Annals of Agric. Sci., Moshtohor **ISSN 1110-0419**
Vol. 59(3) (2021), 707–720 **https://assjm.journals.ekb.eg**

Yield, Lint and Yarn Quality Properties of Some Egyptian Cotton Varieties as Affect By Some Natural Extracts and Mineral Fertilization Rates

Fadia S. A. Tolba[*]; Salah A. H. Allam[**]; El-Sayed M. H. Shokr[**]; Abd El-Based A. Hassan[*] and El-Saeed M. M. El-Gedwy[**]

[*] **Cotton Research Institute, Agricultural Research Center, Giza, Egypt**

[**] **Agronomy Department, Faculty of Agriculture, Benha University, Egypt**

Corresponding author: alsaeed.algedwy@fagr.bu.edu.eg

Abstract

A field experiment was conducted at the Experimental Farm of Sakha Agricultural Research Station (Kafr El-Sheikh Governorate), Agricultural Research Center, Egypt, during two successive seasons of 2019 and 2020 to study the performance of two Egyptian cotton varieties, *i.e.*, Giza 94 and Giza 97 as affected by foliar spray with natural extracts and mineral fertilization rates, *i.e.*, control (full dose of mineral fertilization rates with 60 kg N, 30 Kg P_2O_5 and 48 kg K_2O/fed [A], 75 % A and foliar spray of compost tea, 75 % A and foliar spray of algae extract, 75 % A and foliar spray of compost tea with algae extract, 50 % A and foliar spray of compost tea, 50 % A and foliar spray of algae extract and 50 % A and foliar spray of compost tea with algae extracts on cotton vegetative growth, yield components, yield, fiber and yarn properties. The experiments were laid out in Randomized Complete Block Design (RCBD) with four replicates. Growing the promising cotton variety of Giza 97 significantly gave the maximum mean values of No. of sympodial/plant, No. of opened bolls/plant, boll weight, lint %, seed cotton yield/fed, lint cotton yield/fed, upper half mean length, length uniformity index, fiber bundle strength, fiber elongation %, micronaire value, fiber yellowness degree and lea count strength product in addition to produce the lowest mean values of plant height, fiber brightness degree, yarn unevenness/100 m and No. of neps/100 m in both seasons. The highest mean values of plant height, No. of sympodial/plant, No. of opened bolls/plant, boll weight, lint %, seed cotton yield/fed, lint cotton yield/fed, upper half mean length, fiber bundle strength, fiber elongation %, micronaire value, fiber brightness degree and lea count strength product in addition to the lowest fiber yellowness degree and No. of neps/100 m were obtained from Egyptian cotton plants treated by 75 % A and foliar spray of compost tea with algae extracts, followed by 75 % A with foliar spray of algae extract treatment in both seasons. Egyptian cotton variety of Giza 97 when received 75 % A and foliar spray of compost tea with algae extracts produced the highest mean values of No. of sympodial/plant, No. of opened bolls/plant, boll weight, lint %, seed cotton yield/fed, lint cotton yield/fed, fiber bundle strength, micronaire value and lea count strength product as well as recorded the lowest mean values of No. of neps/100 m in the first and second seasons. Based on the previous results it could be concluded that, growing promising cotton variety of Giza 97 treated by 75 % A along with foliar spray of compost tea and algae extract treatment produced the maximum seed cotton yield and lint cotton yield as well as the properties fiber and yarn have improved.

Keywords: Egyptian cotton varieties, compost tea, algae extract, mineral fertilization rates, fiber and yarn properties.

Introduction

Cotton is considered the main fiber crop in Egypt as well as the world. Egyptian statistics indicate decreasing cotton cultivated area from 851283 fed on 1991 to about 183000 fed on 2020 year, with decreasing percent of about 75.50 % that lead to a decrease in cotton production from 5826000 kentars (one kentar = 157.5 kg of seed cotton) on 1991 to about 1573000 kentars on 2020 year, with decreasing percent by about 73.00% in 2020 year comparing with the year 1991 **(The Egyptian Cotton Gazette, 2021).** One of the reasons of the decreasing cotton cultivated area is unfair prices to producers and better net profits from alternatives crops especially grains in the same time high costs of cotton inputs. In addition to the very high cost of hand picking and insufficient trained picking workers. The improvement of cotton relies mainly upon the Cotton Research Institute, who through a long process of breeding, maintenance, evaluation of fiber and yarn quality properties test arrives at new genotypes of superior quality to replace the old ageing ones. Consequently, strenuous efforts have been always directed towards improving its quality to maintain the worldwide reputation it has gained.

Differences among cotton varieties have been reported by many researchers they found that significant differences between cotton varieties in plant height, No. of sympodial/plant, No. of opened bolls/plant, boll weight (g), lint percentage, seed cotton yield and lint cotton yield **[Mahmoud *et al.* (2016); Mahdy *et al.* (2017); El-Gedwy *et al.* (2018); Kassambara *et al.* (2019) and Ahmed *et al.* (2020 a)]**, fiber properties, *i.e.* upper half mean length, fiber uniformity index, fiber bundle strength,

fiber elongation percentage, micronaire value, fiber maturity and color attributes (fiber brightness degree and fiber yellowness degree) **[Abdel-Khalik *et al.* (2017); El-Gedwy *et al.* (2018); Abdel-Ghaffar *et al.* (2019); Ahmed *et al.* (2020 a) and Gadallah *et al.* (2020)]** as well as yarn spinning properties, *i.e.* (lea count strength product, yarn unevenness/100 m and No. of neps/100 m) **[Beheary *et al.* (2018); Ibrahim and El-Banna (2018); Kassambara *et al.* (2019) and El-Gedwy *et al.* (2020)]**.

In recent years, the world focused his attention to minimize environmental pollution and human health impacts, by reducing the use of synthetic fertilizers and chemicals in crops production **(El-Boukhari *et al.* 2020).**

About 9,000 macro algae species are classified into three main groups depending on the pigmentation including; brown, green and red algae. Algae are used in improving the agriculture output **(Babu *et al.* 2015; and Eef *et al.* 2018).** More than 15 million tons of algae are produced annually and used as bio-fertilizer in agriculture and also used human food, animal feed and raw material for industry **(Begum *et al.* 2018).** Algae extract application for different crops has a great importance due to it contains high levels of organic matter, macro elements (Ca, K and P), micro elements (Fe, Cu, Zn, B, Co, Mo, Mn and Ni), polysaccharides, antioxidants, pigments, hormones, aliginic, vitamins and amino acids in addition to rich in growth regulators such as auxins, cytokinin, betaines and gibberellins **(Begum *et al.* 2018; Eef *et al.* 2018 and El-Boukhari *et al.* 2020)**. Numerous studies have revealed a wide range of beneficial effects of algae extract on cotton vegetative growth, yield and yield components, fiber and yarn properties such as better crop performance, yield and many more **Gencsoylu (2016); Salama *et al.* (2018); Sultana *et al.* (2018) and Yanni *et al.* (2020).**

Compost tea a term used interchangeably with (watery fermented compost extracts), (compost steepage), (organic tea) and (compost leachate) to define waterbased compost preparations. The term does not distinguish between the productions methods **Scheuerell & Mahaffee (2002) and Haas & Defago (2005)**. Compost is comprised of a large and diverse community of humic acids and other chemical nutrients such as carbon and nitrogen that support healthy plant growth. Reviews of literature suggest compost tea may retain to varying degrees some of the same beneficial attributes of compost. Compost tea can be prepared in a shorter period of time and can be applied directly on to plant surface. However, effects of compost tea are short lived and frequent and repeat applications are required **Khalil and Arafa (2013); Zewail and Ahmed (2015)**; **Abd El-Gayed *et al.* (2019)**; **Ahmed *et al.* (2020 b) and Ahmed (2021)** show that foliar application by compost tea increased cotton growth, yield, its components, fiber and yarn properties.

The main aim of the investigation was to study the response of Egyptian cotton varieties to foliar application by algae extract, compost tea and mineral fertilization rates for reducing the use of synthetic fertilizers as well as improving growth, yield, yield components, fiber and yarn properties.

Materials and Methods:

A field experiment was conducted at the Experimental Farm of Sakha Agricultural Research Station (Kafr El-Sheikh Governorate), Agricultural Research Center, Egypt, during two successive seasons of 2019 and 2020 to study the effect of seven natural extracts and mineral fertilization rates on vegetative growth, yield components, yield, fiber and yarn properties of two Egyptian cotton varieties.

Soil Analysis

Soil texture of the experimental site was clay and pH of 8.0. Soil samples were taken at soil preparation to depth of 0-30 cm for chemical and physical properties analysis of the experimental soil were determined according to the standard procedures described by **Rowell 1995** and represented in **Table 1**.

Table 1. Chemical and mechanical analysis of the experimental soil of the two growing seasons (2019 and 2020).

Properties	Season	
	2019	2019
Chemical analysis		
E.C.	3.50	4.22
pH (1 :2.5)	8.92	8.78
Ca Co_3 %	3.21	2.86
O.M %	1.82	1.91
N % (total)	0.119	0.125
Available N (ppm)	62.15	69.51
P % (total)	0.065	0.079
Available P (ppm)	11.32	14.15
K % (total)	0.24	0.31
Available K (ppm)	340.23	400.55
Mechanical analysis		
Sand %	23.42	19.70
Silt %	31.32	33.58
Clay %	45.26	46.72
Texture grade	Clay	Clay

Treatment Details and Experimental Design

Each experiment included fourteen treatments, which were the combination of two Egyptian cotton varieties and seven foliar spray with natural extracts and mineral fertilization rates.

A. Egyptian cotton varieties

1) Giza 94.

2) Giza 97 promising cross [(G.89 × R.101) × G.86] × G.94 which released as 97 cotton variety in 6/2019 season.

The varieties seeds were obtained from Cotton Research Institute, Agricultural Research Center, Giza, Egypt and its pedigree was shown in **Table 2.**

Table 2. Type and pedigree of studied Egyptian cotton varieties

Cotton variety	Type	Pedigree
Giza 94	long staple (over 1 ¼ - 1 3/8 inch)	S1229× G.86
Giza 97	long staple (over 1 ¼ - 1 3/8 inch)	[(G.89 × R.101) × G.86] × G.94

B. Natural extracts with mineral fertilization rates

1) Control (full dose of mineral fertilization rates with 60 kg N, 30 Kg P_2O_5 and 48 kg K_2O/fed) recommended dose (A).
2) 75 % A and foliar spray of compost tea (B).
3) 75 % A and foliar spray of algae extract (C).
4) 75 % A and foliar spray of compost tea with algae extracts (D).
5) 50 % A and foliar spray of compost tea (E).
6) 50 % A and foliar spray of algae extract (F).
7) 50 % A and foliar spray of compost tea with algae extracts (G).

Phosphorous fertilizer was applied at a rate of 30.0 kg P_2O_5/fed in form of calcium super phosphate (12.5 % P_2O_5) after ridging and before cotton sowing in each season. Nitrogen fertilizer was applied at a rate of 60 kg N/fed as ammonium nitrate (33.5 % N) and divided into two equal parts and applied side dressed before first and second irrigations in each season. Potassium fertilizer was applied in form of potassium sulphate (48% K_2O) at a rate of 48 kg K_2O/fed in one dose before the second irrigation in each season (full dose as recommended by Ministry of Agriculture for control), other treatments of mineral fertilization rates were done by the same method using above mentioned rates.

Algae extract product imported by Techno Green Company Group, Cairo, Egypt. Algae extract contains minerals as (Fe, Zn, Cu, Mn and Mo), vitamins, enzymes, amino acids, sugars and plant hormones (auxins, cytokinins and gibberellins) were used. The recommended value of Algae extract was one L/fed in each spraying. Chemical analyses of algae extract are shown in **Table 3**.

Table 3. Chemical analysis of algae extract

Characteristics	Value (%)	Characteristics	Value (%)
Oligosaccharide	3.0	**Pepsin**	0.02
Algnic acid	5.0	**Potassium oxide**	12.0
Phytin	0.003	**Phosphorus oxide**	0.5
Menthol	0.001	**N**	1.0
Cytokinine	0.001	**Mn**	0.1
Indol acetic acid	0.0002	**Fe**	0.2

The compost tea was extract from compost made from rice straw and cattle dung which, had been composted in aerobic heap for three months. To prepare enriched complete compost quality, ten kg of mature compost immersed in appropriate volume of water for 7 days to produce the extract. The recommended value of compost tea extract was 20 L/fed in each spraying. The analysis of compost tea is shown in **Table 4.**

Algae extract and compost tea were repeated three times as foliar spray; the first one was at the beginning of flowering at 65 days after sowing and repeated with 21 days intervals, the spray solution volume was 400 L/fed using a hand operated compressed air. The application was carried out between 09:00 and 11:00 a.m.

Table 4. Nutrient contents of the extracted compost tea

Character	Concentration
Ammonic nitrogen (mg/L)	20
Nitrate nitrogen (mg/L)	35
Total nitrogen (mg/L)	120
Total Phosphorous (mg/L)	60
Total Potassium (mg/L)	50
***COD (mg/L)**	980
***BOD (mg/L)**	435
pH (1:10)	8.04

Where, COD: chemical oxygen demand and BOD: biochemical oxygen demand

The preceding winter crop in the two seasons was Egyptian clover (*Trifolium alexandrinum* L.). Experiments were planted on 7th and 1st of April in first season (2019) and second season (2020), respectively. The plot area was 10.5 m^2 and contained five ridges of 3.5 m long and 60 cm apart Cotton plants was done by the local method of dibbling 5 to 7 seeds in each hill by hand with distance between hills was 30 cm apart and after 35 days of sowing thinning was carried out in order to maintain better two seedlings/hill (46667 cotton plants/fed). The fourteen previous treatments were arranged in Randomized Complete Block Design (RCBD) with four replicates. Pest and weed management were conducted as needed during the growing season, according to local practice performed at the experimental station. The first irrigation was applied after 21 day from sowing, while the other irrigations were given at 15-day interval. Hand hoeing was carried out three times during the season before the first, second and third irrigations, respectively. All recommended cultural practices for growing cotton according to Agricultural Research Center recommendation were done properly.

Sampling and Data Collecting

A. Vegetative growth, yield components and cotton yield:

At harvest, ten guarded cotton plants were taken randomly from each sub-plot to determine the following characteristics.

1) Plant height (cm).
2) Number of sympodial/plant.
3) Number of opened bolls/plant. It was calculated by counting the opened bolls/plant on the above the representative plants before the first and second picking.

4) Boll weight (g). It was calculated from the following formula:

$$\textbf{Boll weight (g)} = \frac{\textbf{Seed cotton yield/plant } (g)}{\textbf{No. of open bolls/plant}}$$

5) Lint percentage. It was calculated from the following equation:

$$\textbf{Lint \%} = \frac{\textbf{Lint cotton yield/plant (g)}}{\textbf{Seed cotton yield/plant (g)}} \textbf{x 100}$$

6) Seed cotton yield/fed (kentar): It was estimated and transformed to kentar/fed (one kentar = 157.5 kg), the seed cotton yield was picked twice in the two seasons, in picking from whole plants of plot were selected to be picked in order to avoid border effect.

7) Lint cotton yield/fed (kentar): It was estimated and transformed to kentar/fed (one kentar = 50 kg), it was calculated from the following equation:

$$\textbf{Lint cotton yield/fed (kentar)} = \frac{\textbf{Seed cotton yield/fed (kentar) X 157.5 X Lint \%}}{\textbf{50 X 100}}$$

B. Fiber and yarn properties:

This study was carried out at Cotton Research Institute, Agricultural Research Center, Giza, Egypt, during 2019 and 2020 seasons with using the new technique of the ring spinning system at yarn count of 60's and 3.6 twist multiplier. The Egyptian cotton materials were obtained from lint cotton yield/fed in all plots. All fiber and yarn properties were tested under controlled atmospheric condition of (21 C°± 2 C°) temperature and (65 % ± 5 %) relative humidity **(ASTM, 2004)** at the Egyptian International Cotton Classification Center laboratories, Cotton Research Institute, Agricultural Research Center, Giza, Egypt.

B.1. Fiber properties

1) Upper half mean length (mm).
2) Fiber uniformity index (%).
3) Fiber bundle strength (g/tex).
4) Fiber elongation percentage (%).
5) Micronaire value.
6) Fiber maturity.
7) Color attributes
  i. Fiber brightness degree (%).
  ii. Fiber yellowness degree.

High Volume Instrument (H.V.I.) instrument system was used to determine: upper half mean length (mm), fiber uniformity index (%), fiber bundle strength (g/tex), fiber elongation percentage (%), micronaire value, fiber maturity and fiber color attributes, *i.e.* fiber brightness degree (Rd %) and fiber yellowness degree ($^{+}$b) according to **(A.S.T.M., 1986 D:4605)**. While, fiber diameter (µ), No. of convolution/cm and No. of reversal/cm were processed at Fiber Structure Lab. Cotton Res. Ins., Agric. Res. center, Giza, Egypt, according to methods described by **Hequet *et al.* (2006).**

B.2. Yarn spinning properties

1) Lea count strength product.
2) Yarn unevenness/100 m (cv %).
3) Number of neps/100 m

Lea count strength product was determined by testing the skein strength on the Good Brand lea tester to estimate the lea strength (Lea product) in pounds **(A.S.T.M., 1967 D-1578)** the Broken leas were weighted by a Souter Al-fered Balance **(A.S.T.M., 1967 D-1907)** to estimate its actual count. The lea breaking strength was corrected according to the actual count. Lea product was the nominal count estimate from the following formula: **Lea product =** Corrected breaking load in pounds × nominal count.

Coefficient of variation of the yarn unevenness/100 (C.V.%) and No. of neps/100 m of the yarn were measured by the Uster Evenness Tester III as described by the designation of the **(A.S.T.M., 1984 D-2256).**

Statistical analysis:

The analysis of variance was carried out according to the procedure described by **Gomez and Gomez (1984).** Data were statistically analyzed according to using the MSTAT-C Statistical Software Package **(Freed, 1991).** Where the F-test showed significant differences among mean of treatments, the least significant difference (L.S.D.) test at 0.05 level was used to compare between means.

Results and Discussion

A. Vegetative growth, yield components and cotton yield:

Performance of Egyptian cotton varieties

Results presented in **Table 5** show that almost cotton growth, yield and its related traits under study were differed significantly among the two Egyptian cotton verities during 2019 and 2020 seasons. Results reveal that the superiority of Giza 97 variety in No. of sympodial/plant (14.05 and 15.99), No. of opened bolls/plant (18.55 and 19.62), boll weight (3.369 and 3.530 g), lint percentage (39.91 and 39.22 %), seed cotton yield/fed (10.76 and 11.95 kentar) and lint cotton yield/fed (13.57 and 14.83 kentar) in two seasons, respectively. The excess ratios between the promising cotton variety of Giza 97 over Giza 94 variety was 14.23 and 19.24 % for No. of sympodial/plant; 25.17 and 20.59 % for No. of opened bolls/plant; 10.86 and 11.96 % for boll weight; 4.15 and 4.14 % for lint percentage; 24.68 and 21.94 % for seed cotton yield/fed in addition to 29.86 and 27.19 % for lint cotton yield/fed, in first and second seasons, respectively. The maximum plant height (150.33 and 155.25 cm) was achieved by Giza 94 variety during both seasons, respectively. The superiority ratios between Giza 94 variety and Giza 97 variety was 8.93 and 10.92 % for plant height in the both seasons, respectively. These differences in cotton yield and its related traits may be due to the genetic differences between cotton varieties under study (Giza 94 and Giza 97). As well as, It could be concluded that Giza 97 variety surpassed Giza 94 variety in cotton and lint yields/fed may be due to more likely attributed to the increases in No. of sympodial/plant, No. of opened bolls/plant, boll weight (g) and lint %. These results in good accordance with those reported by **Mahmoud *et al.***

(2016); Mahdy *et al.* (2017); El-Gedwy *et al.* (2018); Kassambara ***et al.*** **(2019) and Ahmed *et al.* (2020 a)** show that varieties markedly varied for cotton yield and its related traits.

Effect of natural extracts and mineral fertilization rates

Results in **Table 5** indicate that almost growth, yield and its related traits of Egyptian cotton were significantly influenced with application of foliar spray with natural extracts and mineral fertilization rates during 2019 and 2020 seasons. Cotton plants treated by 75 % A and foliar spray of compost tea with algae extracts significantly produced the maximum mean values of plant height (151.09 and 155.85 cm), No. of sympodial/plant (15.95 and 17.99), No. of opened bolls/plant (20.27 and 22.10), boll weight (3.440 and 3.612 g), lint percentage (40.39 and 39.88 %), seed cotton yield/fed (12.57 and 14.38 kentar) in addition to lint cotton yield/fed (16.02 and 18.11 kentar) in 2019 and 2020 seasons respectively, followed by 75 % A and foliar spray of algae extract treatment. On the other hand, the lowest mean values of plant height (138.80 and 139.57 cm), No. of sympodial/plant (11.06 and 12.28), boll weight (2.954 and 3.101 g), lint percentage (37.89 and 37.21 %), seed cotton yield/fed (7.84 and 8.67 kentar) in addition to lint cotton yield/fed (9.39 and 10.17 kentar) were obtained from cotton sowing under fertilized by 50 % A with foliar spray by compost tea extract in both seasons, respectively. While, Cotton plants treated with 100 % mineral fertilizer treatment markedly gave lowest mean values of No. of opened bolls/plant (13.97 and 15.20) in both seasons, respectively. The superiority ratios in 2019 season between application 75 % A and foliar spray of compost tea with algae extracts treatment and each of 100 % mineral fertilizer (A), 50 % A with foliar spray of compost tea, 50 % A and foliar spray of algae extract, 50 % A and foliar spray of compost tea with algae extract, 75 % A and foliar spray of compost tea and 75 % A and foliar spray of algae extract were 45.10, 38.17, 31.20, 23.98, 14.65 and 9.98 % for No. of opened bolls/plant; 5.94, 16.45, 13.01, 11.04, 4.05 and 2.99 % for boll weight; 53.48, 60.33, 48.23, 37.98, 19.26 and 13.14 % for seed cotton yield/fed in addition to 59.24, 70.61, 56.14, 44.06, 21.36 and 14.18 % for lint cotton yield/fed, respectively. The increase ratios in 2020 season when cotton received A over each of 50 % A and foliar spray of compost tea, 50 % A with foliar spray of algae extract, 50 % A and foliar spray of compost tea with algae extract, 75 % A and foliar spray of compost tea and 75 % A with foliar spray of algae extract were 45.39, 42.49, 33.94, 25.85, 17.37 and 10.94 % for No. of opened bolls/plant; 9.59, 16.48, 12.80, 10.02, 6.55 and 2.94 % for boll weight; 59.42, 65.86, 51.05, 38.54, 24.83 and 14.13 % for seed cotton yield/fed in addition to 66.76, 78.07, 60.83, 47.00, 27.18 and 14.91 % for lint cotton yield/fed, respectively. The increase in seed cotton and lint cotton yield and its attributes by foliar spray of compost tea and algae extract may be due to the role of algae extract in activating growth of plants due to contains high levels of organic matter, micro elements, vitamins and amino acids and also, rich in growth regulators such as auxins, cytokinin and gibberellins (**Table 3)** in addition to compost tea comprised of a large and diverse community of microbes, humic acids and other chemical nutrients such as carbon and nitrogen that support healthy plant growth **(Table 4).** It was clear that the increase in seed and lint cotton yield/fed may be due to the increases in mean values of plant height, No. of sympodial/plant, No. of opened bolls/plant, boll weight and lint percentage of cotton resulting from application of 75 % A and foliar spray of compost tea with algae extracts treatment. These results are in compatible with those found by **Babu *et al.* (2015); Zewail and Ahmed (2015); Gencsoylu (2016); Salama *et al.* (2018); Sultana *et al.* (2018); Abd El-Gayed *et al.* (2019); Ahmed *et al.* (2020 b); Yanni *et al.* (2020) and Ahmed (2021).**

Interaction effect between Egyptian cotton varieties and natural extracts and mineral fertilization rates

Results in **Table 5** showed that the interaction effect between Egyptian cotton varieties and natural extracts and mineral fertilization rates induced significant differences on almost cotton growth, yield and its related traits during 2019 and 2020 seasons. The highest mean values in No. of sympodial/plant (17.24 and 19.21), No. of opened bolls/plant (21.98 and 23.88), boll weight (3.659 and 3.868 g), lint percentage (41.21 and 40.88 %), seed cotton yield/fed (13.78 and 15.81 kentar) and lint cotton yield/fed (17.89 and 20.36 kentar) in 2019 and 2020 seasons, respectively were recorded from growing promising cotton variety of Giza 97 treated by 75 % A and foliar spray of compost tea with algae extracts treatment. On the other hand, planting Giza 94 variety treated by 50 % A and foliar spray of compost tea gave the lowest mean values in No. of sympodial/plant (10.84 and 11.57), boll weight (2.784 and 2.986 g), lint percentage (37.02 and 36.77 %), seed cotton yield/fed (6.86 and 8.06 kentar) and lint cotton yield/fed (8.00 and 9.34 kentar) in 2019 and 2020 seasons respectively, meanwhile planting the same cotton variety under soil fertilized by 100 % mineral fertilizer treatment gave the lowest mean values in No. of opened bolls/plant (12.57 and 13.85) during both seasons, respectively. Plants of Giza 94 variety treated by 75 % A and foliar spray of compost tea with algae extracts treatment recorded the highest mean values of plant height (156.74 and 162.73 cm) in 2019 and 2020 seasons respectively. On the other hand, the lowest mean values of plant height (132.24 and 130.42 cm) in both seasons, respectively was obtained from Giza 97 variety with 50 % A and foliar spray of compost tea. The results reported here are in harmony with those obtained by **Babu *et al.* (2015).**

Table 5. Effect of Egyptian cotton varieties, natural extracts and mineral fertilization rates and their interaction on plant height, No. of sympodial/plant, No. of opened bolls/plant, boll weight, lint %, seed cotton yield/fed and lint cotton yield/fed of cotton during 2019 and 2020 seasons

Trait		Plant height (cm)		No. of sympodial /plant		No. of opened bolls/plant		Boll weight (g)		Lint %		Seed cotton yield/fed (kentar)		Lint cotton yield/fed (kentar)	
Treatment		2019	2020	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020
Egyptian cotton variety															
Giza 94		150.33	155.25	12.30	13.41	14.82	16.27	3.039	3.153	38.32	37.66	8.63	9.80	10.45	11.66
Giza 97		138.01	139.96	14.05	15.99	18.55	19.62	3.369	3.530	39.91	39.22	10.76	11.95	13.57	14.83
L.S.D. at 5%		**3.08**	**3.54**	**0.24**	**0.27**	**0.76**	**0.84**	**0.054**	**0.061**	**0.18**	**0.22**	**0.55**	**0.63**	**0.72**	**0.80**
Natural extracts and mineral fertilization rates															
A		142.71	147.48	12.60	14.00	13.97	15.20	3.247	3.296	38.94	38.18	8.19	9.02	10.06	10.86
B		145.42	149.62	13.84	15.23	17.68	18.83	3.306	3.390	39.64	39.11	10.54	11.52	13.20	14.24
C		148.46	152.33	14.63	16.48	18.43	19.92	3.340	3.509	40.00	39.60	11.11	12.60	14.03	15.76
D		151.09	155.85	15.95	17.99	20.27	22.10	3.440	3.612	40.39	39.88	12.57	14.38	16.02	18.11
E		138.80	139.57	11.06	12.28	14.67	15.51	2.954	3.101	37.89	37.21	7.84	8.67	9.39	10.17
F		140.91	142.60	11.93	13.25	15.45	16.50	3.044	3.202	38.31	37.50	8.48	9.52	10.26	11.26
G		141.81	145.79	12.25	13.67	16.35	17.56	3.098	3.283	38.66	37.62	9.11	10.38	11.12	12.32
L.S.D. at 5%		**5.76**	**6.62**	**0.45**	**0.51**	**1.43**	**1.57**	**0.101**	**0.114**	**0.33**	**0.41**	**1.02**	**1.17**	**1.34**	**1.49**
Interaction effect between Egyptian cotton varieties and natural extracts and mineral fertilization rates															
Giza 94	**A**	149.23	155.43	11.56	12.34	12.57	13.85	3.095	3.136	38.37	37.25	7.43	8.25	8.98	9.69
	B	150.47	155.67	12.78	13.98	15.47	16.73	3.124	3.169	38.68	38.12	9.21	10.10	11.22	12.12
	C	154.35	158.79	13.57	15.11	16.74	18.27	3.168	3.221	39.12	38.64	10.10	11.17	12.44	13.60
	D	156.74	162.73	14.65	16.76	18.56	20.32	3.221	3.356	39.56	38.88	11.37	12.95	14.16	15.86
	E	145.36	148.71	10.84	11.57	12.89	14.15	2.784	2.986	37.02	36.77	6.86	8.06	8.00	9.34
	F	147.84	151.63	11.21	11.97	13.24	14.89	2.889	3.089	37.51	36.98	7.30	8.76	8.63	10.21
	G	148.31	153.76	11.51	12.11	14.26	15.66	2.995	3.114	37.98	37.01	8.13	9.27	9.72	10.81
Giza 97	**A**	136.18	139.53	13.63	15.66	15.36	16.54	3.398	3.456	39.51	39.1	8.95	9.78	11.14	12.04
	B	140.37	143.56	14.89	16.47	19.88	20.93	3.488	3.611	40.59	40.1	11.87	12.95	15.18	16.36
	C	142.57	145.87	15.68	17.85	20.11	21.56	3.512	3.797	40.87	40.55	12.13	14.03	15.61	17.92
	D	145.43	148.97	17.24	19.21	21.98	23.88	3.659	3.868	41.21	40.88	13.78	15.81	17.89	20.36
	E	132.24	130.42	11.27	12.98	16.44	16.87	3.124	3.215	38.76	37.65	8.83	9.27	10.78	10.99
	F	133.98	133.57	12.65	14.52	17.65	18.11	3.199	3.314	39.11	38.01	9.65	10.29	11.89	12.32
	G	135.31	137.82	12.98	15.23	18.44	19.45	3.201	3.451	39.34	38.22	10.10	11.49	12.51	13.84
L.S.D. at 5%		**8.15**	**9.36**	**0.64**	**0.72**	**2.02**	**2.22**	**0.143**	**0.161**	**0.47**	**0.58**	**1.44**	**1.65**	**1.90**	**2.11**

Where, **A** = control (full dose of mineral fertilization rates with 60 kg N, 30 Kg P_2O_5 and 48 kg K_2O/fed), **B** = 75 % A and foliar spray of compost tea, **C** = 75 % A and foliar spray of algae extract, **D** = 75 % A and foliar spray of compost tea with algae extract, **E** = 50 % A and foliar spray of compost tea, **F** = 50 % A and foliar spray of algae extract and **G** = 50 % A and foliar spray of compost tea with algae extract.

B. Fiber and yarn properties:

Performance of Egyptian cotton varieties

Results presented in **Tables 6 and 7** show that almost fiber and yarn quality measurements under study were different significantly among the two Egyptian cotton varieties (Giza 94 and Giza 97), except fiber maturity during 2019 and 2020 seasons.

Results reveal that the superiority of Giza 97 variety in upper half mean length (33.74 and 33.67 mm), length uniformity index (85.89 and 86.42 %), fiber bundle strength (46.28 and 46.57 g/tex), fiber elongation (7.874 and 8.023 %), micronaire value (4.304 and 4.324), fiber yellowness degree (9.777 and 9.693) and lea count strength product (2429.8 and 2429.8) in addition to recording the lowest fiber brightness degree (69.62 and 71.47 %), yarn unevenness/100 m (9.37 and 9.94 %) and No. of neps/100 m (111.85 and 104.80) in both seasons respectively.

The excess ratios between the promising cotton variety of Giza 97 over Giza 94 variety was 4.04 and 4.05 % for upper half mean length; 1.95 and 1.92 % for length uniformity index; 2.68 and 3.65 % for fiber bundle strength; 9.01 and 8.17 % for fiber elongation percentage; 7.41 and 8.21 % for micronaire value; 14.96 and 11.73 % for fiber yellowness degree; in addition to 8.99 and 5.87 % for lea count strength product, in first and second seasons, respectively.

The minimum upper half mean length (32.43 and 32.36 mm), length uniformity index (84.25 and 84.79 %), fiber bundle strength (45.07 and 44.93 g/tex), fiber elongation (7.223 and 7.417 %), micronaire value (4.007 and 3.996), fiber yellowness degree (8.505 and 8.675) and lea count strength product (2229.3 and 2295.1) in addition to the maximum fiber brightness degree (78.00 and 79.42 %), yarn unevenness/100 m (13.16 and 12.60 %) and No. of neps/100 m (143.31 and 137.96) in both seasons respectively were recorded from Giza 94 variety.

The superiority ratios between Giza 94 variety and Giza 97 variety was 12.04 and 11.12 % for fiber brightness degree; 40.45 and 26.76 % for yarn unevenness/100 m; in addition to 28.13 and 31.64 % for No. of neps/100 m in both seasons, respectively.

These results in good accordance with those reported by **Abdel-Khalik *et al.* (2017); Beheary *et al.* (2018); El-Gedwy *et al.* (2018); Ibrahim and El-Banna (2018); Abdel-Ghaffar *et al.* (2019); Kassambara *et al.* (2019); Ahmed *et al.* (2020 a); El-Gedwy *et al.* (2020) and Gadallah *et al.* (2020)** show that cotton varieties markedly varied for fiber and yarn quality measurements.

Effect of natural extracts and mineral fertilization rates

Application of seven studied natural extracts with mineral fertilization rates induced significantly differences in almost fiber and yarn quality measurements except fiber maturity, No. of un-length uniformity index and yarn unevenness/100 m were not significantly affected in the both seasons, as shown in **Tables 6 and 7**.

Cotton treated by 75 % A and foliar spray of compost tea with algae extracts significantly recorded the maximum mean values of upper half mean length (34.24 and 34.05 mm), fiber bundle strength (47.11 and 47.00 g/tex), fiber elongation (8.305 and 8.560 %), micronaire value (4.570 and 4.575), fiber brightness degree (76.21 and 77.60 %) and lea count strength product (2460.3 and 2473.6) in addition to recording the lowest fiber yellowness degree (8.307 and 8.391) and No. of neps/100 m (108.60 and 105.45) in both seasons respectively, followed by cotton treated with 75 % A and foliar spray of algae extract treatment. On the other hand, the minimum mean values of upper half mean length (31.91 and 32.01 mm), fiber bundle strength (44.62 and 44.64 g/tex), fiber elongation (6.795 and 6.930 %), micronaire value (3.700 and 3.790), fiber brightness degree (71.80 and 73.58 %) and lea count strength product (2201.0 and 2257.9) in as well as the highest fiber yellowness degree (9.840 and 9.938) and No. of neps/100 m (144.66 and 136.90) in both seasons respectively were recorded from cotton when received 50 % A and foliar spray of compost tea extract in both seasons, respectively.

The superiority ratios in 2019 season between application 75 % A and foliar spray of compost tea with algae extracts treatment and each of 100 % mineral fertilizer (A), 75 % A and foliar spray of compost tea extract, 75 % A and foliar spray of algae extract, 50 % A and foliar spray of compost tea extract, 50 % A and foliar spray of algae extract and 50 % A and foliar spray of compost tea with algae extracts were 3.48, 2.85, 0.79, 7.30, 5.58 and 4.77 % for upper half mean length; 3.27, 2.52, 1.44, 5.58, 4.92 and 4.46 % for fiber bundle strength; 8.99, 5.33, 1.47, 22.22, 19.84 and 16.64 % for fiber elongation percentage; 7.66, 6.03, 3.51, 23.51, 18.55 and 14.39 % for micronaire value; 3.87, 1.75, 1.17, 6.14, 5.47 and 4.64 % for fiber brightness degree in addition to 5.43, 3.08, 2.02, 11.78, 10.05 and 8.00 % for lea count strength product, respectively. The increase ratios in 2020 season were 3.15, 1.67, 0.59, 6.37, 5.61 and 4.80 % for upper half mean length; 2.98, 1.75, 0.30, 5.29, 4.86 and 4.21 % for fiber bundle strength; 11.31, 5.42, 2.70, 23.52, 20.56 and 17.18 % for fiber elongation percentage; 8.16, 7.65, 3.74, 20.71, 18.06 and 14.66 % for micronaire value; 2.97, 1.64, 0.81, 5.46, 4.94 and 4.43 % for fiber brightness degree in addition to 4.79, 3.08, 2.08, 9.55, 8.32 and 5.77 % for lea count strength product, when using the same treatments, respectively.

The decrease ratios in 2019 season between application 75 % A and foliar spray of compost tea with algae extracts treatment and each of 100 % mineral fertilizer (A), 75 % A and foliar spray of

compost tea extract, 75 % A and foliar spray of algae extract, 50 % A and foliar spray of compost tea extract, 50 % A and foliar spray of algae extract and 50 % A and foliar spray of compost tea with algae extracts were 13.33, 5.84, 3.05, 18.45, 15.41 and 14.25 % for fiber yellowness degree in addition to 22.37, 12.48, 5.11, 33.20, 27.03 and 22.15 % for No. of neps/100 m, respectively. The decrease ratios in 2020 season were 10.63, 6.65, 4.50, 18.44, 13.69 and 12.24 % for fiber yellowness degree in addition to 17.01, 9.23, 4.23, 29.82, 24.96 and 20.53 % for No. of neps/100 m, under the same treatments respectively.

The increase in upper half mean length, fiber bundle strength, fiber elongation, micronaire value, fiber brightness degree and lea count strength product as well as the decrease in fiber yellowness degree and No. of neps/100 m when using foliar spray of compost tea and algae extracts may be due to the role of algae extract in activating growth of plants due to contains high levels of organic matter, micro elements, vitamins and amino acids and also, rich in growth regulators such as auxins, cytokinin and gibberellins (**Table 3)** In addition to compost tea comprised of a large and diverse community of microbes, humic acids and other chemical nutrients such as carbon and nitrogen that support healthy plant growth **(Table 4).**

These results are in compatible with those found by **Khalil and Arafa (2013); Babu *et al.* (2015); Zewail and Ahmed (2015); Gencsoylu (2016); Salama *et al.* (2018); Sultana *et al.* (2018); Abd El-Gayed *et al.* (2019); Ahmed *et al.* (2020 b); Yanni *et al.* (2020) and Ahmed (2021).**

Interaction effect between Egyptian cotton varieties and natural extracts and mineral fertilization rates:

Mean values of fiber bundle strength, micronaire value, fiber brightness degree, fiber yellowness degree, lea count strength product and No. of neps/100 m were significantly differences by the interaction effect between Egyptian cotton varieties and natural extracts with mineral fertilization rates, while, mean values of upper half mean length, length uniformity index, fiber elongation %, fiber maturity and yarn unevenness/100 m were not significantly affected by the interaction during the 2019 and 2020 seasons, as shown in **Tables 6 and 7**.

Egyptian cotton variety of Giza 97 when received 75 % A and foliar spray of compost tea with algae extracts produced the highest mean values of fiber bundle strength (47.62 and 47.89 mm), micronaire value (4.750 and 4.690) and lea count strength product (2564.3 and 2536.4) as well as recorded the lowest mean values of No. of neps/100 m (95.75 and 92.45) in the first and second seasons, respectively. On the other hand, the minimum mean values of fiber bundle strength (43.98 and 43.73 mm), micronaire value (3.660 and 3.590) and lea count strength product (2104.3 and 2198.3) as well as recorded the greatest mean values of No. of neps/100 m (161.75 and 152.40) in the first and second seasons, respectively were obtained from Egyptian cotton variety of Giza 94 treated with 50 % A and foliar spray by compost tea extract.

The highest fiber brightness degree (80.55 and 81.63 %) and the lowest fiber yellowness degree (7.562 and 7.892) in the both seasons, respectively were obtained from Egyptian cotton variety of Giza 94 treated by 75 % A and foliar spray of compost tea with algae extracts. On the other hand, the lowest fiber brightness degree (67.55 and 69.62 %) and the highest fiber yellowness degree (10.436 and 10.523) in the both respective seasons were obtained from Egyptian cotton of Giza 97 when received 50 % A and foliar spray by compost tea extract.

These results are in compatible with those found by **Babu *et al.* (2015).**

Table 6. Effect of Egyptian cotton varieties, natural extracts with mineral fertilization rates and their interaction on upper half mean length (mm), length uniformity index (%), fiber bundle strength (g/tex), fiber elongation (%), micronaire value and fiber maturity during 2019 and 2020 seasons.

Trait		Upper half mean length (mm)		Length uniformity index (%)		Fiber bundle strength (g/tex)		Fiber elongation (%)		Micronaire value		Fiber maturity	
Treatment		2019	2020	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020
Egyptian cotton variety													
Giza 94		32.43	32.36	84.25	84.79	45.07	44.93	7.223	7.417	4.007	3.996	0.910	0.903
Giza 97		33.74	33.67	85.89	86.42	46.28	46.57	7.874	8.023	4.304	4.324	0.942	0.933
L.S.D. at 5%		**0.33**	**0.41**	**0.55**	**0.61**	**0.41**	**0.52**	**0.243**	**0.314**	**0.121**	**0.145**	**N.S.**	**N.S.**
Natural extracts and mineral fertilization rates													
A		33.09	33.01	85.66	85.71	45.62	45.64	7.620	7.690	4.245	4.230	0.918	0.909
B		33.29	33.49	85.82	86.19	45.95	46.19	7.885	8.120	4.310	4.250	0.931	0.925
C		33.97	33.85	86.02	86.53	46.44	46.86	8.185	8.335	4.415	4.410	0.938	0.931
D		34.24	34.05	86.31	86.96	47.11	47.00	8.305	8.560	4.570	4.575	0.951	0.939
E		31.91	32.01	83.62	84.17	44.62	44.64	6.795	6.930	3.700	3.790	0.903	0.897
F		32.43	32.24	83.89	84.67	44.90	44.82	6.930	7.100	3.855	3.875	0.915	0.905
G		32.68	32.49	84.19	85.02	45.10	45.10	7.120	7.305	3.995	3.990	0.926	0.921
L.S.D. at 5%		**0.62**	**0.77**	**N.S.**	**N.S.**	**0.77**	**0.97**	**0.455**	**0.587**	**0.226**	**0.271**	**N.S.**	**N.S.**
Interaction effect between Egyptian cotton varieties and natural extracts with mineral fertilization rates													
Giza 94	**A**	32.54	32.27	84.99	85.22	45.13	44.95	7.250	7.330	4.120	4.050	0.902	0.895
	B	32.59	32.87	85.12	85.41	45.32	45.49	7.460	7.810	4.110	4.120	0.911	0.912
	C	33.11	33.02	85.33	85.76	45.89	45.88	7.780	7.980	4.170	4.290	0.918	0.915
	D	33.45	33.11	85.63	86.15	46.59	46.11	7.890	8.190	4.390	4.460	0.935	0.921
	E	31.25	31.62	82.56	83.22	43.98	43.73	6.580	6.710	3.660	3.590	0.889	0.882
	F	31.98	31.75	82.89	83.59	44.15	44.02	6.710	6.880	3.720	3.670	0.901	0.891
	G	32.11	31.89	83.22	84.15	44.43	44.32	6.890	7.020	3.880	3.790	0.911	0.902
Giza 97	**A**	33.63	33.75	86.32	86.19	46.11	46.33	7.990	8.050	4.370	4.410	0.933	0.923
	B	33.98	34.11	86.52	86.96	46.58	46.88	8.310	8.430	4.510	4.380	0.951	0.937
	C	34.83	34.68	86.71	87.29	46.99	47.83	8.590	8.690	4.660	4.530	0.958	0.946
	D	35.02	34.98	86.99	87.76	47.62	47.89	8.720	8.930	4.750	4.690	0.967	0.956
	E	32.56	32.39	84.67	85.11	45.25	45.55	7.010	7.150	3.740	3.990	0.917	0.912
	F	32.88	32.72	84.89	85.74	45.65	45.62	7.150	7.320	3.990	4.080	0.928	0.919
	G	33.25	33.09	85.15	85.89	45.76	45.87	7.350	7.590	4.110	4.190	0.941	0.939
L.S.D. at 5%		**N.S.**	**N.S.**	**N.S.**	**N.S.**	**1.08**	**1.38**	**N.S.**	**N.S.**	**0.320**	**0.384**	**N.S.**	**N.S.**

Where, **A** = control (full dose of mineral fertilization rates with 60 kg N, 30 Kg P_2O_5 and 48 kg K_2O/fed), **B** = 75 % A and foliar spray of compost tea, **C** = 75 % A and foliar spray of algae extract, **D** = 75 % A and foliar spray of compost tea with algae extract, **E** = 50 % A and foliar spray of compost tea, **F** = 50 % A and foliar spray of algae extract and **G** = 50 % A and foliar spray of compost tea with algae extract.

Table 6. Effect of Egyptian cotton varieties, natural extracts with mineral fertilization rates and their interaction on fiber brightness degree (Rd %), fiber yellowness degree (+b), lea count strength product, yarn unevenness/100 m (c.v. %) and No. of neps/100 m during 2019 and 2020 seasons

Trait		Color attributes				Lea count strength product		Yarn unevenness/100 m (c.v. %)		No. of neps/100 m	
		Fiber brightness degree (Rd %)		Fiber yellowness degree (+b)							
Treatment		2019	2020	2019	2020	2019	2020	2019	2020	2019	2020
Egyptian cotton variety											
Giza 94		78.00	79.42	8.505	8.675	2229.3	2295.1	13.16	12.60	143.31	137.96
Giza 97		69.62	71.47	9.777	9.693	2429.8	2429.8	9.37	9.94	111.85	104.80
L.S.D. at 5%		**1.01**	**1.12**	**0.233**	**0.254**	**36.5**	**41.2**	**0.75**	**0.69**	**3.64**	**4.51**
Natural extracts and mineral fertilization rates											
A		73.37	75.36	9.414	9.283	2333.6	2360.6	11.49	11.64	132.89	123.39
B		74.90	76.35	8.792	8.949	2386.9	2399.6	11.04	10.77	122.15	115.18
C		75.33	76.98	8.560	8.769	2411.7	2423.2	10.60	10.30	114.15	109.91
D		76.21	77.60	8.307	8.391	2460.3	2473.6	10.28	10.06	108.60	105.45
E		71.80	73.58	9.840	9.938	2201.0	2257.9	11.95	12.24	144.66	136.90
F		72.26	73.95	9.587	9.540	2235.6	2283.7	11.83	12.10	137.95	131.77
G		72.83	74.31	9.491	9.418	2278.0	2338.7	11.67	11.80	132.66	127.10
L.S.D. at 5%		**1.89**	**2.10**	**0.436**	**0.475**	**68.3**	**77.1**	**N.S.**	**N.S.**	**6.81**	**8.44**
Interaction effect between Egyptian cotton varieties and natural extracts with mineral fertilization rates											
Giza 94	**A**	77.21	79.02	8.882	8.745	2215.5	2298.4	13.56	12.95	150.74	142.23
	B	79.25	80.55	8.051	8.532	2275.3	2325.7	12.87	11.97	137.57	132.78
	C	79.68	81.06	7.798	8.269	2298.7	2348.7	12.25	11.57	128.52	125.45
	D	80.55	81.63	7.562	7.892	2356.2	2410.7	11.98	11.24	121.45	118.45
	E	76.05	77.53	9.243	9.352	2104.3	2198.3	13.93	13.72	161.75	152.40
	F	76.41	77.89	9.014	9.054	2156.4	2207.7	13.81	13.57	154.36	148.97
	G	76.88	78.25	8.987	8.878	2198.6	2276.2	13.69	13.15	148.75	145.45
Giza 97	**A**	69.53	71.69	9.945	9.821	2451.6	2422.8	9.42	10.32	115.04	104.54
	B	70.55	72.15	9.532	9.365	2498.5	2473.5	9.21	9.57	106.72	97.57
	C	70.98	72.89	9.321	9.269	2524.7	2497.6	8.94	9.02	99.78	94.36
	D	71.87	73.57	9.051	8.889	2564.3	2536.4	8.57	8.88	95.75	92.45
	E	67.55	69.62	10.436	10.523	2297.6	2317.5	9.97	10.75	127.56	121.40
	F	68.10	70.01	10.159	10.025	2314.7	2359.7	9.84	10.62	121.54	114.56
	G	68.77	70.36	9.994	9.958	2357.3	2401.3	9.64	10.44	116.57	108.75
L.S.D. at 5%		**2.67**	**2.96**	**0.616**	**0.672**	**96.6**	**109.0**	**N.S.**	**N.S.**	**9.63**	**11.93**

Where, **A** = control (full dose of mineral fertilization rates with 60 kg N, 30 Kg P_2O_5 and 48 kg K_2O/fed), **B** = 75 % A and foliar spray of compost tea, **C** = 75 % A and foliar spray of algae extract, **D** = 75 % A and foliar spray of compost tea with algae extract, **E** = 50 % A and foliar spray of compost tea, **F** = 50 % A and foliar spray of algae extract and **G** = 50 % A and foliar spray of compost tea with algae extract.

Conclusion

Based on the previous results it could be concluded that, growing promising cotton variety of Giza 97 treated by 75 % A and foliar spray with the compost tea along with algae extract treatment produced the maximum seed cotton yield, lint cotton yield, fiber and yarn properties.

References

A. S. T. M. (2004). Standard atmosphere for conditioning and testing designation, (D 1776-04) In Annual Book of Standards, ASTM International, West Conshohocken, PA.

A. S. T. M. (1967). Standards on textile, (D-1578 & D-1907). Philadelphia, USA.

A. S. T. M. (1984). Standards on textile, (D-1445 & D-2256). Philadelphia, USA.

A. S. T. M. (1986). Standards on textile, (D-3818 & D-4605). Philadelphia, USA.

Abd El-Gayed, S. SH.; S. G. Gebaly and M. A. A. Ibrahim (2019). Effect of some bio-stimulates (azola, PGPR, and compost tea) on growth, yield and its components, fiber properties and leaves constituents of cotton plant. Egypt. J. of Appl. Sci., 34 (7): 142-151.

Abdel-Ghaffar, E. A. F.; G. Y. M. Hammam; A. A. A. El-Hosary; E. M. M. El-Gedwy and A. A. Hassan (2019). Influence of some commercial blends between the imported cotton and the upper Egyptian varieties on technological properties. Annals of Agric. Sci., Moshtohor, 57 (1): 31-38.

Abdel-Khalik, F. S.; E. M. Shoker; S. A. H. Allam; E. M. M. El-Gedwy and A. A. Hassan (2017). Production of low priced, medium and coarse yarns using rotor spinning system. Egypt. J. Appl. Sci., 32 (1): 11-24.

Ahmed, H. S. A. (2021). Effect of eco- friendly fertilizers on yield and fiber quality in Egyptian cotton. Middle East J. Appl. Sci., 11 (2): under press.

Ahmed, H. S. A.; M H. A. Hossein and W. M. B. Yehia (2020 a). Response of some Egyptian cotton varieties for biofertilizer and its effect on yield, yield components and fiber traits. Plant Archives, 20 (2): 9575-9583.

Ahmed, H. S. A.; M. H. A Hossein and H. S. A. El-Desoukey (2020 b). Effect of nano-fertilization and some bio-fertilizer on growth, yield and fiber quality of Egyptian cotton. Annals of Agric. Sci., Moshtohor, 58 (1): 35-44.

Babu, S.; N. Bidyarani; P. Chopra; D. Monga; R. Kumar, R. Prasanna; S. Kranthi and A. K. Saxena (2015). Evaluating microbe-plant interactions and varietal differences for enhancing biocontrol efficacy in root rot disease challenged cotton crop. Eur. J. Plant Path., 142 (2): 345-362.

Begum, M.; B. C. Bordoloi; D. D. Singha and N. J. Ojha (2018). Role of seaweed extract on growth, yield and quality of some Agricultural crops: A review. Agricultural Reviews, 1-6.

Beheary, M. G. I.; A. E. I. Ibrahim; A. A. El-Akhdar; M. E. EL-Bagoury and H. A. E. Hanan (2018). Relationships between fiber and yarn technological properties of some Egyptian cotton genotypes. J. Adv. Agric. Res. (Fac. Agric. Saba Basha), 23 (2): 302-315.

Eef, B.; D. Marlies; K. Van-Swam; A. Veen and L. Burger (2018). Identification of the seaweed biostimulant market (Phase 1): The North Sea farm foundation: AD Den Haag, The Netherlands.

El-Boukhari, M. E.; M. Barakate; Y. Bouhia and K. Lyamlouli (2020). Trends in seaweed extract based biostimulants: manufacturing process and beneficial effect on soil-plant systems. Plants, 9 (359): 1-23.

El-Gedwy, E. M. M.; A. E. M. Gadallah; E. Y. Abd-Elkawe; A. A. Hassan and R. M. Abdel-Twab (2020). Study on fiber and yarn quality of some varieties and Egyptian cotton promising crosses. Annals of Agric. Sci. Moshtohor, 58 (4): 895-904.

El-Gedwy, E. M. M.; A. E. M. Gadallh and R. M. Abdel-Twab (2018). Response of some Egyptian cotton cultivars to foliar spray by some microelements. Annals of Agric. Sci. Moshtohor, 56 (4): 965-974.

Freed, A. (1991). MSTATC microcomputer statistical program. Michigan State University, East Lansing, Michigan, USA.

Gadallah, A. E. M.; E. M. M. El-Gedwy and Y. Sh. Abd-Elrahman (2020). Fiber and yarn quality measurements in relation to short fiber content in some Egyptian cotton varieties. Annals of Agric. Sci. Moshtohor, 58 (4): 883-894.

Gencsoylu, I. (2016). Effect of seaweeds and organic foliar fertilizers on the cotton pests, predators, yield and fiber quality in cotton. J. Adnan Menderes Univ. Agric. Fac., 13 (2): 33-38.

Gomez, K. A. and A. A. Gomez (1984). Statistical procedures for agricultural research. 2nd, (ed). John Wiley and Sons, NY, USA.

Haas, D. and G. Défago (2005). Biological control of soil-borne pathogens by fluorescent pseudomonads-Nat. Rev. Microb.

Hequet, E. F.; B. Wyatt; N. Abidi and D. P. Thibodeaux (2006). Creation of a set of reference material for cotton fiber maturity measurements. Textile Res. J., 76 (7): 576- 586.

Ibrahim, I. A. E. and A. A. A. El-Banna (2018). Response of fiber quality to temperature degree and lint cotton grade in two long staple varieties. Alexandria Sci. Exch. J., 39, (3): 482-489.

Kassambara, E.M.; S. Sissoko; M. O. Diawara; N. Teme and A. A. Yattara (2019). **Planting date effect on yield and fiber properties in some cultivars and promising crosses of cotton (*Gossypium Hirsutum L.*) in Mali. J. Bioanal. Biostat., 2 (1): 1-7.**

Khalil, H. M. A. and A. S. Arafa (2013). Influence of rice straw and bio-organic fertilizers on cotton

fiber quality under saline soils. J. Agron., 12 (2): 86-92.

Mahdy, E. E.; A. Abo-Elwafa; G. H. Abd El-Zaher; M. A. Sayed and M. G. Hosein (2017). Tolerance of Egyptian cotton varieties (G. *barbadense*, L.) to late planting. Assiut J. Agric. Sci., 48 (3): 34-53.

Mahmoud, M. A.; A. A. El-Hendawy and M. Y. Awad (2016). Water productivity of some cotton varieties and yield under different irrigation methods. Assiut J. Agric. Sci., 47 (6-1): 203-216.

Rowell, D. L. (1995). Soil science methods and applications. Library of Congress Cataloging Publication Data. New York. NY 10158. USA.

Salama, A. M.; S. A. F. Hamoda and A. E. Ghoniem (2018). Enhancement of cotton plant performance by nutrients under salinity stress. Biosci. Res., 15 (1): 133-144.

Scheuerell, S. J. and W. F. Mahaffee (2002). Compost tea principals and prospects for plant disease control. Compost Sci. Util., 10 (4): 313-338.

Sultana, V.; S. Tariq; K. Hira; A. Tariq; J. Ara; R. M. Tariq and S. Ehteshamul-Haque (2018). Seaweed bio-fertilizer for the management of root rotting fungi and root knot nematodes affecting cotton crop. Pak. J. Bot., 50 (6): 2409-2412.

The Egyptian Cotton Gazette (2021). Alcotexa, 154.

Yanni, Y. G.; A. A. Elashmouny and A. Y. Elsadany (2020). Differential response of cotton growth, yield and fiber quality to foliar application of *Spirulina platensis* and urea fertilizer. Asian J. Adv. Agric. Res., 12(1): 29-40.

Zewail, R. M. Y. and H. S. A. Ahmed (2015). Effect of some biofertilizers (PGPR, biosoal and compost tea) on growth, yield, fiber quality and yarn properties of Egyptian cotton (promising hybrid 10229xG86). Annals of Agric. Sci. Moshtohor, 53 (2): 199-210.

المحصول وخواص الجودة للشعر والخيط لبعض أصناف القطن المصري وتأثرها ببعض المستخلصات الطبيعية بالتعاون مع الأسمدة المعدنية

*فادية صبري عبد الخالق طلبه، **صلاح عباس حسن علام، **السيد محمد حسن شكر، *عبد الباسط عبد الكريم حسان، **السعيد محمد محمود الجدوي**

*معهد بحوث القطن ـ مركز البحوث الزراعية ـ الجيزة ـ مصر.

**قسم المحاصيل ـ كلية الزراعة ـ جامعة بنها ـ مصر.

إجريت تجربة حقلية في محطة البحوث الزراعية بسخا (محافظة كفر الشيخ) . معهد بحوث القطن . مركز البحوث الزراعية . جيزة . مصر، خلال الموسمين 2019 و2020 لدراسة معدل أداء صنفان من القطن المصري جيزة 94 و جيزة 97 وتأثرهما بالرش الورقي بالمستخلصات الطبيعية مع الأسمدة المعدنية وكانت المعاملات كالتالي: كنترول 100 % من الأسمدة المعدنية (60 كجم ن + 30 كجم فو$_2$ أ$_5$ + 48 كجم بو $_2$ أ/فدان)، 75 % من الأسمدة المعدنية + الرش بمستخلص شاي الكمبوست، 75 % من الأسمدة المعدنية + الرش بمستخلص الطحالب، 75 % من الأسمدة المعدنية + الرش بمستخلص شاي الكمبوست والطحالب، 50 % من الأسمدة المعدنية + الرش بمستخلص شاي الكمبوست، 50 % من الأسمدة المعدنية + الرش بمستخلص الطحالب و 50 % من الأسمدة المعدنية + الرش بمستخلص شاي الكمبوست والطحالب في صفات النمو والمحصول ومكوناته وكذلك الصفات التكنولوجية للتيلة والخيط للقطن . وكان التصميم التجريبي المستخدم هو القطاعات الكاملة العشوائية في أربع مكررات.

نباتات صنف القطن المصري الجديد (جيزة 97) أعطت معنوياً أعلى متوسط قيم لصفات عدد الأفرع الثمرية/نبات، عدد اللوز المتفتح/نبات، وزن اللوزة (جم)، النسبة المئوية لتصافي الحليج (%)، محصول القطن الزهر/فدان (قنطار)، محصول القطن الشعر/فدان (قنطار)، طول أطول الشعيرات (مم)، دليل الإنتظامية في الطول (%)، متانة التيلة (جم/تكس)، النسبة المئوية للإستطالة (%)، قراءة الميكرونير، درجة الإصفرار ومتانة الشلة بالإضافة إلى أقل متوسط قيم لصفات أرتفاع النبات (سم)، ودرجة الإنعكاس، معامل إختلاف الخيط/100 م (%) وعدد العقد/100م خلال موسمي الدراسة.

أعلى متوسط قيم لصفات أرتفاع النبات (سم)، عدد الأفرع الثمرية/نبات، عدد اللوز المتفتح/نبات، وزن اللوزة (جم)، النسبة المئوية لتصافي الحليج (%)، محصول القطن الزهر/فدان (قنطار)، محصول القطن الشعر/فدان (قنطار)، طول أطول الشعيرات (مم)، متانة التيلة (جم/تكس)، النسبة المئوية للإستطالة (%)، قراءة الميكرونير، درجة الإنعكاس ومتانة الشلة بالإضافة إلى أقل متوسط قيم لصفتي ودرجة الإصفرار وعدد العقد/100م تم الحصول عليها من نباتات القطن المصري المعاملة بـ 75 % من الأسمدة المعدنية والمرشوشة بمستخلص شاي الكمبوست والطحالب تلتها معاملة نباتات القطن بـ 75 % من الأسمدة المعدنية والرش بمستخلص الطحالب خلال موسمي الدراسة.

نباتات القطن المصري صنف جيزة 97 والمعاملة بـ 75 % من الأسمدة المعدنية والرش بمستخلص شاي الكمبوست والطحالب سجلت أعلى متوسط قيم لصفات عدد الأفرع الثمرية/نبات، عدد اللوز المتفتح/نبات، وزن اللوزة (جم)، النسبة المئوية لتصافي الحليج (%)، محصول القطن الزهر/فدان (قنطار)، محصول القطن الشعر/فدان (قنطار)، متانة التيلة (جم/تكس)، قراءة الميكرونير ومتانة الشلة بالإضافة إلى أقل متوسط قيم لصفة عدد العقد/100م خلال موسمي التجربة.

توصي النتائج بزراعة صنف القطن المصري الجديد (جيزة 97) مع التسميد بمعدل 75 % من الأسمدة المعدنية والرش بمستخلص شاي الكمبوست والطحالب حيث أعطى أعلى محصول من القطن الزهر والشعر وتحسنت الصفات التكنولوجية للتيلة والخيط.