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DESIGN CELLULOSIC FABRICS BLENDED WITH WOOL REALIZED WHERE THE PROPERTIES OF COMFORT

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ABSTRACT

There is no doubt that the sense of comfort during wearing clothing is one of the most important stages which must be completed to all stages of the clothing manufacturing.

That undoubtedly is the subject very tangles and plurality in the concept of comfort has remained one of the topics roiling scientists and researchers in the fields of textile design or quality or control the production of clothing. Cellulosic materials and woolen have many of the properties that achieve comfort when used in clothing.

The aim of this research is to Design fabrics using different blends of cellulosic and woolen materials and structures of various textiles. To get the fabric in which the properties of comfort achieved. A total of Nine woven fabrics were produced In the form of striped designs in Three kind of woven constructions were chosen namely, Plain 1/1, Twill 2/2 and Satin 4, each one were weaved using 100 % Flax yarns were used in warp direction (22yarn / cm), 28/1 Cotton. Three kind of weft blend were used, 28/1 Cotton 100 % Flax yarn, 100% Cotton 20/1 Cotton, 100%Wool 45/2 Cotton (25 pick/cm). The best results obtained showed that: -The maximum of crease recovery was (wool: cotton) for plain1/1. The plain weave was the highest value of fabric stiffness according to the fabric blend and weaving type .The minimum square meter was (wool: cotton: flax) for twill 2/2, this means it is the best sample to achieve the comfort of a lack weight. The maximum of fabric thermal isolation was (wool: cotton) for twill 2/2.The best productive samples According to the measured properties that achieve comfort were form Satin weave, followed by plain weave ,and the best sample was (wool: flax) for Satin4.

Keywords: Cellulosic Materials, Properties of Comfort, Woven Constructions, Wool.

I. INTRODUCTION

There is no doubt that the sense of comfort during wearing clothing is one of the most important stages which must be completed to all stages of the clothing manufacturing [1].

And the comfort of multidimensional issues both in the study and analysis has remained difficult to analyze the mechanisms associated with the achievement of physiological comfort for a particular person in a particular age group and in certain weather conditions through the wearer of clothing

That undoubtedly is the subject very tangles and plurality in the concept of comfort has remained one of the topics roiling scientists and researchers in the fields of textile design or quality or control the production of clothing [2, 3].

It differs property requirements depending on the type of end-use of the product studies have shown that there are elements overlap in the production of comfortable fabrics, which include (air permeability, warmth cycle or cold thermal conductivity or Prevent the absorption of moisture Prevent the absorption of moisture, and reduce shipments static formed and the texture and weight of fabric) and associated properties Comfort clothing closely linked to the type of raw material used in the manufacture of clothing[4].

Comfort is divided into :-(Psychological comfort- Physiological Comfort)

- Psychological comfort reflects the suitability of clothing for the person and for the same occasion that the person wearing the clothing of Waitangi discomfort Because of the psychological state and not physiological or the result of a defect in the clothing the same [5,6].
- Physiological Comfort is the subject of comfort various dimensions of the complex and multidimensional topics in both studied or analyzed remained of difficulty associated with achieving".

  "Physiological comfort" functionally essential goal must be pursued in private clothes especially including certain functional purposes [5]**.**
- Physiological comfort is divided into :-(Sensorial Comfort- Thermal Comfort)

  1)Sensorial Comfort is a sense of cloth handle of the cloth may cause tingling Sensitivity has caused severe This is in addition to the nature of the cloth itself and the extent of adhesion as a result of the body's inability to absorb sweat [5,6]**.**

  2) Thermal Comfort is the comfort resulting from moisture and heat exchange between the human body and its surrounding medium [5, 6].

  Body sensation stops cold temperature fabrics or fabrics on the ability to deliver heat from the body to the outside as well as from the outside to the body composition of this Textile structure of the cloth which is known as the dynamic of the body's heat loss through fabric construction [7]**.**

  The properties of absorption of moisture and water vapor features a highly regarded comfort link the ability of fibers or yarns or fabrics to absorb moisture.

  The properties of absorption of moisture go into determining the appropriateness of the cloth in terms of comfort when in use or not [5].
- Stretch Comfort is the comfort of not restricting clothing movements natural rights may be reasons for Feeling of kinetic comfort either impede the clothing of the movement or the inadequacy of the measured, and the necessary body freedom of movement within his clothes even feel comfortable, as the failure of clothes these requirements lead to pressure loads on the body [8, 5].

  It must be from natural fabrics and soft materials, crease recovery, easy washing and proper textile structures with regularly.

The structural textile of fabrics in charge of the first to achieve properties of the physical and mechanical fabrics, and installation of structural Textile is the sum of mutual relations between each of the strands of fiber, yarn and fabric, structural textile of fabrics which is the main influencing factor in the design of all textile products and therefore the product Textile design process is, in fact, constructivism process or structural and not merely decorative or color process [9].

Textile design features that builders modular design results from the interaction of a number of key factors in building a woven together, and tiger Fabric structure yarn count used for warp and wefts, as well as the number of each of the warp and weft unit of measurement. [10]

Cellulosic materials and woolen have many of the properties that achieve comfort when used in clothing such as...

- Woolen fabrics features such as (Crease Recovery – flexibility – Elongation - Elastic Recovery – absorption - warmth and Ease of configuration and tailoring) Not only wrong with wool deflation and flocculation.
- Cotton fabrics features such as (plasticity - flexibility - the ability configuration - softness - ability to absorb sweat and moisture - Easy Care)
- Flax fabrics features such as (softness - resistance to soiling - ability to absorb moisture) and wrong linen susceptibility to crease [11].

The aim of this research is to Design fabrics using different blends of cellulosic and woolen materials and structures of various textiles, to get the fabric in which the properties of comfort achieved**.**

II. MATERIALS AND EXPERIMENTAL METHODS

2.1 Fabrics Specifications

Table I shows the specification of the produced fabrics and weaving construction. 100 % Flax yarns were used in warp direction (22yarn / cm), 28/1 Cotton. Three kind of weft blend were used in the form of striped design in the direction of the weft. 1 cm width for each of the three kind of weft, 28/1 Cotton 100 % Flax yarn, 100% Cotton 20/1 Cotton, 100 % Wool 45/2 100 % Wool (25 pick/cm)

Table I: Fabric Specifications (Type of Warp Yarns is 100 % Flax)

No	Weft Blending	Weaving Structure
1	1Cm wool :1Cm flax	Plain 1/1
2	1Cm wool :1 Cm Cotton	
3	1Cm wool :1 Cm Cotton :1Cm flax	
4	1Cm wool :1Cm flax	Twill 2/2
5	1Cm wool :1 Cm Cotton	
6	1Cm wool :1 Cm Cotton :1Cm flax	
7	1Cm wool :1Cm flax	Satin 4
8	1Cm wool :1 Cm Cotton	
9	1Cm wool :1 Cm Cotton :1Cm flax	

2.2 Testing and Analysis

Laboratory tests on the produced samples were carried out at the standard conditions for textiles with an air temperature (20±2℃) and relative humidity of air (65 ± 5 %) according to the American Society of Testing Materials (ASTM). Tests applied to samples are:-

2.2.1- Fabric tensile strength (kg) and elongation (%) was determined according to ASTM standard test method **[**12]

2.2.2- Fabric Crease Recovery (Degree).

2.2.3- Fabric Thermal Isolation (Tog).

2.2.4- Fabric Stiffness (Mg .Cm).

2.2.5- Fabric Thickness test (Mm).

2.2.6- Fabric Square Meter Weight (G m).

2.2.7- Fabric Water Absorption (Second).

III. RESULTS AND DISCUSSION

The results of experiments tests carried out on the produced samples are shown in Table II. The results of experiments carried out to measure the properties of the samples produced are shown in Figs (1-10). And figure (11) shows Best sample in terms of the properties of comfort and sample the worst depending on the labs quality.

Figure (1) shows the relationship between fabric blend and weaving type and warp Tensile strength. It is shown that the amount of warp Tensile strength showed that the

Average of amount of warp Tensile strength showed Convergence between plain and Twill weave according to the fabric blend and weaving type, while Satin weave was the lowest.

The maximum of warp Tensile strength was (wool: cotton: flax) for plain1/1, while the minimum was (wool: 1flax) for Satin 4.

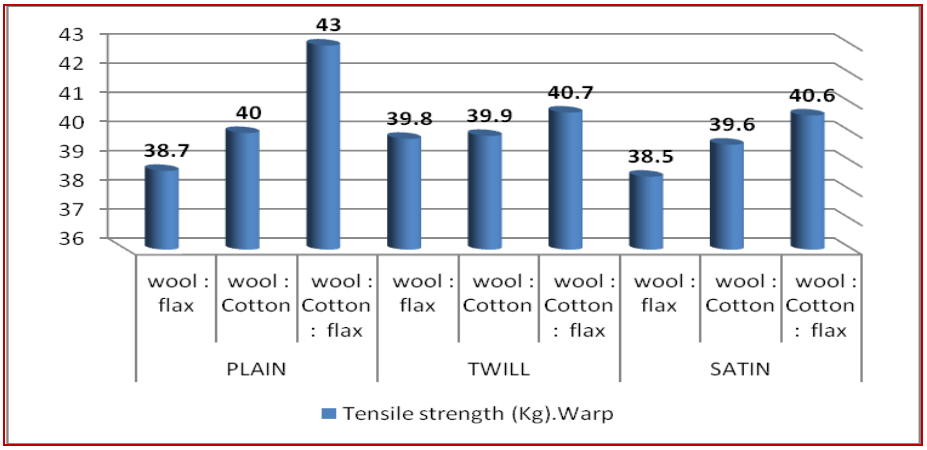

Figure1. Relationship Between fabric blend and weaving type and warp Tensile strength

Figure (2) shows the relationship between fabric blend and weaving type and weft Tensile strength. It is clearly shown that it is shown that the amount of warp Tensile strength showed great variance according to the fabric blend and weaving type. The maximum of weft Tensile strength was

(wool : flax) for plain1/1, and that might be attributed to the large number of interlacing of plain weave. While the minimum was (wool: flax) for Satin 4.

Figure (3) shows the relationship between fabric blend and weaving type and warp elongation. It is clearly shown that In general, there is a convergence between the values of warp elongation with the types of fabric blend and weaving types used. The maximum of warp elongation was (wool: flax) for plain1/1, while the minimum was (wool: cotton) for plain1/1.

Figure (4) shows the relationship between fabric blend and weaving type and weft elongation. It is clearly shown that in general, there is convergence between the values of weft elongation, and increase the values of

weft elongation with the type (wool: flax) of fabric blend with weaving types used. The maximum of weft elongation was (wool: flax) for twill 2/2, while the minimum was

(wool: cotton: flax) for satin 4.

Figure (5) shows the relationship between fabric blend and weaving type and fabric stiffness. It is clearly shown that in general the plain weave was the highest value of fabric stiffness according to the fabric blend and weaving type. and that might be attributed to the large number of interlacing and the short floats of plain weave, That is what a negative impact on the degree of softness of fabric, And therefore the properties of comfort .While the twill weave was the least .The maximum fabric stiffness was (wool: flax) for plain1/1, while the minimum was (wool: cotton: flax) for twill 2/2.

It is clearly shown that In general, the plain weave was the highest value of stiffness.

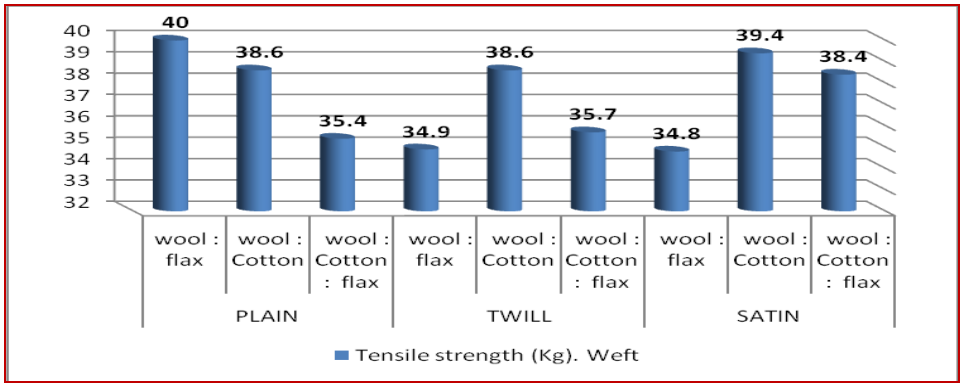

Figure2. Relationship Between fabric blend and weaving type and weft Tensile strength

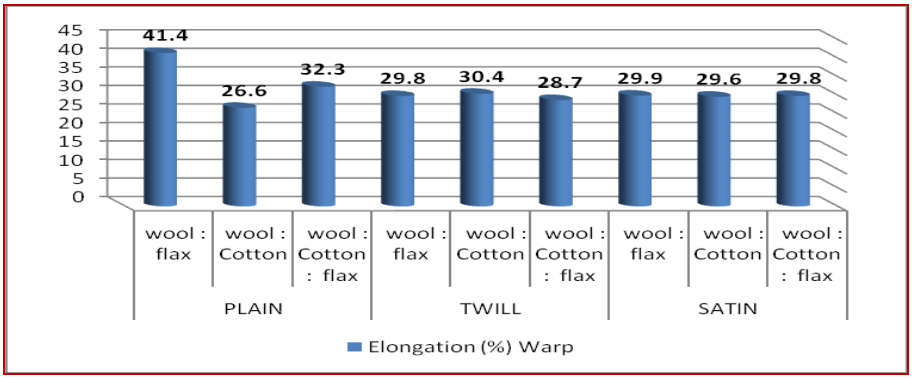

Figure3. Relationship Between fabric blend and weaving type and warp elongation

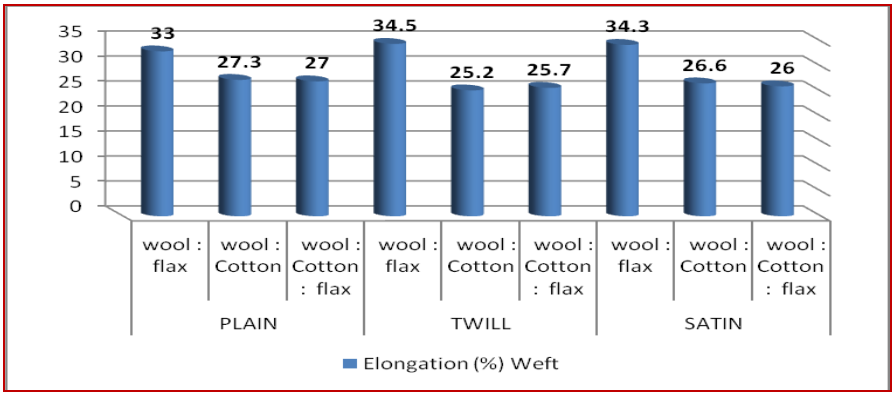

Figure4. Relationship Between fabric blend and weaving type and weft elongation

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Table II .The results of laboratory tests on the produced samples

W .S	Fabric Blend	Tensile strength (Kg).		Elongation (%)		Stiffness (Mg .Cm)	Water absorption (Second)	Thermal isolation (Tog)	Crease recovery (Degree)	Thickness (Mm)	Square meter weight (Cm)	The ideal space	Quality Labs
		Warp	Weft	Warp	Weft								
PLAIN	1Cm wool :1Cm flax	38.7000	40.0000	41.4000	33.0000	70.3600	120.0000	23.9000	99.5500	.5300	174.8000	642.24	64.224
	1Cm wool :1 Cm Cotton	40.0000	38.6000	26.6000	27.3000	57.1500	180.0000	22.0000	116.85	.5200	167.6000	676.62	67.662
	1Cm wool :1 Cm Cotton :1Cm flax	43.0000	35.4000	32.3000	27.0000	65.6300	120.0000	26.7000	96.7000	.4900	177.9000	625.12	62.512
TWILL	1Cm wool :1Cm flax	39.8000	34.9000	29.8000	34.5000	59.3200	60.0000	29.6000	91.3000	.6000	169.8000	549.62	54.962
	1Cm wool :1 Cm Cotton	39.9000	38.6000	30.4000	25.2000	51.0700	240.0000	35.9000	102.3000	.5800	168.0000	731.95	73.195
	1Cm wool :1 Cm Cotton :1Cm flax	40.7000	35.7000	28.7000	25.7000	35.8400	180.0000	35.3000	79.8500	.5900	165.0000	627.38	62.738
SATIN	1Cm wool :1Cm flax	38.5000	34.8000	29.9000	34.3000	56.8800	240.0000	30.0000	101.55	.6200	173.1000	739.65	73.965
	1Cm wool :1 Cm Cotton	39.6000	39.4000	29.6000	26.6000	55.5300	240.0000	33.8000	91.5000	.6300	175.7000	732.36	73.236
	1Cm wool :1 Cm Cotton :1Cm flax	40.6000	38.4000	29.8000	26.0000	49.7800	180.0000	30.9000	79.4000	.6300	166.8000	642.31	64.231

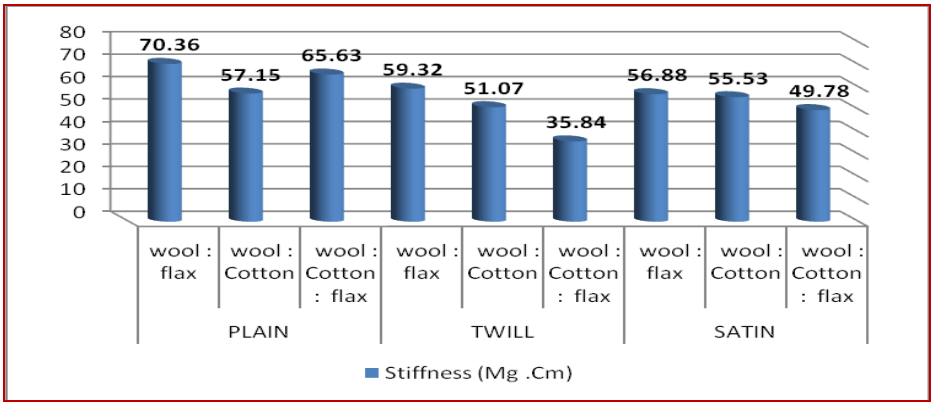

Figure5. Relationship Between fabric blend and weaving type and fabric stiffness

Figure (6) shows the relationship between fabric blend and weaving type and fabric water absorption. There is a great variance between the values of water absorption with the types of fabric blend, and weaving types used. Best sample in terms of the ability to absorb water and thus achieve the most comfort properties was (wool: flax) for twill 2/2. Water absorption time is inversely proportional to the ability to absorb water and thus to feel comfortable.

Figure (7) shows the relationship between fabric blend and weaving type and fabric thermal isolation. It is clearly shown that in general, there is convergence between the values of fabric thermal isolation, with the types of fabric blend, and weaving types, but twill weave was the highest in the average thermal insulation value, while plain weave was the least, and that might be attributed to the number of interlacing between yarns determine the degree of warmth. The more warmth as least in the plain weave, the greater the

increase in warmth whenever twill weave [13]. The maximum fabric thermal isolation was (wool: cotton) for twill 2/2, while the minimum was

(wool : cotton) for plain1/1.

Figure (8) shows the relationship between fabric blend and weaving type and fabric crease recovery. It is clearly shown that In general, there is a convergence between the values of crease recovery with the types of fabric blend, and weaving types used.

The maximum of crease recovery was (wool: cotton) for plain1/1. While the minimum was (wool: cotton: flax) for satin4.

Figure (9) shows the relationship between fabric blend and weaving type and fabric thickness. It is clearly shown that In general, there is a convergence between the values of thickness with the types of fabric blend, and weaving types used, but satin weave was the highest. The maximum of thickness was (wool: cotton: flax) & (wool: cotton) for satin4, while the minimum was (wool: cotton: flax) for plain1/1.

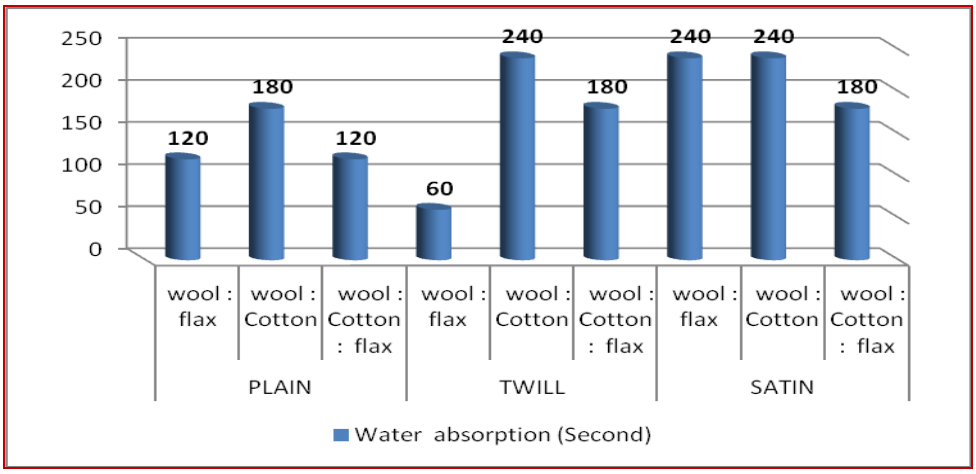

Figure6. Relationship Between fabric blend and weaving type and fabric water absorption

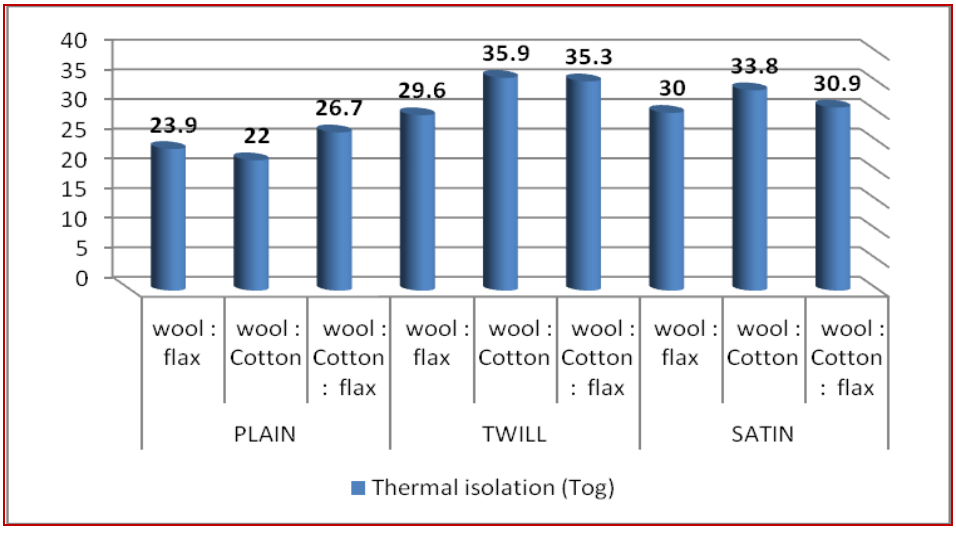

Figure7. Relationship Between fabric blend and weaving type and fabric thermal isolation

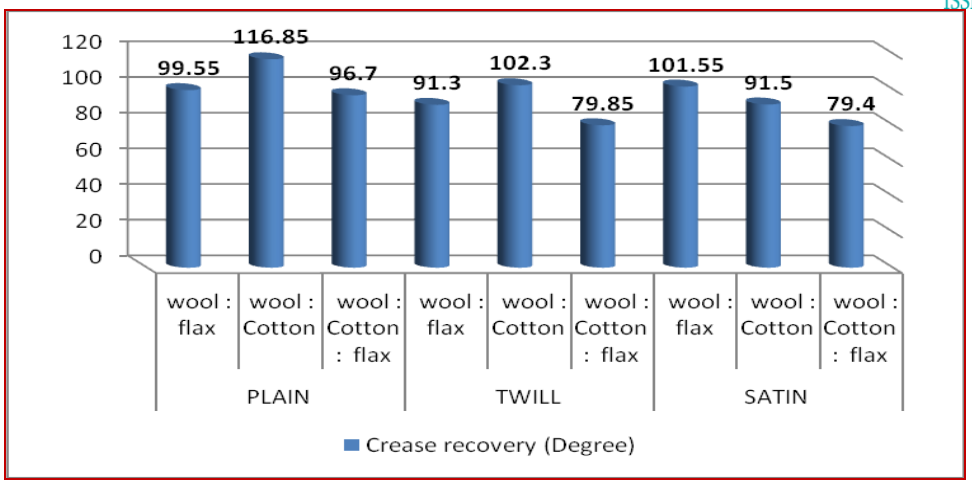

Figure8. Relationship Between fabric blend and weaving type and fabric crease recovery

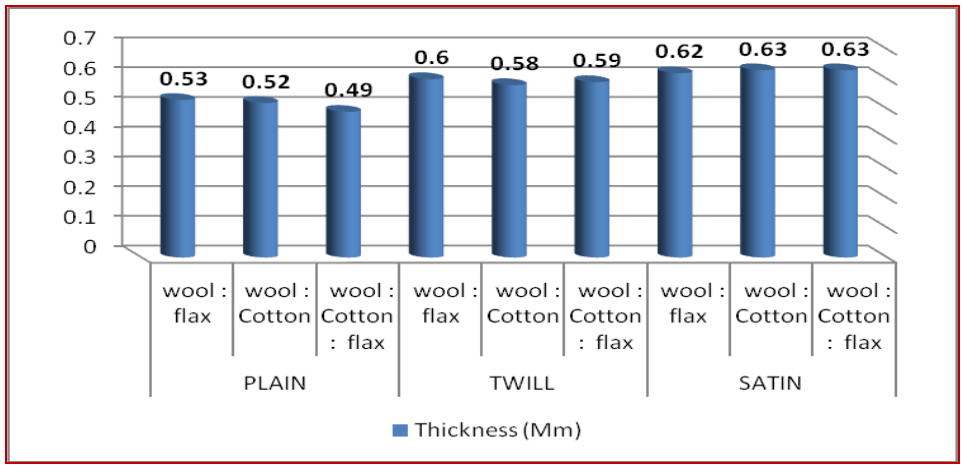

Figure9. Relationship Between fabric blend and weaving type and fabric thickness

Figure (10) shows the relationship between fabric blend and weaving type and fabric square meter weight. There is a great variance between the values of fabric square meter with the types of fabric blend, and weaving types used. It is clearly shown that In general, the plain weave was the highest value of fabric square meter. The maximum of square meter weight was (wool: cotton: flax) for plain1/1, while the minimum was (wool: cotton: flax) for twill 2/2, this means it is the best sample to achieve the comfort of a lack of weight.

Figure (11) shows arrangement the samples produced in terms of the measured properties depending on quality labs. It is clearly shown that the best productive samples According to the measured properties that achieve comfort were form satin weave, followed by plain weave, while twill the weave was the least. The best sample was (wool: flax) for satin4, While the sample was the worst (wool: flax) for

twill 2/2.

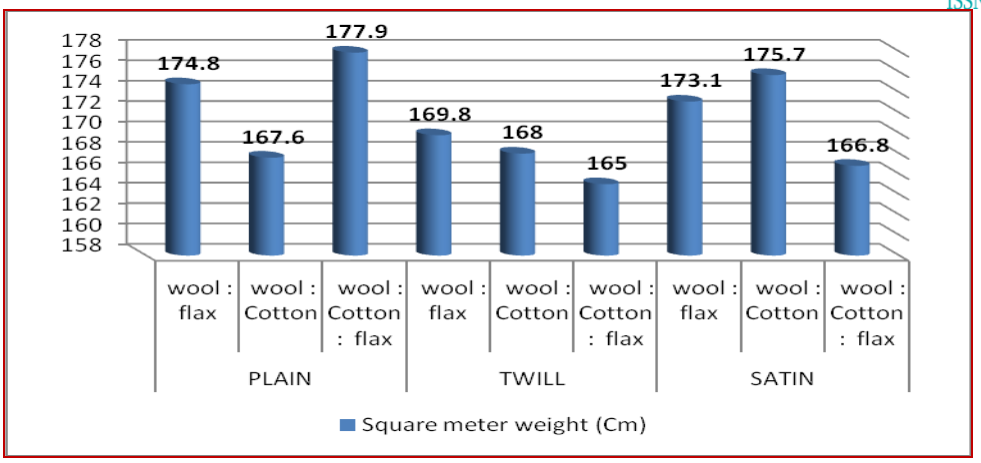

Figure10. Relationship Between fabric blend and weaving type and fabric square meter weight

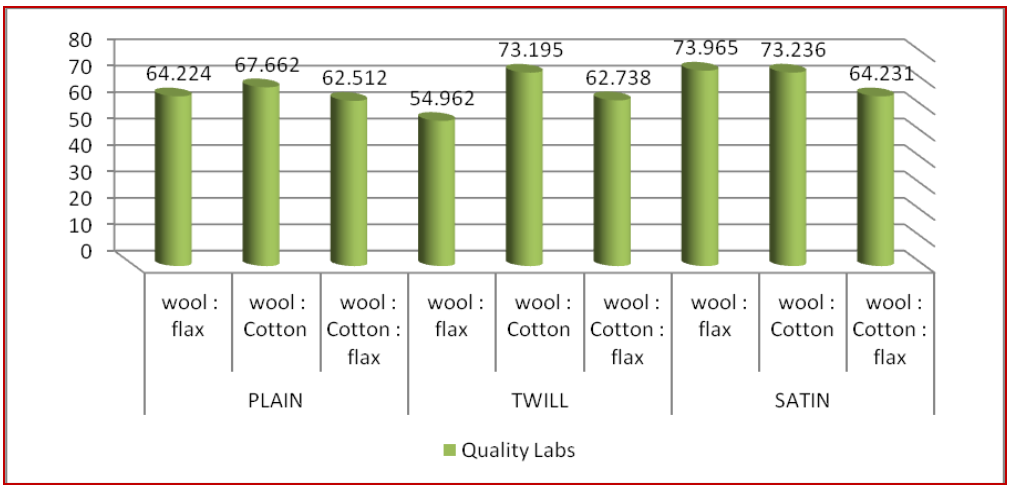

Figure11. The best sample in terms of the properties of comfort and sample the worst depending on quality labs

IV. CONCLUSIONS

In this study, through the evaluation of the properties of comfort of fabrics produced by using three kind of woven constructions were chosen namely, Plain 1/1, Twill 2/2 and Satin 4, each one were weaved using 100 % Flax yarns were used in warp direction (22yarn / cm), 28/1 Cotton. Three kind of weft blend were used, 28/1 Cotton 100 % Flax yarn, 100% Cotton 20/1 Cotton, 100%Wool 45/2 Cotton (25 pick/cm). From the results, the following conclusions can be made:

-The maximum of crease recovery was (wool: cotton) for plain1/1, while the minimum was (wool: cotton: flax) for satin4.

-The maximum of square meter weight was (wool: cotton: flax) for plain1/1, while the minimum was (wool: cotton: flax) for twill 2/2. This means it is the best sample to achieve the comfort of a lack of weight.

-The maximum of fabric thermal isolation was (wool: cotton) for twill 2/2, while the minimum was (wool: cotton) for plain1/1.

-The best productive samples According to the measured properties that achieve comfort were form satin weave, followed by plain weave, while twill weave was the least. The best sample was (wool: flax) for satin4, while the sample was the worst (wool: flax) for twill 2/2.

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