

Exploitation of the Statistical Method of Multi-Criteria Decision Making (Mcdm) to Rank Cotton in Estimating Yarn Evenness (Cv%)

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Abstract:

This investigation employs a Multi-Criteria Decision Making (MCDM) procedure to derive equation used in ranking the cotton materials regarding yarn evenness (CV %) based on three quality criteria of fiber properties being tensile, fineness and length properties. The weight or relative importance of each criterion is decided by Analytic Hierarchy Process (AHP). The study utilized three Egyptian cotton cultivars being Giza 90, Giza 95 and Giza 86 in addition to three imported cotton cultivars namely; Acala, Kemian and Medling from Sudan, China and Greece, respectively following the Long Staple category. Three yarn counts of 24's, 30's and 36's (Ne) with twist multiplier (4) were applied to produce carded ring yarns. The efficiency of the proposed equation was determined by running Spearman rank correlation coefficients between the yarn evenness (CV %) estimated by the proposed formula and actual yarn evenness (CV %) measured at counts 24's, 30's and 36's Ne. Results revealed that the Egyptian local cultivars were superior to the imported cultivars considering all tested fiber properties. According to the equation derived by AHP method, the power values indicated that the fiber strength, upper half mean length, uniformity index and short fiber index plays an important role in determining yarn evenness (CV %) while the fiber fineness and fiber elongation had low influence. It is obvious that Spearman rank correlation coefficient between the actual yarn evenness (CV %) and that calculated by Analytic Hierarchy Process (AHP) were positive and highly significant indicating the validity of the proposed equation to be applied for ranking cotton materials regarding yarn evenness (CV %).

Keywords:

Fiber Strength
Tensile Properties
Evenness
Fiber Elongation
(MCDM)

Paper received 19th October 2019, Accepted 17th October 2019, Published 1st of January 2020