper and Middle Egypt.

These results are in agreement with those obtained by **Meredith and Bridge (1973), Hosny (1974), Turner** ***et al.*** **(1976), El-Marakby** ***et al*** **(1986), Abd El-Wahid (1987), Abou-Alam** ***et al.*** **(1988), Abo El-Zahab** ***et al.*** **(1992 a), Shafshak** ***et al.*** **(1993 a)and Seyam** ***et al.*** **(1994 a).**

II . F . 2 . ***Fiber properties*** **:-**

Data shown in Table (4) demonstrated that variety x location interaction significantly affected all fiber properties studied.

Table 16 . Averages of **seed index (in grams)** of 15 cotton genotypes grown at ten locations combined over three years (1992 to 1994).

Locations / Genotypes	Sohag	Assuit	El-Minia	El-faiyum	Gharbia	Sharkeih	Dakahlia	Domiatta	El-Beheira	Kafr El-Sheikh
Dendera	10.87	10.84	11.38	11.46	10.59	10.48	10.50	10.36	11.49	10.09
Giza 45	11.20	10.01	9.85	11.01	10.06	10.24	10.19	9.59	10.58	9.39
Giza 70	10.01	9.32	9.90	10.47	10.12	9.83	9.53	9.33	10.56	9.30
Giza 75	11.56	10.80	10.85	11.66	10.99	10.42	10.63	9.65	11.12	10.02
Giza 76	10.44	9.12	9.12	10.69	9.53	9.61	9.35	8.88	10.18	9.02
Giza 77	9.95	9.73	9.32	10.29	10.05	9.61	9.80	9.39	10.74	9.40
Giza 80	10.55	10.12	9.82	11.02	10.31	10.17	10.29	9.82	10.64	9.74
Giza 81	9.93	10.01	9.36	10.84	10.46	10.02	9.94	9.57	10.73	9.54
Giza 83	9.99	9.65	9.82	10.23	9.43	9.19	9.32	9.20	10.46	9.13
Giza 84	10.01	10.16	9.89	10.65	10.13	9.79	9.89	9.93	11.01	9.72
Giza 85	10.74	10.64	10.35	11.49	10.69	10.15	10.82	9.82	10.84	9.88
Giza 86	11.45	10.88	10.94	11.54	10.70	10.84	10.67	10.19	11.37	10.52
Giza 75 X Rus. 6022	10.10	9.61	9.98	10.53	9.33	9.11	9.06	8.88	9.84	8.79
Giza 77 X Giza 45 A	10.42	9.56	9.76	10.62	9.80	9.65	9.60	9.77	10.33	9.35
Giza 77 X Giza 45 B	10.08	9.09	9.24	10.16	10.25	9.70	9.74	9.68	10.52	9.51
Mean	**10.49**	**9.97**	**9.97**	**10.84**	**10.16**	**9.92**	**9.95**	**9.60**	**10.69**	**9.56**
L.S.D. 0.05	0.61									

II. F. 2. 1. Micronaire reading :-

Results in Table (17) show the average values of Micronaire reading. The values ranged from 2.77 for Giza 77 x Giza 45A in El-Minia to 4.27 for Giza 75 in Sohag.

Generally, it could be noticed that Giza 75, Giza 80 and Giza 81 gave the highest micronaire reading compared to the other genotypes almost in all locations, while the two genotypes Giza 45And the promising strain Giza 77 x Giza 45A gave the lowest micronaire reading almost in all locations.

These results revealed that long staple varieties gave higher micronaire reading followed by the extra-long staple varieties and this depicts the strong relationship between high lint yield and coarser fiber.

Similar results were reported by **Miller *et al.* (1959) Eweida *et al.* (1984), Abd El-Salam *et al.* (1985), El-Marakby *et al.* (1986), Abou-Alam *et al.* (1988), Ismail *et al.* (1989) and Bing - Tang *et al.* (1993 b).**

II. F. 2. 2. Fiber strength (pressley index):-

Results in Table (18) show the average values of fiber strength. It ranged from 8.52 for Giza 83 in El-Sharkeih to 11.83 for Giza 77 in Sohag.

Generally, it could be noticed that Giza 84, Giza 77 x Giza 45B and Giza 70 (extra long-staple) gave the highest values of fiber strength compared to the other genotypes in the almost locations, while Giza 83 (long staple) gave the lowest values of fiber strength in all locations.

These results explain that extra-long staple varieties gave highest fiber strength value followed by long staple varieties and this depicts the strong relationship between fiber length and fiber strength.

Similar results were reported by **Miller *et al.* (1959), Hosny (1974), El-Kadi *et al.* (1978), Thomson and Cunningham (1979), El-Marakby *et al.* (1986), Abou-Alam *et al.* (1988) and Shafshak *et al.* (1993 b).**

Table 17 . Averages of **Micronaire reading (units)** of 15 cotton genotypes grown at ten locations combined over three years (1992 to 1994).

Locations / Genotypes	Sohag	Assuit	El-Minia	El-faiyum	Gharbia	Sharkeih	Dakahlia	Domiatta	El-Beheira	Kafr El-Sheikh
Dendera	3.97	3.74	3.64	3.98	3.57	3.39	3.58	3.33	3.62	3.33
Giza 45	3.37	3.04	2.78	3.33	2.92	2.91	3.08	2.85	2.89	3.05
Giza 70	3.75	3.10	3.05	3.87	3.43	3.22	3.46	3.23	3.61	3.50
Giza 75	4.27	3.90	3.70	4.12	3.90	3.63	4.00	3.82	4.09	3.76
Giza 76	3.37	2.81	2.94	3.42	3.17	2.99	3.34	3.03	3.25	3.20
Giza 77	3.67	3.17	3.06	3.59	3.51	3.21	3.42	3.24	3.45	3.27
Giza 80	4.13	3.67	3.64	3.85	3.77	3.76	3.86	3.70	3.93	3.87
Giza 81	3.88	3.72	3.57	4.17	3.90	3.61	3.89	3.72	4.00	3.87
Giza 83	3.84	3.76	3.40	3.90	3.57	3.30	3.59	3.38	3.73	3.59
Giza 84	3.27	3.32	2.91	3.33	3.26	2.98	3.28	3.15	3.40	3.18
Giza 85	3.80	3.67	3.33	3.97	3.47	3.27	3.77	3.61	3.72	3.56
Giza 86	4.18	3.63	3.66	3.90	3.72	3.54	3.91	3.50	3.88	3.88
Giza 75 X Rus. 6022	4.01	3.65	3.71	4.01	3.78	3.55	3.78	3.64	3.98	3.63
Giza 77 X Giza 45 A	3.12	2.81	2.77	3.10	2.79	2.77	3.16	2.83	2.96	2.94
Giza 77 X Giza 45 B	3.39	3.01	3.12	3.54	3.50	3.08	3.60	3.45	3.56	3.42
Mean	**3.73**	**3.40**	**3.28**	**3.74**	**3.48**	**3.28**	**3.58**	**3.37**	**3.60**	**3.47**
L.S.D.	0.25									

Table 18 . Averages of **fiber strength (pressley index)** of 15 cotton genotypes grown at ten locations combined over three years (1992 to 1994).

Locations / Genotypes	Sohag	Assuit	El-Minia	El-faiyum	Gharbia	Sharkeih	Dakahlia	Domiatta	El-Beheira	Kafr El-Sheikh
Dendera	9.74	9.25	9.36	9.32	8.92	9.44	8.93	9.13	9.03	9.46
Giza 45	10.88	10.37	10.10	10.60	10.41	10.53	10.08	10.46	10.32	10.61
Giza 70	11.36	11.17	10.53	10.92	11.15	10.52	10.94	10.82	10.84	10.93
Giza 75	11.08	10.50	10.13	10.92	10.32	10.43	10.49	10.68	10.09	11.27
Giza 76	11.13	10.96	10.40	11.11	10.83	10.95	10.77	10.55	10.97	10.85
Giza 77	11.83	10.93	10.13	11.09	10.52	10.40	11.05	10.55	9.96	10.72
Giza 80	9.96	9.54	9.14	9.69	9.69	9.27	9.71	9.29	9.03	9.78
Giza 81	10.75	10.31	9.38	10.49	10.71	10.00	10.29	9.84	10.38	10.63
Giza 83	9.28	8.83	8.90	9.00	9.08	8.52	8.74	9.09	8.61	8.98
Giza 84	11.31	10.84	10.22	11.13	11.28	10.60	11.14	11.28	11.44	10.88
Giza 85	10.22	10.25	9.38	10.32	9.58	10.09	9.96	9.67	9.83	9.79
Giza 86	10.72	10.32	10.40	10.67	10.18	10.17	10.52	9.97	10.57	10.52
Giza 75 X Rus. 6022	10.16	9.96	9.60	10.30	9.76	9.78	10.02	9.55	9.32	10.10
Giza 77 X Giza 45 A	11.09	10.75	10.27	11.00	11.00	10.51	10.73	11.00	10.66	10.94
Giza 77 X Giza 45 B	11.43	11.14	11.05	11.23	10.86	10.71	11.13	10.82	10.82	10.60
Mean	**10.73**	**10.34**	**9.93**	**10.52**	**10.29**	**10.13**	**10.30**	**10.18**	**10.13**	**10.40**
L.S.D. 0.05	0.57									

II . F . 2 . 3 . 2.5 % span length :-

Results in Table (19) show that the average values of 2.5 % span length ranged from 35.27 mm. for Giza 70 in El-Beheira to 29.08 mm. for Giza 83 in El-Sharkeih.

Generally, it could be noticed that Giza 45, Giza 70 and the promising strain Giza 77 x Giza 45A gave higher 2.5% span length compared to the other genotypes in most locations, while Dendera and Giza 85 gave lower 2.5% span length in most locations.

These results are in harmony with those obtained by **Miller *et al.* (1959), Abou El-Fittouh *et al.* (1969), El-Sanhoury (1970), Eweida *et al.* (1984), El-Marakby *et al.* (1986), Abou-Alam *et al.* (1988), Ismail *et al.* (1989), Abo El-Zahab *et al* (1992 b), Badr (1994) and Idris (1995).**

II . F. 2 . 4 . 50 % Span length :-

Result in Table (20) show averages of 50 % span length. It ranged from 14.22 mm. for Giza 83 in El- Sharkeih to 17.59 mm. for Giza 77 in El- Beheira.

Generally, it could be noticed that Giza 45, Giza 70 and Giza 77 x Giza 45A gave higher 50% span length compared to the other genotypes in most locations, while Dendera, Giza 83 and Giza 85 genotypes gave less 50% span length in almost all locations.

These results are in harmony with those obtained by **Miller *et al.* (1959), abou El- Fittouh *et al.*(1969), Bridge *et al.* (1969), El-Sanhoury (1970), Eweida *et al.* (1984), El-Marakby *et al.* (1986), Abou-Alam *et al.* (1988), Ismail *et al.* (1989), Abo El- Zahab *et al.* (1992 b) and Idris (1995).**

Table 19 . Averages of **span length 2.5 % (mm.)** of 15 cotton genotypes grown at ten locations combined over three years (1992 to 1994).

Locations / Genotypes	Sohag	Assuit	El-Minia	El-faiyum	Gharbia	Sharkeih	Dakahlia	Domiatta	El-beheira	Kafr El-Sheikh
Dendera	30.18	30.42	30.24	30.40	29.68	29.72	29.55	29.43	30.38	30.19
Giza 45	34.76	34.39	33.72	34.76	34.19	34.15	34.61	34.36	35.12	34.89
Giza 70	35.22	35.00	34.27	34.87	34.38	34.23	34.97	33.90	35.27	34.72
Giza 75	32.94	32.19	31.56	32.68	31.97	30.47	31.07	30.78	31.51	30.68
Giza 76	34.64	33.73	33.35	34.43	33.97	33.51	34.42	33.62	34.83	33.98
Giza 77	34.96	34.20	34.24	34.79	34.15	32.81	33.51	33.53	34.75	33.91
Giza 80	32.20	31.93	30.90	31.62	30.85	30.04	31.10	30.66	30.67	30.43
Giza 81	31.46	32.13	31.67	31.95	30.99	29.78	31.00	30.36	30.93	30.91
Giza 83	30.74	31.58	31.01	31.13	30.17	29.08	30.07	30.22	30.33	30.03
Giza 84	33.37	33.50	32.62	33.70	32.65	31.65	33.08	32.69	33.37	33.15
Giza 85	30.64	30.38	30.36	29.96	29.94	29.23	29.84	29.24	29.44	29.44
Giza 86	34.53	33.30	33.03	33.78	33.03	32.65	33.27	31.90	33.17	32.79
Giza 75 X Rus. 6022	32.72	32.07	31.68	32.19	31.02	30.72	31.00	31.03	31.55	32.38
Giza 77 X Giza 45 A	35.05	34.55	33.72	34.67	34.74	33.53	34.64	33.93	34.92	34.66
Giza 77 X Giza 45 B	35.32	34.30	33.55	34.53	33.67	32.98	33.87	33.35	34.48	33.66
Mean	**33.25**	**32.91**	**32.42**	**33.03**	**32.36**	**31.64**	**32.40**	**31.93**	**32.72**	**32.39**
L.S.D. 0.05	0.69									

Table 20 . Averages of **span length 50 % (mm.)** of 15 cotton genotypes grown at ten locations combined over three years (1992 to 1994).

Locations / Genotypes	Sohag	Assuit	El-Minia	El-faiyum	Gharbia	Sharkeih	Dakahlia	Domiatta	El-Beheira	Kafr El-Sheikh
Dendera	14.88	15.13	14.88	15.27	14.65	14.63	14.62	14.44	14.90	15.01
Giza 45	17.23	16.74	16.62	16.84	16.80	17.20	17.15	16.57	16.99	17.38
Giza 70	17.24	17.26	16.84	17.38	16.68	16.81	17.30	16.52	17.52	17.53
Giza 75	16.48	16.03	15.14	16.39	15.80	14.92	15.84	15.58	15.82	15.65
Giza 76	17.28	16.36	16.32	17.40	17.05	16.17	16.99	16.56	17.18	16.93
Giza 77	17.30	16.71	17.08	17.40	17.02	16.11	16.74	16.59	17.59	17.35
Giza 80	15.75	15.40	14.95	15.71	15.41	14.70	15.35	15.16	14.80	15.36
Giza 81	15.50	15.46	15.14	15.88	15.21	14.51	15.48	15.21	15.49	15.78
Giza 83	14.89	15.32	15.03	15.35	14.49	14.22	14.59	15.20	14.96	15.17
Giza 84	16.85	16.87	16.20	16.97	16.32	15.73	16.82	16.36	17.02	16.88
Giza 85	15.75	15.36	14.71	15.33	15.00	14.49	15.21	14.86	15.37	15.19
Giza 86	17.23	16.23	16.10	16.86	16.44	16.24	17.06	15.86	16.52	16.42
Giza 75 X Rus. 6022	16.06	15.55	15.22	15.98	15.18	15.18	15.09	15.46	15.74	16.20
Giza 77 X Giza 45 A	17.08	16.89	16.32	17.38	17.03	16.21	16.89	16.64	17.12	17.23
Giza 77 X Giza 45 B	17.23	16.89	16.35	17.24	16.67	16.08	17.08	16.59	17.32	17.08
Mean	**16.45**	**16.15**	**15.79**	**16.49**	**15.98**	**15.55**	**16.15**	**15.84**	**16.29**	**16.34**
L.S.D. 0.05	0.56									

III- Variance components :-

III . A . Yield and yield components :-

Estimates of variance components, heritability in broad sense, phenotypic and genotypic coefficient of variability for the seven characters are presented in Table (21). It could be seen from the results that both genotype x location (σ^2_{gl}) and genotype x year (σ^2_{gy}) sources of variation were small and statistically nonsignificant for boll weight only, but were significant and highly significant for other characters.

Considering boll weight character, the first order interaction of genotypes x years (σ^2_{gy}) was statistically nonsignificant indicating that there was inconsistent year effects on differential varietal responses for this trait. On the other hand, the genotype x location interaction was of sizable magnitude for seed cotton yield, lint yield and number of bolls per plant and significant for lint percentage and seed index indicating that these characters were highly affected by the interaction between genotype and locations. However, insignificant variance was found in lint index indicating variable effect of locations on the studied genotypes.

The second order interaction of genotypes x locations x years (σ^2_{gly})was highly significant for all traits indicating that the cotton genotypes under study responded differently under different environments. The results obtained might also suggest that this differential varietal response might be due to location effects rather than year effects because this latter was nonsignificant.

From the results presented in Table (21) it is important to note that phenotypic coefficient of variability (P.C.V.) for yield and its components were higher than genotypic coefficient of variability (G.C.V.). The highest values of (P.C.V.) were recorded in lint yield K/F., seed cotton yield K/F and lint index which were 17.818%, 13.372% and 11.664%, respectively. Whereas, the highest values of (G.C.V.) were 17.278%, 12.654% and 11.609% for lint yield, seed cotton yield and lint index, respectively.

Table 21 . Variance components, phenotypic (P.C.V.), genotypic (G.C.V.) coefficients of variability and heritability (h^2 %) estimates for combined analysis of yield and yield components .

Variance components	**Seed cotton yield (K/Fed.)**	**Lint yield (K/Fed.)**	**Boll weight (g)**	**Number of bolls/plant (NO.)**	**Lint percentage %**	**Lint index (g)**	**Seed index (g)**
σ^2_g	0.7361**	1.8772**	0.0156**	0.6946**	5.7049**	0.4868**	0.1953**
σ^2_{gy}	0.1185**	0.0835**	-0.0005+	0.1066**	0.0822**	0.0067**	0.0175**
σ^2_{gL}	0.2345**	0.5828**	0.0010	0.4439**	0.0402*	0.0031	0.0203*
σ^2_{gLy}	0.4115**	0.5967**	0.0120**	0.6981**	0.2188**	0.0318**	0.0666**
σ^2_e	1.1039	1.5813	0.0277	1.6589	0.7172	0.1215	0.3065
P.C.V. %	13.372	17.818	4.716	8.058	6.461	11.664	4.506
G.C.V. %	12.654	17.278	4.609	7.455	6.436	11.609	4.367
h^2 %.	89.550	94.050	95.710	85.582	99.223	99.06	93.922

* , ** Significant at 5 % and 1 % level of probability, respectively.

σ^2_g , σ^2_{gy} , σ^2_{gL} , σ^2_{gLy} is the variance attributed to genotypes, genotypes X years, genotypes X locations and genotypes X locations X years, respectively.

+ Negative estimate for which the most reasonable value is zero.

Whereas, the lowest values of (P.C.V.) and (G.C.V.) were recorded for boll weight, number of bolls per plant, lint percentage and seed index.

High heritability estimates (over 50 %) in broad sense were detected for all characters studied, indicating that the phenotypic expression of these traits were indicative of their genetic behaviour.

Similar results were obtained by **Miller *et al.* (1958), Yousef and El-Agamy (1980), El-Shaarawy *et al.* (1988 b), Abou-Tour *et al.* (1991) and Abou-Zahra *et al.* (1992)** who mentioned high heritability values for these traits.

III . B. Fiber properties :-

Genotypic variances for all fiber traits studied (micronaire reading, fiber strength and fiber length) were highly significant (Table 22). This indicates that most cultivars differed in their genetic potential for all fiber traits. These results coupled with the relative low magnitude of interactions (σ^2_{gy} , σ^2_{gl} , σ^2_{gly}) variance components indicated that the interaction of cultivars with environment had little importance in determining the performance of fiber traits.

The first order interactions (σ^2_{gy} and σ^2_{gl}) had significant variances for all fiber traits. The second order interaction (σ^2_{gly}) had insignificant variance for fiber length only. While the second order interactions (σ^2_{gly}) for the other fiber traits were highly significant indicating that the cotton genotypes under responded differently under different environments. The results obtained might suggest that locations were more important than years in determining fiber quality.

From the results presented in Table (22), It is important to note that phenotypic coefficient of variability (P.C.V.) for fiber properties was higher than genotypic coefficient of variability (G.C.V.). The highest values of (P.C.V.) and (G.C.V.) were recorded for micronaire reading (9.020% and 8.924 %, respectively. Whereas the lowest values of P.C.V. and G.C.V. were recorded for fiber length (2.5% and 50 % span length).

Table 22 . Variance components, phenotypic (P.C.V.), genotypic (G.C.V.) coefficients of variability and heritability (h^2 %) estimates for combined analysis of fiber properties.

Source of variation	**Micronaire Reading**	**Fiber strength Pressley index**	**Fiber length (mm.) 2.5% S.L.**	**50% S.L.**
σ^2_g	0.0970**	0.4332**	3.0679**	0.7130**
σ^2_{gy}	0.0025**	0.0119**	0.0221**	0.0282**
σ^2_{gL}	0.0045**	0.0156*	0.0915**	0.0226**
σ^2_{gLy}	0.0142**	0.0625**	0.0071	0.0150
σ^2_e	0.0395	0.2460	0.7145	0.4287
P.C.V. %	9.020	6.4680	5.410	5.302
G.C.V. %	8.924	6.396	5.389	5.245
h^2 %	97.890	97.820	99.260	97.841

* , ** Significant at 5 % and 1 % level of probability, respectively.

σ^2_g , σ^2_{gy} , σ^2_{gL} , σ^2_{gLy} is the variance attributed to genotypes, genotypes X years, genotypes X locations and genotypes X locations X years, respectively.

High heritability estimates (over 50%) in broad sense were detected for all characters studied, indicating that the phenotypic expressions of these fiber traits were indicative of their genetic behaviour.

Similar results were obtained by **Abo El-Zahab** ***et al*** **(1992 b).**

IV- Genotypic Stability For different genotypes :

IV. A. Yield and yield components :-

IV. A . 1 . *Seed Cotton Yield :-*

Genotype x environment (GE) interactions are of notable importance in the development and evaluation of plant cultivars, and they represent a major challenge to plant breeders because the most adapted genotypes show differential response when grown in different environments. In Table (3); environment + (genotype x environment) interaction source of variation was partitioned into environment (linear), genotype x environment interaction (sum of square due to regression, b_i) and unexplainable deviation from regression (pooled deviation mean square; S^2d). The nonsignificant genotype x environment (linear) mean square for seed cotton yield indicated that varieties did not differ genetically in their response to different environments when tested with pooled deviation.

The regression of average mean performance of variety on the environmental index resulted in regression coefficient (b) for seed cotton yield ranged from o.676 to 1.324 (Table 23). The b values obtained did not deviate significantly from unity, except Giza 77 and Giza 83.

Coefficients of determination (r^2) between seed cotton yield of individual genotypes and environmental index of each location were variable and ranged from o.422 (Giza 83 and Giza 85) to o.891 (Giza 77), indicating that these were real differences in the stability of genotypes.

The ecovalence index (W) of stability which represents the proportion of the (GE) sum of square (Table 23) attributed to each genotype, varied among genotypes from 17.191 (Giza 77) to 5o.35 (Giza 85). these results indicated differences in stability among cotton genotypes over the environment.

Ideally, a cultivar would be adapted to all environments if b did not differ significantly from unity, S^2d did not differ significantly from zero and had above yielding ability particularly for a given production area. In this study, seed cotton yield of all varieties except Giza 77 and Giza 83 met the first criterion, only the three genotypes Giza 77, Giza 84 and Giza 75x Rus. 6022 met the second criterion and the genotypes Giza 75 x Rus. 6022, Giza 85, Giza 83, Giza 86, Giza 75 and Giza 80 met the third criterion. One genotype, Giza 75 x Rus. 6022 out of the aforementioned four ones met the three criteria. The other high yielding genotypes Giza 85, Giza 83, Giza 86, Giza 75 and Giza 84 had a regression coefficient not significantly different from unity and significant deviation sum square from zero. Consequently, it did not meet the stability characteristics of the ideal genotype.

It is clear from the results presented in Table (23) and figure (1) that the promising strain Giza 77 x Giza 45A and commercial varieties Giza 70, Giza 76, and Giza 45 which yielded below average mean yield over environments are poorly adapted to all environments. However, the varieties Giza 75 x Rus. 6022, Giza 83, Giza 85, Giza 86 and Giza 75 which gave above average mean yield are well adapted to all environments. The remaining varieties (Giza 84, Giza 80, Dendera, Giza 81, Giza 77 x Giza 45B and Giza 77) which were not significantly differed from the average mean performance of all cultivars had average stability. Out of the 15 genotypes tested, only the promising strain Giza 75 x Rus. 6022 met the production response and stability. Its mean performance ($\bar{X}$ = 7.97 K/F.) was significant above the average mean of genotypes, or the highest second cheek cultivar b= 0.926 which did not significantly differ from unity and S^2d = 0.377 which did not significantly differ from zero, beside its r^2 = 0.688 which was maximum and minimum W = 21.243. Therefore, the promising strain Giza 75 x Rus. 6022 may be recommended to be released as commercial stable high yielding and/or incorporated into the breeding stock in any future breeding program aiming for producing stable high seed yielding lines.

Table 23 . **Averages of genotypes and estimates of stability parameters for seed cotton yield (K / fed.) over 30 environments.**

Genotypes	Means X	Regression coefficient b	Deviation from regression S^2d	coefficient of determination r^2	Ecovalence W	Adaptation #
Dendera	6.90	0.888	1.357**	0.467	49.055	A
Giza 45	4.80	1.047	0.605**	0.684	27.440	A
Giza 70	5.82	1.046	0.506**	0.706	24.659	A
Giza 75	7.27	1.074	0.570**	0.702	26.637	A
Giza 76	5.53	1.082	0.432**	0.737	22.851	A
Giza 77	6.45	1.324 +	0.041	0.891	17.191	H
Giza 80	7.10	1.095	1.094**	0.612	41.499	A
Giza 81	6.87	0.873	0.789**	0.558	33.336	A
Giza 83	7.66	0. 676 +	0.831**	0.422	39.307	L
Giza 84	7.15	0.915	0.353	0.690	20.645	A
Giza 85	7.94	0.811	1.358**	0.422	50.350	A
Giza 86	7.43	0.962	0.498**	0.672	24.403	A
Giza 75 X Rus. 6022	7.97	0.926	0.377	0.688	21.242	A
Giza 77 X Giza 45 A	6.03	1.184	0.538**	0.748	27.257	A
Giza 77 X Giza 45 B	6.78	1.098	0.407**	0.749	22.298	A
mean	**6.78**					
L.S.D. 0.05	0.42					

+ , ++ Indicates regression coefficient is significantly different from unity at 5 % and 1 % level of probability, respectively.

Indicates deviation from regression is significantly different from zero at 5 % and 1 % level of probability, respectively.

, A , H , L indicates adaptation to all, high yielding and low yielding environments, respectively.

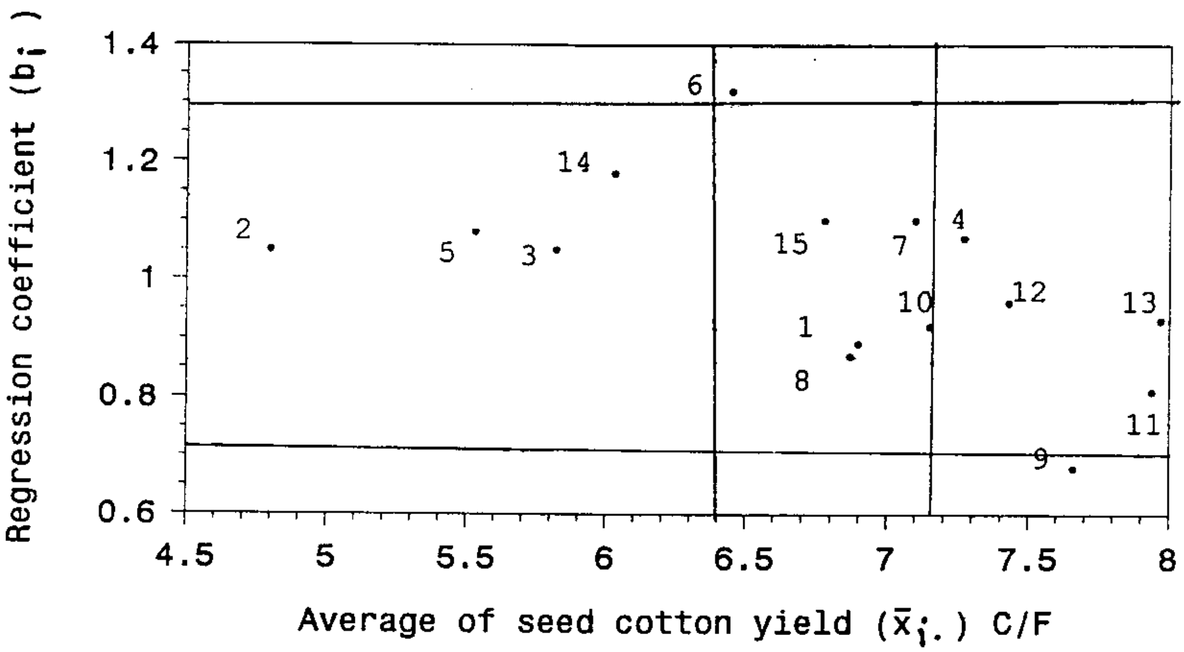

Figure 1: The relation of seed cotton yield ($\bar{X}_{i.}$) and stability (regression coefficient b_i) for 15 Egyptian cotton genotypes.

1 - Dendera	2 - Giza 45	3 - Giza 70
4 - Giza 75	5 - Giza 76	6 - Giza 77
7 - Giza 80	8 - Giza 81	9 - Giza 83
10 - Giza 84	11 - Giza 85	12 - Giza 86
13 - Giza 75 x Rus 6022	14 - Giza 77 x Giza 45A	15 - Giza77 x Giza 45B

These results are in agreement with those reported by **Bilbro and Ray (1976), Singh *et al.* (1980), Gill and Singh (1982), El-Marakby *et al.* (1986) and Abo El-Zahab *et al* (1992 a).**

IV . A . 2 . *lint cotton yield* :-

The regression of average mean performance of variety on the environment index resulted in regression coefficients (b) for lint yield ranged from 0.698 to 1.343 (Table 24). The b values obtained did not deviate significantly from unity, except Giza 77. With the exception, Giza 77 and Giza 84, deviation (S^2d) were significant.

Coefficient of determination (r^2) between lint yield of individual genotypes and environmental index of each location were variable and ranged from 0.396 (Giza 83) to 0.877 (Giza 77), indicating that these were real differences in the stability of genotypes.

The ecovalence index (W) of stability which represents the proportion of the (GE) sum of square (Table 24) attributed to each genotype, varied among genotypes from 25.356 (Giza 84) to 74.879 (Giza 85). These results indicated differences in stability among cotton genotypes over the environments.

Ideally, a cultivar would be adapted to all environments, if b did not differ significantly from unity, (S^2d) did not differ significantly from zero and above yielding ability particularly for a given production area. In this study, lint yield of all varieties except Giza 77 met the first criterion, only Giza 77 and Giza 84 met the second criterion (Table 24). Some of genotypes namely Giza 83, Giza 85, Giza 75 x Rus. 6022, Giza 80, Giza 86 and Giza 75 had lint yields which were significantly above the mean performance of all genotypes. Giza 83 and Giza 85 did not differ significantly, while Giza 75 x Rus. 6022, Giza 80 and Giza 86 did not differ significantly from the second highest yield check (Giza 85). These genotypes Giza 83, Giza 85, Giza 75 x Rus. 6022, Giza 80. Giza 86, Giza 75 and Giza 81 met the third criterion and they showed no significant different regression coefficient from unity and significant deviation sum of squares from zero. Consequently, they did not meet the stability characteristics of the ideal genotype.

Table 24 . Averages of genotypes and estimates of stability parameters for **lint cotton yield (K / fed.)** over 30 environments.

Genotypes	Means X	Regression coefficient b	Deviation from regression S^2d	coefficient of determination r^2	Ecovalence W	Adaptation #
Dendera	8.01	0.901	1.833**	0.468	66.726	A
Giza 45	5.06	0.935	0.562*	0.673	30.748	A
Giza 70	6.69	0.996	0.804**	0.656	37.222	A
Giza 75	8.55	1.095	0.865**	0.688	39.570	A
Giza 76	6.06	1.046	0.479*	0.736	28.286	A
Giza 77	7.55	1.343 +	0.121	0.877	26.510	H
Giza 80	9.08	1.121	2.103**	0.550	74.660	A
Giza 81	8.25	0.929	1.072**	0.580'	45.088	A
Giza 83	9.92	0.698 +	1.376**	0.396	59.785	L
Giza 84	7.75	0.882	0.344	0.696	25.356	A
Giza 85	9.58	0.851	2.092**	0.414	74.879	A
Giza 86	9.06	1.029	0.964**	0.645	41.752	A
Giza 75 X Rus. 6022	9.28	0.901	0.629**	0.643	33.027	A
Giza 77 X Giza 45 A	6.23	1.085	0.541*	0.738	30.359	A
Giza 77 X Giza 45 B	7.93	1.189	0.544*	0.772	32.488	A
mean	**7.93**					
L.S.D. 0.05	0.51					

+ , ++ Indicates regression coefficient is significantly different from unity at 5 % and 1 % level of probability, respectively.

Indicates deviation from regression is significantly different from zero at 5 % and 1 % level of probability, respectively.

, A , H , L indicates adaptation to all, high yielding and low yielding environments, respectively.

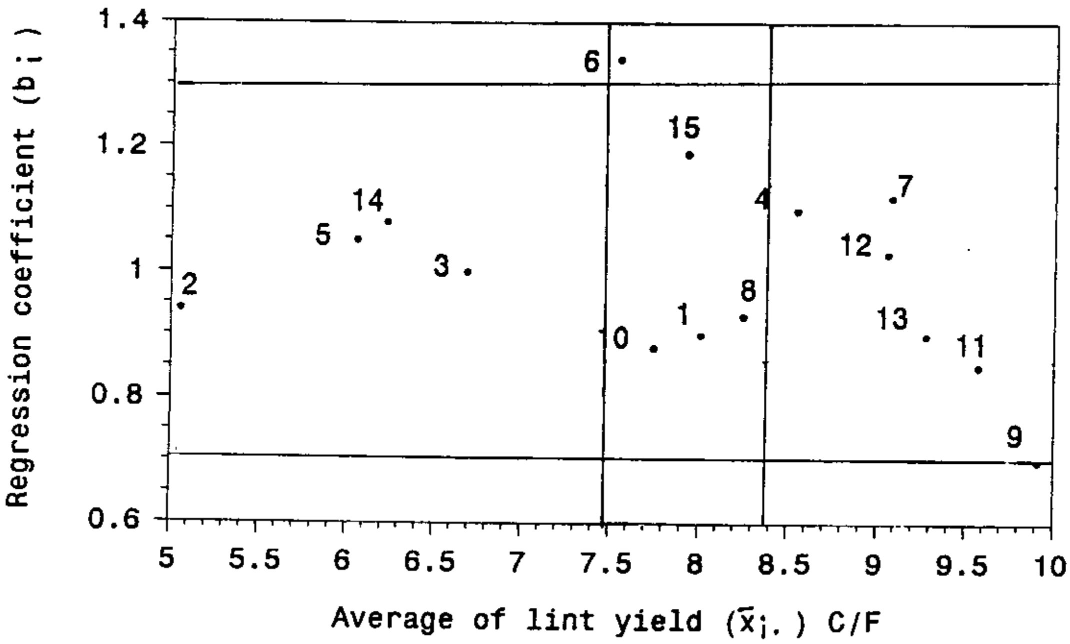

Figure 2: The relation of lint yield ($\bar{X}_{i.}$) and stability (regression coefficient b_i) for 15 Egyptian cotton genotypes.

1 - Dendera	2 - Giza 45	3 - Giza 70
4 - Giza 75	5 - Giza 76	6 - Giza 77
7 - Giza 80	8 - Giza 81	9 - Giza 83
10 - Giza 84	11 - Giza 85	12 - Giza 86
13 - Giza 75 x Rus 6022	14 - Giza,77 x Giza 45A	15 - Giza77 x Giza 45B

It is clear from the results presented in Table (24) and figure (2) that genotypes Giza 83, Giza 85, Giza 75 x Rus. 6022, Giza 80, Giza 86 and Giza 75 which showed above average mean yield are well adapted to all environments. However, Giza 70, Giza 77 x Giza 45A, Giza 76 and Giza 45 which showed below average mean yield over environments are poorly adapted to all environments. These results support the evidence that out of the 15 genotypes, only the new genotype Giza 84 met the production response and stability. Its mean performance (7.75 K/F.) was not significantly below the average mean of genotypes, or the highest second cheek genotype had b = 0.882 which did not significantly differ from unity and S^2d = 0.344 which did not significantly differ from zero and r^2 = 0.696 which was maximum and W = 25.356 which was minimum.

These results are in agreement with those reported by **Kalsy and Singh (1974), Bilbro and Ray (1976), Gill and Singh (1982), Abou-Zabra *et al.* (1989) and El-Shaarawy *et al.* (1994).**

IV. A. 3. *Boll weight* :-

The nonsignificant genotype x environment (linear) mean squares for boll weight indicated that genotypes did not differ in their response to different environment when tested with pooled deviations (Table 3).

The regression of average mean performance of variety on the environment index resulted in regression coefficient (b) for boll weight ranged from 0.820 to 1.279 (Table 25). The b values obtained did not deviate significantly from unity for all cultivars except Giza 75 and Dendera. In the present study several of the deviations (S^2d) were significant for boll weight, except those for Giza 80, Giza 86 and Giza 77 x Giza 45A which were nonsignificant.

Coefficient of determination (r^2) between boll weight of individual genotypes and environmental index of each location were variable and ranged from 0.535 (Dendera) to 0.873 (Giza 86), indicating that these were real differences in the stability of genotypes.

The ecovalence index (W) of stability (Table 25) pertaining to each genotype, varied from 0.287 (Giza 77 x Giza 45A) to 1.128 (Dendera). These results indicated differences in stability of genotypes over the environments.

For this character all genotypes, except Giza 75 and Dendera met the first criterion (b did not differ significantly from unity). Only three genotypes Giza 80, Giza 86 and the promising strain (Giza 77 x Giza 45A) met the second criterion (S^2d did not differ significantly from zero). Some genotypes, namely, Giza 85, Giza 75, Giza 86, Giza 80, Giza 81 and Giza 83 had boll weights which were significantly above the mean performance of all genotypes and met the third criterion. While, only two genotypes, Giza 86 and Giza 80, out of the previously mentioned five met the three criteria. The other high yielding genotypes, Giza 85, Giza 75 and Giza 81, had no significant S^2d from zero and, consequently they did not meet the stability characteristics of the ideal genotype.

It is clear from data presented in Table (25) and figure (3) that the genotypes Giza 85, Giza 75, Giza .86, Giza 81 and Giza 83 which showed above average mean yield are well adapted to all environments, however Giza 77, Dendera, Giza 77 x Giza 45A, Giza 84 and Giza 45 which yielded below average mean yield are poorly adapted to all environments.

In summary, results support the evidence that out of the 15 genotypes, only Giza 86 and Giza 80 met the production response and stability. They had average boll weights of 2.88 and 2.82 g. respectively, which were significantly above the average mean of all genotypes and the highest second check cultivar, b = 1.090 and 0.942 which did not significantly differ from unity, S^2d = 0.004 for both genotypes Giza 86 and Giza 80 and which did not significantly differ from zero, r^2 = 0.873 and o.840 for Giza 86 and Giza 80, respectively which are maximum and W = o.330 and o.315 which are minimum. Therefore, these two genotypes Giza 86 and Giza 80 may be recommended to be released as commercial stable with high boll weight and/or incorporated into a breeding stock in any future breeding program aiming for stable high boll weight lines.

These results are in agreement with those reportedly **El-Shaarawy (1977), El-Marakby *et al.*(1986), El-Saarawy *et al.* (1988 a) and El-Shishtawy *et al.* (1994).**

Table 25 . Averages of genotypes and estimates of stability parameters for **boll weight (g.)** over 30 environments.

Genotypes	Means	Regression coefficient	Deviation from regression	coefficient of determination	Ecovalence	Adaptation
	X	b	S^2d	r^2	W	#
Dendera	2.61	0.820	0.031**	0.535	1.128	A
Giza 45	2.52	0.919	0.013**	0.727	0.594	A
Giza 70	2.67	0.995	0.008**	0.806	0.436	A
Giza 75	2.90	1.279 ++	0.012**	0.845	0.692	H
Giza 76	2.66	0.986	0.010**	0.788	0.480	A
Giza 77	2.63	0.955	0.006*	0.812	0.392	A
Giza 80	2.82	0.942	0.004	0.840	0.315	A
Giza 81	2.81	1.121	0.018**	0.761	0.750	A
Giza 83	2.77	0.895	0.018**	0.669	0.745	A
Giza 84	2.56	0.990	0.007*	0.821	0.392	A
Giza 85	2.91	1.023	0.010**	0.796	0.490	A
Giza 86	2.88	1.090	0.004	0.873	0.330	A
Giza 75 X Rus. 6022	2.70	0.953	0.007*	0.799	0.422	A
Giza 77 X Giza 45 A	2.58	0.984	0.003	0.861	0.287	A
Giza 77 X Giza 45 B	2.68	1.050	0.008**	0.819	0.451	A
mean	**2.71**					
L.S.D. 0.05	0.07					

+ , ++ Indicates regression coefficient is significantly different from unity at 5 % and 1 % level of probability, respectively.

Indicates deviation from regression is significantly different from zero at 5 % and 1 % level of probability, respectively.

, A , H , L indicates adaptation to all, high yielding and low yielding environments, respectively.

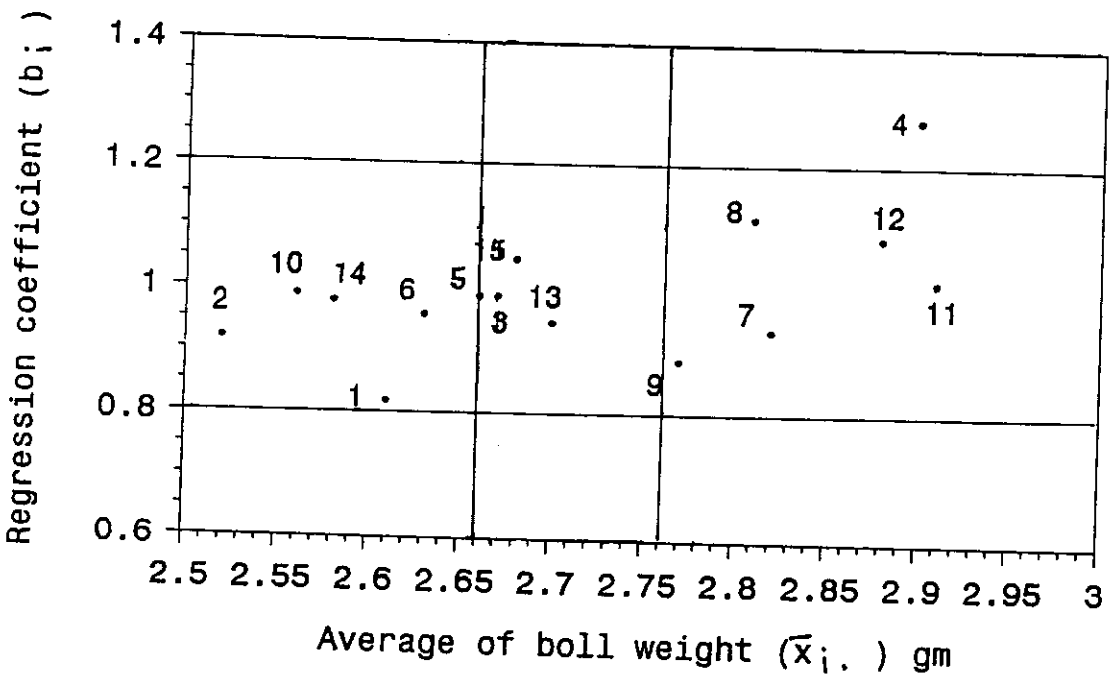

Figure 3: The relation of boll wieght ($\bar{X}_{i.}$) and stability (regression coefficient b_i) for 15 Egyptian cotton genotypes.

1 - Dendera
4 - Giza 75
7 - Giza 80
10 - Giza 84
13 - Giza 75 x Rus 6022
2 - Giza 45
5 - Giza 76
8 - Giza 81
11 - Giza 85
14 - Giza 77 x Giza 45A
3 - Giza 70
6 - Giza 77
9 - Giza 83
12 - Giza 86
15 - Giza77 x Giza 45B

IV . A . 4 . *Number of open bolls per plant* :-

It can be seen from Table (3), that the genotype x environment (linear) mean square was significant this trait indicating that there were differences among the regression coefficients for the genotypes.

The regression of average mean performance of genotype on the environmental index resulted in regression coefficients (b) for this trait ranged from 0.720 (Giza 81) to 1.261 for Giza 77 (Table 26). The b values obtained did not deviate significantly from unity, except Giza 81 and Giza 77. In the present study, several of the deviations (S^2d) were significant for number of open bolls per plant except Giza 77 and Giza 86 which were nonsignificant.

Coefficient of determination (r^2) for this trait of individual genotypes and environmental index of each location were variable and ranged from 0.585 (Giza 85) to 0.921 (Giza 77), indicating that these were real differences in the stability of genotypes.

The ecovalence index (W) of stability (Table 26) pertaining to each genotype, varied from 27.912 (Giza 86) to 70.847 (Giza 85), These results indicated differences in stability of genotypes over the environment.

For this character, all genotypes except Giza 77 and Giza 81, met the first criterion (b did not differ significantly from unity.) Only two genotypes, Giza 86 and Giza 77, met the second criterion (S^2d did not differ significantly from zero). Some genotypes, Giza 75 x Rus. 6022, Giza 84 , Giza 83 and Giza 85, had number of open bolls per plant which were significantly above the mean performance of all genotypes and met the third criterion. These genotypes had significant S^2d from zero and consequently, they did not meet the stability characteristics of the genotypes.

It is clear from the results presented in Table (26) and figure (4) that the genotypes Giza 75 x Rus. 6022, Giza 84 , Giza 83 and Giza 85 which were above average mean are well adapted to all environments, however, Giza 70, Giza 76 and Giza 45 which were below average mean are poorly adapted to all environments.

Table 26 . Averages of genotypes and estimates of stability parameters for **number of bolls per plant (No.)** over 30 environments.

Genotypes	Means X	Regression coefficient b	Deviation from regression S^2d	coefficient of determination r^2	Ecovalence W	Adaptation #
Dendera	11.60	0.988	1.663**	0.692	61.546	A
Giza 45	9.30	1.128	0.846**	0.824	40.948	A
Giza 70	10.21	1.144	0.545*	0.860	33.162	A
Giza 75	11.24	0.948	0.773**	0.777	36.984	A
Giza 76	9.84	1.063	0.714**	0.821	35.483	A
Giza 77	11.08	1.261 ++	0.159	0.921	29.058	H
Giza 80	11.25	1.083	1.333**	0.761	53.261	A
Giza 81	10.99	0.720 ++	1.324**	0.586	63.098	L
Giza 83	12.10	0.903	1.178**	0.707	49.248	A
Giza 84	12.11	0.945	0.480*	0.817	28.813	A
Giza 85	11.93	0.808	1.809**	0.585	70.847	A
Giza 86	11.43	0.883	0.393	0.810	27.912	A
Giza 75 X Rus. 6022	12.67	0.883	0.976**	0.724	44.200	A
Giza 77 X Giza 45 A	10.65	1.185	0.880**	0.834	44.425	A
Giza 77 X Giza 45 B	11.31	1.059	0.536*	0.842	30.439	A
mean	**11.18**					
L.S.D. 0.05	0.54					

+ , ++ Indicates regression coefficient is significantly different from unity at 5 % and 1 % level of probability, respectively.

Indicates deviation from regression is significantly different from zero at 5 % and 1 % level of probability, respectively.

, A , H , L indicates adaptation to all, high yielding and low yielding environments, respectively.

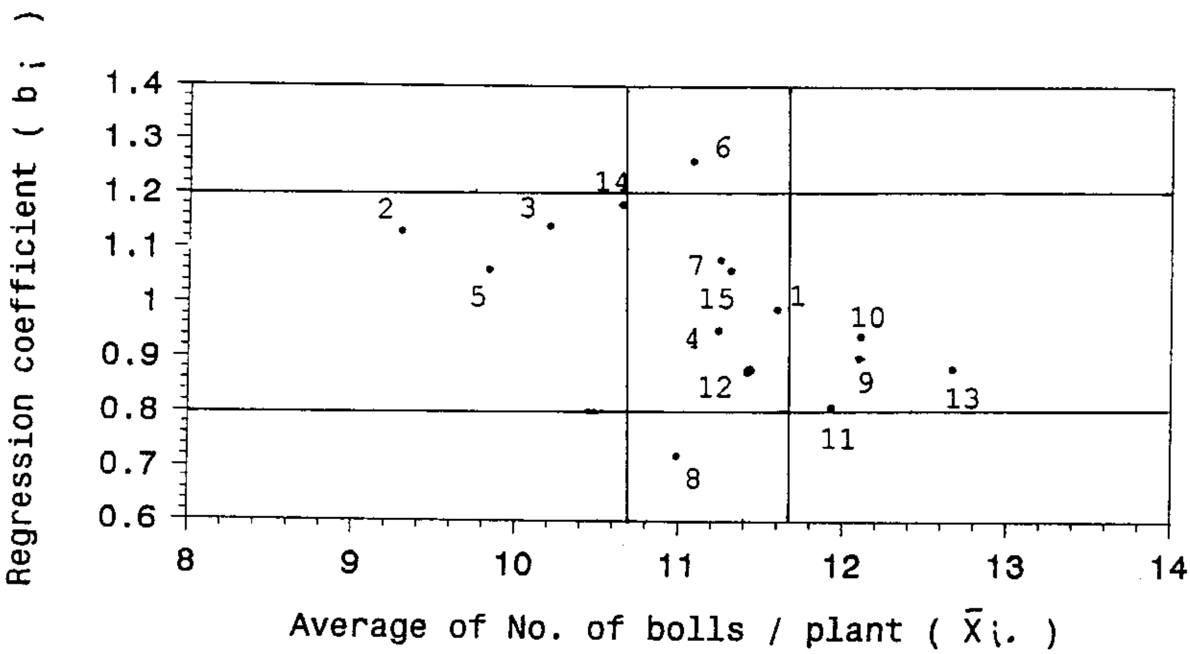

Figure 4 : The relation of number of bolls / plant ($\bar{X}_{i.}$) and stability (regression coefficient b_i) for 15 Egyptian cotton genotypes.

1 - Dendera	2 - Giza 45	3 - Giza 70
4 - Giza 75	5 - Giza 76	6 - Giza 77
7 - Giza 80	8 - Giza 81	9 - Giza 83
10 - Giza 84	11 - Giza 85	12 - Giza 86
13 - Giza 75 x Rus 6022	14 - Giza 77 x Giza 45A	15 - Giza77 x Giza 45B

These results indicate that out of the 15 genotypes, only Giza 86 met the production response and stability. Its mean performance (11.43 bolls) was not significant above the average of genotypes and the highest second check genotype, b = 0.883 which did not significantly differ from unity, S^2d = 0.393 which did not significantly differ from zero, r^2 = 0.810 which is maximum and W = 27.912 which is minimum. Therefore, the genotype Giza 86 may be recommended to be released as commercial stable in high number of bolls and/or incorporated into a breeding stock any future breeding program aiming for producing stable high number of bolls lines.

These results were in agreement with those reported by **Gill and singh (1982), El-Marakby *et al.* (1986) and shafskak *et al.* (1993 a).**

IV . A . 5 . *Lint percentage* :-

The regression of average mean performance of genotype on the environmental index resulted in regression coefficients (b) for lint percentage ranged from 0.664 to 1.227. The b values obtained did not deviate significantly from unity, except Dendera, Giza 76 and Giza 84. The deviation S^2d were significant for lint percentage, except Giza 77, Giza 84 and Giza 77x Giza 45B.

Coefficients of determination (r^2) between lint percentage of individual genotypes and environmental index of each location were variable and ranged from 0.752 (Giza 80) to 0.912 (Giza 77), indicating that these were real differences in the stability of genotypes.

The ecovalence index (W) of stability (Table 27) pertaining to each genotype, varied from 7.176 (Giza 77) to 23.516 (Giza 45). These results indicated differences in stability of genotypes over the environments.

In this study for lint percentage, four genotypes ,Giza 77, Giza 81, Giza 86 and Giza 77 x Giza 45B met the first criterion (b did not differ significantly from unity), S^2d did not differ significantly from zero and high lint percentage.

It is clear from the results presented in Table (27) and figure (5) that the genotypes Giza 83, Giza 80, Giza 86, Giza 85, Giza 81 and Giza 75 which were above average mean of lint percentage are well adapted to all environments

Table 27 . Averages of genotypes and estimates of stability parameters for **lint percentage** (%) over 30 environments.

Genotypes	Means X	Regression coefficient b	Deviation from regression S^2d	coefficient of determination r^2	Ecovalence W	Adaptation #
Dendera	36.96	0.763 ++	0.191*	0.775	14.094	L
Giza 45	33.68	1.129	0.615**	0.780	23.516	A
Giza 70	36.38	1.114	0.325**	0.844	15.167	A
Giza 75	37.50	1.021	0.245**	0.844	12.139	A
Giza 76	35.01	1.227 ++	0.266**	0.881	15.907	H
Giza 77	37.32	1.068	0.058	0.912	7.176	A
Giza 80	40.89	0.924	0.443**	0.752	18.016	A
Giza 81	38.34	0.838	0.062	0.863	8.638	A
Giza 83	41.36	0.973	0.355**	0.796	15.231	A
Giza 84	34.59	0.664 ++	0.044	0.810	13.529	L
Giza 85	38.49	1.038	0.389**	0.807	16.241	A
Giza 86	38.85	1.009	0.102	0.888	8.088	A
Giza 75 X Rus. 6022	37.21	1.148	0.233**	0.875	13.146	A
Giza 77 X Giza 45 A	32.83	1.040	0.181*	0.868	10.427	A
Giza 77 X Giza 45 B	37.31	1.048	0.124	0.888	8.879	A
mean	**37.11**					
L.S.D. 0.05	0.32					

+ , ++ Indicates regression coefficient is significantly different from unity at 5 % and 1 % level of probability, respectively.

Indicates deviation from regression is significantly different from zero at 5 % and 1 % level of probability, respectively.

, A , H , L indicates adaptation to all, high yielding and low yielding environments, respectively.

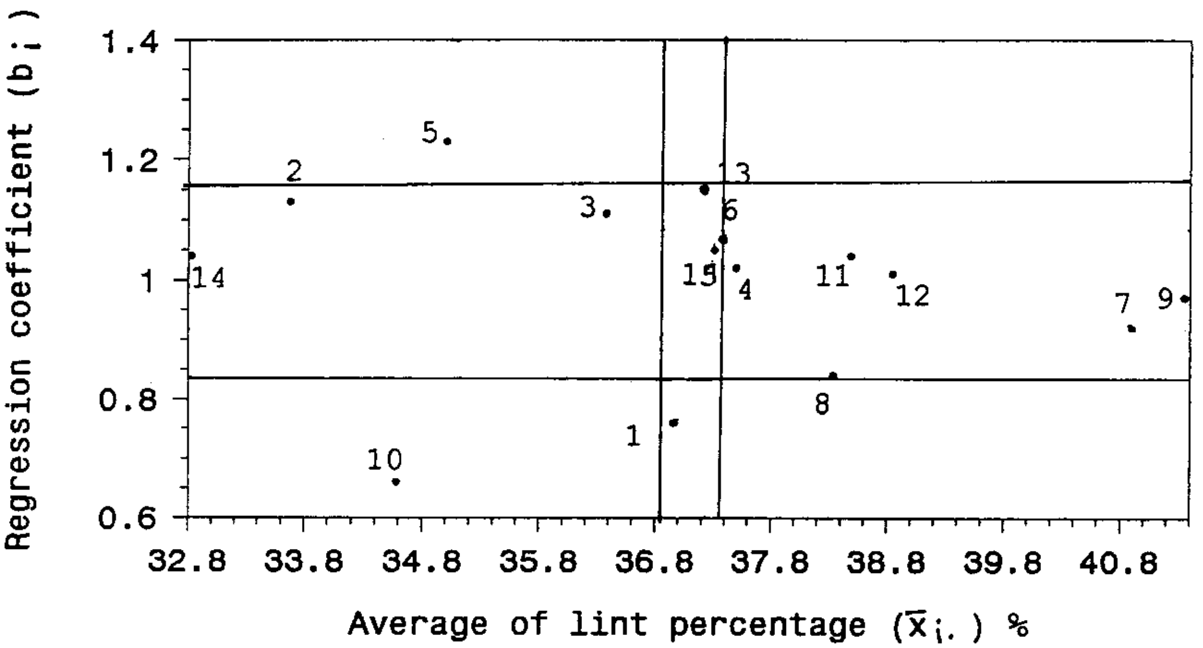

Figure 5 : The relation of lint percentage ($\bar{X}_{i.}$) and stability (regression coefficient b_i) for 15 Egyptian cotton genotypes.

1 - Dendera	2 - Giza 45	3 - Giza 70
4 - Giza 75	5 - Giza 76	6 - Giza 77
7 - Giza 80	8 - Giza 81	9 - Giza 83
10 - Giza 84	11 - Giza 85	12 - Giza 86
13 - Giza 75 x Rus 6022	14 - Giza 77 x Giza 45A	15 - Giza77 x Giza 45B

However Giza 70, Giza 76, Giza 84, Giza 45And Giza 77 x Giza 45A which were below average mean are poorly adapted to all environments. These results support the evidence that out of the 15 genotypes, only four genotypes Giza 86, Giza 81, Giza 77 and Giza 77 x Giza 45B met the production response and stability, these means were 38.85, 38.34, 37.32 and 37.31 % respectively, and two genotypes Giza 86 and Giza 81 were significantly above the average mean of genotypes, but the other two genotypes Giza 77 and Giza 77 x Giza 45B were not significantly different. The highest second check genotype, b =1.009, 0.838, 1.068 and 1.048 for Giza 86, Giza 81, Giza 77 and Giza 77 x Giza 45B respectively, which did not significantly differ from unity, S^2d for these genotypes were 0.102, 0.062, 0.058 and 0.124, respectively and which did not significantly differ from zero, r^2 for these genotypes were 0.888, 0.863, 0.912 and 0.888, respectively which are maximum and W = 8.088, 8.638, 7.176 and 8.879 for these genotypes respectively, and which are minimum. Therefore, the genotypes Giza 86, Giza 81, Giza 77 and Giza 77 x Giza 45B may be recommended to be incorporated into a breading stock in any future breeding program.

These results are in agreement with those obtained by **El-Shaarawy (1977), El-Kadi *et al.* (1978), El-Marakby *et al.* (1986), Abd El-Rahman and El-Mazar (1987)and El- Shishtawy et al (1994).**

IV . A . 6 . *Lint index :-*

It can be seen from Table (3), that the genotype x environment (linear) mean square was significant for this trait, indicating that there were differences among the regression coefficients for the genotypes.

The regression of average mean performance of genotype on the environmental index resulted in regression coefficient (b) for lint index ranged from 0.724 to 1.161, The b values obtained did not deviate significantly from unity, except Giza 45, Giza 76 and Giza 83. The deviations from regression (S^2d) were significant for lint index, except Giza 76, Giza 85, Giza 86 and Giza 77 x Giza 45A.

Coefficients of determination (r^2) between lint index of individual genotypes and environmental index of each location were variable and ranged from 0.707 (Giza 45) to 0.906 (Giza 86), indicating that these were real differences in the stability of genotypes.

The ecovalence index (W) of stability (Table 28) pertaining to each genotypes, varied from 1.242 (Giza 77 x Giza 45A) to 3.221 (Giza 83). These results indicated differences in stability of genotypes over the environments.

In this study for lint index, only two genotypes, Giza 86 and Giza 85 met the three criteria (b did not differ significantly from unity, S^2d did not differ significantly from zero and high lint index).

It is clear from the results presented in table (28) and figure (6) that genotypes Giza 80, Giza 86, Giza 83, Giza 85, Giza 75, Dendera and Giza 81 which were above average mean are well adapted to all environments, however all other genotypes which were below average mean over environments are poorly to all environments. These results support the evidence that out of the 15 genotypes, only two genotypes Giza 86 and Giza 85 met the production response and stability. They means performance were 6.94 and 6.60 respectively, and were significant above average mean of genotypes. The highest second check cultivar, b = 1.093 for both genotypes (Giza 86 and Giza 85), which did not significantly differ from unity, S^2d = 0.014 and 0.016, respectively and which did not significantly differ from zero, r^2 = 0.906 and 0.903 for Giza 86 and Giza 83 respectively, which are maximum and W = 1.389 and 1.437 respectively, which are minimum. Therefore, the genotypes Giza 86 and Giza 85 may be recommended to be incorporated as a breading stock in any future breeding program aiming to increase lint index.

These results are in agreement with those reported by **El-Kadi *et al.* (1978), Abd El-Rahman and El-Mazar (1987) and Seyam *et al.*(1994).**

Table 28 . Averages of genotypes and estimates of stability parameters for lint index (g.) over 30 environments.

Genotypes	Means X	Regression coefficient b	Deviation from regression S^2d	coefficient of determination r^2	Ecovalence W	Adaptation #
Dendera	6.34	0.990	0.026*	0.863	1.628	A
Giza 45	5.19	0.724 ++	0.048**	0.707	3.064	L
Giza 70	5.64	1.099	0.025*	0.886	1.726	A
Giza 75	6.46	1.004	0.028*	0.862	1.693	A
Giza 76	5.17	0.836 +	0.012	0.854	1.525	L
Giza 77	5.87	1.134	0.028*	0.889	1.872	A
Giza 80	7.11	1.127	0.037**	0.872	2.123	A
Giza 81	6.25	0.915	0.035*	0.823	1.958	A
Giza 83	6.81	1.161 +	0.073**	0.827	3.221	H
Giza 84	5.36	0.925	0.023*	0.851	1.623	A
Giza 85	6.60	1.093	0.016	0.903	1.437	A
Giza 86	6.94	1.093	0.014	0.906	1.389	A
Giza 75 X Rus. 6022	5.65	0.866	0.025*	0.830	1.797	A
Giza 77 X Giza 45 A	4.85	0.942	0.011	0.885	1.242	A
Giza 77 X Giza 45 B	5.85	1.091	0.035*	0.868	1.975	A
mean	**6.01**					
L.S.D. 0.05	0.13					

+ , ++ Indicates regression coefficient is significantly different from unity at 5 % and 1 % level of probability, respectively.

Indicates deviation from regression is significantly different from zero at 5 % and 1 % level of probability, respectively.

, A , H , L indicates adaptation to all, high yielding and low yielding environments, respectively.

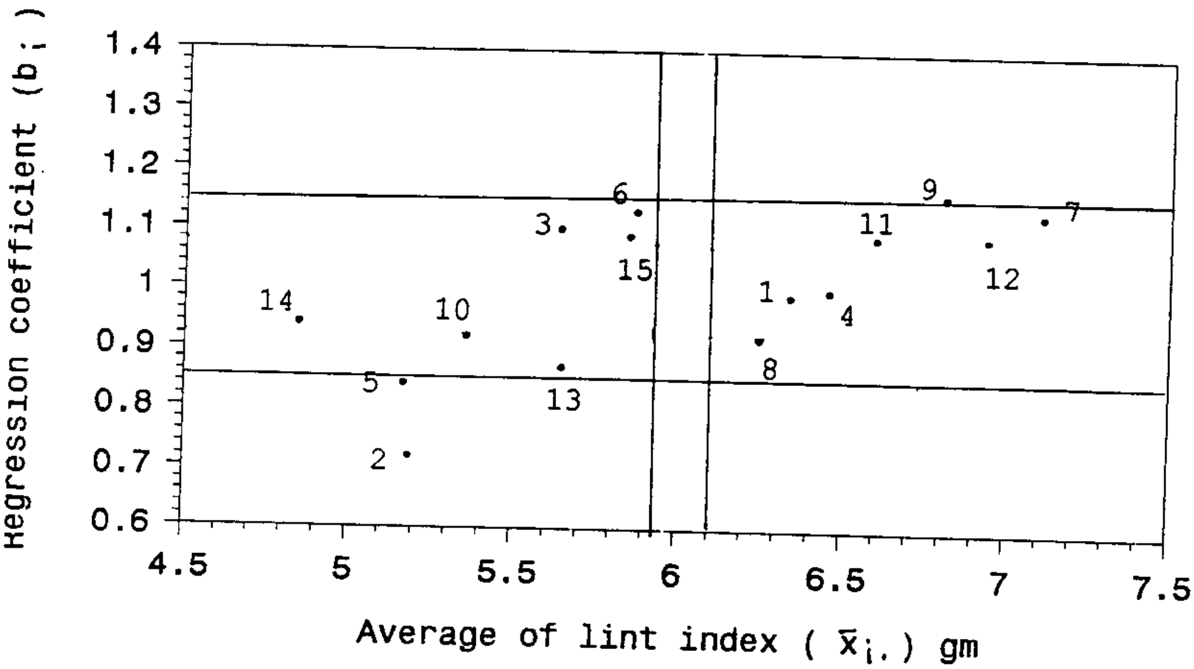

Figure 6: The relation of lint index ($\bar{X}_{i.}$) and stability (regression coefficient b_i) for 15 Egyptian cotton genotypes.

1 - Dendera	2 - Giza 45	3 - Giza 70
4 - Giza 75	5 - Giza 76	6 - Giza 77
7 - Giza 80	8 - Giza 81	9 - Giza 83
10 - Giza 84	11 - Giza 85	12 - Giza 86
13 - Giza 75 x Rus 6022	14 - Giza 77 x Giza 45A	15 - Giza77 x Giza 45B

IV . A . 7 . *Seed index* :-

Results presented in Table (3) showed non significant genotype x environment (linear) mean square for seed index, indicating that genotypes did not differ in their response to different environments when tested with pooled deviation.

The regression of average mean performance of variety on the environmental index resulted in regression coefficients (b) for seed index ranged from 0.848 to 1.151 (table 29). The b values obtained did not deviate significantly from unity, except Giza 85 only. With the exception of Giza 77, Giza 80, Giza 86 and Giza 77 x Giza 45A, deviations (S^2d) were significant.

Coefficients of determination (r^2) between seed index of individual genotypes and environmental index of each location were variable and ranged from 0.676 (Giza 77 x Giza 45B) to 0.894 (Giza 86), indicating that these were real differences in the stability of genotypes.

The ecovalence index (W) of stability which represents the proportion of the (GE) sum of square (Table 29) attributed to each genotypes, varied among genotypes from 2.898 (Giza 77 x Giza 45A) to 6.604 (Giza 77 x Giza 45B). These results indicated differences in stability among cotton genotypes over the environments.

In this study for seed index, only two genotypes Giza 86 and Giza 80 met the three criteria (b did not differ significantly from unity, S^2d did not differ significantly from zero and high seed index).

It is evident from the results presented in Table (29) and Figure (7) that genotypes Giza 86, Dendera, Giza 75 and Giza 85, which were significantly above average mean are well adapted to all environments. However, genotypes Giza 77 x Giza 45A, Giza 70, Giza 77, Giza 77 x Giza 45B, Giza 83, Giza 76 and Giza 75 x Rus. 6022, which were significantly below average mean over environments are poorly adapted to all environments.

These results support the evidence that out of the 15 genotypes, there are two genotypes Giza 86 and Giza 80 met the production response and stability. They means performance 10.91 and 0.25 gram respectively, and were significantly above the

Table 29 . Averages of genotypes and estimates of stability parameters for seed index (g.) over 30 environments.

Genotypes	Means X	Regression coefficient b	Deviation from regression S^2d	coefficient of determination r^2	Ecovalence W	Adaptation #
Dendera	10.81	1.014	0.084*	0.796	4.708	A
Giza 45	10.21	0.865	0.088*	0.735	5.155	A
Giza 70	9.84	1.080	0.061*	0.837	4.178	A
Giza 75	10.77	1.151	0.073*	0.843	4.808	A
Giza 76	9.59	0.924	0.062*	0.789	4.190	A
Giza 77	9.83	0.926	0.052	0.801	3.911	A
Giza 80	10.25	0.848	0.046	0.779	4.058	A
Giza 81	10.04	0.890	0.090*	0.745	5.076	A
Giza 83	9.64	0.961	0.122**	0.741	5.796	A
Giza 84	10.12	1.129	0.094**	0.821	5.270	A
Giza 85	10.54	1.224 +	0.081*	0.853	5.520	H
Giza 86	10.91	1.147	0.016	0.894	3.185	A
Giza 75 X Rus. 6022	9.52	0.974	0.107**	0.760	5.357	A
Giza 77 X Giza 45 A	9.89	1.017	0.019	0.865	2.898	A
Giza 77 X Giza 45 B	9.80	0.853	0.138**	0.676	6.604	A
mean	**10.12**					
L.S.D. 0.05	0.19					

+ , ++ Indicates regression coefficient is significantly different from unity at 5 % and 1 % level of probability, respectively.

Indicates deviation from regression is significantly different from zero at 5 % and 1 % level of probability, respectively.

, A , H , L indicates adaptation to all, high yielding and low yielding environments, respectively.

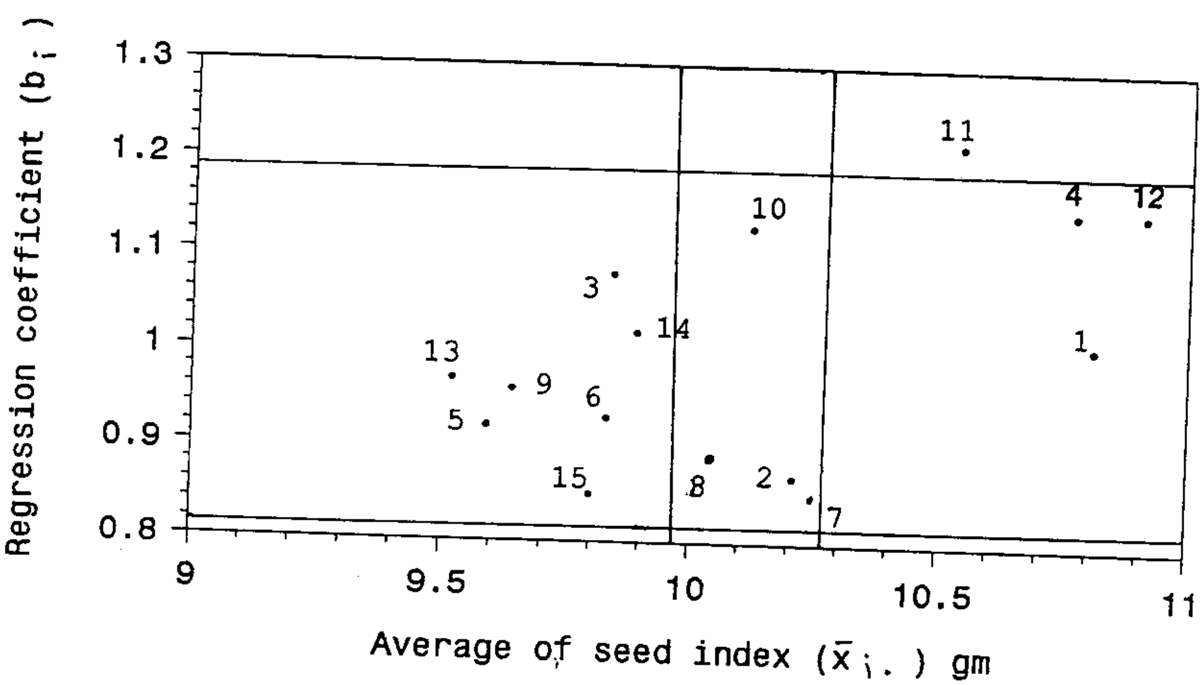

Figure 7 : The relation of seed index ($\bar{X}_{i.}$) and stability (regression coefficient b_i) for 15 Egyptian cotton genotypes.

1 - Dendera	2 - Giza 45	3 - Giza 70
4 - Giza 75	5 - Giza 76	6 - Giza 77
7 - Giza 80	8 - Giza 81	9 - Giza 83
10 - Giza 84	11 - Giza 85	12 - Giza 86
13 - Giza 75 x Rus 6022	14 - Giza 77 x Giza 45A	15 - Giza77 x Giza 45B

average mean of genotypes, the highest second check cultivar, b = 1.147 and 0.848 for genotypes Giza 86 and Giza 80 respectively, which did not significantly differ from unity, S^2d = 0.016 and 0.046 for Giza 86 and Giza 80 respectively, and which did not significantly differ from zero, the r^2 = 0.894 and 0.779 respectively, which are maximum and W = 3.185 and 4.058, which are minimum.

Therefore, the genotypes Giza 86 and Giza 80 may be recommended to be released as commercial stable high seed index and/or incorporated into a breeding stock in any future breeding program aiming to improve seed index.

These results are in agreement with those reported by **El-Shaarawy (1977), El-Kadi *et al.* (1978), Gill and Singh (1982), El-Marakby *et al.* (1986), Abou-Alam *et al.* (1988) and Shafshak *et al.* (1993 a).**

Therefore, the present study for yield and yield component characters (Table 23 to 29), indicated that for selection for stability with the objective of incorporating this important trait in the Egyptian cotton genotypes, the following genotypes may be considered as breeding stocks for specific traits :-

Seed cotton yield	Giza 75 x Rus. 6022.
Lint cotton yield	Giza 84.
Boll weight and seed index	Giza 86 and Giza 80.
Number of bolls per plant	Giza 86.
Lint percentage	Giza 86, Giza 81, Giza 77 and Giza 77 x Giza 45B.
Lint index	Giza 86 and Giza 85.

IV . B . <u>Fiber properties</u> :-

It can be seen from (Table 4) that genotypes x environments (linear) interactions were significant for Micronaire reading, 2.5% S.L. and 50% S.L., indicating that there were differences among the regression coefficients for the genotypes, while interaction was nonsignificant for fiber strength, indicating that genotypes did not differ in their response to different environments when tested with pooled deviation.

IV .B .1 . *Micronaire reading* :-

The regression of average mean performance of variety on the environmental index resulted in regression coefficient (b) for micronaire reading ranged from 0.756 to 1.282 (Table 30). The b values obtained did not deviate significantly from unity, except Giza 45, Giza 75, Giza 80 and the promising strain Giza 77 x Giza 45A.

Coefficients of determination (r^2) between micronaire reading of individual genotypes and environmental index of each location were variable and ranged from 0.689 (Giza 45) to 0.897 (Giza 77), indicating that these were real differences in the stability of genotypes.

The ecovalence index (W) of stability which represents the proportion of the (GE) sum of square (Table 30) attributed to each genotypes, varied among genotypes from 0.424 (Giza 77) to 1.360 (Giza 75). These results indicated differences in stability among cotton genotypes over the environments.

In this study for micronaire reading, only two genotypes, Giza 86 and the promising strain Giza 75 x Rus. 6022 met the three criteria (b did not differ significantly from unity, S^2d did not differ significantly from zero and high micronaire reading).

It is clear from the results presented in Table (30) and Figure (8) that the genotypes Giza 75, Giza 81, Giza 80, Giza 86, Giza 85, Dendera, Giza 83 and promising strain Giza 75 x Rus. 6022 which were significantly above average mean yield are well adapted to all environments. However, the genotypes Giza 77 x Giza 45B, Giza 77, Giza 84, Giza 76, Giza 45 and Giza 77 x Giza 45A, which were significantly below average mean yield are poorly adapted to all environments. The remaining genotype Giza 70 which was not significantly differed from the average mean performance of all cultivars had average stability.

These results support the evidence that out of 15 genotypes, there are two genotypes Giza 86 and Giza 75 x Rus. 6022 met the production response and stability. The mean performance for Giza 86 values $x = 3.78$, $b = 1.122$, $S^2d = 0.008$,

Table 30 . Averages of genotypes and estimates of stability parameters for **micronaire reading (unit)** over 30 environments.

Genotypes	Means X	Regression coefficient b	Deviation from regression S^2d	coefficient of determination r^2	Ecovalence W	Adaptation #
Dendera	3.61	1.076	0.031**	0.734	1.219	A
Giza 45	3.02	0.810 +	0.019**	0.689	0.964	L
Giza 70	3.42	1.076	0.020**	0.793	0.890	A
Giza 75	3.92	1.282 ++	0.029**	0.808	1.360	H
Giza 76	3.15	1.005	0.009*	0.835	0.580	A
Giza 77	3.36	1.096	0.003	0.897	0.424	A
Giza 80	3.82	0.739 ++	0.022**	0.628	1.136	L
Giza 81	3.83	1.049	0.009*	0.848	0.579	A
Giza 83	3.61	0.927	0.017**	0.758	0.810	A
Giza 84	3.21	0.941	0.013**	0.790	0.693	A
Giza 85	3.62	1.050	0.016**	0.805	0.780	A
Giza 86	3.78	1.122	0.008	0.871	0.584	A
Giza 75 X Rus. 6022	3.77	1.039	0.006	0.861	0.509	A
Giza 77 X Giza 45 A	2.92	0.756 +	0.002	0.811	0.558	L
Giza 77 X Giza 45 B	3.37	1.033	0.028**	0.734	1.113	A
mean	**3.49**					
L.S.D. 0.05	0.08					

+ , ++ Indicates regression coefficient is significantly different from unity at 5 % and 1 % level of probability, respectively.

Indicates deviation from regression is significantly different from zero at 5 % and 1 % level of probability, respectively.

, A , H , L indicates adaptation to all, high yielding and low yielding environments, respectively.

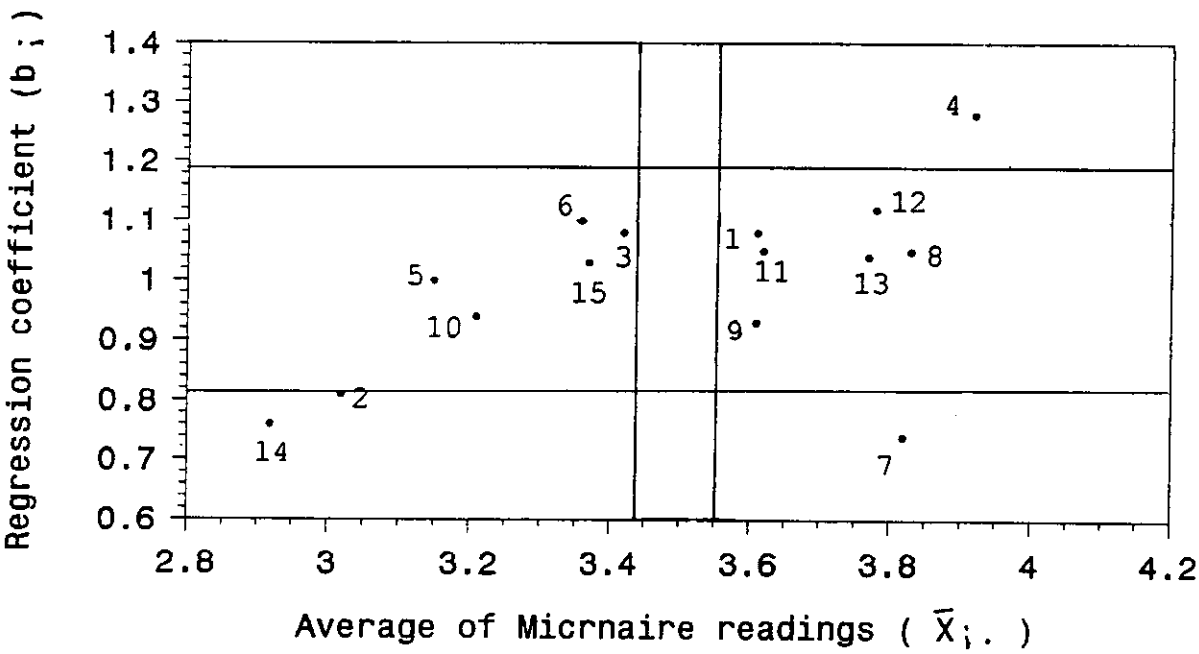

Figure 8: The relation of Micronaire readings ($\bar{X}_{i.}$) and stability (regression coefficient b_i) for 15 Egyptian cotton genotypes.

1 - Dendera	2 - Giza 45	3 - Giza 70
4 - Giza 75	5 - Giza 76	6 - Giza 77
7 - Giza 80	8 - Giza 81	9 - Giza 83
10 - Giza 84	11 - Giza 85	12 - Giza 86
13 - Giza 75 x Rus 6022	14 - Giza 77 x Giza 45A	15 - Giza77 x Giza 45B

r^2 = 0.871 and W = 0.584, while mean performance for Giza 75 x Rus. 6022 was x = 3.77, b = 1.039, S^2d = 0.006, r^2 = 0.861 and W = 0.509.

These results are in agreement with those reported by **El-Shaarawy (1977), Abou-Alam *et al.* (1988), Seyam *et al.* (1994 b) and Shafshak *et al.* (1994 b).**

IV . B . 2 . *Fiber strength* :-

The regression of average mean performance of variety on the environmental index resulted in regression coefficients (b) for fiber strength ranged from 0.682 to 1.569 (Table 31). The b values obtained did not deviate significantly from unity, except Giza 77. With the exception, Giza 76, Giza 77, Giza 80, Giza 81, Giza 83, Giza 84, Giza 85 and Giza 77 x Giza 45A, deviation (S^2d) were significant.

Coefficients of determination (r^2) between fiber strength of individual genotypes and environmental index of each location were variable and ranged from 0.22 (Giza 83) to 0.544 (Giza 77), indicating that these were real differences in the stability of genotypes.

The ecovalence index (W) of stability which represents the proportion of the (GE) sum of square (Table 31) attributed to each genotype, varied among genotypes from 2.039 (Giza 45) to 6.028 (Giza 84). These results indicated differences in stability differences among cotton genotypes over the environments.

In this study for fiber strength, five genotypes, Giza 45, Giza 70, Giza 75, Giza 86 and Giza 77 x Giza 45B met the three criteria (b did not differ significantly from unity, S^2d did not differ significantly from zero and high fiber strength).

It is clear from the results presented in Table (31) and Figure (9) that genotypes Giza 84, Giza 77 x Giza 45B, Giza 70, Giza 76, Giza 77 x Giza 45A, Giza 77 and Giza 75 which were significantly above average mean are well adapted to all environments. However, the genotypes Giza 85, Giza 75 x Rus. 6022, Giza 80, Dendera and Giza 83, which were significantly below average over the environments are poorly adapted to all environments. The remaining genotypes Giza 45, Giza 86 and Giza 81 which were not significantly differed from the average mean performance of all cultivars had average stability.

Table 31 . Averages of genotypes and estimates of stability parameters for **fiber strength (Pressley index)** over 30 environments.

Genotypes	Means X	Regression coefficient b	Deviation from regression S^2d	coefficient of determination r^2	Ecovalence W	Adaptation #
Dendera	9.26	0.682	0.046	0.247	3.679	A
Giza 45	10.44	0.854	-0.006	0.470	2.039	A
Giza 70	10.92	1.158	0.022	0.540	2.816	A
Giza 75	10.59	1.033	0.041	0.439	3.290	A
Giza 76	10.85	0.918	0.095**	0.297	4.825	A
Giza 77	10.72	1.569 +	0.101**	0.544	5.759	H
Giza 80	9.51	1.085	0.064*	0.420	3.952	A
Giza 81	10.28	1.409	0.068*	0.542	4.455	A
Giza 83	8.90	0.706	0.076*	0.220	4.476	A
Giza 84	11.01	1.133	0.137**	0.341	6.028	A
Giza 85	9.91	0.712	0.085**	0.213	4.722	A
Giza 86	10.40	0.884	0.034	0.380	3.119	A
Giza 75 X Rus. 6022	9.85	1.124	0.052	0.459	3.644	A
Giza 77 X Giza 45 A	10.79	0.816	0.054*	0.305	3.749	A
Giza 77 X Giza 45 B	10.98	0.919	0.035*	0.396	3.132	A
mean	**10.29**					
L.S.D. 0.05	0.18					

+ , ++ Indicates regression coefficient is significantly different from unity at 5 % and 1 % level of probability, respectively.

Indicates deviation from regression is significantly different from zero at 5 % and 1 % level of probability, respectively.

, A , H , L indicates adaptation to all, high yielding and low yielding environments, respectively.

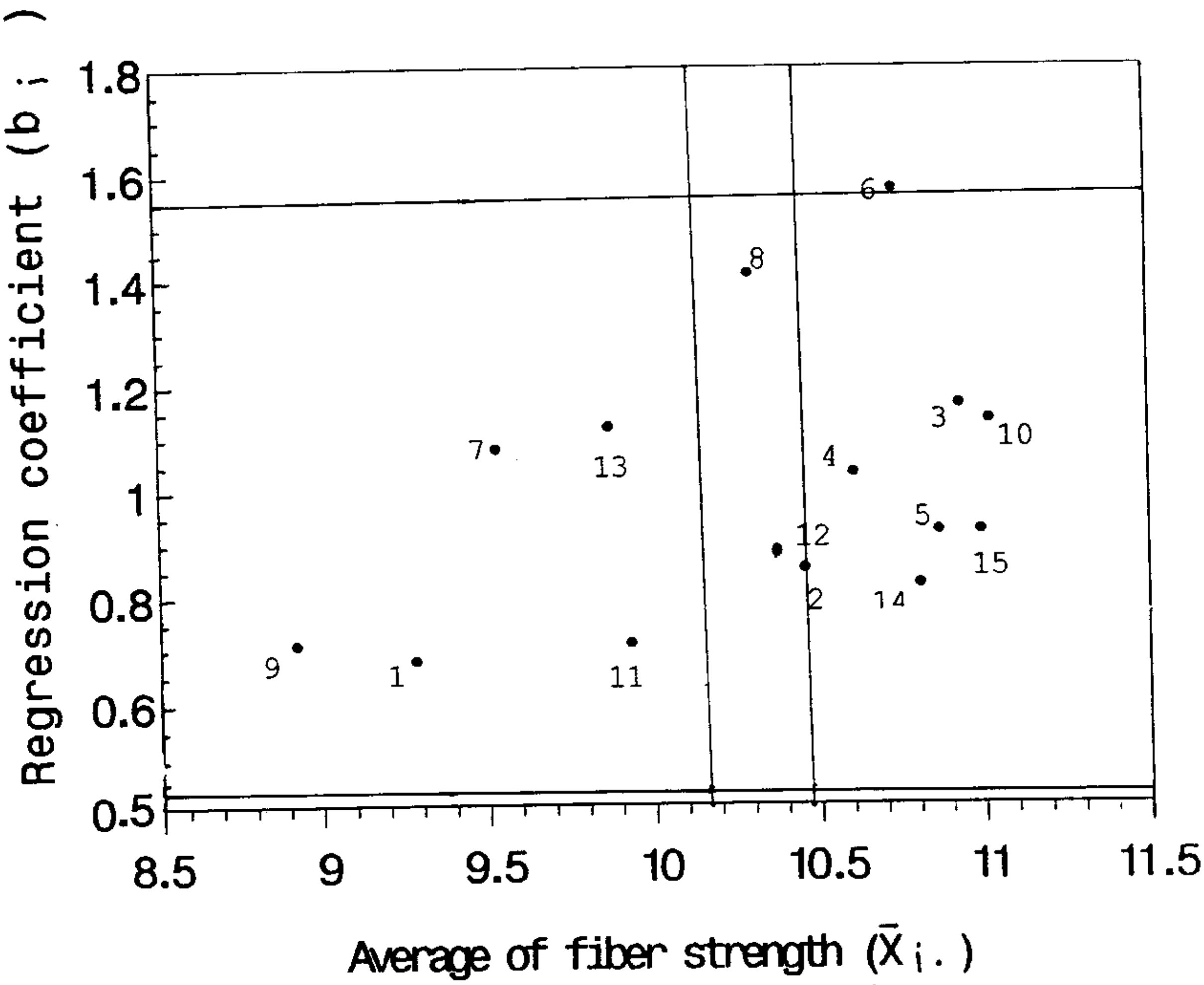

Figure 9: The relation of fiber strength ($\bar{X}_{i.}$) and stability (regression coefficient b_i) for 15 Egyptian cotton genotypes.

1 - Dendera
2 - Giza 45
3 - Giza 70
4 - Giza 75
5 - Giza 76
6 - Giza 77
7 - Giza 80
8 - Giza 81
9 - Giza 83
10 - Giza 84
11 - Giza 85
12 - Giza 86
13 - Giza 75 x Rus 6022
14 - Giza 77 x Giza 45A
15 - Giza77 x Giza 45B

These results support the evidence that out of the 15 genotypes, there are five genotypes Giza 45, Giza 70, Giza 75, Giza 86 and Giza 77 x Giza 45B met the production response and stability.

The coefficients of determination (r^2) for these genotypes were maximum values and minimum values for ecovalence index (W). These genotypes may be recommended to be released as commercial stable and/or incorporated into a breading stock in any future breading program aiming for producing stable high strength lines.

These results are in agreement with those reported by **El-Shaarawy (1977), El-Marakby *et al.* (1986) and Seyam *et al.* (1994 b).**

IV . B . 3. *Fiber length (2.5% span length).*

The regression of average mean performance of genotype on the environmental index resulted in regression coefficient (b) for 2.5% span length ranged from 0.669 to 1.257. The b values obtained did not deviate significantly from unity, except Dendera, Giza 45 and Giza 84. The deviations from regression (S^2d) were non significant for all genotypes, except Giza 45, Giza 83 and Giza 85.

Coefficient of determination (r^2) between 2.5% span length of individual genotypes and environmental index of each location were variable and ranged from 0.403 (Giza 45) to 0.822 (Giza. 77 x Giza 45B), indicating that these were real differences in the stability of genotypes.

The ecovalence index (W) of stability which represents the proportion of the (GE) sum of square (Table 32) attributed to each genotypes, varied among genotypes from 5.152 (Giza 77) to 12.315 (Giza 45). These results indicated differences in stability among cotton genotypes over the environments.

These results support the evidence that out of the 15 genotypes, only five genotypes Giza 70, Giza 77, Giza 86, Giza 77 x Giza 45A and Giza 77 x Giza 45B met the performance response and stability characteristics of the ideal genotypes for 2.5% span length. These genotypes were above average mean and had b values and S^2d values which did not differ significantly from one and zero, respectively.

Table 32 . Averages of genotypes and estimates of stability parameters for **span length 2.5% (mm.)** over 30 environments.

Genotypes	Means X	Regression coefficient b	Deviation from regression S^2d	coefficient of determination r^2	Ecovalence W	Adaptation #
Dendera	30.02	0.669 ++	-0.037	0.618	6.119	L
Giza 45	34.49	0.674 +	0.186*	0.403	12.315	L
Giza 70	34.68	1.001	0.102	0.657	8.263	A
Giza 75	31.59	1.185	0.060	0.758	7.649	A
Giza 76	34.05	0.924	0.071	0.647	7.489	A
Giza 77	34.08	1.095	-0.015	0.791	5.152	A
Giza 80	31.04	1.057	0.049	0.722	6.843	A
Giza 81	31.12	0.846	0.132	0.554	9.517	A
Giza 83	30.44	1.121	0.137*	0.683	9.494	A
Giza 84	32.98	1.257 +	0.014	0.812	6.862	H
Giza 85	29.85	0.895	0.211**	0.528	11.502	A
Giza 86	33.15	1.149	0.035	0.766	6.749	A
Giza 75 X Rus. 6022	31.64	1.002	0.031	0.717	6.279	A
Giza 77 X Giza 45 A	34.44	0.948	0.020	0.704	6.021	A
Giza 77 X Giza 45 B	33.97	1.173	-0.025	0.822	5.189	A
mean	**32.50**					
L.S.D. 0.05	0.22					

+ , ++ Indicates regression coefficient is significantly different from unity at 5 % and 1 % level of probability, respectively.

Indicates deviation from regression is significantly different from zero at 5 % and 1 % level of probability, respectively.

, A , H , L indicates adaptation to all, high yielding and low yielding environments, respectively.

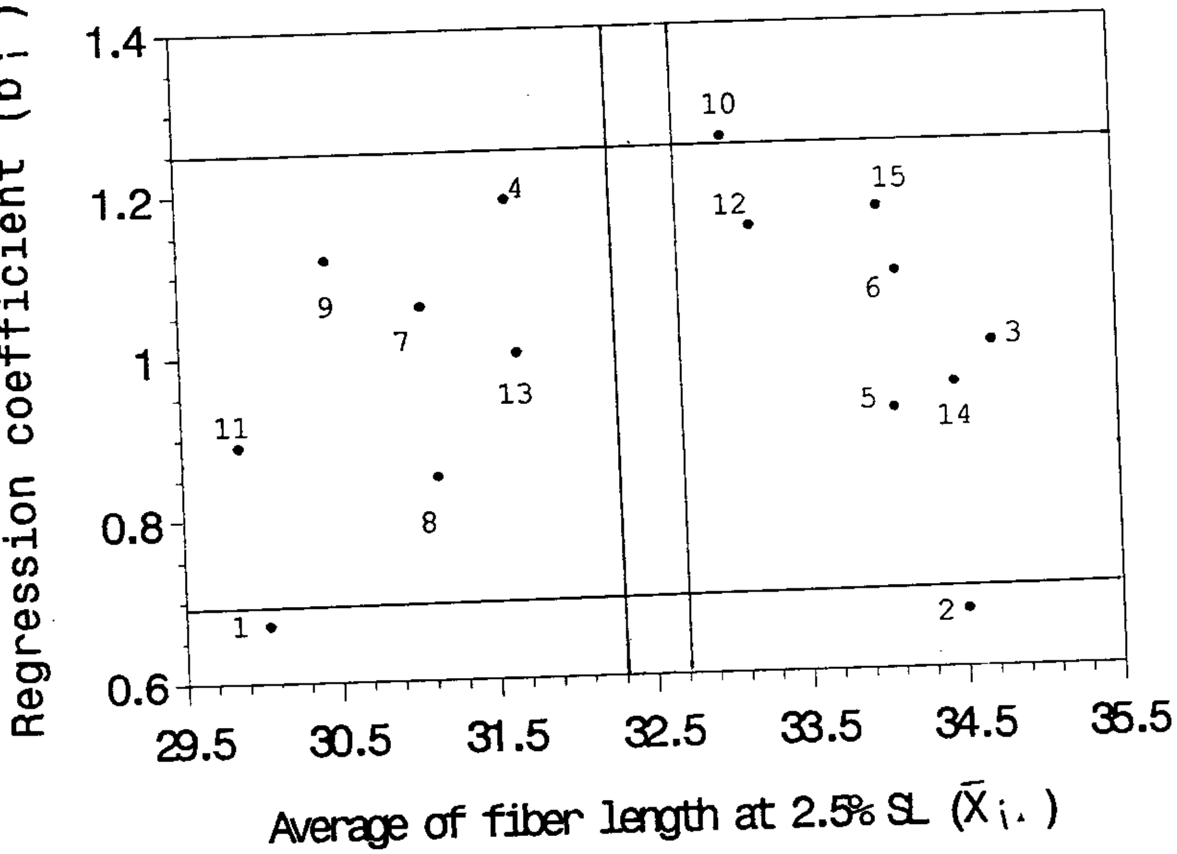

Figure 10: The relation of fiber length at 2.5% Spain Length ($\bar{X}_{i.}$) and stability (regression coefficient b_i) for 15 Egyptian cotton genotypes.

1 - Dendera	2 - Giza 45	3 - Giza 70
4 - Giza 75	5 - Giza 76	6 - Giza 77
7 - Giza 80	8 - Giza 81	9 - Giza 83
10 - Giza 84	11 - Giza 85	12 - Giza 86
13 - Giza 75 x Rus 6022	14 - Giza 77 x Giza 45A	15 - Giza77 x Giza 45B

The coefficients of determination (r^2) for these genotypes were gave maximum values and minimum values for ecovalence.

It is clear from the results presented in Table (32) and figure (10) that genotypes Giza 70, Giza 45, Giza 77 X Giza 45A, Giza 77, Giza 76, Giza 77 x Giza 45B, Giza 86 and Giza 84 which were above average mean are well adapted to all environments. However, the other genotypes which were significantly below average mean over the environments are poorly adapted to all environments.

Therefore, the genotypes Giza 70, Giza 77, Giza 86, Giza 76, Giza 77 x Giza 45A and Giza 77 x Giza 45B (they are classified as extra-long staple genotypes) may be used as a breeding stock for incorporating in any crosses with the objective for selection for stable fiber length (2.5% span length).

These results are in agreement with those reported by **El-Kadi *et al.* (1978), El-Marakby *et al.*(1986), Abou-Alam *et al.* (1988) and Abo El-Zahab *et al.* (1992 b).**

IV. B. 4 . *Fiber length (50 % span length)* :-

The regression of average mean performance of genotype on the environmental index resulted in regression coefficient (b) for 50% span length ranged from 0.785 to 1.407. The b values obtained did not deviate significantly from unity, except Giza 76, Giza 84 and Giza 85. The deviations from regression (S^2d) were nonsignificant for all genotypes, except Giza 45 and Giza 85.

Coefficients of determination (r^2) between 50% span length of individual genotypes and environmental index of each location were variable and ranged from 0.459 (Giza 45) to 0.902 (Giza 84), indicating that these were real differences in the stability of genotypes.

The ecovalence index (W) of stability which represents the proportion of the (GE) sum of square (Table 33) attributed to each genotypes, varied among genotypes from 2.007 (Giza 81) to 9.974 (Giza 45). These results indicates differences in stability among cotton genotypes over the environments.

Table 33 . **Averages of genotypes and estimates of stability parameters for span length 50 % (mm.) over 30 environments.**

Genotypes	Means X	Regression coefficient b	Deviation from regression S^2d	coefficient of determination r^2	Ecovalence W	Adaptation #
Dendera	14.84	0.785	-0.045	0.767	2.794	A
Giza 45	16.95	0.825	0.218**	0.459	9.974	A
Giza 70	17.11	1.054	-0.040	0.848	2.417	A
Giza 75	15.77	1.121	-0.013	0.827	3.320	A
Giza 76	16.82	1.224 +	-0.013	0.851	3.746	H
Giza 77	16.99	1.011	0.013	0.759	3.875	A
Giza 80	15.26	1.037	0.013	0.769	3.884	A
Giza 81	15.37	0.944	-0.055	0.844	2.007	A
Giza 83	14.92	0.806	0.069	0.588	5.898	A
Giza 84	16.60	1.407 ++	-0.033	0.902	4.549	H
Giza 85	15.13	0.750 +	0.150**	0.466	8.443	L
Giza 86	16.50	1.056	0.044	0.738	4.778	A
Giza 75 X Rus. 6022	15.57	0.855	0.013	0.694	4.110	A
Giza 77 X Giza 45 A	16.88	0.944	-0.019	0.782	3.007	A
Giza 77 X Giza 45 B	16.85	1.182	-0.023	0.854	3.254	A
mean	**16.10**					
L.S.D. 0.05	0.18					

+ , ++ Indicates regression coefficient is significantly different from unity at 5 % and 1 % level of probability, respectively.

Indicates deviation from regression is significantly different from zero at 5 % and 1 % level of probability, respectively.

, A , H , L indicates adaptation to all, high yielding and low yielding environments, respectively.

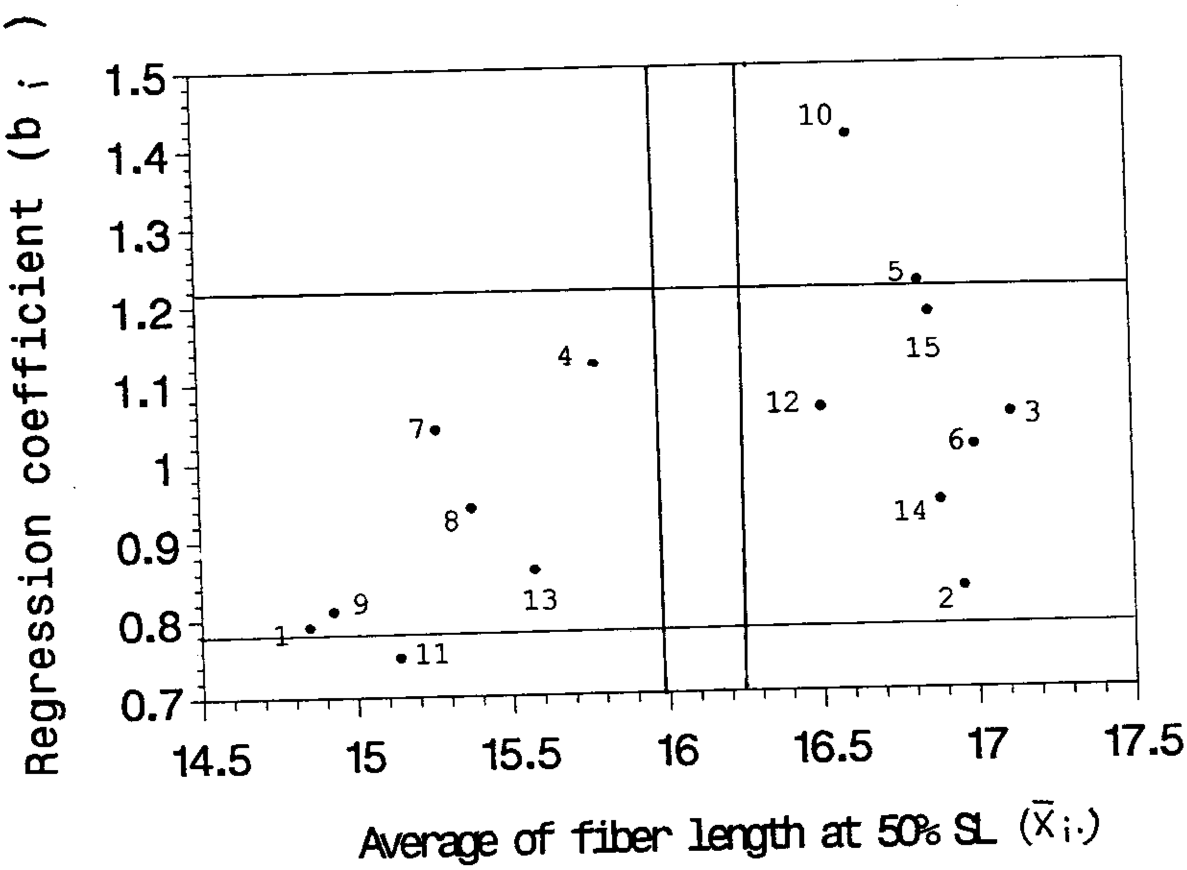

Figure 11: The relation of fiber length at 50% Spain Length ($\bar{X}_{i.}$) and stability (regression coefficient b_i) for 15 Egyptian cotton genotypes.

1 - Dendera	2 - Giza 45	3 - Giza 70
4 - Giza 75	5 - Giza 76	6 - Giza 77
7 - Giza 80	8 - Giza 81	9 - Giza 83
10 - Giza 84	11 - Giza 85	12 - Giza 86
13 - Giza 75 x Rus 6022	14 - Giza 77 x Giza 45A	15 - Giza77 x Giza 45B

These results support the evidence that out of the 15 genotypes, only five genotypes Giza 70, Giza 77, Giza 86 ,Giza 77 x Giza 45A and Giza 77 x Giza 45B met the performance response and stability characteristics of the ideal genotypes for 50% span length. These genotypes were above average mean and had b values and S^2d values which did not differ significantly from one and zero, respectively. The coefficients of determination (r^2) for these genotypes were gave maximum values and minimum values for ecovalence index (W).

It is clear from the results presented in Table (33) and Figure (11) that genotypes Giza 70, Giza 77, Giza 45, Giza 77x Giza 45A, Giza 77 x Giza 45B, Giza 76, Giza 86 and Giza 84 which were above average mean are well adapted to all environments. However, The other genotypes which were significantly below average mean over the environments are poorly adapted to all environments.

Therefore, the genotypes Giza 70, Giza 77, Giza 86, Giza 77 x Giza 45A and Giza 77 x Giza 45B (they are classified as extra-long staple genotypes) may be used as a breeding stock for incorporating in any crosses with the objective for selection for stable fiber length (50% span length).

These results are in agreement with those reported by **El-Kadi *et al.* (1978), El-Marakby *et al.* (1986), Abou-Alam *et al* (1988) and Abo El-Zahab *et al.* (1992 b).**

Therefore, the present study for fiber properties (Table 30 to 33), indicated that for selection for stability with the objective of incorporating this important trait in the Egyptian cotton genotypes, the following genotypes may be considered as breading stocks for specific traits :-

Fiber strength	Giza 45, Giza 70, Giza 75, Giza 86 and Giza 77x Giza 45B.
Fiber length	Giza 70, Giza 77, Giza 86, Giza 77 x Giza 45A and Giza 77 x Giza 45B.
Micronaire reading	Giza 77.

V . **Breeding implications** :-

Cotton in Egypt grown in Delta and in Middle Egypt and nowadays the area of cotton extended to include area in Upper Egypt. A rather wide range of soil types, variable fertility levels, climatic condition such as temperature, relative humidity and hours of sunshine are expected to vary between these areas. These factors are expected to vary from location to location and year to year at the same location. Information is needed concerning cotton varietal differential response to different environmental conditions and the Significance of variety x environment interaction. Therefore, this study was conducted to obtain estimates of the magnitudes of the variety x location, variety x year and variety x year x location interactions in cotton variety tests in Egypt and to consider the implications of these interactions on variety evaluation procedures.

The results obtained in this study show the following trend :-

i) The significant year by variety interaction for all traits indicates that the relative performance of the varieties was not the same in each of the three years of testing.

ii) The presence of significant variety x locations interactions for the tested cotton area indicates the importance to be gained for zoning certain genotypes to certain areas. In addition this significant variety x location also indicates that the ten locations tested in any one of the three years must have been reasonably an adequate sample which were actually encountered in the other two years.

The eleven studied characters as to their interactions with environments could be divided as follows ;

I- Characters showing significant genotypes by locations, genotypes by years and genotypes by locations by years interactions were seed cotton yield, number of bolls per plant, lint percentage, seed index, micronaire reading and fiber strength, simply they represent major yield components.

II- Characters showing significant genotype by year and genotypes by locations by years interactions and no genotype by location interaction namely lint index trait.

III- Characters showing significant second - order interaction, whereas the first - order interactions were not significant namely boll weight character.

IV- Characters showing significant first - order interactions genotype by year and genotype by location and non significant second - order interaction, these were the two length parameters (2.5% and 50% span length).

Relevant to the first group is that :-

1- The varieties by years by locations mean squares were highly significant for seed cotton yield, lint yield, number of bolls per plant, lint percentage, seed index, lint index, micronaire reading and fiber strength. This indicates that a significant portion of the interactions manifested by these traits were not attributable to years or to locations and that testing in different environment (locations and years) is necessary to obtain reliable estimates of the relative performance for those traits. However, results shown previously depicted clearly that the variety by years component of the interaction was two - to three folds greater than its counterpart of variety by locations interaction and this put more emphasis on multiple locations rather than on a series of years. This is endorsed by the very large and significant variety x location interactions which suggests that yield results obtained from a single location are inadequate to make varietal recommendations. In addition, this justifies subdividing the country in some way for testing varieties and zoning certain varieties to certain areas. However, data also show that the varietal component was as twice in magnitude as that of the second - order interaction; **Miller and Robinson (1962)**, from similar results they inferred that there would be little advantage, if any to be gained from subdividing the area to subareas for breeding and testing. But breeding for certain areas could be feasible provided that environmental factors are under control. Third the error term is twice - three times the genotypic components to certain areas.

2- As for boll weight the second - order interaction was of a sizable magnitude. The relatively small values for the first - order interactions indicated that there were no consistent locations effects or years effects on differential varietal response.

3- For the two length parameters, the second - order interaction were not significant whereas, the two first - order interactions were highly significant. This indicates that the first - order interactions were of the same magnitudes but in different directions. Therefore, testing in number of years or number of location will suffice to give an account of the performance of any genotype.

- Generally, the ten locations could be grouped into four regions according to the varietal performances in seed cotton yield and lint cotton yield (1) In Upper Egypt (Sohag and Assuit) Giza 80 was superior for lint and seed cotton yields, (2) Giza 83 and Giza 85 in Middle Egypt (El-Minia and El-Faiyum), (3) the promising strain Giza 75 x Rus. 6022 and Giza 86 in South and Middle Delta (El-Gharbia and El-Sharkeih) and (4) Giza 85 and Giza 86 in North Delta (Dakahlia, Damiatta, El-Beheira and Kafr El-Sheikh).
- The promising strain Giza 75 x Rus 6022 and the new variety Giza 85 surpassed the established cultivars in seed cotton yield, lint yield and number of bolls per plant and may be desirable substitutes in the future. These genotypes exceeded their corresponding varieties Giza 75, Dendera, Giza 80 and Giza 83. Also, the promising strain Giza 77 x Giza 45 A surpassed the established cultivars in all fiber properties studied, which exceeded their alternative varieties Giza 45, Giza 70, Giza 76 and Giza 77.
- The phenotypic and genotypic stability results detected that both strains of the promising and cultivated cultivars showed different features at stable characteristic. The potentially useful lines varied in demonstrating stable, agronomic and quality characteristics. For example; Giza 86 was the high

staple variety which showed nine stable traits out of eleven. However, Giza 84 was the low stable variety that showed only one stable traits. The results also indicated that the promising strains Giza 75 x Rus. 6022 showed two stable traits out of eleven, but the promising strain Giza 77 x Giza 45A showed four stable traits out of eleven . These results may leads to the fact, that there is not any stable old commercial variety for general cultivation in the cotton areas all over Egypt. Moreover, every Egyptian cotton category has a distinct distract to be cultivated within to obtain its maximum potentiality and especially fiber characteristics. However, the low stable varieties suggest that an effective breeding methods would be one leading towards introducing lines more genetically stable than cultivated varieties.

- Twelve of the tested genotypes are cultivars that are in production for several years. Conceivably, they have survived rather extensive testing. In fact the material used here excluding the three breeding stocks represent a highly selected group. Therefore, they would represent a highly adaptive group. Results previously presented show that all varieties including the three promising ones were highly adaptive to all tested locations. therefore, we do not know weather the picture will be the same if another group of genotypes are tested ?

- Finally, it is important to notice that climatological data are lacking because, they are very expensive to obtain. However, edaphic factors are given elsewhere in this dissertation. Therefore, we were not able to correlate the performance of characters with climatic data to know their relative importance. This might require future research or researches for the benefit of cotton production in Egypt.

- Interestingly enough, El-Faiyum represent a distinctive area in its high productivity. The edaphic factors are quite different to both Delta and Upper Egypt, we do not know weather yield increases in El-Faiyum are due to a soil difference or due to climatological factors or the interaction of both.

SUMMARY AND CONCLUSION

Cotton in Egypt ranked first in relation to fiber crops and efforts are exerted to increase cotton production and quality through agricultural policies and breeding new varieties.

It is well known that the productivity of any variety is the outcome of the interaction between the genetical constitution and environmental conditions. For this reason, cotton should be grown under suitable environmental conditions to achieve the highest yield and the best quality.

Therefore, 30 field experiments were conducted during the three successive seasons 1992 , 1993 and 1994 at ten different regions :-

- Upper Egypt (Sohag, Assuit, El-Minia and El-Faiyum).
- Southern and Middle Delta (Dakahlia, El-Gharbia and sharkeih.
- Northern Delta (Kafer El-Sheikh, El-Beheira and Damaitta), to evaluate 15 cotton genotypes of which twelve are the commercial varieties namely, dendera, Giza 45, Giza70, Giza 75, Giza76, Giza 77, Giza 80, Giza 81, Giza 83, Giza 84, Giza 85 and Giza 86, in addition to the three promising strains (Giza 75 x Rus. 6022), (Giza 77 x Giza 45A) and (Giza 77 x Giza 45B) .

Varieties and strains all together were grown following the routine adapted in the experimental stations. A complete randomized blocks design with four replications in each of the 30 environments (combination of ten locations in three years).

Variance components and different stability estimates over location and years were calculated for seed cotton yield and yield components, in addition to fiber property traits.

The results obtained could be summarized as follows :-

I . **Effect of cotton genotypes, locations, years and the interactions between them :-**

I .1. **Effect of cotton variety** :-