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Mixing in Weaving Process to Achieve the Best Physiological Comfort Properties for Summer Shirt Fabrics

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Abstract:

Statement of the Problem: Focusing on blending raw materials in pre-spinning process, which made currently summer shirt fabrics don't achieve different forms of sufficient physiological comfort properties for the user, and thus an attempt to find new scientific and practical solutions away from stereotypical methods. The performance mechanisms of summer shirt fabrics in general are severely lack to evaluative experimental and analytical studies which enrich functional and aesthetic properties, in addition to economic properties. The scarcity of scientific and applied research deals with the effect of mixing in weaving process on different forms of physiological comfort properties of fabrics in general, despite distinctive characteristics for functional and aesthetic performance, and at lowest cost, which helps in economic popularity.

Research Significance: Achieving infinite diversity in producing new types of summer shirt fabrics by enriching with many functional and aesthetic properties of mono-color designs which achieve the needs of consumers and keeps pace with scientific progress in materials and implementation techniques. Clarifying relationship between the difference of weft yarn material type as one of production input elements, as well as structural weaves and their impact on functional and aesthetic performance of summer shirt fabrics, which contributes to opening new horizons for developing different forms of physiological comfort properties of fabrics in general. Reducing costs of producing summer shirt fabrics through a competitive local product with unique functional and aesthetic structures to enhance local production and achieve competitive capabilities against imported product.

Research Objectives : Developing new types of mono-color summer shirt fabrics achieves different forms of the best physiological comfort properties for the user using new materials and technologies, at low prices to expand marketing circle regionally and globally. Identifying changing technical dimensions due to the difference in some production input elements on different forms of physiological comfort properties of summer shirt fabrics to reach to the best material and the best weave structure. Comparison, evaluation, and analysis of different functional and aesthetic properties of summer shirt fabrics produced using mixing in weaving process to increase production economies of these types compared to traditional fabrics.

Research Delimitations: Produce (7) samples of mono-color summer shirt fabrics using different weft yarn materials: polyester DTY, polyacrylic, viscose (Vibrane), bamboo, lyocell (Tencel STD), modal, micromodel with same specifications, and use one warp of ring-combed cotton yarn 100% for all samples with plain weave 1/1, and (7) other samples with atlas-4 by using flexible rapier weaving loom.

Research Methodology: The research follows the analytical experimental method.

Experimental Work : Different types of mono-color summer shirt fabrics for (Men's, Women's) produced by mixing in weaving process using combed cotton ring yarn 100%, Ne. 60/2s (Z/S), with T.P.I 21 as warp yarns, and use (7) different artificial materials (regenerated, synthetic) for weft yarns: polyester (DTY), polyacrylic, viscose (Vibrane), bamboo, lyocell (Tencel STD), modal, micromodel Ne. 30/1s (Z) with T.P.I 20, carded compact spinning technique to produce (7) samples of mono-color summer shirt fabrics with plain weave 1/1, and (7) other samples with atlas-4 by using flexible rapier weaving loom. Then perform some preparatory operations on produced fabrics, which are: de-sizing, Scouring, full bleaching, semi-mercerization.

Summer Shirt Fabrics Testing: All laboratory tests were carried out on both produced fabrics in weft direction with standard laboratory atmosphere at (temperature 20°C ±2, relative humidity 65% ±2) in accordance to American standard specifications, which are: Fabric Tensile Strength (kg/mm2), Fabric Elongation Percentage (%), Fabric Crease Recovery (°), Fabric Thickness (mm), Fabric Air Permeability (cm3/cm2/S), Fabric Water Absorption Time (S), Fabric Weight (g/m2).

Results: Both types of summer shirt fabrics produced from polyacrylic weft yarns, as one of synthetic fibers, are better than both types of summer shirt fabrics produced from polyester DTY, in achieving different forms of physiological comfort properties. Both types of summer shirt fabrics produced from micromodel weft yarns as one of regenerated fibers are the best in achieving different forms of physiological comfort properties. Both types of summer shirt fabrics from lyocell (tensile STD) weft yarns as one of regenerated fibers are the least in achieving different forms of physiological comfort properties. Summer shirt fabrics with weave structure atlas-4 are better than fabrics with weave structure plain weave 1/1 in terms of high appearance, gloss, and smooth surface texture for synthetic and regenerated materials. Remaining yarns of different materials, and similar in specifications can be used in mixing in weaving process, which generally gives final product distinct functional and aesthetic properties, in addition to reducing cost and preserving environment. Summer shirt fabrics are closely related to humans daily for long hours in most seasons of year, to achieve the best different forms of physiological comfort properties for the user, in addition to aesthetic properties, they must be built on unique specifications, which are high air permeability, high ability to absorb moisture to reduce static charges, low weight to reduce the feeling of fatigue, with high resistance to penetration and absorption sunlight and increasing reflection to lowest level, as well as economic aspect.

Keywords:

Mixture Fabrics, Synthetic Materials, Regenerated Materials, Physiological Comfort, Summer Shirt Fabrics, Mono-Color Fabrics

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