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Relationship between roller gin type and ginning efficiency of Egyptian cotton cultivar 'Giza 86'

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ABSTRACT

Attaining the highest cotton fibers quality during ginning process is the ultimate objective of the community of cotton field industry for both local uses and exportation, but the productivity of the three types of conventional roller gin stands used in ginning process still limited. Therefore, current investigation was carried out at Plant Production Department, The Faculty of Agriculture (Saba Basha), Alexandria University, Egypt, during 2016/2017 ginning season to investigate the relationships between two different types of roller gin stand, i.e., McCarthy single roller and Indian double roller on four seed cotton levels of Giza 86 cotton cultivar; namely, Good + ¼ (G + ¼), Good + ⅛ (G + ⅛), Good (G) and Good - ⅛ (G – ⅛), also, to estimate their effects on ginning efficiency, lint grade and fiber properties. The obtained results indicated that the McCarthy roller gin stand with using the seed cotton level; namely, (G + ¼); recorded the highest mean values of the most important ginning efficiency properties; i.e., gin stand capacity (kg lint/inch/hr.), lint percentage (%) and lint grade. The differences in fiber length parameters (Upper half mean length UHML] , length uniformity index [UI] and short fiber index [SFI]), fiber mechanical properties (fiber bundle strength and elongation percentage), micronaire value, yellowness degree (+b) and trash area (%) were not significantly ($p \geq 0.05$) affected due to the gin stand type effect. The highest seed cotton level (G + ¼), produced the best fiber quality characteristics.

***Keywords*:** Seed cotton level, Double and single roller gin, Fiber properties, long staple.

Introduction

Natural fibers of cotton used primarily as a raw material for textiles. Cotton strength, absorbency and capability to wash and dye make it the fiber king adaptable to a considerable variety of textile products. The Egyptian cotton, despite of the up and down of the cultivated area, will continue its leadership role as the best natural fiber of choice around the world (Ibrahim, 2010). It is a unique descended of cotton that is characterized by high quality; it gained worldwide reputation for the highest lint quality among the world cottons. Examining cotton in matured boll in the field reflects beautiful silky fibers - free - neps and trash. Likewise, hand picking and ginning result in maximum length which is ultimately desired, also after ginning, the consequence is attaining a lower fiber length with high neps content, which reduce its quality and value (El-Banna, 2013). Cotton is the main part of the global textile industry (Hanna, Dalla, 2017). Therefore, ultimate objective is to continue trying to improve yield and attaining higher fiber characters in order to face the increasing human consumption and the continuous competition of man – made fibers. It is known that conducting of ginning in Egypt is 100% using roller type McCarthy single roller gin (El-Banna, 2009)

Ginning is the first important process, to which cotton is subjected on its way from the field to the textile mill, before it's spun into yarn and converted into fabrics. The gin stand is the heart of the ginning plant (Wright and Moore, 1977). Roller ginning produces a superior fiber with fewer raw-fiber neps and less fiber breakage. Roller ginned fiber, also, has excellent spinning potential. Roller gins are used primarily for ginning extra long staple cotton (Baker and Griffin, 1984). The roller gin uses a laminated canvas/rubber roller with a fixed and a reciprocating knife, to pinch and pull fibers from the seed (Alberson and Stredonsky, 1964). Roller ginned cotton, generally, has more dust, longer mean length, less short fiber and fewer neps than saw ginned cotton (Cocke *et al*., 1977a and b). Saw ginning is a more efficient method for short staple, fuzzy seed cultivars than roller ginning. The increased opening action of saw ginning allows less trash to be retained, but increases short fiber content and neps (Kveton, 1986).

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The roller ginning of cotton is defined as the mechanical separation process of cotton fibers from their seeds by means of one or more rollers. Staple length, uniformity and HVI color grade were better when using the roller gin stands. Roller ginning improved fiber length, length uniformity, and nep count, when compared to saw ginning (Hughs and Lalor, 1990). Likewise, roller ginning upland cotton, when compared to saw ginning, produced upland fiber that was more than one staple length longer, had fewer short fiber and neps and higher turn-out (Armijo and Gillum, 2007). Armijo and Gillum (2010) found that the grade, length and value of fibers derived from the roller gin stands were better than those from the saw gin stands. Nevertheless, there are, presently, three types of conventional roller gin stands being used in Egypt as single roller (McCarthy), single roller (Turkish) and double roller (Indian).Their productivity reaching to 1 cantar/hour of lint cotton at the best conditions. The better grades had longer fibers, more mature fiber, higher fiber bundle strength and less short fiber content (Ibrahim and El-Banna, 2018). On the other hand, in Egypt, cultivated cotton varieties are long (LS) Giza 86, Giza 90, Giza 94, Giza 95 and Giza 97 and extra-long staple (ELS) Giza 45, Giza 88, Giza 87, Giza 92, Giza 93 and Giza 96 cottons, so that it must be ginned by the roller gin stands. Nevertheless, the gin stand capacity and lint grades are more affected by the roller gin types, and seed cotton levels being under ginning. Recently, in Egypt, the ginning companies used different types of roller gin stands.

The present research was conducted aiming to study the effect of the roller gin type and seed cotton level on ginning efficiency, lint grades and fiber properties of the Egyptian cotton variety, Giza 86.

Material and Methods

Four seed cotton levels; namely, Good + ¼ (G + ¼), Good + ⅛ (G + ⅛), Good (G) and Good - ⅛ (G – ⅛) belonging to Giza 86 in the ginning season (2016/2017), it is the long staple Egyptian cotton variety were used in this work (Long Staple varieties group whose staple length ranges between 1 ¼ and 1 $^{3}/_{8}$ inch) and the pedigree and origin of cotton Giza 86 (Giza 75 x Giza 81). A bulk sample of about 18 Kg of each seed cotton level was thoroughly mixed and checked or reclassified by a committee of three expert classers belong to the Cotton Arbitration for Testing General Organization (C.A.T.G.O.), in the gin plant. The studied samples were attained from the Arabia ginning Company, Damanhour, of the commercial cotton received from Abo El-Matameer region, El-Behaira Governorate, during 2016 season. The bulk sample of each seed-cotton level was divided into six sub- samples, (3 kilograms each). The studied sub-samples were ginned using the two kinds of roller gins; i.e., the conventional single roller gin (SR) a roll covered with natural leather (McCarthy roller gin) and the double roller gin (DR) a roll covered with the chrome composite leather-clad (CCLC) with the adjustments required for the each grade in the same gin plant.

Studied characteristics

1. Ginning efficiency parameters*:*

These parameters were calculated according to the following equations, proposed by **Chapman and Stedronsky (1959)**:

1.1. Gin stand capacity (G.S.C.): as the lint weight (kg) per inch per hour, as follows:

$$\text{Gin stand capacity (G.S.C)} = \frac{60 \times \text{weight of ginned lint (kg)}}{\text{Time (min)} \times \text{Length of roller (inch)}} = \text{(kg lint /inch/hr)}$$

(Length of roller = 40 inch of the McCarthy roller gin stand)

(Length of roller = (40×2) inch of the Indian double roller gin stand)

1.2. Ginning time (G.T.): was determined according the following equation:

$$\text{Ginning time (G.T.)} = \frac{\text{Ginning time (minute)} \times 157.5}{\text{Seed-cotton weight (Kg)} \times 60} = \text{(hr. / cantar)}$$

(1 metric seed cotton cantar = 157.5 kilograms)

$$\text{Lint percentage (L.P.)} = \frac{\text{Lint cotton weight (kg)}}{\text{Seed cotton weight (kg)}} = \times 100 = (\%)$$

1.3. Lint percentage (%): as a percentage, and determined according the following equation:
1.4. Lint grade: was determined by a three export classers, at (CATGO), Alexandria.

For statistical analysis, the grades were converted to code numbers according to Sallouma (1970), as shown in the following Table (1):

Table 1: Lint cotton grades, their abbreviation and their codes.

Grade	Abbreviation	Code
Extra	Extra	41
Fully good/Extra	FG/Extra	37
Fully good	FG	33
Good/fully good	G/FG	29
Good	G	25
Fully good fair/good	FGF/G	21
Fully good fair	FGF	17
Good fair/fully good fair	GF/FGF	13
Good fair	GF	9
Fully fair/good fair	FF/GF	5
Fully fair	FF	1

Each $^{1}/_{8}$ grade is represented by one mark.

3. Fiber properties as determined by H.V.I. instrument:

Representative sample of lint cotton (200 grams) was drawn for determining the fiber properties using the High Volume Instrument (HVI) Spectrum II system at the Laboratories of Cotton Arbitration for Testing General Organization (CATGO), Alexandria, Egypt.

All samples were opened and left for 24 hours at least under the standard conditions of 65% ± 2% relative humidity and 20 ± 2°C temperature before being tested, and following properties were determined:

3.1. Fiber upper half mean length (UHML; mm.).
3.2. Length uniformity index (%).
3.3. Short fiber index (%).
3.4. Fiber bundle strength (g/tex).
3.5. Fiber elongation (%).
3.6. Micronaire value.
3.7. Maturity index (%).
3.8. Fiber brightness or reflectance degree (Rd %).
3.9. Chroma or degree of yellowness (+b).
3.10. Trash area (%).
3.11. Trash count.

4. Statistical procedures

This investigation was conducted in a completely randomized design with three replicates and analyzed as a factorial experiment according the procedure of Snedecor and Cochran (1967). The data was computed using the CoStat 6.311 (1998-2005) as statistical program, to test differences among studied mean values of treatments the least significant difference (L.S.D.) at 0.05 level of probability was used.

Results and Discussion

1. Ginning efficiency parameters:

Results attained revealed that the studied ginning efficiency parameters, i. e. gin stand capacity, ginning time, Lint percentage (%) and lint grade code for the cotton cultivar Giza 86 in the studied ginning season (2016/2017) are shown in Tables (2 & 3). Results presented in Table (2) reveal that ginning efficiency parameters, i. e. gin stand capacity(G.S.C.), ginning time(G.T.) and Lint percentage (%) of Giza 86 cotton variety were significantly ($p \leq 0.05$) affected by the gin stand types. The highest mean value of G.S.C. (0.98 kg lint / inch / hr) was reached due to using the McCarthy

single roller gin stand. While, the lowest mean value of the same trait (0.40 kg lint / inch / hr.) was attainted from the Indian double roller gin stand. These results could be attributed to method of feeding seed-cotton for ginning zone in the McCarthy roller gin stand which could help the arrival of more seed cotton may enhance separate more cotton fibers from cotton seeds at the same time. These results were not in parallel with the findings of Ibrahim, (2010).

On the other hand, similar results, more or less, were obtained by Gurdeep and Lyer (2004), who reported that ginning efficiency, primarily, depends upon the surface speed of the roller and number of working strokes on the moving knife. While the operation of these rollers in the ginning machines, the rate of ginning goes on declining when the roller diameter is reduced. Gin plants, nowadays, are looking for every opportunity to improve the bottom line by increasing capacity and efficiency while preserving fiber quality. The lowest ginning time per cantar (1.29 hr/cantar) was recorded by using the McCarthy single roller gin stand, and the highest mean value of the same character (1.53 hr/cantar) was given by using the double roller Indian gin stand. In this connection, the gained results were in agreement, more or less, with those of Valco and Ashley (2008), who mentioned that one key factor for increasing overall ginning efficiency is to decrease the time required to gin a bale. As for the main effect of gin stand type, the highest mean value (31.79 %) of lint percentage was possessed by the McCarthy single roller gin stand. Meanwhile, the lowest mean value of the same trait (31.01 %) was gained by double roller Indian gin stand. These results are in disagreement with those obtained by Patil and Arude (2014), who concluded that double roller ginning technology had a higher ginning out-turn of fiber compared with other ginning methods.

Similar results were obtained by Armijo and Gillum (2005), who concluded that ginning rate, was affected by the design of the stationary knife and variety. For the main effect of seed cotton level, it was obvious that there was a direct proportional relationship between seed cotton level and the given trait. As the seed cotton levels decreased, the gin stands capacity decreases and *vise versa*. The highest gin stand capacity (0.77 kg lint/inch/hr) was recorded from the highest seed-cotton levels (G + ¼).On the other hand, the lowest mean values of the same character (0.63 and 0.64 kg lint/inch/hr) were obtained from the lowest seed cotton levels (G - ⅛) and Good), respectively. These results could be explained on the basis that the high seed cotton level contained a high percentage of healthy fluffy locks and a low percentage of dust, trash and infected locks and *vise versa*.

These results are in accordance with those obtained by Frig (2002); Abdel-Aal (2006); Ibrahim (2010), who noticed that the gin stand capacity was, significantly, affected by the seed cotton level. With regard to the ginning time, the lowest seed cotton level (G - ⅛) recorded the highest mean value of ginning time per cantar (1.54 hr/cantar) compared to the other studied seed cotton levels. These results might be taken place due to the fluffy untwisted locks of the high level, compared with the compact locks and high trash content in the low seed cotton level. In this connection, similar results, more or less, were obtained by Batisha, Eman (2005) and Solieman (2016), who found that seed cotton level affecting the ginning time. In terms of the main effect of seed cotton levels, data presented in the same Table revealed that the Lint percentage was significantly ($p \leq 0.05$) affected by seed cotton levels. It is obvious that the best lint percentage (32.11%) was recorded owing to use the highest seed cotton level, (Good + ¼; G + ¼). It could be concluded that the lint percentage (%), correspondingly, decreased as the seed-cotton level decreased.

In this connection, Abdel-Aal (2006) and Solieman (2016) reported that the ginning out-turn (%), correspondingly, decreased as the seed cotton level decreased. Tables (2 & 3), cleared the significant interaction between gin stand type and seed cotton level (A × B), for two ginning efficiency parameters. From these tables it could be noticed that the best mean values of the most importance ginning efficiency parameters i.e., gin stand capacity (1.06 and 1.05 kg/inch/hr) and lowest ginning time (1.21 and 1.19 hr./cantar) were reached by the highest seed cotton levels (G + ¼) and (G + ⅛), respectively, when ginned by the McCarthy gin stand, as shown in Table (3). Generally, the highest gin stand capacity kg lint/inch/hr was considered a resultant of the highest seed cotton level and the lowest ginning time. As for lint grade code: Concerning the main effect of gin stand type, the obtained results indicated that the gin stand type had a highly significant ($p \leq 0.01$) effect on lint grade code, as given in Table (2). The lint grade code was significantly, increased because of using the Indian double roller gin stand and the McCarthy gin types. These results may be caused due to the double seed grid in the Indian double roller gin stand, which separated the most trash contents

from seed cotton before ginning. It could be noticed that the best lint grade code (27.67) was obtained from ginning of the highest seed cotton level, (Good + ¼). Generally, it could be summarized that lint grade was considerably decreased by decreasing the seed cotton level.

Table 2: Mean values of the ginning efficiency parameters of Giza 86 cotton variety as affected by the gin stand types and seed cotton levels during ginning season (2016/2017).

Characters / Treatments	Gin stand capacity (kg lint/inch/hr.)	Ginning time (hr./cantar)	Lint percentage (%)	Lint grade code
Gin stand types (A)				
McCarthy (SR)	0.98 [a]	1.29 [b]	31.79 [a]	25.83 [b]
Indian (DR)	0.40 [b]	1.53 [a]	31.01 [b]	26.38 [a]
L.S.D. 0.05	**0.023**	**0.035**	**0.304**	**0.177**
Seed cotton levels (B)				
G+¼	0.77 [a]	1.25 [d]	32.11 [a]	27.67 [a]
G+⅛	0.72 [b]	1.37 [c]	31.32 [b]	26.42 [b]
G	0.64 [c]	1.47 [b]	30.35 [c]	25.92 [c]
G-⅛	0.63 [c]	1.54 [a]	31.83 [a]	24.42 [d]
L.S.D. 0.05	**0.033**	**0.050**	**0.429**	**0.249**
Interaction				
A × B	**	**	**ns**	*

Means designated by the same letter within each column are not significantly different
*Significant at 0.05 level of probability.
**Significant at 0.01 level of probability.
ns.: Not significant.
SR: Single roller gin.
DR: Double roller gin.

Table 3: The Interaction between gin stand types and seed-cotton levels (A × B) for the ginning efficiency parameters of Giza 86 during ginning season (2016/2017).

Variables		Gin stand capacity (kg lint/inch/hr)	Ginning time (hr/cantar)	Lint grade code
Gin stand types (A)	**Seed cotton levels (B)**			
McCarthy (SR)	**G+¼**	1.06	1.21	27.50
	G+⅛	1.05	1.19	26.00
	G	0.91	1.33	25.83
	G-⅛	0.89	1.42	24.00
Indian (DR)	**G+¼**	0.48	1.29	27.83
	G+⅛	0.39	1.54	26.83
	G	0.37	1.61	26.00
	G-⅛	0.36	1.66	24.83
L.S.D.0.05		**0.046**	**0.071**	**0.353**

SR: Single roller gin.
DR: Double roller gin

Looking forward to Table (2) it is obvious that the interaction between the two studied factors, i.e. gin stand type and seed cotton level (A × B) was significant for lint grade code. Mean values of the lint grade code are presented in Table (3). Using the double roller Indian gin stand with the highest seed cotton level (G + ¼) recorded the highest mean value of lint grade (27.83), while the lowest mean value of the same trait (24.00) was obtained using the McCarthy single roller gin stand with the lowest seed cotton level (G–⅛). It is worthy to mention that the greatest mean value for lint grade resulted from the highest seed-cotton level (G + ¼) ginned at any of the two gin stand types. In this research, the gin stand capacity (G.S.C.) of Giza 86 cotton variety for the McCarthy gin stand was higher (0.98 kg lint / inch / hr.) than for Indian double roller gin stand (0.40 kg lint / inch / hr.), as shown in Table (2). So, it could be concluded that the gin stand capacity (G.S.C.) and lint grade gradually increased by the increasing of seed-cotton level and followed its same trend.

3. Fiber properties tested by H.V.I. instrument:

In general, the results attained in Table (4), indicated that the effect of the gin stand type was highly significant ($p \leq 0.01$) for maturity index, fiber reflectance degree (Rd %) and the differences in trash count. Meanwhile, the differences in fiber length parameters (upper half mean length (UHML), length uniformity index (UI) and short fiber index (SFI)), fiber mechanical properties (fiber bundle strength and elongation percentage), micronaire value, yellowness degree (+b) and trash area (%) were insignificantly affected due to the gin stand type.

With regard to the main effect of seed cotton level, data in the same Table (3), showed that this factor had a significant effect on fiber properties tested by H.V.I. instrument of 'Giza 86' cotton variety. Respecting Table (4), it could be noticed that the first order interaction (A × B) of the two studied factors, gin stand type and seed cotton level was significant for upper half mean length (UHML), fiber bundle strength, maturity index and trash count. While, the remain interactions (7 case) were not significant, especially for HVI color attributes (fiber reflectance degree (Rd %) and yellowness degree (+b), indicating that each factor may be acted as an independent factor.

The highest mean values of the maturity index (87.92 %) was given using the McCarthy single roller gin stand, whereas, the highest mean value of the fiber reflectance degree (Rd %; 66.25 %), and the lowest mean value of trash count (92.33) were recorded using the double roller Indian gin stand, respectively, as shown in Table (4). These results are in agreement with those obtained by Patil and Arude (2014) who concluded that double roller ginning technology is a gentle ginning and hence less or no damage to fibers and seed, better fiber parameters could be taken place, but higher length of fiber compared with other ginning methods, retaining of natural luster and moisture, lower nep content.

Also, Nomeir *et al.* (1990) mentioned that the important physical properties of cotton fiber such as fiber length, fineness, maturity and strength vary considerably depending on the variety of cotton. In addition, Etman, Hanan (2010) indicated that the physical properties of the cotton fiber, significantly, differed depend on the genetic structure of the used cotton cultivar. The highest mean values (32.37 mm, 38.03 g/tex and 70.98 %) of upper half mean length (UHML), fiber bundle strength and reflectance degree (Rd %), and the desirable features mean values (6.02 %, 4.51, 0.75 and 63.67) of short fiber index (SFI), micronaire value, trash area (%) and trash count were attained by using the highest seed cotton level, Good + ¼ (G + ¼), respectively, as shown in Table (4). These results were in harmony with those obtained by Abdel-Aal (2006); Solieman (2016) who found affected the fiber bundle strength related to the grade and the better seed cotton grades had longer fibers.

Regarding upper half mean length (UHML), the highest mean value (32.43 mm.) was reached by the highest seed cotton level (G + ¼) when ginned by the McCarthy gin stand, as shown in Table (5). On the other hand, the lowest mean value of the same trait (29.94 mm.) was recorded from the lowest seed cotton level (G) ginned at the double roller Indian gin stand. The highest seed cotton level (G + ¼) ginned by the double roller Indian gin stand recorded the highest mean value of fiber bundle strength (39.23 g/tex) and the lowest mean value of trash count (59.67), while the lowest mean value of the fiber bundle strength (34.63 g/tex) and the highest mean value of trash count (214.67), were obtained by the lowest seed cotton level (G – ⅛) ginned at the McCarthy gin stand, as shown in Table (5). As for length uniformity index (UI) and fiber maturity index (%), the highest mean values (86.37% and 88 %) were recorded using the highest seed cotton level(Good + ⅛), respectively. While, the seed cotton level, Good (G) recorded the highest mean values (6.38 % and 11.33) for fiber elongation (%) and degree of yellowness (+b), respectively, as shown in Table (4). These results are in agreement with the findings of Ibrahim (2010) who stated that high content of mature locks and fibers and low content of trash (non-lint content) and short fibers of the highest seed cotton levels

For the seed cotton level effect, it was obvious that, when the seed-cotton level increased, fiber properties would improve and *vise versa*. These results may be due to increasing the mature fiber in the higher grades which contain the healthy lucks and vice versa. These results are in agreement with the findings of Estur and Gergely (2010) they mentioned that the choice of ginning technology is an important factor of performance and also has an impact on lint quality, and, as roller ginning is less damaging to the fiber properties than saw ginning. As for fiber maturity index (%), the highest mean value (88.00 %) was recorded by the seed cotton levels (G + ⅛), (G) and (G – ⅛) when

Table 4: Mean values of the H.V.I fiber properties of Giza 86 as affected by the gin stand types and seed cotton levels during ginning season (2016/2017)

Characters / Treatments	UHML (mm)	Uniformity index (%)	Short fiber index (%)	Fiber strength (g/tex)	Fiber elongation (%)	Maturity index (%)	Micronaire value	Rd (%)	+ b	Trash area (%)	Trash count
Gin stand types (A)											
McCarthy (SR)	31.37^{a}	85.73^{a}	6.42^{a}	36.48^{a}	6.05^{a}	87.92^{a}	4.74^{a}	65.02^{b}	10.62^{a}	1.79^{a}	138.92^{a}
Indian (DR)	31.55^{a}	85.16^{a}	6.53^{a}	36.80^{a}	6.28^{a}	87.58^{b}	4.70^{a}	66.25^{a}	10.53^{a}	1.39^{a}	92.33^{b}
L.S.D. $_{0.05}$	**ns**	**ns**	**ns**	**ns**	**ns**	**0.249**	**ns**	**1.174**	**ns**	**ns**	**13.835**
Seed cotton levels (B)											
G +¼	32.37^{a}	85.32^{b}	6.02^{c}	38.03^{a}	5.98^{b}	87.50^{b}	4.51^{c}	70.98^{a}	10.30^{b}	0.75^{c}	63.67^{c}
G +⅛	31.88^{ab}	86.37^{a}	6.13^{c}	37.17^{ab}	5.97^{b}	88.00^{a}	4.88^{a}	66.45^{b}	10.25^{b}	2.30^{a}	123.67^{b}
G	30.48^{c}	85.27^{b}	6.58^{b}	36.20^{bc}	6.38^{a}	87.50^{b}	4.69^{b}	67.85^{b}	11.33^{a}	1.21^{bc}	105.00^{b}
G -⅛	31.09^{bc}	84.82^{b}	7.17^{a}	35.15^{c}	6.32^{ab}	88.00^{a}	4.82^{ab}	57.25^{c}	10.40^{b}	2.09^{ab}	170.17^{a}
L.S.D. $_{0.05}$	**0.829**	**0.873**	**0.398**	**1.765**	**0.371**	**0.353**	**0.137**	**1.661**	**0.529**	**0.999**	**19.565**
Interaction											
A × B	*	**ns**	**ns**	*	**ns**	*	**ns**	**ns**	**ns**	**ns**	**

Means designated by the same letter within each column are not significantly different
* : Significant at 0.05 level of probability.
**: Significant at 0.01 level of probability.
ns: Not significant.
SR: Single roller gin.
DR: Double roller gin.
UHML: Upper Half Mean Length.

ginned by the McCarthy gin stand and the seed cotton levels (G + ⅛) and (G – ⅛) when ginned by the double roller Indian gin stand, respectively. Whereas, the lowest mean value of the same trait (87.00 %) was attained from the lowest seed-cotton level (G), ginned at the double roller Indian gin stand are illustrated in Table (5).

Table 5: The interaction between gin stand types and seed cotton levels (A × B) for the H.V.I fiber properties of Giza 86 during 2016/2017 ginning season.

Variables		UHML (mm)	Fiber strength (g/tex)	Maturity index (%)	Trash count
Gin stand types (A)	Seed-cotton levels (B)				
McCarthy (SR)	G+¼	32.43	36.83	87.67	67.67
	G+⅛	31.60	36.77	88.00	135.00
	G	31.01	37.67	88.00	138.33
	G-⅛	30.42	34.63	88.00	214.67
Indian (DR)	G+¼	32.32	39.23	87.33	59.67
	G+⅛	32.17	37.57	88.00	112.33
	G	29.94	34.73	87.00	71.67
	G-⅛	31.76	35.67	88.00	125.67
L.S.D. 0.05		**1.173**	**2.496**	**0.499**	**27.669**

SR: Single roller gin.
DR: Double roller gin.
UHML: Upper Half Mean Length.

Conclusion

Generally, it could be concluded that the Ginning efficiency of the same studied cotton variety Giza 86, was found to be more affected with gin stand type as well as the seed cotton levels. The gin stand type and seed-cotton level were the most contributors to gin stand capacity (G.S.C.) and ginning time. As the seed-cotton levels decreased, the gin stand capacity decreased and *vise versa*. The seed cotton level had an effect on the most fiber properties and lint cotton grade.

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