

## **GROWING IMPORTANCE OF COTTON BLENDS IN APPAREL MARKET**

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*This paper deals with growing importance of cotton blends in apparel market. The most important reason for blending is to produce fabrics with a better combination of performance characteristics in the product. Nowadays, Global competition blending of cottons appear to be inevitable. This paper deals with cotton blending with different varieties of fibres and their properties.*

**Key words:** Cotton blends, Cotton Jute, Cotton linen, Cotton Ramie, Cotton Wool.

### **INTRODUCTION**

The textile industry in India including the garment industry contributes to over 6% of the Gross Domestic Product (GDP) of India and earns 18% of the total foreign exchange earnings of the country. The garment industry in India is a \$23 billion industry and produces over 100 varieties of garments for different end uses. Out of total 3052 million kg production of yarn in the year 2003-04, blended yarn production was 589 million kg. As far as production of fabric in 2003-04 is concerned, blended fabric was 6068 million square meter out of total production of 42383 million square meter.

The break up of production of yarn and fabric in 2003-2004 is given in tables below:

**Production of Yarn 2003-04**

<b>Fibre</b>	<b>Million Kg.</b>
Pure Cotton	2121
Blended	589
100% Non-cotton	342
<b>Total</b>	<b>3052</b>

**Production of Fabric in 2003-04**

<b>Fibre</b>	<b>Million Kg.</b>
Pure Cotton	18040
Blended	6068
100% Non-cotton	17613
Khadi, wool, silk	6622
<b>Total</b>	<b>42383</b>

The term 'blending' is used by the yarn manufacturer to describe specifically the sequence of processes required to convert two or more kinds of staple fibres into a single yarn composed of an intimate mixture of the component fibres. This is necessary to obtain a uniform yarn from different varieties of the same fibrous polymer.

### **GROWING IMPORTANCE OF FIBRE BLENDS IN APPARELS**

The reasons for development of blends are

- **Economy:** or Economic reasons expensive fibres can be extended by blending them with more plentiful fibres. Eg. (Cashmere & Wool).
- **Durability:** To produce fabrics with a better combination of

performance characteristics in the product. This is perhaps the most important reason for blending. In end uses where durability is very important, nylon or polyester blended with cotton or wool provide strength and resistance to abrasion while the wool or cotton look is maintained. A classic example is in durable press garments, where 100 percent cotton fabrics are not as durable as polyester/cotton.

- **Physical Properties:** To obtain better hand, or fabric appearance. A small amount of a speciality wool may be used to give a buttery or slick hand to wool fabrics, or a small amount of rayon may give luster and softness to a cotton fabric. Fabrics with different shrinkage properties are blended to produce bulky and lofty fabrics or fur-like fabrics.
- **Colour:** To obtain cross dyed effects or create new colour effects such as heather, when fibres with unlike dye affinity

are blended together and then piece dyed.

- **Appearance:** To improve spinning, weaving finishing efficiency for uniformity of product as with self blends of natural fibres to improve uniformity.

## FIBRE BLENDS

The accepted definition of a blend, as stated by ASTM, is a single yarn spun from a blend or mixture of different fibre species.

Blending is a complicated and expensive process, but it makes it possible to build in a combination

of properties that are permanent. Not only are blend used for better serviceability of fabrics but they are also used for improved appearance and hand. In the following chart, some fabric properties are rated. Notice that each fibre is deficient in one or more important property.

**Chart of the Property**

Properties	Cotton	Rayon	Wool	Acetate	Nylon	Polyester	Acrylic	Moda Crylic	Olefin
Bulk and loft	-	-	+++		-	-	+++	+++	
Wrinkle recovery	-	-	+++	++	++	+++	++	++	++
Press (wet) retention	-	-	-	+	++	+++			
Absorbency	+++	+++	+++	+	-	-	-	-	-
Static resistance	+++	+++	++	+	+	-	+	+	++
Resistance to pilling	+++	+++	+	+++	+				++
Strength	++	+	+	+	+++	+++	+	+	+++
Abrasion resistance	+	-	++	-	+++	+++	+	+	+++
Stability	++	-	-	+++	+++	+++	+++	+++	+++
Resistance to heat	+++	+++	++	+	+	+	++	-	-

+++ : excellent; ++ : good; + : fair; - : deficient

Properties	Cotton	Flax	Wool	Silk	Rayon	Acetate	Nylon	Polyester	Olefin	Acrylic
Abrasion resistance	Poor	Poor	Fair	Fair	Poor	Poor	Exc.	Good	Exe.	Fair
Breaking Strength	3-10	2-7-	20-40	10-25	19-24	25-35	19-40	18-50	15-50	25-35
Elongation (%)		3.3								
Elastic Recovery	Poor	Poor	Exc.	Good	Poor	Fair	Exc.	Good	Exc.	Exc.
Moisture Regain (%)	8-11	12	13-18	11	13	6	4-4.5	0.4	0.1	1.3-2.5
Softening Point (°C)	(a)	(a)	(a)	(a)	(a)	180	170-230	240	130	200
Specific gravity <sup>b</sup>	1.54	1.54	1.30	1.34	1.52	1.32	1.14	1.38	0.91	1.32
Tenacity (N/tex)										
Standard	0.26- 0.44	0.49- 0.58	0.09- 0.15	0.21- 0.16	0.07- 0.53	0/11- 0.13	0.23- 0.83	0.23- 0.83	0.42- 0.69	0.11- 0.13
Wet	0.29- 0.56	0.53- 0.64	0.07- 0.14	0.16- 0.37	0.06- 0.40	0.07- 0.11	0.18- 0.71	0.23- 0.82	0.42- 0.69	0.07- 0.11

a Will char and burn rather than melt when subject to heat

b Ratio of weight of a given volume of fiber to the same volume of water

Abbreviation : Exc. = Excellent

Blends of synthetic fibres with natural fibres offer the most valuable possibilities for combining desirable physical properties, because the two components are so dissimilar. In blends of polyester or acrylic fibres with cotton or viscose the synthetic component provides crease recovery, dimensional stability, tensile strength, abrasion resistance and easy care properties, whilst the

cellulosic fibres contributes moisture absorption, antistatic characteristics and reduced pilling.

Different fibres can be blended in textile structures to obtain the desirable properties of each of the fibres in the blend. A blended yarn or fabric generally displays an averaging of the properties of the constituent fibres. A cotton/polyester blend has higher wrinkle

recovery than a 100% cotton fabric, but lower recovery than all polyester fabric. The blend level, used to describe textile blends is the percentage by weight of each fibre in the blend.

### **THREE COMPONENT BLENDS**

The selection of fibre blend components and their proportions is as critical for three component blends as it is for the more familiar binary blends. But the addition of third component offers no guarantee of producing a fabric with enhanced characteristics overall. Apparel fabrics for blazers, outerwear, flannels, traditionally manufactured with a cotton warp and a wool weft may be made with a blended wool/viscose or nylon/viscose weft.

Four component blends are occasionally encountered, too, since dress wear or other items of apparel may be woven from dissimilar blends staple to yarns in both warp and weft.

Some of three component blends which has cotton are:

- Nylon/Wool/Cotton
- Cotton/Acrylic Fibre/Nylon
- Cotton/Modacrylic/Acrylic Fibre
- Polyester/Acrylic Fibre/Cotton
- Cellulose Triacetate/Polyester/Cotton
- Cellulose Acetate/Nylon/Cotton

### **GLOBAL COMPETITION BLENDING OF COTTONS APPEARS TO BE INEVITABLE**

Blending of cottons offers flexibility in choosing varieties of cottons for minimizing the cost of cotton going into yarn besides allowing uninterrupted production. Blending of cottons, yields the following benefits.

- Minimizing Cotton Cost
- Uninterrupted Production

**Classification of Binary Blends**

S. No.	Blends Types	Few Examples
1.	AA Blends	1) Wool/Silk 2) Nylon/Wool 3) Nylon/Silk 4) Wool/Polyurethane
2.	AB Blends	1) Wool/Acrylic Fibre 2) Silk/Acrylic Fibre 3) Nylon/Acrylic Fibre
3.	AC Blends	1) Wool/Cotton 2) Silk/Cotton 3) Nylon/Cotton 4) Polyurethane/Cotton 5) Wool/Viscose 6) Silk/Viscose
4.	CB Blends	1) Cotton/Acrylic Fibre 2) Cotton/Modacrylic Fibre 3) Viscose/Acrylic Fibre
5.	CC Blends	1) Cotton/Viscose 2) Cotton/Modal Fibre 3) Cotton/Polynosic Fibre 4) Cotton/Linen 5) Linen/Viscose
6.	DA Blends	1) Polyester/Wool 2) Polyester/Silk 3) Polyester/Nylon 4) Cellulose Acetate/Wool
7.	DB Blends	1) Polyester/Acrylic Fibre 2) Cellulose Acetate/Modacrylic Fibre 3) Polyester/Modacrylic Fibre 4) Cellulose Acetate/Acrylic Fibre
8.	DC Blends	1) Cellulose Acetate/Cotton 2) Polyester/Cotton 3) Cellulose Acetate/Viscose 4) Polyester/Viscose 5) Polyester/Linen
9.	DD Blends	1) Cellulose Acetate/Polyester 2) Cellulose Acetate/Triacetate 3) Cellulose Triacetate/Polyester

Note: Classification of fibres by dyeing properties:

- A Fibres : Dyed with acid dyes in full depth
- B Fibres : Dyed with basic dyes in full depth
- C Fibres : Dyed with cellulosic dyes in full depth
- D Fibres : Dyed with disperse dyes in full depth

- Economizing use of imported, expensive cotton
- Being Competitive
- In fierce competition

Cotton should be put to non-traditional textile applications such as:

- Wool/Cotton blends for apparel fabrics that will combine comfort with exceptional aesthetic appeal.
- Acrylic/Cotton blends for bulky woven and knitted dress material, vests, socks etc. and
- Cotton alone or in combination with other fibres for technical textiles like absorbent pads, bandages, plasters, gauzes, surgical clothing, tarpaulins, covers, mats, belting etc.

When referring to blends of polyester with natural fibres it is customary to name the synthetic fibre first i.e. Poly/Cotton or even polyester/cotton rather than cotton/polyester, which is usually encountered if cotton-rich blends are being considered. Further more when a fibre type is referred to by an adjectival term, such as 'acrylic' or 'cellulosic' it is preferable to name this component second as in nylon/acrylic or wool/cellulosic blends. Where both adjectival terms occur in the same category i.e. the cellulosic/acrylic category, this order is preferred for the individual blends such as cotton/acrylic and viscose/acrylic, rather than their reversals.

Cotton blends are widely used in the garment industry. Each of the blend has its own distinctive characteristics, processability, versatility, application areas and end uses for the apparels. It is possible to use a range of cotton blends in conjunction with special finishes to meet requirements and

needs of the garment market. The paper will include different cotton blends with their properties such as:

- Cotton and Linen
- Cotton and Jute
- Cotton and Ramie
- Cotton and Wool
- Cotton and Silk
- Cotton and Viscose
- Cotton and HWM Rayon
- Cotton and Lyocell
- Cotton and Tencel
- Cotton and Triacetate
- Cotton and Polyester
- Cotton and Nylon
- Cotton and Acrylic
- Cotton and Modacrylic
- Cotton and Polyurethane Blends
- Cotton and Lycra/Spandex

#### **The Composition of Blend Fabrics**

Staple fibre yarn blends are long established in woven fabrics and there is an exceedingly wide variety of fabric constructions woven or knitted from two or more types of homogeneous yarn. Materials of the later kind referred to as 'Union Fabrics'.

#### **Cotton and Linen**

As with any blend, the amount of each fibre used is significant in its contributing effects. In any event, linen offers prestige. It also provides body and improved drapability. Linen adds greater strength and absorbency. Cotton is very compatible with linen. It spins well with it to provide good quality yarn and fabrics while keeping the cost lower than it would be an all-linen material. Cotton World Corporation (CWC) one of the trendiest apparel brands of India recently launched its linen collection. For mens, the trousers range is available in linen cotton and corduroy. The linen-cotton range takes trousers from

the realm of mere lower body clothing to one of functional style or functional fashion. Also CWC launched shirts, T-shirts, Capris etc. Linen and its blends with cotton have been used traditionally in fine woven apparel and household textiles notably table cloths, napkins, curtains and furnishings.

#### **Cotton and Jute**

The jute fibre is available in inexhaustible quantities and at comparatively low prices and hence has the potential to replace several expensive fibres and saves forest resources. Some of the inhibitions to the usage of jute, like variation in fibre length, harsh feel, brittleness and difficulty to launder can be overcome by blending this fibre with other fibres. Jute fibres has several advantages like a lustrous golden appearance, high tenacity, lygenoscopicity and good properties. Hence the techniques of blending and softening could as utilized to upgrade the quality of jute and thus form a new class of jute-based fabrics having an expanding market within and outside the country. Considering the ecological movement, eco-degradability and high compatibility with the environment, an attempt has been made to obtain. Jute-cotton yarns, convert them into fabric by knitting improve the eco-friendly nature of jute by dyeing with 'LAC' natural dye after necessary processing and evaluate the performance qualities of the material. (% blend 50:50, Cotton: Jute).

The study reveals that Jute Cotton (50:50) is appropriate for knitting. Its appeal would be increased by lac, an environment friendly dye the 'T' shirts have proved to provide warmth. Therefore it is best suited as winter wear, especially in the country with tropical climate like India. A large scale production of jute cotton T-shirts, is sure the right solution for overcoming shortage of major fibres like Cotton and Wool.

### **Cotton and Ramie**

According to the study done at CIRCOT. Ramie/Cotton blends (60:40 to 50:50) are of interest for woven or knitted leisure clothing.

### **Cotton and Wool**

Wool is blended with cotton in various ratios. The properties of the yarns and fabrics will be affected by the proportion of the fibres blended. Wool contributes warmth, resilience, abrasion resistance, and drapability. Cotton adds strength and reduces the cost of the yarn and fabric. Both fibres are absorbent and can be blended to make a comfortable, durable fabric with a nice hand. The tertiary blend of cotton, rabbit hair and polyester fibres with equal proportions has produced knitted fabric of better bursting strength and low shrinkage parameters. The fabric produced are more whiter, softer and have higher bulk. The result shows that there is a good scope for development of low shrink of knitted fabrics from blends of Angora rabbit hair with other blends.

Application: Very light weight, having soft feel suitable for women's under wear and also light weight outer jersey.

Wool Cotton blends for apparel fabrics combine comfort with exceptional aesthetic appeal. The Cotton/Cashmere blends are used for light weight sweaters. According to investigations by CIRCOT and CSWRI (Central Sheep and Wool Research Institute) explores the possibilities of blending Avivastra Wool with cotton and producing good quality yarns adopting commercial cotton spinning systems. The wool/cotton blend is superior in durability to all wool fabrics but there is a loss in other desirable characteristics, such as handle, drape pleat retention and crease recovery. There is a resurgence of interest in blending these two natural fibres throughout the developed world, where such

blends in garments traditionally made from cotton are seen as conferring desirability and exclusively in high quality dress wear and shirting fabrics. Developments in shrink resist treatment of the wool component have greatly improved the washability of such materials which offer value, comfort, versatility and styling. Typical examples of traditional union fabrics with cotton warp and a woolen weft include blazer cloths, gabardine rain wear, shirtings, pyjamas. Blended worsted yarns containing approximately equal proportions of wool and cotton have been long established in knit wear, dress wear, under wear, children's clothing, light weight shirtings, pyjama clothes and blankets. The original Viyella shirt fabric was a wool/cotton blend. The 20:80 Wool/Cotton yarn is the best for achieving washable apparel without the use of chlorinated wool.

Attractive pile fabrics are made with a cotton backing cloth and a worsted – spun pile yarn of either mohair or wool. Mohair gives high luster and better crush resistance than wool. Fabrics of this kind have been used to cover toys and as other wear.

### **Cotton and Silk**

When silk is blended with cotton, silk contributes a soft, smooth hand, lightness of weight with strength, resilience, comfort, and good colour possibilities. Cotton provides body and lower cost. According to Jody Crow; A silk/cotton has a more sophisticated expensive look and its washable.

### **Cotton and Viscose Rayon**

Viscose Rayon Blends : Viscose rayon is blended as staple with a wide variety of fibres. Among the natural fibres, it is most frequently blended with cotton. The principal advantage afforded by rayon is lower cost. It may also be used to add luster, colour, and textural

effects. Variants may be blended with other fibres for special purposes. For example, high-absorbency Fibro HSO may be blended with polyester to obtain greater absorbency and comfort.

Several properties of viscose rayon represent limitations, particularly for its use as a substitute for cotton. The most significant limitation is its wet strength: viscose rayon loses upto 70 per cent of its strength is identified as its tensile modulus – the relative amount of pulling force that it can endure before breaking. In 1960, commercial production was initiated for a rayon that approximated the natural strength of cotton and retained most of that strength, even when wet. It was consequently identified as a high wet-modulus, or HWM, rayon. Subsequently, it also became known as a modified rayon.

There are two varieties of this type of rayon in commercial production in the United States: Zantrel 700 and Arvil while both are cellulosic and have basic characteristics similar to high grade cotton, they do differ from each other in certain respects. Viscose as a stand alone fibre and in all its blends augments all the characteristics desired in a knitted apparel. The most vibrant colour softness, moisture absorbance and superior comfort go hand in hand with viscose. It finds itself most available to applications like innerwear, leisure wear, ladies western wear (tops, trousers etc.) sports wear etc.

### **Cotton and High Wet Modulus Rayon HWN**

Polynosic fibres show improved laundering performance and give good yarn strength in blends with cotton, but they are generally less useful for blending with polyester fibres. Model and polynosic fibres are finding increasing application in blends with cotton for knit goods. Wincel in a polynosic fibre i.e. used alone are in blends with cotton,

viscose polyester staple. A popular blend for apparel fabrics is 50:50 cotton viscose. Blends of cotton with model fibres are particularly important in woven dress wear and light weight suiting. These model rich blends (80:20 to 55:45) are usually designed to exploit lusture, drape, and softness of the regenerated fibre, whereas in cotton rich mixtures the strength, washability and durability of the natural fibre make important contribution.

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According to Mr. Shrinivasan Krishnamoorthy, Grasim's Yarn Division Viscose is a very Versatile Fibres and I believe that it is the

ideal fibre to go into blends. There is an increasing trend to use viscose staple in woven apparels through tertiary blends (polyester/cotton/Viscose) and cotton viscose blends in shirting.

The presence of viscose in blends with cotton improves the appearance by imparting more lusture and firmness of hand firmness of handle. The regenerated fibre provides additional absorbency, which is useful in toweling constructions. Apparel uses for cotton/viscose blends include poplin shirts, blouses, dress wear, knitwear, leisure garments, T-shirts, under wear, and children's clothing. These blends offer comfort appeal with good wear and laundering properties. The optimum blend composition for wear resistance is approximately 70:30 cotton/viscose.

Terry Toweling may be made from 50:50 or 45-55 cotton/viscose blends for greater absorbency than all cotton clothes. An important traditional use for cotton/viscose unions is in brocade material for curtain and furnishings in which the viscose appears on the surface in the form of floral designs. These construction often contains both filament and staple yarns. Pile fabrics are sometimes made with a viscose pile in a cotton packing fabric. These are an economical alternative to wool pile/cotton backing fabrics.

Hollow viscose fibres, such as Viloft (Courtanlds) have been produced in an attempt to stimulate the material lumen of cotton. These characteristics make an important contribution to the appeal of cotton/viloft and polyester/viloft blends. These have been exploited successfully in knitted under wear, sports wear, leisure garments, dress wear and toweling.

#### **Cotton and Lyocell**

As blends, Lyocell can be used with

cotton, lyocell is a soft fibre like silk and highly absorbent softer, it is similar to cotton and has excellent dry and wet strength. It is also highly wrinkle resistant and fibrillates during wet processing to produce special textures. It can take high ironing temperatures. If burnt these will not melt but scorch like others celluloses. It is similar to silk in stability.

The other important properties of Lyocell are its similarity to rayon in drape and smoothness. Lyocell can be made into micro fibres offering depth and body to fabrics. Short fibres result in cotton like look in fabrics and long fibres provides silk like appearance.

Arvind mill is already in the field of manufacturing denims with Tencel. These denims have softness and drape that normal denim back.

#### **Cotton and Tencel**

Tencel is fibrillar in structure and resembles cotton even more closely than model fibres in its behaviour under stress and capacity for absorbing liquid water. Because of the close similarity between the stress – strain curves of Tencel and Cotton, it can contribute to the strength of the blended yarn even to low blend levels. An interesting feature of Tencel is that the conversion of fibre strength to yarn strength is considerably higher than for other cellulosic fibre types because of high cohesion between the closely Packed fibres of circular cross section in the yarn. Tencel improves the performance of blends with cotton by enhancing strength, luster, yarn regularity, spinning and wear performance.

#### **Cotton and Polynosic**

Lyocell being a cellulosic fibre is bio-degradable. It will degrade if disposed in a landfill. Products made from lyocell can be recycled for digested in Sewage. The fibre will degrade in 8 days.

### Blends and Counts Prevalent for Knitted Applications

Sr. No.	Product	Blend (%)	Inner Wear	Out Wear
1.	Cotton/Viscose	55/45, 75/25	34 <sup>s</sup> , 40 <sup>s</sup>	20 <sup>s</sup> , 24 <sup>s</sup> & 30 <sup>s2</sup>
2.	Poly/Cotton/Viscose	52/33/15	-	30 <sup>s</sup> , 40 <sup>s</sup>
<b>SPECIALITY YARNS</b>				
1.	Grasisoft/Cotton	45/55	34 <sup>s</sup>	20 <sup>s</sup> , 24 <sup>s</sup> & 30 <sup>s</sup>
2.	Cotton/Viscose/Melange	Spun Shades From 2% to 75%	20 <sup>s</sup> , 24 <sup>s</sup> , 30 <sup>s</sup> & 40 <sup>s</sup>	

Predecessor to Lyocelol is the polynosic fibre introduced in the sixties. These fibres had good strength and smooth round cross section, but the cost of production was pretty high, prone to fibrillation and was difficult to dye. These fibres were good as a blend with cotton.

#### Cotton and Triacetate

Triacetate provides easy care and shape retention when these fabrics are laundered. Triacetate and cotton blended fabrics resist wrinkling and need little or no ironing. Cotton provides strength, abrasion resistance, and durability. Such fabrics are given greater absorbency by the cotton and are therefore less clammy and more comfortable in warm, humid weather.

This type of blend increases the styling properties. Arnel Triacetate is most often blended with cotton, wool, or rayon, less frequently with other fibres. Triacetate/cotton blends have a cotton like hand appearance. To retain the intrinsic desirable properties of triacetate, such blends should not contain more than 30 percent cotton. Some blends contain 50 percent or more of cotton, permitting higher yarn counts, that is finer yarns, which may be desirable where styling is the prime consideration. This greater amount of cotton will, however, decrease the desirable contribution of the triacetate to the blend.

#### Cotton and Polyester

For satisfactory wash and wear purpose, fabrics for rain wear, tailored clothing, dress shirts and sports shirts usually have a blend of at least 65 per cent polyester with cotton. Polyester will provide wrinkle resistance and shape retention. Cotton will provide absorbency and consequent comfort. However, unless properly constructed and properly cared for, a fabric of a polyester and cotton blend may pucker and lose its shape if the cotton should shrink or if cotton thread is used in swing. Polyester and cotton blends are well suited for fabrics to be given a permanent press resin finish. The polyester not only contributes its own inherent shape-retentive qualities but also retains its strength, thereby reducing the total potential strength loss from resin finishing that an all cotton fabric would have.

**Polyester/Cotton (70/30) Popular counts 62<sup>s</sup> + 70<sup>s</sup> for blouses.**

**Shirting : Polyester Cotton 65/35 counts 2/40<sup>s</sup> to 2/60<sup>s</sup>.**

**Suiting: Polyester Cotton : 65/35 popular counts 2/15<sup>s</sup> to 2/20<sup>s</sup>, 2/24<sup>s</sup>, 2/40<sup>s</sup>.**

**Long Cloth: Polyester Cotton : 65/35 popular counts 2/40<sup>s</sup>.**

Where greater absorbency and softer hand are desired, a 50/50 blend is preferable, but there will be a corresponding strength loss of as much as 20 percent as well as a slight loss in resilience. A 50/

50 blend of polyester and cotton is also satisfactory for effective permanent press finishes.

On the other hand, blends of as much as 80/20 of polyester and cotton, respectively, will have a somewhat stiffer, slicker hand strength, wrinkle resistance, and shape retention will be increased but absorbency will be reduced.

According to Mr. R. L. Toshinwal, M.D., Banswara Syntax – In bottom wear fabric, cotton will continue to dominate but there is demand for polyester cotton and polyester viscose fabric too.

According to Ms. Nisha, Shilpa Creations, a garment export unit – There are a lot of fabric developments in polyester cottons and demand for special treatments on fabric are becoming important. For instance, wax coating, wrinkle – free finishes etc. are popular today. Demand of cotton polyester is going up fast in bottom wear fabrics.

Polyester/Cotton and Polyester/Viscose blends are very popular are apparel materials. Polypropylene on other hand is not usually blended with cotton or viscose. Cotton/Polyester/Rayon, cotton polyester are also widely used for sweat suits and warm – up fabrics. Check the percentage of each fibre, since the amount contributes to fabric performance and fabric characteristics. Cotton/Polyester blends are durable, more wrinkle resistant, and shrink less than 100% cotton unless specially treated or structured. Polyester/Cotton blends which have greater amounts of cotton tend to hold their shape and more absorbent than all synthetic garments.

Garments may be lined of cotton or cotton/polyester blend fabric, which adds to comfort absorbency, since the outer synthetic fabrics are low moisture absorbers.

Cotton-Spun blends of polyester and acrylic fibres often (85:15 to 70:30) are important in woven or knitted upholstery and furnishings, outer wear, easy care suitings, dress goods, sports wear and leisure clothing. Without question the exploitation of polyester/cellulosic blends represents are most successful compromise between the contrasting physical properties of synthetic and natural fibres. Polyester/cellulosic yarns are used in sewing threads and slub effects for apparels.

Woven Polyester/Cellulosic fabrics are important in shirting, sheeting dress goods, outer wear and work wear.

Polyester/cellulosic knit goods include fleece knits, inter locks and jerseys, sportswear, T-shirts and dress wear.

At the most important fibre blend, ranging in characteristics from light weight poplin shirting to heavy drill work wear fabric, polyester/cotton is sufficiently familiar to require little description.

### **Cotton and Nylon**

When properly combined with cotton, nylon adds strength, which allows the development of unusually fine 'textures' and Nylon provides smoothness, silkiness, and dirt rejection. It also reduces the weight of the fabric and increases its wrinkle resistance. The cotton gives softness and moisture absorption. This combination permits the weaving of fabrics that are soft, supple, and extremely serviceable. If the combination is not properly balanced, the cotton may shrink, causing the fabric to pucker. Also the nylon fibres may cut the cotton fibres. A blend of at least 17 per cent high-tenacity nylon staple with cotton can make a very durable fabric. According to Tody Crow 'Nylon controls shrinkage'. She explains Nylon gives cotton a more fluid feel, a softer hand and more

contemporary look than cotton/polyester, Cotton/Nylon is cool stuff.

Serious problems were encountered with the early nylon/cotton blends in 1950s. Blends containing less than 50% nylon were actually weaker than all cotton yarns. Owing to the lower modulus of the nylon, the load on the yarn as it was extended was increasingly borne by the cotton fibres in the blend. This problem was solved by developing nylon with the stress – strain curve closer to that of cotton.

Nylon/cellulosic staple blends containing 10/30% nylon with cotton or viscose are used in light weight suiting and dress wear and leisure shirts. Many of these blends as well as work wear fabrics with a 25:75 nylon/cotton warp and a cotton weft, or 20:80 nylon/viscose carpet yarns contains relatively minor proportions of nylon are not difficult to achieve. Similar considerations apply to pile fabrics, such as upholstery with a nylon pile in a woven cotton backing, or cotton pile terry toweling with a weft knit nylon backing for beachwear, children's clothing or leisure shirts, where slight two-sided differentiation may present no problem in made up garments or covers. Tactel (TCI) Nylon/Cotton blends have been strongly promoted in sportswear. Good solidity of hue and depth is more critical in 50:50 blends and in union fabrics, such as nylon warp stretch fabrics, containing cotton or nylon/cotton wefts for swim wear and narrow fabrics, crimped nylon warp/viscose filament dress wear, or cotton warp/nylon weft constructions for uniforms, rain wear or work wear. Nylon/cotton are also used in socks.

### **Cotton and Acrylic**

Orlon Acrylic and Cotton: In combination with cotton, orlon adds light weight and body. The cotton contributes strength and absorbency. The fabric is wrinkle-

resistant, retains its shape well and provides easy care. A blend of 80 per cent or more of Orlon with cotton will provide the general characteristics of a wash and wear fabric.

Acrilan Acrylic and Cotton: In combination with cotton, Acrilan adds warmth, light weight, and wrinkle resistance. The cotton provides strength to the fabric. The fabric can be laundered and easily pressed.

Zefran Acrylic and Cotton: Zefran and cotton blends provide comfortable, durable fabrics that will wash easily, dry fairly rapidly, and need little or no ironing. Zefran provides shrink resistance, resilience, and shape retention. Cotton increases the absorbency and lowers the cost of the fabric. Acrylic cotton blends are used for bulky woven and knitted dress material, vests, socks etc. Cotton Acrylic are used in Sweat suit and warm up fabrics.

Cellulosic/acrylic blends are the most important of the acrylic fibre blends. The cellulosic fibre contributes economy, moisture regain and antistatic properties. In apparel outlets, the acrylic components is included for heat insulation, crease recovery and abrasion resistances. Important characteristics cellulosic acrylic fabric blends in upholstery, pile fabrics and tufted carpets are appearance retention, resilience and wear resistance. Cotton/acrylic blends are widely used in the rapidly expanding sports wear and leisure wear sectors. Fine spun 20:80 to 50:50 cotton/acrylic yarns are used in light weight woven suiting, dress wear and sports wear or knitted underwear, leisure wear and swim wear.

### **Cotton and Modacrylic**

One of the important factors in determining the percentage of fibres in a blend of Verel and cotton is the cost. Cotton is relatively

inexpensive and therefore, the greater the amount of Verel in the blend, the more expensive the fabric. Fabrics containing upto 25 per cent Verel are within reasonable price range. To this type of blend, Verel contributes a soft, pliable hand with good drapability. It also provides dimensional stability, so that the fabric will not wrinkle easily, will resist shrinkage, and will retain its shape. Cotton contributes greater absorbency and additional strength. Fabrics of a Verel and cotton blend are used for underwear, children's sleepers, sport shirts, and outer garments.

Modacrylic fibres in blends with cotton or viscose (20:80 to 50:50) have been exploited for underwear, hosiery, leisure clothing and dress wear, particular pleated skirts.

Dynel (Union Carbide) modacrylic fibre is used in 20:80 to 50:50 blends with cotton or viscose for underwear and nightwear. The modacrylic component contributes dimensional stability, improved handle and good launderability. Woven goods include pile fabrics with a cotton warp and a 70:30 cotton/Dynel weft. Dynel is resistant to mercerizing and peroxide bleaching of cotton.

### Polyurethane and Cotton Blends

Knitwear made from Polyurethane/cotton blends, in which the elastomeric fibre may range from 5% to 20% has been widely popular in recent years for stretch garments, such as skiwear, sportswear, underwear and leisure clothing.

### Cotton and Lycra

Lycra world's leading faster brand in partnership with Westwood, a brand synonymous with fashionable women's wear has launched their spring, summer collection featuring an amazing range of denims, cottons and combinations topped with the magic touch of

lycra. Lycra jeans with unique lycra benefits includes ease of movement, perfect fit and comfort. This unique combination with unique look and feel is sure to find favour with women in summer. Consumers are looking for clothing with more than just hanger appeal. They want fashion that will make them feel comfortable, confident

and sensuous. Lycra with its multiple benefits of incomparable fit, comfort and freedom of movement, delivers exactly that.

### Cotton and Spandex

Tody Crow, product development manager for Cutter and Buck, a Seattle based Sportswear company recommends cotton/rayon/spandex

#### Applications of Cotton Blends in Garment Market Cotton with Natural Fibres

1	Cotton/Jute 50:50	T-Shirts, Ladies, Dresses, and other apparels
2	Cotton/Ramie 65:35, 60:40, 50:50	Woven or knitted leisure clothing
3	Cotton/Wool 80:20, 70:30, 50:50	Dresses, children's clothing, women's inner wear, light weight outer jersey's sweaters, gabardine rainwear, shirtings, blankets, knitwear.
4.	Cotton/Linen	Men's trousers, shirts, T-shirts, Capris etc. woven and household textiles notably table cloths, napkins, curtains, and furnishings.
5.	Cotton/Silk	Shirts, ladies dresses, scarfs, ties, sarees

#### Cotton With Manmade Fibres

1.	Polyester/Cotton 65:35, 60:40, 50:50	Rainwear, dress shirts, sport wear, cotton wear, sweat suits and warm up fabrics, sewing threads, sheeting, outerwear, workwear, Jerseys, knitted upholstery and furnishing fabrics.
2.	Cotton/Nylon 25:75, 50:50	Light weight suiting, dresswear, leisure shirts, children clothing, sportswear, swimwear, rainwear, socks, uniforms, stretch wear.
3.	Cotton/Lyocell	Denims, towels, T-shirts, Shirts
4.	(i) Cotton/Modacrylic 20:80, 50:50  (ii) Cotton/Verel Modacrylic 25:75	Underwear, hosiery, leisure clothing, dresswear, nightwear  Sportswear, and underwear, children's sleepers, outer garments
5.	Cotton/Acrylic 20:80, 50:50	Bulky woven and knitted dress material, vests, socks, sweat suit, warm up fabrics, sports, leisure wear, knitted underwear, swimwear
6.	Cotton/Polyurethane Elastomeric Fibre Range from 5% to 20%	Knitwear, Stretch garments, skiwear, sportswear, underwear, leisure clothing.
7.	Cotton/Lycra	Jeans, dresswear, saree blouses
8.	Cotton/Spandex	Sportswear, bottomwear, pant, skirts
9.	Cotton/Viscose Rayon 55:45, 75:25, 50:50, 45:55	Knitted apparels, innerwear, leisure wear, ladies western wear (tops, trousers), sports wear, children clothing, T-shirts, blouses, towels, curtains, and furnishings.
10.	Cotton/Polynosic 80:20, 55:45, 50:50	Apparels, Woven dresswear, light weight suitings.

blends for 'buttons' – pants and shirts. Cotton with Spandex is another mix popular with manufacturers and consumers. At Coldwater Creek, Gap and other retail sources, cotton twill and denim products are blended with spandex. They are machine washable/dryable and require little care. She says pure cotton is 'fine' but cotton blended with spandex is even better.

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## CONCLUSION

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The textile industry in India contributes lot in foreign exchange earnings of the country. In which garment industry contributes to 6% of the Gross Domestic Product of India. Hence growing importance of fibre blends in apparels. Global competition blending of cottons appears to be inevitable.

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