SUMMARY

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The present study was undertaken to investigate effects and reliability of fiber length distribution on some other variables and on yarn quality and yarn appearance.

Materials used in this study comprised seven commercial varieties. Three of these varieties, belong to the extra–long staple category, i.e. Giza 45, Giza 70 and Giza 88 and the other four ones belong to the long staple class, i.e. Giza 86, Giza 89, Giza 80 and Giza 83. Every variety was represented by three lint cotton grades these were Fully Good (FG), Good (G) and Fully Good Fair (FGF).

Studied fiber properties included the fiber length expressed by each of 2.5 % , 50 % span lengths, uniformity ratio and short fiber content. Fiber strength at (1/8'' gauge) and elongation percent measured by Stelometer instroment, fiber stiffness and toughness were derived.

Micronarie value, Maturity percentage and hair weight were measured by Fineness & Maturity Tester (FMT). All of these properties were tested according to ***ASTM - Designations*** .

Cotton samples were spun into " 60_S" carded yarn using a twist factor "3.6"; Yarn strength was determined by the Statimate L.L Automatic Tensile Tester and yarn appearance grades were converted into a numerical index.

Data obtained were analysed using statistical Analysis System (SAS). Simple correlation coefficients, were calculated. Stepwise regression analysis was applied to study the relationship between fiber length parameters and other fiber with yarn properties as well as their relative contribution to yarn strength and yarn appearance. The results obtained in this study could be summarized in the following points:

(I) -The analysis of variance could be cited in :

1 - Fiber length parameters differed from one variety to another within the same lint grade and from one grade to another of the same variety.

2- The extra-long staple varieties were characterized by higher 2.5%, 50% span lengths and lower short fiber content than long staple varieties. No striking differences in uniformity ratio were detected.

3- The higher the lint grade the higher were the 2.5%, 50% span lengths and the uniformity ratio and the lower the short fiber content .

4- Variation in short fiber content among varieties and also among grades were more frequently than in other parameters.

5- Generally, variation of length parameters was resultant from both variety and lint grade whereas the effect of lint grade was the preponderant .

(II) -Simple correlation coefficients between fiber length parameters and other variables indicate the following:

1-The 2.5% span length was found to be closely and positively associated with fiber strength, stiffness, toughness, yarn strength and yarn appearance grade, whereas correlations were strong and negative with short fiber content, fiber elongation and hair weight.

2 - Positive and highly significant correlations were obtained between the 50% span length and fiber strength, stiffness toughness, yarn strength and yarn appearance. Nevertheless, the correlations with fiber elongation and short fiber content were strong and negative. Moreover, the 2.5% and 50% span length did not show obvious relationship with the micronaire value and the maturity percentage.

3 -The correlations between uniformity ratio and fiber strength, micronaire value, % maturity, hair weight, yarn strength and yarn appearance were positively and fairly strong. On the other hand, there was negative and highly significant relationship with short fiber content and fiber elongation, but no consistent relation was found between uniformity ratio and both of fiber stiffness and toughness.

4 - Short fiber content showed negative and significant correlations with fiber toughness and the mirconaire value, also correlation coefficients were negative but highly significant with fiber strength, stiffness, % maturity, yarn strength and appearance. The relationship was also negative

and insignificant with hair weight. On the other hand, fiber elongation, alone showed positive and high significantly correlation with short fiber content.

(III)-Stepwise regression results indicate the following :

1- For yarn strength, fiber strength ranked first and was followed in order by 2.5% span length then came micronaire value, short fiber content, uniformity ratio and maturity percentage.

2- With regard to yarn appearance, the most effect was imposed by short fiber content, the next variable was the 2.5% span length followed by each of maturity percentage, micronaire value and uniformity ratio which were of minor contribution.

It could be seen clearly that, all fiber length parameters except 50% span length, had big share in the variability of both yarn strength and yarn appearance.

In conclusion, fiber length is a varietal characteristic affected highly by environmental factors and by conditions imposed by the lint grade. This character had strong relationship with the other fiber properties and has high relative contribution to variability of yarn strength and yarn appearance as well as many other yarn properties.