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Evaluation of Some Egyptian Cotton Cultivars for Yield, Seed Quality and Viability Characters.

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ABSTRACT

The present investigation aimed to evaluate some Egyptian cotton cultivars *i.e.*: Giza 86, Giza 94, Giza 87, Giza 88, Giza 92, Giza 93 and Giza 96 under three different locations in Lower Egypt (Delta) during the two successive growing seasons of 2015 and 2016 for yield, seed quality and viability characters. Randomized complete block design with three replications was used at each location. Significant differences for cultivars and locations for all studied characters, except free fatty acid and acid value. The effects of the growing years, interactions between (genotype x seasons), (location x season) and the second order interaction were significant on most studied characters, Also the effect of the interaction between (genotype x locations) was significant for all studied characters, except for seed cotton yield and lint percentage. Giza 94 and Giza 92 surpassed in seed cotton yield, boll weight, lint percentage and seed index. The cultivar Giza 92 gave the highest oil % and germination, while, Giza 96 produced the highest radical length, shoot length and seedling dry weight, while. Giza 88 surpassed all studied cultivars in protein %.Positive significant correlations were found between seed cotton yield and both boll weight and seed index, lint percentage and each (boll weight, seed volume and seed coat), boll weight and seed coat %, seed index and both (seed volume and seedling dry weight), free fatty acid and acid value, protein % and seed coat %, seed volume and seedling dry weight, germination % and both (shoot length and seedling dry weight), shoot length and seedling dry weight.
Keyword: Egyptian cotton cultivars, locations, cotton yield, seed quality and viability characters.

INTRODUCTION

Improving cotton quality through introducing cultivars is the most important objective of the Cotton Research Inistitue. Cotton yield and seed quality are important characters, the performance of cotton cultivars under different environments was studied by several works, *i.e.* Badr and Soad (2004 A) studied some genotypes extra long staple i.e. G 45,G 70,G 87,G 88, G 84*(G 74xG 68) during two seasons for seed cotton yield, boll weight, lint percentage, seed index, oil%, free fatty acid%, Acid value, crude protein %, moisture %, seed volume, relative density, seed coat, germination %, seedling vigor (radical length, shoot length and seedling dry weight). They found that year and year x location effect were significant for all traits except oil%, seed volume, shoot length and seedling dry weight also, insignificant for seed coat to year effect. The location was insignificant radical length. Genotype and genotype x year were insignificant for free fatty acidy and acid value also, genotype insignificant for significant for all traits. The genotype x year x location percentage and seedling dry weight.

Badr and Soad (2004b) studied some genotypes long staple *i.e.* G 85, G 86, G 89, (G 89* G 86) and (G 89 * piwa S6 they reported that year and crud protein year x location were significant for all traits except for boll weight, seed index, oil%, free fatty acid, acid value, moisture % and seed coat also, year was insignificant for crude protein, seed volume and relative density. Location and genotype were insignificant for free fatty acid, acid value and seed coat also, location insignificant for relative density, genotype was insignificant for seed cotton yield. Genotype x year interaction was insignificant for seed cotton yield, boll weight, oil%, seed coat and germination. Genotype x location was significant for all traits except seed coat.

Amal *et al.* (2009) reported that the effect of the difference among cotton varieties were significant for oil %, protein % and gossypol content.

Amal *et al.* (2009) studied 8 genotypes i.e. G 45, G 70, G 85, G 86, G 88, G 89, G 80 and G 90 over 7 years found that the effect of genotype, year and the interaction between them were significant for seed oil content and protein content %.

Shaker (2014) evaluated five extra long staple cotton genotypes (G. 70, G 88, G 92, {G 84 (G 70 X G 51b X G 62)}, G 96 and G 77 x S_6 (G 93) and detected that the mean square due to genotypes, location and year x location were significant for seed cotton yield, boll weight, lint percentage and seed index. While those due to year and genotype x year x location was significant for the previous characters, except for seed index. Genotype x year was significant for seed cotton yield and lint percentage. Genotype x location was significant for seed cotton yield and boll weight.

Abd El-Aty *et al* (2015) studied some genotypes performance *i.e.*(10229 x G 86) , G 94, G 45, G 70, G 85, G 86, G 87, G 88, G 92 and exchange hydride among them for half diallel found that genotype effect was significant for oil content %, protein content, acid value as F1 generation (traits) as well as germination %, seedling length, seedling vigor index, seedling fresh weight and dry weight in F2 generation for control and accelerated aging treatment. The results exhibited that seed index, seed density, were positively correlated with germination % under control and accelerated aging conditions, seedling length and seedling vigor index under accelerated aging as well as seedling dry weight under control.

The aim of the present investigation was to evaluate some Egyptian cotton cultivars for yield, seed quality and viability characters.

MATERIALS AND METHODS

The materials consisted of seven cultivars *i.e.* Giza 86, Giza 94, Giza 87, Giza 88, Giza 92, Giza 93 and Giza 96 of Egyptian cotton were grow in Behira, Dakhlia and Gharbia locations for two years 2015 and 2016.

A randomized completed block design with three replications was used at each location. Each plot 60 m^2. The distance between hills was 25cm and each hill was thinned to two plants. Sowing date was at during the second week of April. Cultural practices were carried out as recommended in cotton fields.

Data were collected for the following traits:

- Seed cotton yield (k/fed) obtained as weight of seed cotton yield (kg) per plot and converted to kantar per feddan (kantar = 157.5 kg).
- A random sample of 50 bolls was harvested at random from each plot and was used to obtain plot mean values for:

a- Boll weight in gram (BW (g)): The average weight of 50 bolls in gram.

b- Lint percentage (L %): The weight of lint obtained a seed cotton sample.

$$L\% = \frac{1 weightofl \text{ int int } hesample(g)}{weightofseed \text{ cot } ton \text{ int } hesample}$$

Physical properties of seed cotton

- Seed index and seed volume: One hundred seeds were counted and weighed. Then their volume was measured by absolute displacement method (Kramer and Twigg 1962).

-Relative density of seeds was calculated accorded to Kramer and Twigg (1962) as follows:

$$\text{Relative density} = \frac{100 - seed\ weight(g)}{100 - seed\ volume(mm^3)} = gm/mm3$$

-Seed coat: One hundred-gram of seeds of both samples was decorticated. The decorticated seeds and seed coats were weighed separately (Youssef, 1978 and Shehata *et al*., 1985a). Percentage of seed coat was calculated as follows:

$$\text{Seed coat\%} = \frac{wt.\ of\ seed\ coat\ (g)}{wt.\ of\ seed\ coat + wt.\ of\ decoric\ at\ seeds} \ x\ 100$$

-Standard germination: Test was carried out under optimum conditions according to International Rules Testing (ISTA, 1999).

-Seed vigor (seedling growth and evaluation test): Radical, shoot length and seedling dry weigh were measured according to procedures reported in the seed vigor testing handbook (ISTA, 1995), Seed vigor test do not predict percentage field emergence, but neither does standard germination. However, seed vigor test do relate better to field emergence under stressful soil conditions than does standard germination. Values obtained from seed vigor tests are relative values, not absolute values.

Chemical composition characters:

Seed sample were taken at random from each plot and grounded to fine powder to pass through 2 mm mesh for chemical analysis; *i.e.* moisture content, fat, crude protein, free fatty acids (F.F.A) and acid value (A.V) were determined according to procedures outline in AOAC (1990).

Statistical analysis:

Analysis of variance was done according to Snedecor and Chochran (1982) for each location. Combined analysis for all location was performed on all the studied traits as out lined by Mclntosh (1983). Differences between means were compared by using the least significant difference (L.S.D.) test as given by Steel and Torrie (1980).

RESULTS AND DISCUSSION

The results reported in this investigation included the evaluation of seven Egyptian cotton cultivars in the two seasons, *i.e.* 2015 and 2016 across three different locations of Lower Egypt in order to study the effects of genotypes, locations, years ant their interactions and the interaction between them.

Table1. Mean performance of cotton cultivars for seed cotton yield and viability and quality characters in combined analysis for three locations and two years

Characters	L.S.D$_{0.01}$	G 86	G94	G87	G88	G92	G93	G96
Seed cotton yield (k/f)	1.04	9.49	11.61	7.62	8.75	9.49	8.91	9.51
Boll weight (g)	0.19	3.10	3.07	2.54	2.73	2.94	2.66	2.95
Lint (%)	1.36	38.78	41.13	33.49	37.16	36.06	34.10	38.90
Seed index (g)	0.47	10.83	12.09	10.00	10.47	10.43	10.37	10.33
Oil (%)	1.807	27.51	27.35	26.58	26.20	29.95	29.27	28.30
Free fatty acid (%)	N.S	0.214	0.219	0.213	0.219	0.213	0.221	0.216
Acid value	N.S	0.426	0.440	0.430	0.442	0.442	0.420	0.446
Crude protein (%)	0.306	24.27	24.37	26.39	27.81	24.203	23.89	24.25
Moisture (%)	0.680	12.00	11.98	11.90	12.80	13.00	12.90	12.80
Seed volume (mm3)	0.976	11.90	12.60	12.50	13.14	12.67	12.70	12.95
Relative density	0.009	0.762	0.778	0.768	0.768	0.774	0.765	0.771
Seed coat (%)	1.218	35.16	30.35	38.40	36.90	37.00	36.90	38.20
Germination (%)	0.859	74.61	80.61	86.89	87.06	90.94	87.83	89.28
Seedling vigor								
(Radical length (cm)	0.629	16.68	16.43	15.93	15.13	14.84	16.31	17.55
(Shoot length (cm)	0.404	14.22	15.17	13.52	13.41	14.51	15.20	15.95
Seedling dry weight (mg)	1.21	52.0 0	53.88	50.90	51.90	54.70	52.28	56.13

***, ** and NS indicated P<0.05%, P<0.01% and not significant, respectively.**

1-Cultivars effect:

Seed cotton yield, some its components, seed quality and seed viability characters of cotton cultivars in combined analysis for three locations (Beheira, Gharbia and Dakahlia) and two seasons (2015 and 2016) are presented in Table1. The obtained results

showed that the effect of the different cotton cultivars on all studied characters were significantly different, except for free fatty acid % and acid value.

The cultivars Giza 94 from long staple category superior in yield and its components on the rest cultivars. The cultivars Giza 96, Giza92 and Giza 88 recorded the highest yield and boll weight on all cultivars from extra long staple category; also Giza 96 superior in lint percentage for this category. However, the cultivar Giza 87 was the lowest one in yield and its components. These results confirm the findings of Hassan *et al*. (2013), Abd El-Salam *et al*. (2014) and Shaker *et al*. (2014). They reported that the effect of genotype was significant on yield and yield components. Giza 92, Giza 96 and Giza 93 gave the highest value for oil % than the other genotypes, while, G 87 and G 88 were the lowest in oil%. G 88 gave the highest value for protein%, moisture% and seed coat%. While, G 93 gave the lowest protein%, moisture% and seed coat%. The cultivar G 96 gave the highest seed volume than the other genotypes while, G 88and G 86 gave the lowest in this respect. G 92 and G 94 gave the highest seed relative density while, G 86 was the lowest in this respect. G 92 and G 96 gave the higher germination %. G 96 gave the higher radical length, shoot length and seedling dry weight than all genotypes. G 87 and G 88 gave the lowest in these respects. This may belong to different the gene expression for genotype to germblasm another. Also, this results in agreement with those obtained by Atteia (2001), El-Desuky (2002), Badr and Soad (2004 a), Badr and Soad (2004b), Amal *et al.* (2010), Hassan *et al*. (2013) and Abd El- Aty *et al.* (2015).

2- Effect of different growing years:

Table 2 shows the average values of studies characters as affected by different growing year. The combined analysis showed highly significant differences in all studied characters due to years except lint %, free fatty acid, acid value and seed coat. The first season (2015) gave the significant best values for seed cotton yield, boll weight, seed index, moisture % seedling dry weight. While, the second season (2016) gave the significant best values for oil %, free fatty acid %, acid value, protein %, seed volume, relative density, seed coat, germination %, radical length and shoot length. This may belong the different among the climatic conditions from year to year. These results are in harmony with those obtained by Badr and Soad (2004 a), Badr and Soad (2004b), Hassan *et al*. (2013), Abd El-Salam *et al*. (2014) and Shaker (2014). They reported that the effect of growing season was significant on cotton yield and some yield component characters. Also, Atteia (2001), El-Desuky (2002) and Abd El-Aty *et al*. (2015).they reported that this effect was significant in some cotton seed characters.

Table 2. Effect of growing season and growing locations on seed cotton yield and viability and quality character.

Treatments		Year			Location		
Characters	**L.S.D$_{0.01}$**	**2015**	**2016**	**L.S.D$_{0.01}$**	**Beheira**	**Gharbia**	**Dakahlia**
Seed cotton yield k/f	1.21	10.23	8.45	1.48	8.66	10.13	9.23
Boll weight (g)	0.16	2.94	2.77	0.21	2.59	2.99	2.99
Lint (%)	N.S	36.97	37.21	0.98	37.81	36.80	36.66
Seed index (g)	0.54	11.35	9.94	0.66	9.33	11.45	11.16
Oil (%)	1.551	27.17	29.15	1.899	28.82	29.35	25.32
Free fatty acid (%)	N.S	0.210	0.220	N.S	0.199	0.220	0.240
Acid value	N.S	0.440	0.430	N.S	0.410	0.443	0.460
Crude protein (%)	0.177	21.59	23.25	0.217	22.30	23.95	21.01
Moisture (%)	0.232	13.20	12.60	0.565	12.60	11.90	12.01
Seed volume (mm3)	0.654	13.50	12.54	0.762	12.00	13.96	12.98
Relative density	0.004	0.768	0.771	0.003	0.774	0.765	0.769
Seed coat (%)	N.S	37.72	38.97	1.650	36.98	38.81	37.90
Germination (%)	0.288	81.024	87.325	0.353	78.21	86.26	88.08
Seedling vigor							
(Radical length (cm)	0.411	15.51	16.73	0.503	15.77	17.00	15.59
(Shoot length (cm)	0.295	14.09	15.22	0.361	14.17	15.24	14.48
Seedling dry weight (mg)	0.622	55.36	54.06	0.982	52.90	55.30	53.06

***, ** and NS indicated P<0.05%, P<0.01% and not significant, respectively.**

3- Effect of different growing locations:

Table 2 shows the average values of studied characters as affected by different growing location. The combined analysis showed highly significant differences in all studied characters due to location except free fatty acid % and acid value. The cotton grown at Gharbia and Dakahlia recorded the highest yield, boll weight (g) and seed index (g). While, Beheira location recorded the highest lint percentage. These results are in agreement with those obtained by Badr and Soad (2004b), Hassan *et al*. (2013), Abd El-Salam *et al*. (2014) and Shaker (2014). They reported that the effect of growing locations was significant in cotton and some yield components. Seed oil %, protein %, seed volume (mm3), seed coat % and seed vigor for the cotton genotypes grown at Gharbia were higher than the other two locations. While, the less protein % was for cotton grown at Dakahlia. Also, the lowest seed coat % was for cotton grown at Beheira. The highest seed volume was for cotton grown at Gharbia, while at Beheira was the lowest for these two characters. The highest germination % was for cotton grown at

Dakahlia, while at Beheira was the less. The highest radical length, shoot length and seedling dry weight were for cotton grown at Gharbia than the other two locations. Theses results are in harmony with those obtained by Atteia (2001), El-Desuky (2002), Badr and Soad (2004 a), Badr and Soad (2004b), Amal *et al.* 2010 and Hassan *et al.* (2013). They reported that the effect of location was significant in most seed characters. This may belong to different environments in location to another.

4- Effect of interaction between cultivars and location:

Data in Table 3 show that the cultivars x location interaction were significant for all studied characters, except seed cotton yield and lint %. Data indicate that cultivars differently at different locations. Gharbia location recorded the highest boll weight for Giza 86, Giza 94, Giza 92 and Giza 96. Giza 94 at Gharbia and Dakahlia recorded the highest seed index compared with Giza 86; also Giza 88, Giza 92 and Giza 96 surpassed on Giza 87 and Giza 93. Also, Giza 88 and Giza 93 at Dakahlia and Gharbia recorded the highest seed index. Beheira location gave the lowest values for boll weight and seed index for most cultivars.

Table 3. Effect of cultivars x growing location interaction on seed cotton yield, viability and seed quality characters.

Treatments / Characters	L.S.D$_{0.01}$	Giza 86			Giza 94			Giza 87			Giza 88		
		L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Seed cotton yield k/f	NS	8.88	9.60	9.98	10.55	12.32	11.96	6.75	8.57	7.54	7.77	10.10	8.38
Boll weight (g)	0.33	2.76	3.27	3.27	2.75	3.41	3.06	2.19	2.65	2.79	2.38	2.86	2.95
Lint %	NS	39.23	38.53	38.58	42.29	40.61	40.49	34.80	32.78	32.90	37.89	36.85	36.73
Seed index (g)	0.82	9.64	11.64	11.20	10.49	13.12	12.66	8.70	10.64	10.68	8.65	11.13	11.63
Oil %	1.131	26.61	28.67	27.45	29.19	26.57	26.28	28.98	29.98	27.00	29.45	23.25	23.67
Free fatty acid (%)	0.069	0.210	0.230	0.210	0.207	0.240	0.220	0.201	0.214	0.206	0.210	0.238	0.225
Acid value	0.065	0.390	0.410	0.405	0.419	0.430	0.420	0.401	0.419	0.410	0.400	0.453	0.440
Crude protein (%)	0.529	22.72	27.71	22.39	21.87	25.96	20.29	27.59	29.01	21.57	20.08	20.08	27.55
Moisture (%)	0.650	10.20	10.20	10.50	12.50	11.98	12.10	11.26	10.99	11.49	10.80	11.94	10.98
Seed volume (mm3)	0.780	11.09	11.98	12.00	12.60	13.90	12.89	10.90	11.98	11.95	12/69	13.60	12.90
Relative density	0.007	0.762	0.743	0.767	0.783	0.766	0.786	0.769	0.768	0.766	0.771	0.772	0.775
Seed coat (%)	1.215	32.30	31.70	32.00	37.00	38.35	37.50	35.63	36.20	36.00	35.95	37.50	36.25
Germination (%)	2.150	77.66	98.33	86.83	71.00	76.33	73.50	95.66	68.50	96.50	76.00	86.83	96.50
Seedling vigor													
Radical length (cm)	1.091	14.84	20.37	14.80	13.07	18.14	18.07	18.57	16.84	12.37	15.24	15.77	14.37
Shoot length (cm)	0.701	12.15	18.61	11.91	13.55	13.68	18.28	18.55	11.71	11.58	13.78	14.71	11.71
Seedling dry weight (mg)	0.923	51.00	53.28	52.90	49.00	52.62	50.61	47.90	48.90	48.00	52.60	57.89	55.96

***, ** and NS indicated P<0.05%, P<0.01% and not significant, respectively. L1= El-Beheira L2= El-Gharbia L3= El-Dakahlia**

Continue table 3.

Treatments / Characters	L.S.D$_{0.01}$	Giza 92			Giza 93			Giza 96		
		L1	L2	L3	L1	L2	L3	L1	L2	L3
Seed cotton yield k/f	NS	8.89	10.31	9.29	8.23	9.91	8.61	9.54	10.13	8.87
Boll weight (g)	0.33	2.78	3.08	2.96	2.50	2.57	2.90	2.79	3.11	2.96
Lint %	NS	36.37	36.12	35.70	34.49	34.25	33.55	39.58	38.45	38.68
Seed index (g)	0.82	9.45	11.25	10.60	9.25	10.80	11.07	9.12	11.54	10.33
Oil %	1.131	27.03	29.97	29.43	28.99	28.76	27.12	29.76	29.65	29.21
Free fatty acid (%)	0.069	0.219	0.225	0.215	0.230	0.225	0.215	0.230	0.240	0.230
Acid value	0.065	0.407	0.420	0.409	0.400	0.410	0.405	0.395	0.430	0.410
Crude protein (%)	0.529	20.66	20.55	20.40	21.54	21.45	20.57	28.56	29.22	25.33
Moisture (%)	0.650	11.96	11.59	10.90	11.89	12.00	11.60	11.30	12.00	11.50
Seed volume (mm3)	0.780	11.50	12.90	11.89	11.80	11.98	11.50	12.00	12.90	11.87
Relative density	0.007	0.791	0.765	0.766	0.774	0.770	0.767	0.770	0.773	0.771
Seed coat (%)	1.215	34.78	36.66	36.00	34.00	36.36	35.78	38.28	39.20	36.10
Germination (%)	2.150	81.00	99.17	92.67	72.67	96.50	94.33	73.50	75.17	74.17
Seedling vigor										
Radical length (cm)	1.091	15.81	13.34	15.38	16.08	14.51	18.34	16.81	20.06	15.78
Shoot length (cm)	0.701	14.55	15.98	13.02	12.62	14.82	20.42	14.02	17.15	14.45
Seedling dry weight (mg)	0.923	52.00	54.60	53.70	52.00	53.69	52.90	55.28	58.80	54.90

***, ** and NS indicated P<0.05%, P<0.01% and not significant, respectively. L1= El-Beheira L2= El-Gharbia L3= El-Dakahlia**

As for Giza 92 at Gharbia region gave higher oil % and germination percentage, while Giza 92 at Dakahlia produced the highest relative density. Giza 96 cultivar recorded the highest values for seed coat (39.20), radical length and seedling dry weight for the cotton grown at Gharbia, while, Giza 96 at Dakahlia

gave the lowest acid value. Giza 87 cultivar at Dakahlia gave the lowest free fatty acid. Giza 86 gave the lowest value of moisture % at both Dakahlia and Ghrbia. Giza93 at Behira produced the highest shoot length. Giza 87 cultivars gave the lowest values for boll weight (g), seed index (g), oil %, free fatty acid, acid value and seed volume were at Dakahlia. While, Giza 87 at Gharbia gave the lowest germination % and shoot length. Theses results are in harmony with theses obtained by Badr and Soad (2004 a), Badr and Soad (2004b), Amal *et al.* 2009, Amal *et al.* 2010 and Hassan *et al.* (2013). They reported that the effect of location was significant in most seed characters.

5-Effect of the interaction between cultivars and growing seasons:

Table 4 show the average values of the studied cotton characters for the seven Egyptian cotton cultivars growing during the two successive seasons (2015 and 2016), all studied characters, except for lint %, free fatty acid, acid value and shoot length were not significant effect. The cultivars Giza86, Giza 94 and Giza 96 during two seasons produced the highest boll weight; also Giza 94 during the 1st season.

Table 4. Effect of cultivars x growing season interaction on seed cotton yield, viability and seed quality characteristics.

Treatments / Characters	L.S.D$_{0.01}$	G86		G94		G87		G88	
		2015	2016	2015	2016	2015	2016	2015	2016
Seed cotton yield k/f	NS	10.46	8.51	13.15	10.07	8.12	7.12	9.61	7.89
Boll weight (g)	0.27	3.11	3.09	3.21	2.94	2.66	2.42	2.84	2.62
Lint (%)	NS	38.91	38.65	41.03	41.23	33.19	33.79	37.20	37.12
Seed index (g)	0.67	11.51	10.14	13.17	11.02	10.79	9.22	11.44	9.50
Oil (%)	2.556	27.63	29.52	26.35	27.35	27.51	29.51	25.19	27.19
Free fatty acid (%)	N.S	0.200	0.210	0.200	0.220	0.209	0.218	0.210	0.229
Acid value	N.S	0.440	0.416	0.406	0.425	0.408	0.410	0.421	0.459
Crude protein (%)	0.432	24.44	26.11	21.54	23.21	26.55	28.22	22.97	22.64
Moisture (%)	0.36	13.00	12.76	12.00	11.00	11.65	12.00	11.95	12.80
Seed volume (mm3)	1.260	11.97	10.99	12.00	12.90	11.40	10.96	12.10	12.45
Relative density	0.005	0.762	0.764	0.777	0.779	0.766	0.769	0.762	0.769
Seed coat (%)	1.240	35.36	35.00	36.90	37.97	36.09	36.76	36.00	37.41
Germination (%)	1.219	84.72	90.50	71.11	78.11	83.61	90.16	84.16	89.94
Seedling vigor									
(Radical length (cm)	0.891	16.07	17.28	15.82	17.03	15.32	16.53	14.52	15.73
(Shoot length (cm)	N.S	13.64	14.81	14.58	15.75	13.36	14.53	12.82	13.98
Seedling dry weight (mg)	1.265	51.72	50.70	45.23	57.80	53.90	51.29	55.90	56.20

***, ** and NS indicated P<0.05%, P<0.01% and not significant, respectively.**

Continue Table 4

Treatments / Character	L.S.D$_{0.01}$	G92		G93		G96	
		2015	2016	2015	2016	2015	2016
Seed cotton yield k/f	NS	10.17	8.82	10.23	7.60	9.90	9.13
Boll weight (g)	0.27	3.01	2.87	2.78	2.54	2.96	2.95
Lint (%)	NS	35.83	36.29	33.89	34.31	38.73	39.08
Seed index (g)	0.67	10.97	9.89	10.80	9.95	10.80	9.86
Oil (%)	2.556	27.95	29.95	25.27	27.27	26.30	27.30
Free fatty acid (%)	N.S	0.240	0.220	0.230	0.210	0.210	0.200
Acid value	N.S	0.414	0.434	0.410	0.425	0.424	0.443
Crude protein (%)	0.432	20.37	21.03	20.06	21.72	27.20	28.87
Moisture (%)	0.36	11.96	11.00	11.23	11.05	11.69	11.06
Seed volume (mm3)	1.260	13.00	13.30	12.90	13.00	12.32	12.50
Relative density	0.005	0.772	0.775	0.763	0.766	0.770	0.772
Seed coat (%)	1.240	39.16	37.98	38.19	37.90	36.98	36.36
Germination (%)	1.219	88.33	93.55	84.44	91.22	70.77	77.77
Seedling vigor							
(Radical length (cm)	0.891	14.23	15.45	15.70	16.92	16.94	18.15
(Shoot length (cm)	N.S	13.93	15.10	15.36	16.53	14.62	15.79
Seedling dry weight (mg)	1.265	56.30	57.50	56.70	57.98	54.60	55.70

***, ** and NS indicated P<0.05%, P<0.01% and not significant, respectively.**

G 92 during two seasons gave the highest oil%. G 96 during 2nd season gave the highest protein % and radical length (cm). G 94, G 88, G 92, G 93 and G 96 during both seasons produced the highest seed volume. G 92 and G 94 during two seasons gave the highest relative density. G 92 during 1st season produced the highest seed coat. Giza 92 during 2nd season produced the highest germination percentage. G 92 and G 93 during both seasons and G 94 during 2nd season gave the highest seedling dry weight. G 87 during 2nd season gave the lowest boll weight (g) and seed index. G 86 and G 87 during two seasons gave the lowest seed

volume. G 96 during 1st season gave the lowest germination, G 88 during 1st season produced the lowest oil and radical length. G 92 during 1st season gave the lowest protein %. Theses results are in harmony with those obtained by Badr and Soad (2004 a), Badr and Soad (2004b), Amal *et al.* 2009, Amal *et al.* 2010 and Hassan *et al.* (2013). They reported that the effect of location was significant in most seed characters.

6- Effect of the interaction between growing location and season:

Table 5 shows the average values of the studied cotton characters for the three locations during the two successive seasons (2015 and 2016) and indicated that the all studied characters were significantly, except for lint % and seed volume.

The highest values for seed cotton yield, free fatty acid and acid value at Beheira in the 1st season. The highest boll weight, seed coat and germination were at Dakahlia in the 2nd season, also Gharbia location equal significantly Dakhlia for boll weight.

The highest oil %, protein %, moisture, radical length and shoot length at Gharbia in 2nd season. The highest values of seed index and seedling dry weight at Gharbia in 1st season. The highest relative density at Beheira in 2nd season. Therefore it could be concluded that the mean values of different traits varied from location to another according to the year of production. These results may belong to the each character needs suitable condition environment for the best quality. Theses results are in harmony with those obtained by Badr and Soad (2004 a), Badr and Soad (2004b), Amal *et al.* 2009, Amal *et al.* 2010 and Hassan *et al.* (2013). They reported that the effect of location was significant in most seed characters.

Table 5. Mean performance the effect of growing interaction and significantly the (C. X L. X Y.) interaction on seed cotton yield, viability and seed quality characteristics.

Treatments / Characters	L.S.D$_{0.01}$	El-Beheira		El-Gharbia		El-Dakahlia		CxLxY
		Y1	Y2	Y1	Y2	Y1	Y2	
Seed cotton yield k/f	2.09	11.32	5.99	10.06	10.20	9.31	9.15	N.S
Boll weight (g)	0.30	2.94	2.25	2.99	2.99	2.88	3.09	**
Lint (%)	N.S	37.40	38.22	36.91	36.69	36.60	36.72	N.S
Seed index (g)	0.93	11.24	7.41	11.68	11.22	11.14	11.19	N.S
Oil (%)	2.286	27.33	28.33	26.87	29.81	25.32	26.32	N.S
Free fatty acid (%)	0.035	0.236	0.203	0.203	0.199	0.220	0.230	**
Acid value	0.025	0.490	0.410	0.443	0.470	0.414	0.468	**
Crude protein (%)	0.307	22.31	24.31	24.45	25.46	21.01	23.01	**
Moisture (%)	0.965	11.50	10.98	12.59	12.30	11.99	11.59	**
Seed volume (mm3)	N.S	11.70	11.95	13.09	13.29	12.50	12.97	**
Relative density	0.006	0.773	0.775	0.764	0.767	0.768	0.771	**
Seed coat (%)	1.250	37.50	35.98	37.36	36.43	38.20	38.98	**
Germination (%)	0.499	74.76	81.67	83.45	89.08	84.86	91.24	**
Seedling vigor								
(Radical length (cm)	0.712	15.00	16.55	16.73	17.28	14.81	16.36	**
(Shoot length (cm)	0.364	13.42	14.92	14.99	15.49	13.73	15.23	N.S
Seedling dry weight (mg)	0.456	52.00	53.01	57.50	56.36	55.56	55.00	N.S

***, ** and NS indicated P<0.05%, P<0.01% and not significant, respectively.**

7- Effect of second order interaction:

Table 5 shows that the (C x Y x L) was significant on studied characters, except for seed cotton yield, lint %, seed index (g), oil %, shoot length and seedling dry weight. These results were in accordance with those obtained by Badr (2003), Badr and Soad (2004 a), Badr and Soad (2004b), Hassan *et al* (2013), Abd El-Salam *et al*. (2014) and Shaker (2014). They reported that the effect of cultivars (C), location (L), year (Y) and the interaction between them were significant on yield and yield components characters. Also Atteia (2001), El-Desuky (2002), Badr and Soad (2004 a), Badr and Soad (2004b), Hassan *et al* (2013) and Abd El-Aty *et al*. (2015), they reported that effects were significantly on some cotton seed quality characters. However, Gipson and Joham (1969), Quisenberry and Gipson (1974) and Thomson (1979), they reported that effect of environmental conditions was significant on some seed quality and seed viability characters.

8- Correlations between studied characters:

Results in Table 6 indicated significant Positive significant correlations were found between seed cotton yield and both (boll weight and seed index), lint percentage and each (boll weight, seed volume and seed coat), boll weight and seed coat %, seed index and both (seed volume and seedling dry weight), free fatty acid and acid value, protein % and seed coat %, seed volume and seedling dry weight, germination % and both (shoot length and seedling dry weight), shoot length and seedling dry weight.

The cultivar Giza 94 gave higher seed index than both Giza 92 and G 96 and it gave higher seed volume than each of Giza 92, Giza 93, Giza 96 and Giza 88. Giza 92 it gave higher germination %, Giza 96 gave higher radical length and seedling dry weight, this cultivar (G 88) gave the less than other genotypes for seed cotton yield, germination % and seedling dry weight. Its recommended by this correlations in the breeding program to improve seed cotton yield and seed characters. Some our results were in accordance with those obtained by Badr (2003), Badr and Soad (2004 a) and Badr and Soad (2004b), they reported that the relationship between seed cotton yield, boll weight and lint percentage was positive and significant. Atteia (2001), El-Desuky (2002), Badr and Soad (2004 a) and Badr and

Soad (2004b) reported that the correlation between (seed index and seed volume) was positive and significant while the correlation between (seed relative density and seed volume) was negative and significant. Hopper and MoDaniel (1999) who reported that improved seed vigor through genetic improvement programs. This correlation in the breeding program to improve seed cotton yield and cotton seed characters. Also, Leffler and Williams (1983) and Finch (1995), they reported that both seed size and density are correlated with planting seed quality. El-Desuky (2002) reported that the correlation among (seed oil % and protein %) was negative and significant.

Table 6. Correlation coefficient between studied characters of seven Egyptian cotton cultivars combined over two years on three location.

X16	X15	X14	X13	X12	X11	X10	X9	X8	X7	X6	X5	X4	X3	X2	Characters	
-0.1639	-0.4128**	-0.0580	-0.3468	0.2764	0.1629	-0.3650	-0.1450	-0.0183	0.2138	0.2185	-0.002	0.3065*	0.6056**	0.0639	Seed cotton yield k/f	X1
-0.0475	-0.517**	-0.2027	-0.1299	0.3264*	-0.4118**	0.3115*	-0.0474	0.1806	0.1284	0.1231	-0.2626	0.0827	0.2965*		Lint (%)	X2
-0.0472	-0.4278**	-0.2027	-0.3335*	0.3837**	-0.0472	0.1349	0.1355	-0.1689	-0.0846	-0.0866	-0.2717	0.0828			Boll weight (g)	X3
0.5202**	0.0897	0.0547	0.2096	-0.3313*	0.1248	0.7147**	0.2555	-0.3064*	-0.1843	-0.2031	0.0935				Seed index (g)	X4
0.2118	0.3163	0.2175	0.2022	-0.5523**	0.0702	-0.1264	-0.3161*	-0.3075*	-0.1203	-0.0966					Oil (%)	X5
-0.1591	0.0357	0.0229	-0.0451	0.1025	-0.1617	-0.0735	-0.3023*	0.1754	0.9761**						Free fatty acid (%)	X6
-0.1393	0.0352	0.0128	-0.0447	0.1148	-0.1712	-0.0490	-0.2884	0.1967							Acid value	X7
-0.1558	0.0845	-0.1957	0.0607	0.3267*	-0.2297	-0.1193	0.1192								Crude protein (%)	X8
0.1498	-0.1216	-0.1752	-0.0243	0.2070	-0.0786	0.2645									Moisture (%)	X9
0.5005**	0.2603	0.0336	0.2614	-0.1885	-0.5707**										Seed volume (mm3)	X10
0.1484	-0.2426	0.0521	-0.1026	0.1384											Relative density	X11
-0.4027**	-0.4963**	0.1874	-0.4547**												Seed coat (%)	X12
0.3995**	0.4312**	0.1587													Germination (%)	X13
Seedling vigor																
-0.1761	0.1537														(Radical length (cm)	X14
0.3912**															(Shoot length (cm)	X15
1.00															Seedling dry weight (mg)	X16

*** = significant ** = high significant r at 5% = 0.282 r at 1% = 0.363**

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تقييم بعض أصناف القطن المصري من حيث صفات المحصول و جودة و حيوية البذور.

شاكر عبد العزيز شاكر[١]، إيمان نبيل محمود محمد[٢] و آلاء محمد المهدي أحمد شاهين[٢]

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تهدف هذه الدراسة إلى تقييم بعض أصناف القطن المصري (جيزة ٨٦ ، جيزة ٩٤ ، جيزة ٨٧ ، جيزة ٨٨ ، جيزة ٩٢ ، جيزة ٩٣ ، جيزة ٩٦) في ثلاث مناطق البحيرة ؛ الغربية ؛ الدقهلية بالدلتا خلال موسمي (٢٠١٥ ، ٢٠١٦) لتقدير صفات المحصول وجودة وحيوية البذور وصممت التجارب بنظام القطاعات الكاملة العشوائية في ثلاث مكررات . وتم دراسة صفات محصول القطن الزهر(ق/ف)، وزن اللوزة (جم)، معدل الحليج (%)، معامل البذرة (جم) ، النسبة المئوية للزيت (%)، النسبة المئوية للأحماض الدهنية الحرة (%)، رقم الحموضة، النسبة المئوية للبروتين (%)،النسبة المئوية للرطوبة (%)، حجم ١٠٠ بذره (مم٣)، الكثافة النوعية للبذور، النسبة المئوية للقصرة (%), النسبة المئوية للإنبات (%).صفات قوة البادرة و طول الجذير (سم)، طول الريشة (سم)، الوزن الجاف للبادرة (مجم).يمكن تلخيص النتائج المتحصل عليها كما يلي: اختلفت الأصناف والمناطق تحت الدراسة فيما بينها معنويا لجميع الصفات تحت الدراسة فيما عدا صفتي النسبة المئوية للأحماض الدهنية الحرة (%) و رقم الحموضة. اختلفت السنوات، التفاعل بين الأصناف والسنوات، والتفاعل بين الأصناف والسنوات والمناطق معنويا لمعظم الصفات تحت الدراسة كان تأثير التفاعل بين الأصناف والمناطق معنويا لجميع الصفات تحت الدراسة فيما عدا صفة محصول القطن الزهر. تفوق الصنفان جيزة ٩٤ ، جيزة ٩٢ في صفات محصول القطن الزهر، وزن اللوزة، معدل الحليج. سجل الصنف جيزة ٩٢ أعلي نسبه مئوية للزيت والبروتين ؛ بينما سجل الصنف جيزه٩٤ أعلي طول للجذير وأعلي وزن جاف للبادرة في حين سجل أقل نسبه مئوية للقصرة ونسبه مئوية للإنبات. كان هناك ارتباط معنوي موجب في كلا من: محصول القطن الزهر و وزن اللوز. معدل الحليج ، حجم ١٠٠ بذره، النسبة المئوية للقصرة – وزن اللوزة، النسبة المئوية للقصرة – وكل من حجم ١٠٠ بذره, الوزن الجاف للبادرة النسبة المئوية للأحماض الدهنية الحرة ، رقم الحموضة - النسبة المئوية للبروتين، النسبة المئوية للقصرة - حجم ١٠٠ بذره, الوزن الجاف للبادرة .النسبة المئوية للإنبات وكل من طول الريشة، الوزن الجاف للبادرة - طول الريشة، الوزن الجاف للبادرة. يمكن استخدام الصنف جيزة ٩٢ لتحسين صفات الزيت والبروتين للأصناف والسلالات الجديدة. كما يمكن الاستفادة من نتائج الارتباط بين الصفات في برامج التربية لتحسين المحصول وصفات البذرة.