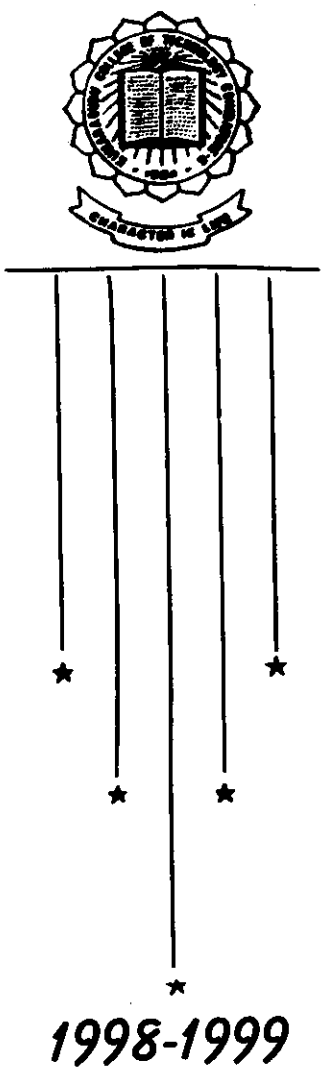
PRODUCTION AND STUDY OF COTTON AND JUTE/COTTON BLENDED FABRICS

PROJECT WORK



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IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF

BACHELOR OF TECHNOLOGY IN TEXTILE TECHNOLOGY

OF THE BHARATHIAR UNIVERSITY

Department of Textile Technology

Kumaraguru College of Technology

COIMBATORE - 641 006.

Department Of Textile Technology

Kumaraguru College Of Technology

Coimbatore - 641 006.

CERTIFICATE

This is to certify that the project report entitled

PRODUCTION AND STUDY OF COTTON AND JUTE/COTTON BLENDED FABRICS

has been submitted by

Mr/Ms._____

in partial fulfillment of the requirements for the award of the Degree of Bachelor of Technology in Textile Technology of the Bharathiar University, Coimbatore - 641 006, during the academic year 1998-99.

Guide

Head Of The Department

certified that the above candidate was examined by us in the project work viva-voce examination held on 24/3/99 and the University Register No. is _____.

Internal Examiner

External Examiner

CONTENTS

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We wish to thank **Dr.K.K.Padmanabhan**, Principal, Kumaraguru college of Technology, for his encouragement given to us in doing this project work.

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We would like to record our sincere thanks to **Mr.Murugasamy**, Sundaram Weaving Factory, Palladam for permitting us to weave fabric samples in their nonautomatic weaving machines.

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SYNOPSIS

It is obvious that jute fibre has potential to be integrated in to the textile system, because it has some major advantages like environmental friendly, higher strength, non abrasive etc. But jute fibre has some drawbacks like harsh in feel, itching in touch etc. Hence, traditionally, the jute fibre is being used mainly in the manufacture of hessian cloth for packaging material. In order to overcome such drawbacks and to get the combined properties of jute and cotton fibre is necessary. However, studies are needed to standardize the products.

In this project, an attempt has been made to develop jute / Cotton blended fabrics and to study the physical properties of these fabrics.

Different sets of fabrics in plain and twill weave were produced using Raw Jute Yarn, 100% Cotton yarn and Jute / cotton blended yarn as weft with 100% Cotton yarn as warp.

Fabrics were dyed and tested for their physcial properties.The results have lighted that ;

- Fabrics with Jute cotton blended weft can be manufactured with quality characteristics comparable to 100% cotton fabrics in any type of automatic loom without much of technical problems.

- Jute cotton blended weft fabrics has comparable quality characteristics with that of 100% cotton fabrics in terms of tensile strength,bursting strength,crease recovery and abrasion resistance.

- As far as union fabrics are concerned, their physical properties differ widely with those of jute cotton blended weft fabrics poses lot of difficulties in weaving.

- Jute can be successfully blended with cotton and the yarn so produced can be readily used for the production of fabric which are comparable to 100% Cotton weft fabrics.

1. INTRODUCTION

The textile industries play an important role in the economy of the country by contributing to employment generation and foreign exchange earning.

In recent years demand for cotton has increased significantly and the gap between demand and supply is met by man made fibres and yarns. The increasing demand for pollution free and eco-friendly textile goods has put more pressure on cotton textiles.

Also jute fibres being the cheapest eco-friendly renewable natural fibre traditionally used in packaging materials because of its coarseness and harshness. For the last few years, demand for jute in this area has been seriously challenged by synthetic substitutes both in internal and external markets.

To cope up the situation therefore constant efforts are now being made to explore the possibilities of use of jute in the new areas like apparel and technical fabrics where some of its desired properties can be exploited advantageously in blends with other natural and synthetic fibres.

Since its inception jute industry was engaged in the production of heavy duty sheeting fabric (Hessian) and flexible packing (Sacking), gunny bags, Cords and covering materials. The use of jute in apparel, furnishing, luggage and fashion garments etc., is relatively a new phenomenon, which is showing sign of picking up momentum.

Hence in this project efforts have been made to produce jute blended and union fabrics and to study their properties and to find out the margin of cost reduction if any, by using jute as weft yarn.

The statistical data about the production of raw jute in various countries is given in appendix I.

Data about the world export of jute goods also is given in appendix II.

2. REVIEW OF LITERATURE

2.1 JUTE FIBRE:

Jute is the common name given to the fibre produced from the stem of plant belonging to the genus "Corchorus", family. "Tiliceae".It has been important industrial fibre and has been used for many years mainly for textile application. Jute for fibre production occupies the land, for about 4-5 months and is commonly rotated with food crops. The fibre lies along the length of plant stem in the form of an annual meshwork composed of more than one fibre layer.

The comemrcial fibres, as obtained from the plant are 1.5 to 3.0 meters long, and when viewed in the transverse section under the microscope, show from 6 to 20 or even as many as 50, single thick walled polygonal cells (Ultimates) each containing a central canal or lumen. It is not single filament but minute fibre cells at about 2.5mm cemented together to form "Reed" with branches all through its length. There are three types of jute namely Tossa Jute, White Jute and Mesta or Bimli jute. Important fibre quality characteristics for jute are **colour and lustre, fineness and strength**

The chemical composition of jute and cotton fibres is given in appendix-III.

The physical and chemical properties of jute and cotton fibres is given in the appendix-IV

2.2 ADVANTAGES & DISADVANTAGES OF JUTE:

ADVANTAGES:

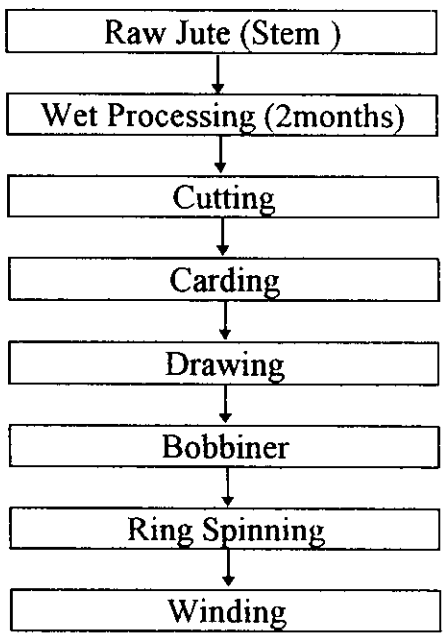
1. Annual renewable material
2. Inexpensive
3. Plant matter is fully utilised
4. Environment friendly
5. Gives up a very low level of harmful substances
6. High level of stability
7. Resistance towards fracture
8. Non-abrasive
9. Low density
10. No health hazard
11. Low thermal conductivity
12. Antistatic property
13. Good dyeability

DISADVANTAGES:

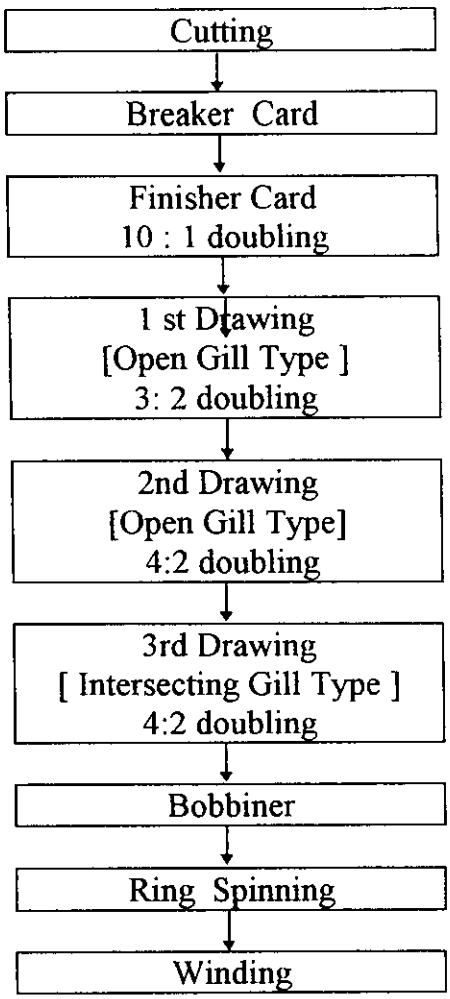
1. Affinity towards moisture
2. Lignin degradation sets in around 200 °C
3. Low mildew resistance
4. Relative coarseness
5. Brittleness
6. Harshness in feel
7. Rugged appearance

2.3 SPINNING -JUTE,COTTON & J/C YARNS:

2.3.1 JUTE SPINNING - PROCESS FLOWCHART



2.3.2 MACHINERY LAYOUT FOR JUTE SPINNING:



2.3.3 PROCESS DETAILS:

RAWJUTE:

Available in the form of long uncut fibres which have a length of 12 feet.

It contains the following constituents.

Cellulose-60%

Lignin (or)Rigidwax-12%

Moisture(Water) etc.

WET PROCESSING:

100kg of jute fibre is taken. 25L Water, 5L Diesel and 0.25L Soap oil are mixed and sprayed on the fibre and the wetted fibres are kept for 24 hours. The resultant jute fibre will have 16% moisture regain.

CUTTING:

Jute fibres are cut in to lengths of 10inches for better performance.

Rotary cutters are used for cutting.

CARDING:

1. Breaker Card:

Cylinder diameter	-	20 inches
Cylinder speed	-	365 rpm
Delivery speed	-	70m/min
Production/day	-	1.33 MT

2.Finisher card:

Cylinder diameter	-	30 inches
Cylinder speed	-	300 rpm
No.of doubling	-	10
Delivery speed	-	60m/min
Production/day	-	70 MT

DRAWING:

Passage	I	II	III
Type of gill	Open	Open	Intersecting
No.of doubling	3	4	4
Delivery	2	2	2
Draft	4	5	6
Speed(m/min)	50	40	40
Production per day(MT)	0.60	0.50	0.40

BOBBINER:

Drafting, Parallelisation & Packaging in form of cheese is done.

Feed	-	4 to 5 slivers
No.of doubling	-	5
Dilvery	-	4
Draft	-	6
Speed	-	40m/min
Type	-	Intersecting Gill
TPI	-	0.5
Cheese Wt.	-	400 gms
Production/day	-	0.40 MT

RING SPINNING:

Yarn formation is achieved by twist insertion.

Spindle speed	-	3500 rpm
Ring diameter	-	3 inch
Traveller type	-	Steel
Traveller No.	-	4/3 F
Drafting	-	4/3 Apron drafting
Draft constant	-	54.5
Draft	-	15

1. Break draft - 0.1
2. Middle draft - 4.3(Slip type)
3. Front draft - 35

Twist constant	-	296
TPI	-	6.7
Cop content	-	90 gms
Production/day	-	0.4 MT

Modern Ringframe employs **nylon traveller** to reduce hairiness.

WINDING:

Winding is done in hank or cone form. The cone weight is of 1Kg. Thread stop motion (automatic) is available. If double yarn is to be wound, then maximum 5ply can be produced.

2.3.4 DIFFERENCES BETWEEN JUTE AND COTTON SPINNING:

Carding:

The jute cards differ from the cotton cards, that in addition to the main cylinder, on the periphery are complimentary pairs of small rollers clad with pins called **worker** and **stripper**. The pins of the worker are set to work **against** those of the main cylinder where as the stripper pins are set in the **same** direction as the cylinder pins. On a breaker card. there are **2 pairs** of workers and strippers where as in finisher card, there are **more** number of workers / strippers and the pins are somewhat **finer** and set close together.

Drawframe:

The jute drawframes differ from the cotton drawframes that the fibres are being drafted and controlled by means of moving sheet of pins. The pins provide sufficient strain to stop, most of the short fibres from being drafted. All those drawframes also have a crimping system attached to their delivery which crimps or craves the silver to get a certain amount of cohesion to the strand.

Bobbiner:

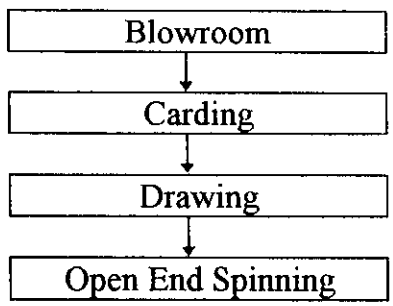
This machine has no resemblance to any machine of the cotton spinning sequence. The slivers are twisted by means of rubbing rollers and the drafted material is wound in form of cheese and taken to the ring frame.

Ringframe:

Jute ringframe is similar to the cotton system with the implementation of heavy travellers for these coarse jute yarns. Project works are now being carried out for implementation of nylon travellers in order to reduce the hairiness.

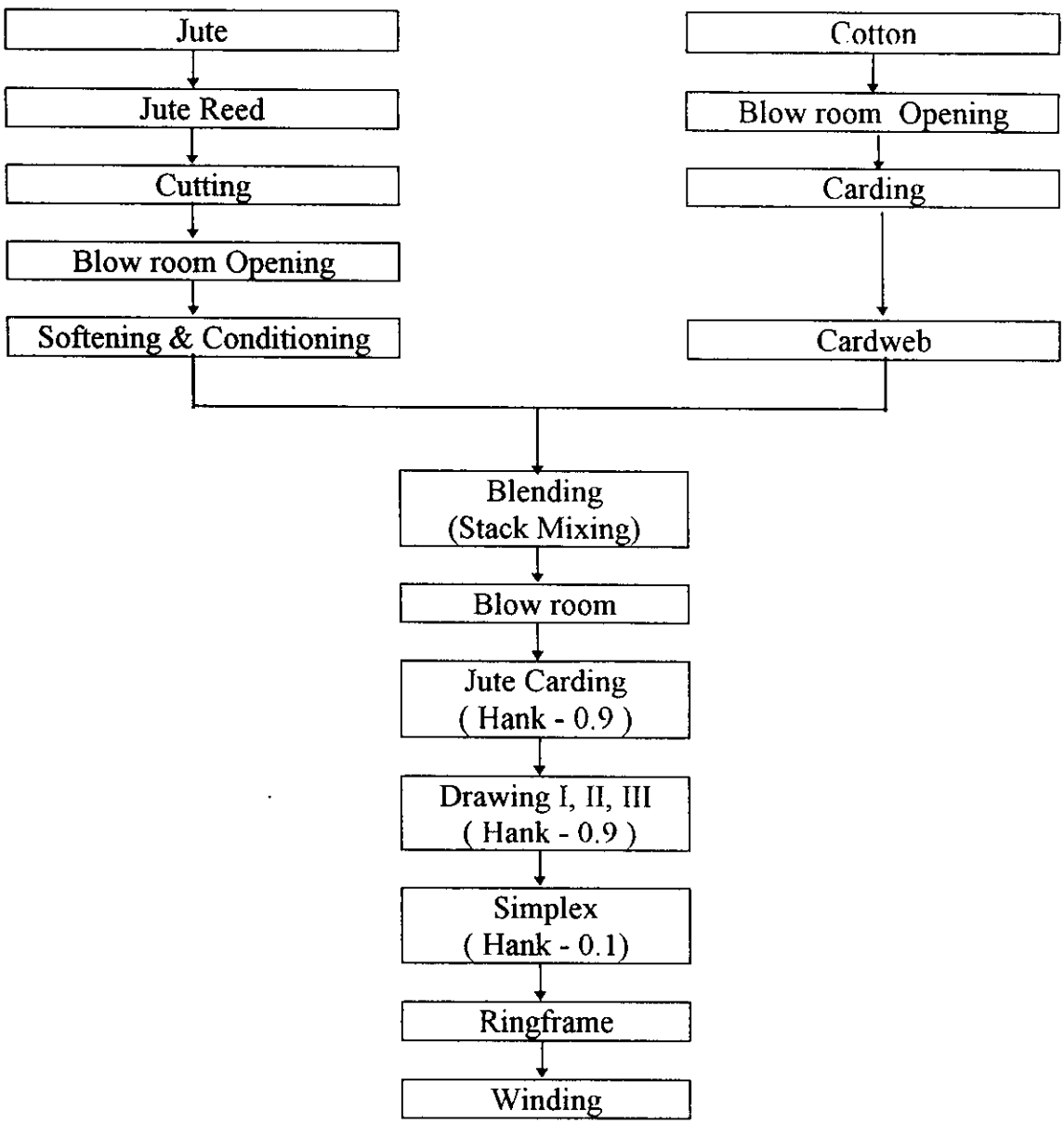
2.3.5 COTTON SPINNING : (20s & 10s)

PROCESS FLOWCHART:



2.3.6 JUTE /COTTON BLENDED YARN SPINNING :

PROCESS FLOW CHART:



2.4 JUTE / COTTON BLENDED YARNS :

Jute is blended with natural and synthetic textile fibres to make variety of value-added textile goods, jute-cotton blend is one such cheaper mix promoted to serve the clothing needs to millions of down-trodden people. Another advantage is that textile machineries handling cotton need only slight modifications when jute is included. The only disadvantage is that jute being brittle drops out considerably during spinning. Hence, the percentage of jute is be as ascertained, it is necessary for subsequent next processing. Mills procuring Jute-Cotton blended yarn need the exact percentage of jute. Pioneering work has been carried out on spinning of Jute/ Cotton blends in ringspinning system. In order to make use of jute yarns in house hold textiles, these yarns are to be improved in terms of appearance and wear life.

The quality standards for jute yarn is given in the appendix V.

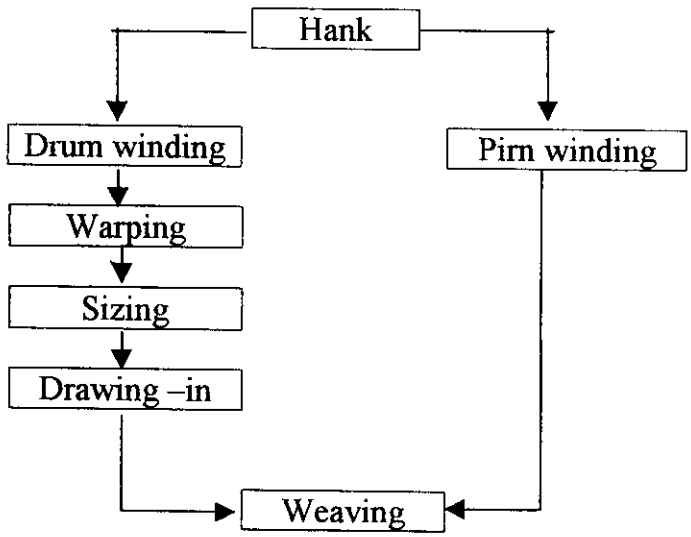
The essential quality control function in a jute spinning mill are;

1. Yarn strength test
2. Jute bundle strength test
3. Q.R.% for warp and weft Yarn
4. Diameter CV%, slub count for yarn
5. Constant tension winding test for yarn
6. Water hardness test
7. Process moisture checking; Raw jute to finished goods
8. Emulsion checking for stability (% min)
9. Dust and droppage checking analysis of drest to boiler etc.
10. Ends - Down in spinning.

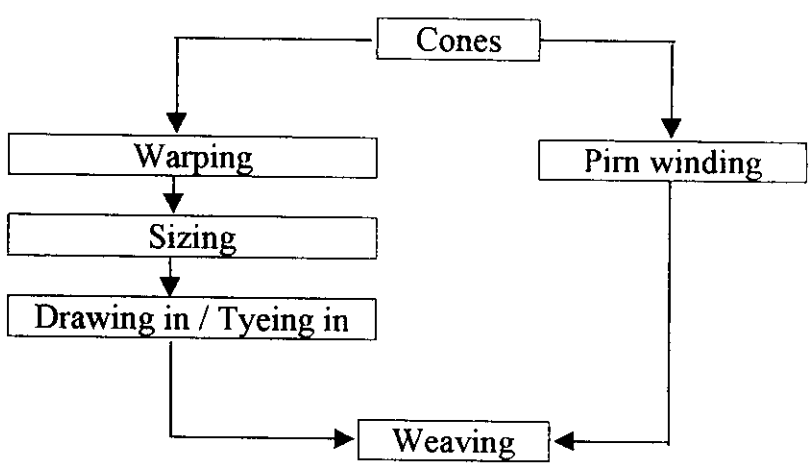
2.5 JUTE WEAVING:

2.5.1 Process flow chart for production of jute fabrics on

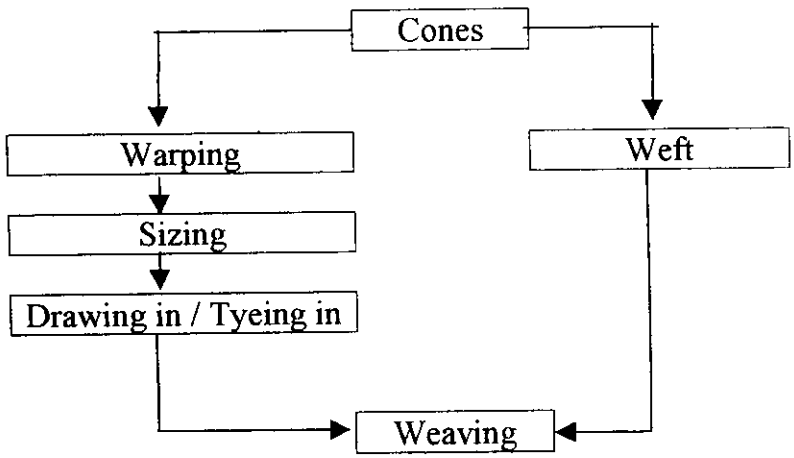
(1)Hand loom weaving:



(2)Power loom weaving:



(3)Shuttleless loom:



2.5.2 Jute blended fabrics :

When 100% cotton yarn as warp and Jute/cotton blend as weft is used to produce a fabric,the resultant fabric is called as JUTE/COTTON BLENDED FABRICS. Similarly with 100% cotton yarn in warp and raw jute in weft ,the resultant fabric is called as "UNION FABRIC".

2.5.3 Typical construction of some value added products :

1) Furnishing (90" x 60")

Warp	-	2/17s Cotton
Weft	-	6 lbs Jute
Ends / Inch	-	36
Picks / Inch	-	22

2) Blanket (71" x 46")

Warp	-	2/17s Cotton
Weft	-	6 lbs Jute
Ends/Inch	-	62
Picks / Inch	-	18

3) Wall Hanging (90" x 60")

Warp	-	2/17s Cotton
Weft	-	6 lbs Jute
Ends/Inch	-	64
Picks / Inch	-	24

4) Curtain (90" x 50")

Warp	-	2/17s Cotton
Weft	-	6 lbs Jute
Ends/Inch	-	60
Picks / Inch	-	28

2.6 SIZING OF JUTE YARNS:

Sizing is an important preparatory process which improves the weavability of the yarns. The process of weaving necessiates the warp thread to be kept under considerable tension and at the same time to be subjected to the abrasive action of different part of the loom. To prevent excessive warp breakge under these conditions and thus to attain increased production, the warp yarns are sized. The operation consists in coating the yarn with suitable materials which increases the abrasion resistance with reduction in hairiness and improvement in strength of the yarn as well as smoothness of its surface.

In the Indian jute Industry, T.K.P. is used exclusievely as the only suitable sizing material, the optimum add-on recommended being in the range of 3-5% on the weight of the yarn along with a suitable antiseptic (0.025 to 0.03% of the size paste). For achieving further improvement in the loom performance, an addition of lubricants, supplimentary adhesives and humactants either as such or in the form of proprietary products has been tried in the mills from time to time but the results obtained are not conclusive, although some trends towards improvement have been noted in some cases.

In jute weaving, the warp breakage alone on an average, account for about one-third of the total loss of efficiency and so three may be sufficient scope for improving the same by reduction of warp breakage.

At all levels of application, PVAC, increases the abrasion resistance of the warp yarn. Moreover, it improves the fibre shedding property of the yarn. The quality ratio of the warp yarn, in general, also improves on treatment with PVAC.

Singnificant improvement in weaving efficiency can be achieved at all concentrations of PVAC. The application of wax emulsion gives a beneficial effect on abrasion resistance. The sized yarns are then wound on a final warp beam and ready for the loom.

2.7 APPLICATIONS OF JUTE COTTON BLENDED FABRICS :

The Jute cotton blended fabric has many end-uses which some are given below :

Furnishing Fabrics:

Furnishing fabrics include heavy figures and jacquard fabrics used for drapery and upholstery purposes. Shrinkage of 7% in length and 5% in width has been usual and acceptable for these fabrics. But with the increasing use of

fitted sheets, this becomes more critical and maximum residual shrinking of 3% in length and width should be aimed for.

Bed Sheets:

Bed sheets is a piece of cloth woven with coloured yarn in the border lengthwise and widthwise and which may be used on a bed and includes plain, Satin, a combination of weaves with or without dobbies or jacquards. It has a width ranging from 110cm to 155cm and length from 1.5m to 2.8m.

Bed Covers:

Bed covers is a piece of cloth woven in grey or bleached or coloured yarn with or without checks or in floral or in geometrical designs with woven border and or headings having a decorative or coloured effect used as outer coverings of a bed when not in use. It has a width ranging from 75cms to 225cms and length from 1.5 cm to 2.8cms. It is of any weave including plain satin and combination of weaves with or without jacquards.

Apparel Fabrics:

Fabrics suitable for apparel end uses are being produced by NTC with SITRA assistance, but jute content is currently limited to around 15% of the fabric weight. Further rapier looms are required to increase weaving capacity of these yarns.

Soft luggage and Hand Bags:

For western export markets, Luggage fabrics must meet stringent performance requirements in terms of tensile strength, abrasive strength, water proofness elasticity, crease resistance, soil release and hairiness.

Shopping Bags:

Opportunities now appear to exist in two areas;

1. As new price promotional or supermarket or chain store bags, for free or nominal distribution by retailers.
2. As more "Sophisticated" bags for commercial sale to customer.

Table Mats:

These products are already being sold successfully into the use.

Jute Decorative Fabrics:

It is used for wall-Coverings and display fabrics for interior decoration. It is classified into all Jute decorative fabrics, rustic jute fabrics and Jute-Blended decorative fabrics.

All jute fabrics may be dyed or bleached or fully grey where certain natural colour of the fibre gives the final effect.

The rustic jute fabrics are normally made by using grey warp and bleached weft. The jute-blended fabrics are made either from Jute/Viscose, or Jute/Polypropylene - blended yarn.

Polymeric finished products:

These are the products deveoped from Jute/cotton blended fabric by polymeric finishing. This inlcude apparel fabrics, furnishing fabrics, Bed Sheets, Bed lines, Book binding cloth, water proof materials, Soft Luggage fabric, carry bags and school bags fabrics, Shoe upper, Flock fabric, compact jute fabric for fancy effects.

The strength and weakness of jute for being used in the various diversified products is given in the appendix VI.

2.8 DYEING OF JUTE BLENDED FABRICS :

- Fabric should be dyed in open width on jigger.
- Fibre /Yarn in hank form can be dyed with direct dye stuffs in open vat/vessel.
- A dye bath containing about containing about 0.5 - 1.0gm/litre sequestering agent and wetting agent(added if required) is set at 50°C.
- The material is then entered and stirred for about 10min to obtain uniform wetting.

Predisolved dye stuff is then added into the dye bath at about 50°C and stirring continued for 10min. Temperature of dye bath is then raised to boiling point with constant stirring at about 1°C per minute and dyeing continued for about 10 to 15min at boil.

Predissolved electrolyte (Common salt) about 10 to 15 gms /lit is then added to dye bath and dyeing is continued further for 30 to 40 min depending on depth of shade required.

The material is then rinsed with luke warm water at 45 to 50°C to remove the electrolyte and loose dye molecules before giving after treatment to improve wash fastness.

In general 3.5 gms/lit of dye fixing agent viz., Cationic dye fixing agent, metal salts, formaldehyde etc., are used during after treatment for enhancing the wash fastness of dyeing. However with restrictions being imposed on use of heavy metal salts and formaldehyde, cationic dye fixing agents are now used widely.

3. OBJECTIVES

The main objectives of our project are;

1. To weave fabric samples using cotton warp yarn and interlacing it with the following weft yarns.
    a. 100% cotton
    b. Raw Jute
    c. Jute / Cotton blend.

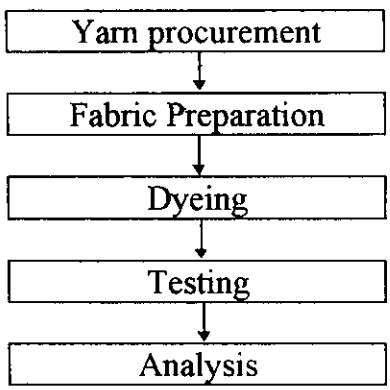
2. To evaluate the physical properties of the above fabric samples and find their suitablity for apparel use.

3. To estimate the margin of cost reduction by using Jute as weft yarn.

4. METHODOLOGY

4.1 OVERVIEW OF THE PROJECT :

An overview of the project is shown below:

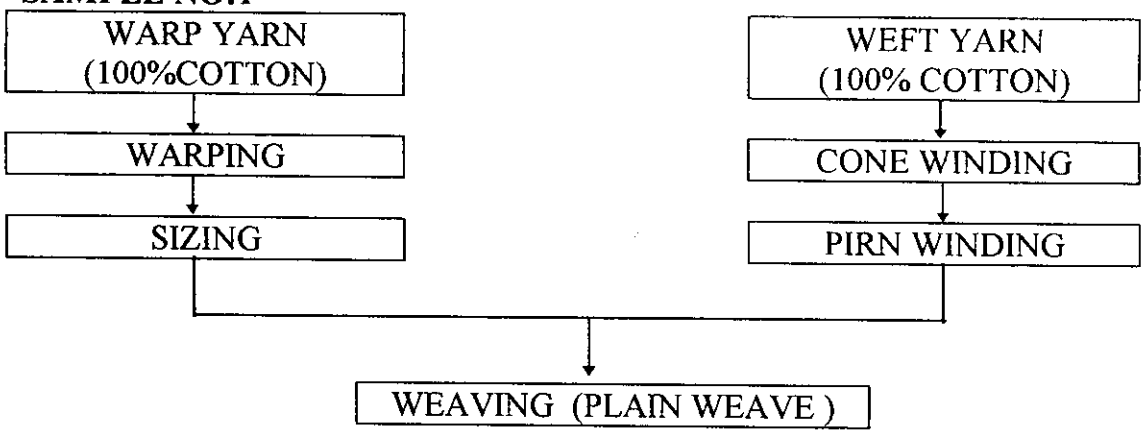


4.2 MATERIAL USED AND FABRIC CONSTRUCTIONS:

S.NO	WARP		WEFT		REED	PICK	WEAVE
	MATERIAL	COUNT	MATERIAL	COUNT			
1	COTTON	20s	COTTON	20s	56/2s	60	PLAIN
2	COTTON	20s	JUTE/COTTON	10s	56/2s	40	PLAIN
3	COTTON	10s	COTTON	10s	32/4s	60	DRILL
4	COTTON	10s	JUTE/COTTON	10s	32/4s	40	DRILL
5	COTTON	10s	JUTE	3s	32/4s	24	DRILL

4.3 FLOW CHART OF FABRIC PRODUCTION:

SAMPLE NO:1



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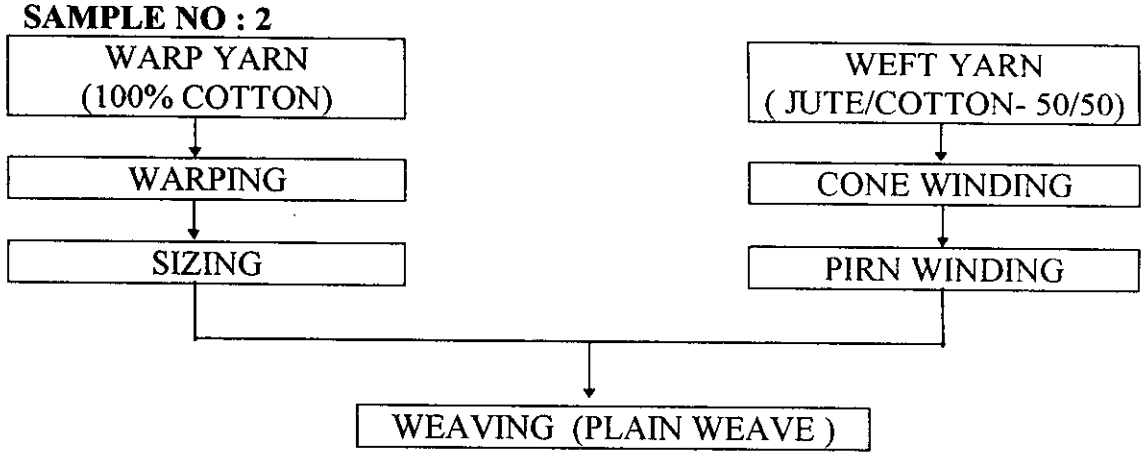

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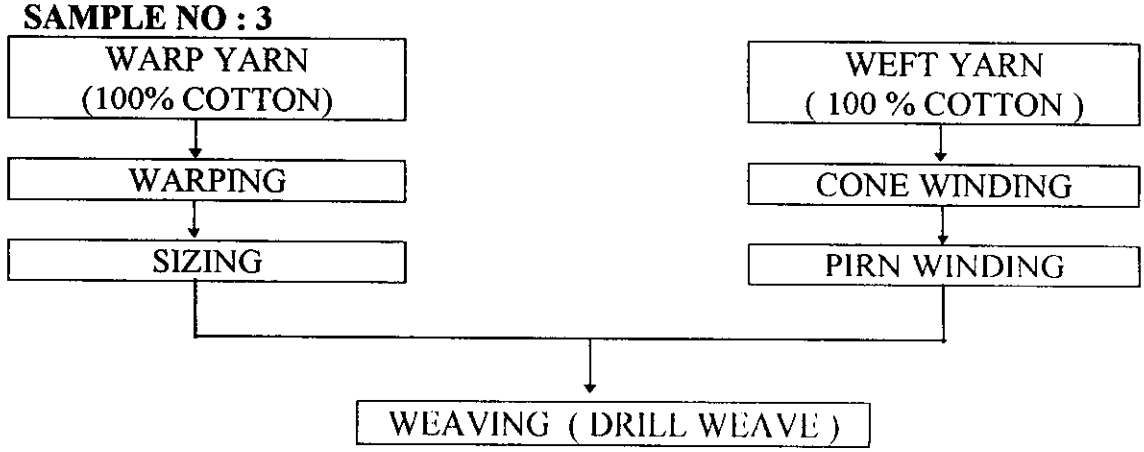

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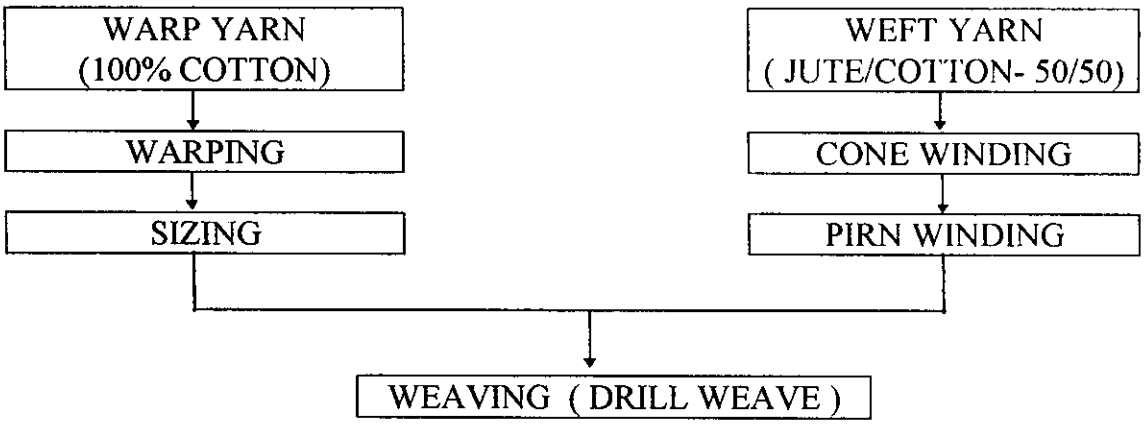

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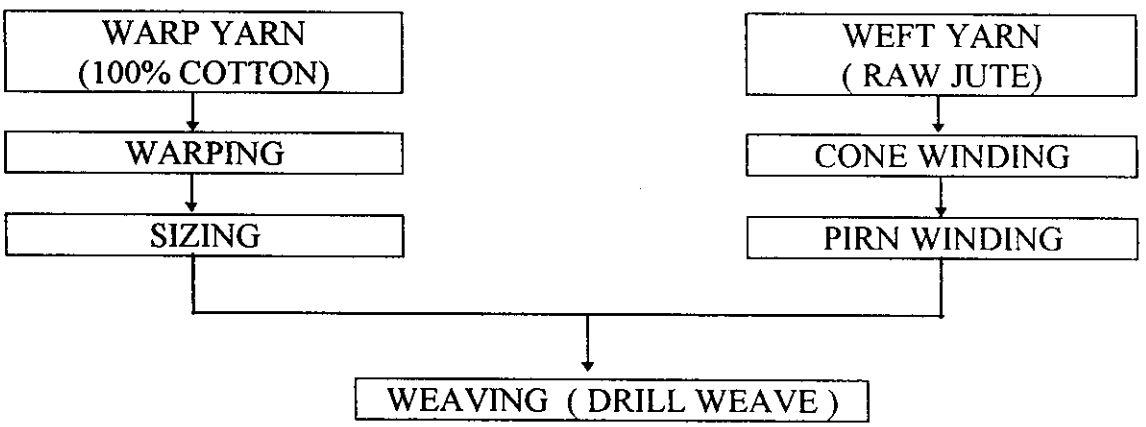


4.4 WEAVING DETAILS :

PIRN WINDING:

Make	-	Sri Krishna Foundary, Madurai
Type	-	Circular Conventional Vertical Type.
No.of Spindles	-	30
Type of Traverse	-	Wheel Type
Traverse Wheel dia	-	36 inches
Spindle speed	-	10200 rpm
Pirn diameter	-	1.2 inches
Pirn length	-	8 inches

Winding time per pirn for different material is given below :

	COTTON	JUTE/COTTON	RAW JUTE
COUNT	20s	10s	3s
WINDING TIME PER PIRN	7 MIN	3.5 MIN	45 SEC

LOOM DETAILS FOR PLAIN WEAVE :

Make - Venkateswara loom works, Bangalore

Type - Conventional Plain loom

Loom Width - 69 inches

Loom speed - 120 rpm

Reed width - 65 inches

Reed count - 56/2 s

Take up motion type - 7-Wheel

Let off - Negative

Total No. of ends - 3800

LOOM DETAILS FOR DRILL WEAVE :

Make - Venkateswara loom works, Bangalore.

Type - Non-automatic

Loom Width - 69 inches

Loom Speed - 110 rpm

Reed width - 60 inches

Reed count - 32/4 s

Take-up motion Type - 7 - Wheel

Let off - Negative

Total no.of ends - 3700 ends.

4.5 PROBLEMS FACED WHILE WEAVING JUTE FABRICS :

We faced the following problems in the loom while weaving the jute and jute / cotton fabrics.

When Using "RAW JUTE" On Plain And Drill Weave Fabrics :

- We faced with problem of frequent shuttle fly outs, due to warp getting excessively tensioned, which inturn due to negative type of letoff motions, that needed constant regulation and adjustments of dead weight in relation to beam diameter. The problem was acute in case of using raw jute as weft in plain fabrics that forced us to withdraw any further weaving.

- With drill weave the problems were less and we were able to weave without much of difficulty.

- When weaving Jute / cotton blended yarn and 100% cotton yarns as weft we did not face any difficult and weaving was smoothly carried out.

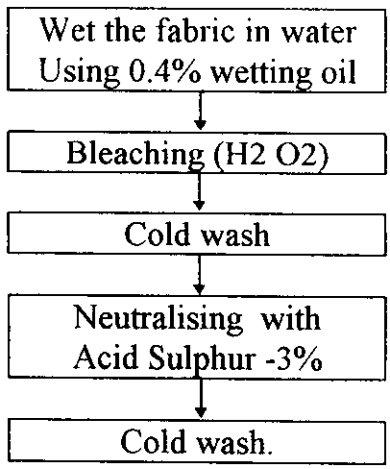
- "Fibre shedding" was very high when weaving raw jute as weft.

4.6 PROCESSING DETAILS :

BLEACHING :

For bleaching of Jute and jute cotton blended fabric **hydrogen peroxide** is more preferred.

Processing Sequence:

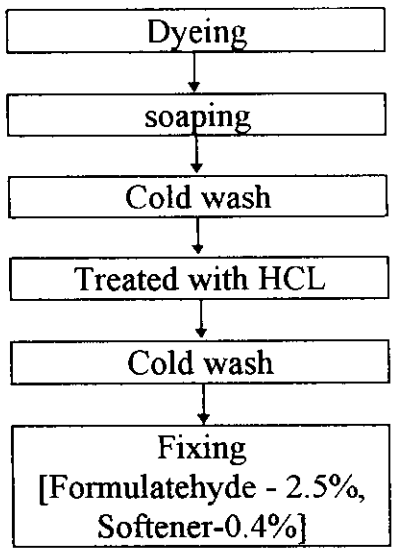


Receipe:

M : L Ratio	-	1 :20
Soda Ash [Ceromex RNw]	-	1.5% O.W.M.
Caustic Soda	-	2% O.W.M.
Stabiliser [Es 10]	-	0.4% O.W.M.
Peroxide [50%]	-	3% O.W.M.
Temperature	-	80°C
Time	-	1 .5 Hours.

Processing Sequence :

1. Dissolve the dye stuff in water.
2. The amount of dye depends on the depth of shade.
3. Immerse the fabric into dye bath.
4. Half protion of dye solution poured in dye bath and material passed.
5. Again second half portion of dye solution poured into dye bath process for 15 minutes at temperature of 60°C.
6. Common salt added. Dyed for 30 Minutes at 90°C.
7. Alkali is then added and dyed for 30-60 minutes.



Receipe:

Black	-	5% O.W.M.
Reactive Red Mbb	-	0.5% O.W.M.
Salt	-	0.8% O.W.M.
Soda Ash	-	1.5% O.W.M.
Time	-	2 .5 HOURS
Temperature	-	60°C
M : L Ratio	-	1 : 20

4.7 TESTING INSTRUMENTS AND PROCEDURES :

The following physical properties of fabrics were tested using the appropriate instruments given in below.

S.No.	PROPERTY	INSTRUMENT
1.	Ends / inch and picks/inch	Counting glass
2.	Fabric Weight	Electornic Balance
3.	Shrinkage in width	Measuring tape
4.	Fabric thickenss	Shriley Thickness gauge

5.	Bending properties	Fabric stiffness tester
6.	Crease recovery	Crease recovery tester
7.	Tensile strength and Elongation	Tensile strength tester
8.	Tear strength	Elemndorf tear strength tester
9.	Bursting strength	Bursting strength tester
10.	Abrasion Resistance	Martindale Abrasion resistance

4.7.1 Ends / Inch and Picks / Inch :

The determination of fabric count measures the number of warp yarns per inch and the number of weft yarns per inch. The fabric count is the number of warp and weft yarns per unit distance while the fabric is held without tension and is free from folds and wrinkles.

In the woven fabric the warp yarns are reffered to as "ends". The number of warp threads/inch is called "ends/inch". The threads of weft are referred to as "picks" and the number of weft threads per inch is called "picks/inch". This can be counted using counting glass.

The counting glass is a small maginifying glass in a stand over a square exactly one inch each way. The number of threads in the field directly gives the number of threads per inch. This is the method generally used.

4.7.2 Fabric weight:

Principle :

The weight of the fabric can be described as weight per unit area in terms of ounces per square yard (or) grams per square yard (or) grams per square metre.

Procedure:

A square sample is cut from the fabric and weighed in the electronic balance which gives the weight in grams or ounces.

4.7.3 Fabric Width :

Principle :

Fabric width is the distance between two extremes inclusive of both selvedges, measured perpendicular to the length of the fabric.

Procedure:

The cloth is laid on a smooth flat measuring table without applying more tension. The tension applied must be just sufficient to keep the fabric straight and flat. Then a measuring scale is placed at right angles to the selvedge, and the width of the fabric is measured correct to 10mm for width over 100cm.

4.7.4 Fabric Thickness:

Principle & Procedure :

The fabric is kept between two plain parallel plates and a known arbitrary pressure is applied between the plates and maintained. Then the distance between the plates is measured precisely, the thickness is read from the dial of the instrument. But the selvedges and creased areas should be avoided. The thickness is measured at five places and the mean value is reported. No specimen preparation is required.

4.7.5 Bending stiffness:

Principle :

The shirely stiffness tester is used to mesure the fabric stiffness by the cantilever principle.

Sample Preparation:

The sample is conditioned in the standard testing atmosphere and using the template the specimens are cut to the size of 6 inch x 1 inch.

Procedure :

The specimen is placed on the platform with the template at the top of it so that the leading edges coincides. Both are slowly pushed forward until the leading edges of the specimen and the template project beyond the edge of the platform. With the eye in a position so that the index lines coincides, the sliding of the speicmen is stopped when it cuts both index lines. The bending length can be read from the scale opposite to a datum line engraved on the side of the platform.

4.7.6 Crease Recovery :

Principle:

A wrinkle - free rectangular specimen of prescribed dimensions is folded in half and compressed under a load for a specified time. The load is then removed and the specimen is allowed to recover for the specified time. The amount of recovery is expressed as the angle betwen the limbs of the fold which is called the "crease recovery angle".

Sample Preparation:

Ten test specimens are cut from the fabric with a template , 2 inches long by 1 inch wide.

Using a pair of scissors or blade with their longer side parallel to warp and weft threads respectively the specimens cut in such a way that no two warp way specimens contain the same set of warp yarns and no two weft way

specimens contain the same set of weft yarns. The specimens should not be cut from creased, bent or other deformed parts of the sample and also not from within 2 inches from the selvedges.

Since the moisture present in the fabric influences the results the tests are carried out after conditioning in the standard atmosphere.

Procedure:

The instrument is levelled with the help of the levelling screws and spirit level. The specimen is folded gently end to end with its edges in one line, with the help of the tweezers. The edges should not gripped more than 5mm in the tweezers. The folded specimen is placed on the lower plate of the loading device and the load is applied gently.

Before loading, a metal foil with thickness not more than 0.02mm is placed between the limbs of the specimen. The load is then removed after 5 minutes.

4.7.7 Tensile Strength And Elongation :

Principle :

The breaking strength is a measure of the resistance of the fabric to a tensile load in either warp or weft direction.

Sample Preparation :

The sample width is 2 inches and the test length is 8 inches. The sample is cut for 2.5 inches width and ravelling of the sample is necessary.

Procedure:

A catch is provided for the upper clamp to mount the sample without distrubing the pointer on the dial. Place the sample in the clamps. The specimen should be so placed that yarns are broken prependicular to the load. Apply load to the sample till it breaks. The breaking strength and elongation is noted from the scale of the instrument.

4.7.8 Tear Strength :

Principle:

The average force required to continue a tongue type tear in a fabric is determined by measuring the work done in tearing it through a fixed distance.

Sample Preparation :

From the fabric sample, warp way and weft way test specimens of the required size are preapred with the help of the template. The length wise direction shall be parallel to the warp or weft direction for which the tearing strength is required. The specimens are cut so that no two warp way specimens contain the same set of warp yarns and no weft way specimens contain the same set of weft yarns.

Procedure:

The instrument is levelled and adjusted for zero point. The capacity of the instrument is selected so that the specimen tears between 20 and 60 percent of the scale value.

The pendulum is raised to the starting position and the pointer is set against its stop. The conditioned test specimen is fixed in the clamps so that it is well centred, with bottom edge set against the marks and upper edge parallel

to the top of the clamps. Then the clamps are tightened using approximately the same force on both the clamps.

The pendulum is then released by depressing the pendulum stop. The stop is held down until after the tear is completed and the pendulum is caught on the return swing by the hand without distrubing the position of the pointer. The reading opposite to the pointer is noted directly.

4.7.9 Bursting Strength

Principle:

The pressure in a liquid is exerted in all directions and this phenomenon of a liquid is used for testing bursting strength in Hydraulic bursting strength tester.

Sample Preparation:

The specimen for this test should be cut so that the sample is 1/2 inch greater in diameter than the outside diameter of the clamp ring. Ten specimens are chosen avoiding inclusion of the same ends in the different speicmens.

Procedure:

The specimen is clamped by a ring over a thin flexible rubber diaphragm which itself is clamped over a circular hole in the upper face of the reservoir. The liquid used may be water or glycerine. The pressure in the liquid is increased, by valves or screw-driven piston. Due to increase in pressure, the diaphragm bulges, taking with it the specimen. At some point the fabric bursts, and the pressure at that point is indicated by the pressure gauge.

4.7.10 Abrasion Resistance :

Principle :

The martindale abrasion tester is used for determining the resistance to abrasion of all cloth. The design of the instrument makes use of the principle of two simple harmonic motions working at right angles. The instrument can be used for getting circular or linear motion.

Sample Preparation:

Sample is cut using template of 38mm diameter. Sample is cut at different places of fabric and tested.

Procedure:

The top plate consists of four holes to carry the circular sample holders and they can be clamped to the top plate. The specimens are fixed on the sample holders and are able to move vertically in the clamp bushes. The sample holders touch the table surface, it will be flat and will move in the same plane in which the top plate slides. Because of this movement the cloth is rubbed against the cloth surface in harmonic pattern. Hence the loss in weight of the samples for known 25 cycles and 200 gram weight is calculated.

5. RESULSTS AND DISCUSSIONS

The samples were tested for their physical properties such as wt/sq.m, Tensile strength, Elongation, tearing strength, thickness, crease revcovery and abrasion resistance. A comprehensive study of the various properties of all the samples produced were made.

The results of the study are discussed in detail for each and every property and are given in the following pages;

5.1 Increase In Ends Per Inch :

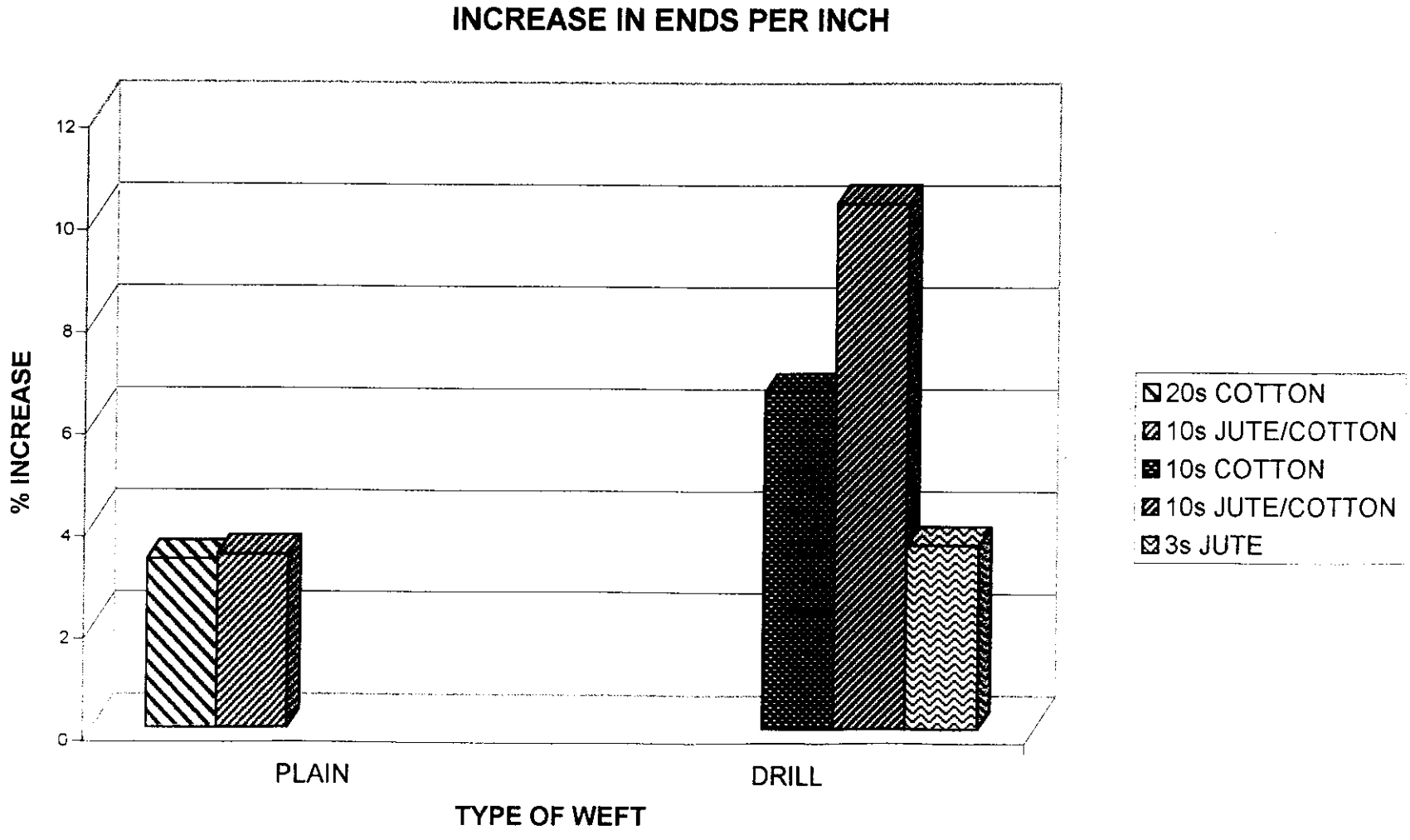
The increase in Ends/Inch of the various fabrics is given in the following table.

Table 1

TYPE OF WEAVE	S. No.	EPI x PPI	COMPONENT		ENDS / INCH		
			WARP	WEFT	GREY	DYED	% INCREASE
PLAIN	1	56 x 60	20s COTTON	20s COTTON	60	62	3.3
	2	56 x 40	20s COTTON	10s J/C	58	60	3.4
DRILL	1	64 x 40	10s COTTON	10s COTTON	60	64	6.6
	2	64 x 40	10s COTTON	10s J/C	58	64	10.3
	3	64 x 24	10s COTTON	3s JUTE	56	58	3.6

As far as the plain weave fabrics are concerned, the increase is almost uniform for both 100% cotton and Jute / cotton blended weft fabrics.

In case of drill fabrics, the % increase was very high in Jute / cotton blended weft fabric and very low % increase was noted in raw jute weft fabric.


INCREASE IN ENDS PER INCH
% INCREASE
12
10
8
6
4
2
0
PLAIN
DRILL
TYPE OF WEFT
20s COTTON
10s JUTE/COTTON
10s COTTON
10s JUTE/COTTON
3s JUTE

5.2 Increase In Picks Per Inch :

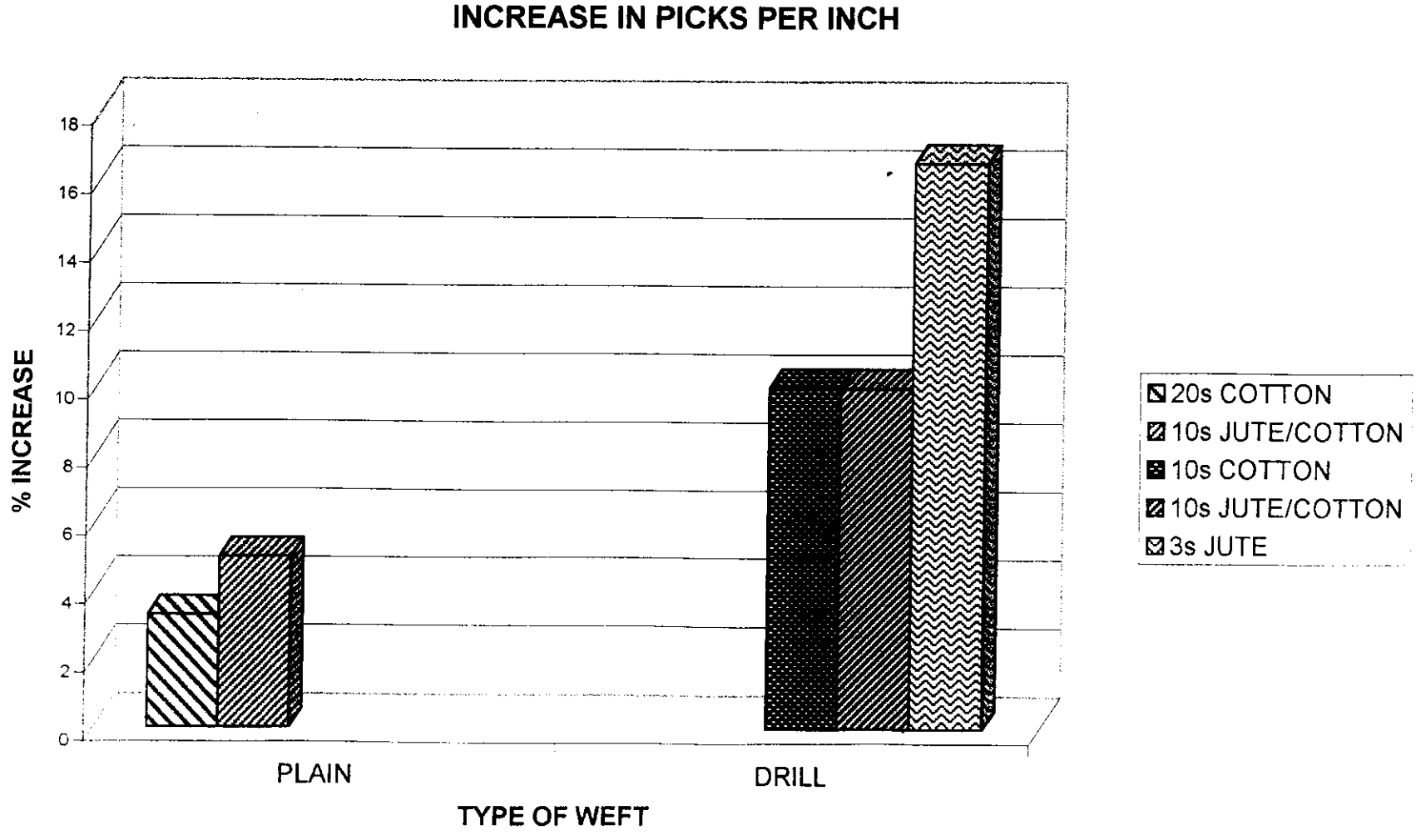
The increase in Picks/Inch of the various fabrics is given in the following table.

Table 2

TYPE OF WEAVE	S. No.	EPI x PPI	COMPONENT		PICKS / INCH		
			WARP	WEFT	GREY	DYED	% INCREASE
PLAIN	1	56 x 60	20s COTTON	20s COTTON	60	62	3.3
	2	56 x 40	20s COTTON	10s J/C	40	42	5
DRILL	1	64 x 40	10s COTTON	10s COTTON	40	44	10
	2	64 x 40	10s COTTON	10s J/C	40	44	10
	3	64 x 24	10s COTTON	3s JUTE	20	28	16.6

It was noticed that in the case of plain weave fabrics, the difference in % increase between 100% cotton weft fabric and jute / cotton blended weft fabric was minimal.

But when analysed for drill fabrics, we found the % increase of picks/inch was same for cotton and J/C weft fabrics and was extremely high for raw jute weft fabric.


INCREASE IN PICKS PER INCH
% INCREASE
18
16
14
12
10
8
6
4
2
0
PLAIN
DRILL
TYPE OF WEFT
20s COTTON
10s JUTE/COTTON
10s COTTON
10s JUTE/COTTON
3s JUTE

5.3 Increase In GSM :

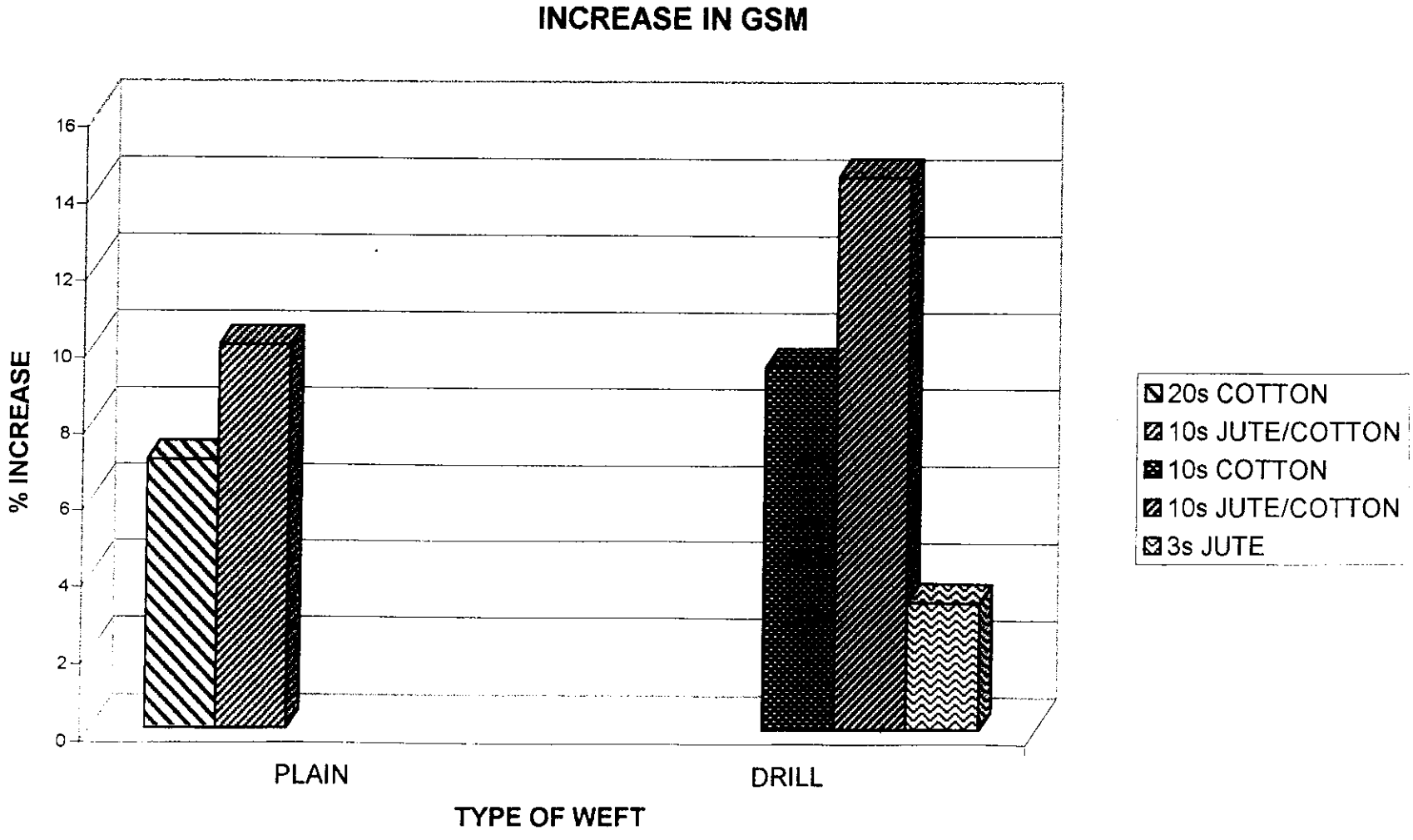
The GSM values of the various fabrics is given in the following table.

Table 3

TYPE OF WEAVE	S. No.	EPI x PPI	COMPONENT		GSM		
			WARP	WEFT	GREY	DYED	% INCREASE
PLAIN	1	56 x 60	20s COTTON	20s COTTON	146	157	7.0
	2	56 x 40	20s COTTON	10s J/C	165	184	10
DRILL	1	64 x 40	10s COTTON	10s COTTON	275	301	9.45
	2	64 x 40	10s COTTON	10s J/C	236	270	14.4
	3	64 x 24	10s COTTON	3s JUTE	361	373	3.32

The results in case of plain fabrics shows a marginal diference in the % increase in wt/sq.m of both 100% cotton weft fabric and Jute / cotton weft fabric.

The results for drill fabrics show the same marginal difference for both 100% cotton weft fabric and Jute / Cotton weft fabric like the plain fabrics, but the % increase of weight was very low in case of raw jute weft fabric.


INCREASE IN GSM
% INCREASE
16
14
12
10
8
6
4
2
0
PLAIN
DRILL
TYPE OF WEFT
20s COTTON
10s JUTE/COTTON
10s COTTON
10s JUTE/COTTON
3s JUTE

5.4 Shrinkage in width :

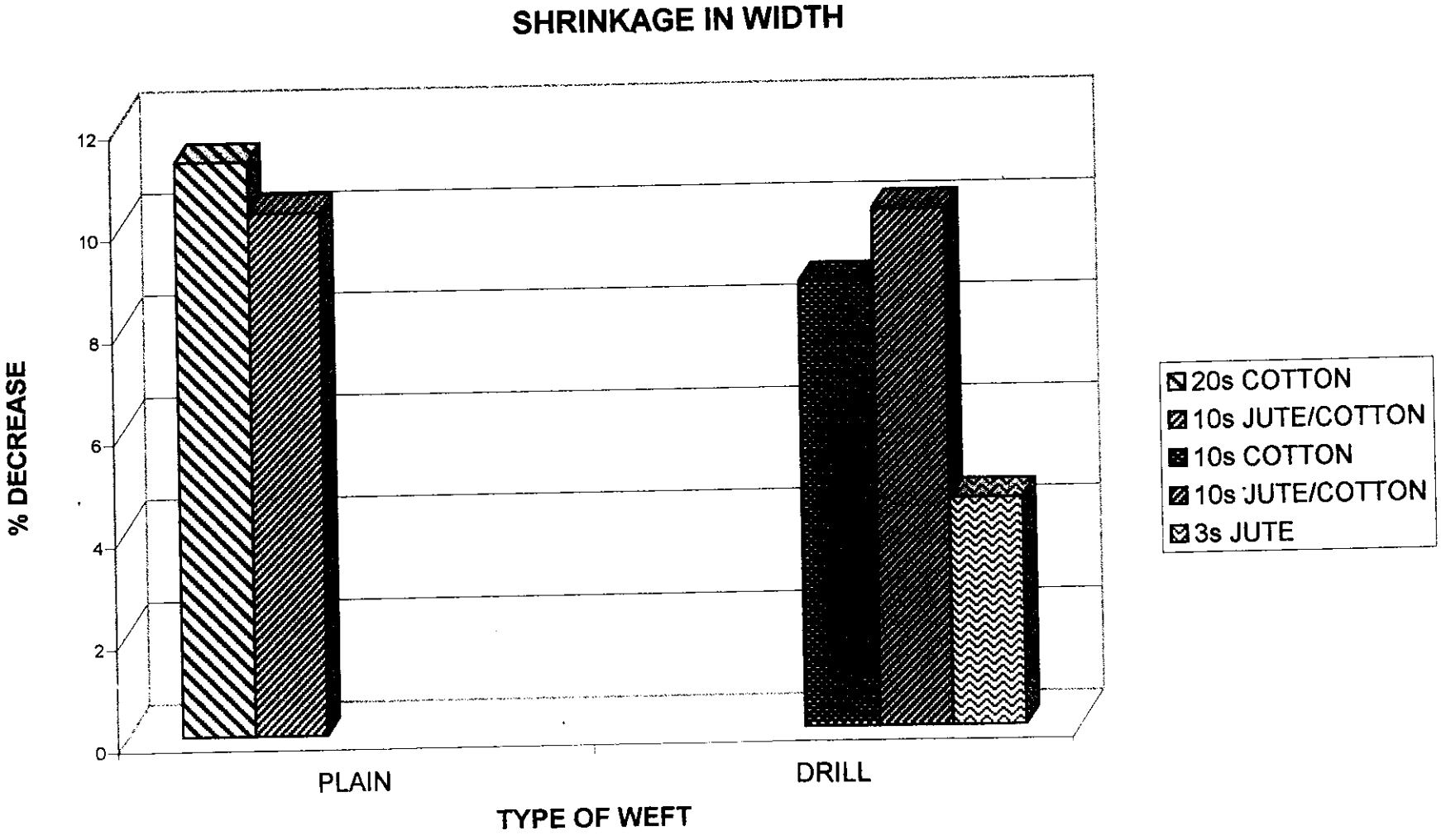
The width of the various fabrics is given in the following table.

Table 4

TYPE OF WEAVE	S. No.	EPI x PPI	COMPONENT		WIDTH IN CMS		
			WARP	WEFT	GREY	DYED	% DECREASE
PLAIN	1	56 x 60	20s COTTON	20s COTTON	160	142	11.25
	2	56 x 40	20s COTTON	10s J/C	166	149	10.24
DRILL	1	64 x 40	10s COTTON	10s COTTON	149	136	8.72
	2	64 x 40	10s COTTON	10s J/C	153	137.5	10.13
	3	64 x 24	10s COTTON	3s JUTE	157	150	4.45

In case of plain fabric the % of shrinkage in width is almost equal for both 100% cotton weft & Jute / cotton blended weft fabrics.

In the case of drill fabrics the % of shrinkage was very high in Jute / cotton weft fabric and is very low in 100% jute weft fabric.


SHRINKAGE IN WIDTH
% DECREASE
12
10
8
6
4
2
0
PLAIN
DRILL
TYPE OF WEFT
20s COTTON
10s JUTE/COTTON
10s COTTON
10s JUTE/COTTON
3s JUTE

5.5 Thickness :

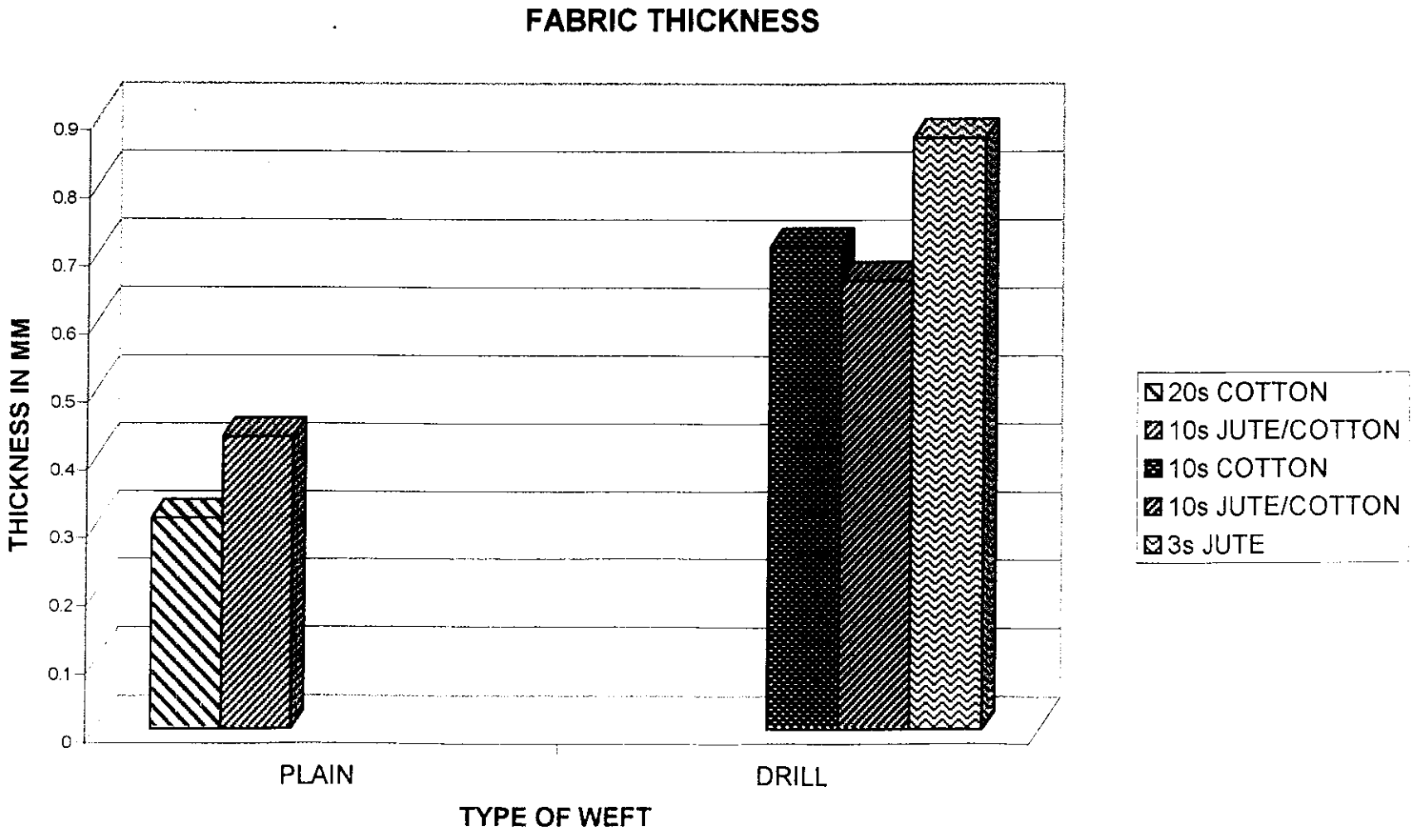
The thickness values of the various fabrics is given in the following table.

Table 5

TYPE OF WEAVE	S. No.	EPI x PPI	COMPONENT		THICKNESS IN MM	
			WARP	WEFT	GREY	DYED
PLAIN	1	56 x 60	20s COTTON	20s COTTON	0.24	0.31
	2	56 x 40	20s COTTON	10s J/C	0.42	0.43
DRILL	1	64 x 40	10s COTTON	10s COTTON	0.67	0.71
	2	64 x 40	10s COTTON	10s J/C	0.56	0.66
	3	64 x 24	10s COTTON	3s JUTE	1.09	0.87

In the case of plain weave fabrics, the thickness is high in Jute / cotton weft fabric.

While analysing the drill fabrics, we noticed that raw jute weft fabric has the highest thickness compared to cotton and jute / cotton blended weft fabric.


FABRIC THICKNESS
THICKNESS IN MM
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
PLAIN
DRILL
TYPE OF WEFT
20s COTTON
10s JUTE/COTTON
10s COTTON
10s JUTE/COTTON
3s JUTE

5.6 Tensile Strength :

The tensile strength of the various fabrics is given in the following table.

Table 6

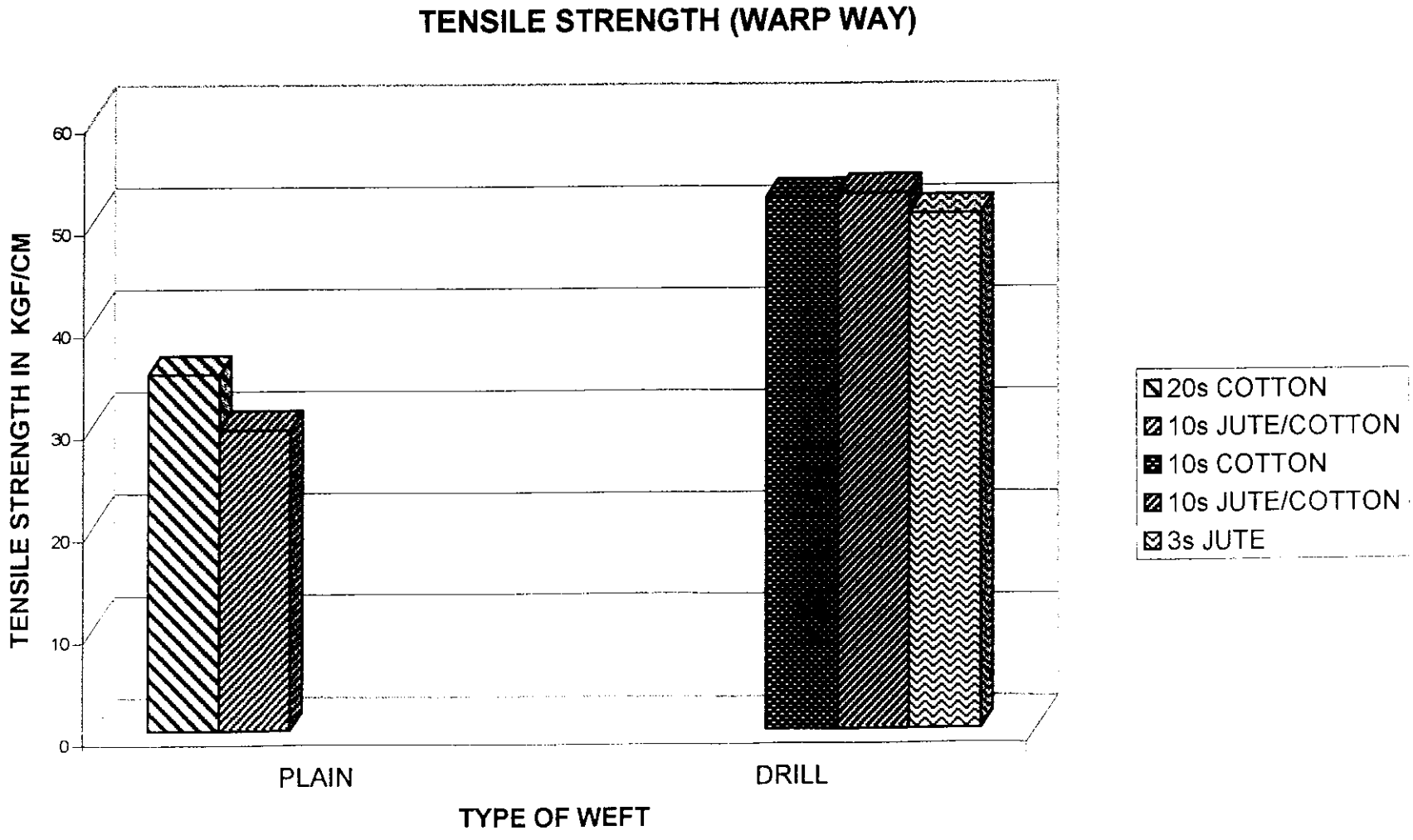
TYPE OF WEAVE	S. No.	EPI x PPI	COMPONENT		IN KG F / CM	
			WARP	WEFT	WARP WAY	WEFT WAY
PLAIN	1	56 x 60	20s COTTON	20s COTTON	34.97	38.20
	2	56 x 40	20s COTTON	10s J/C	29.51	38.74
DRILL	1	64 x 40	10s COTTON	10s COTTON	52.13	38.99
	2	64 x 40	10s COTTON	10s J/C	52.51	44.56
	3	64 x 24	10s COTTON	3s JUTE	50.53	49.34

In case of plain weave fabrics, the warp way tensile strength is higher in case of 100% cotton fabric compared to Jute / cotton blend fabric.

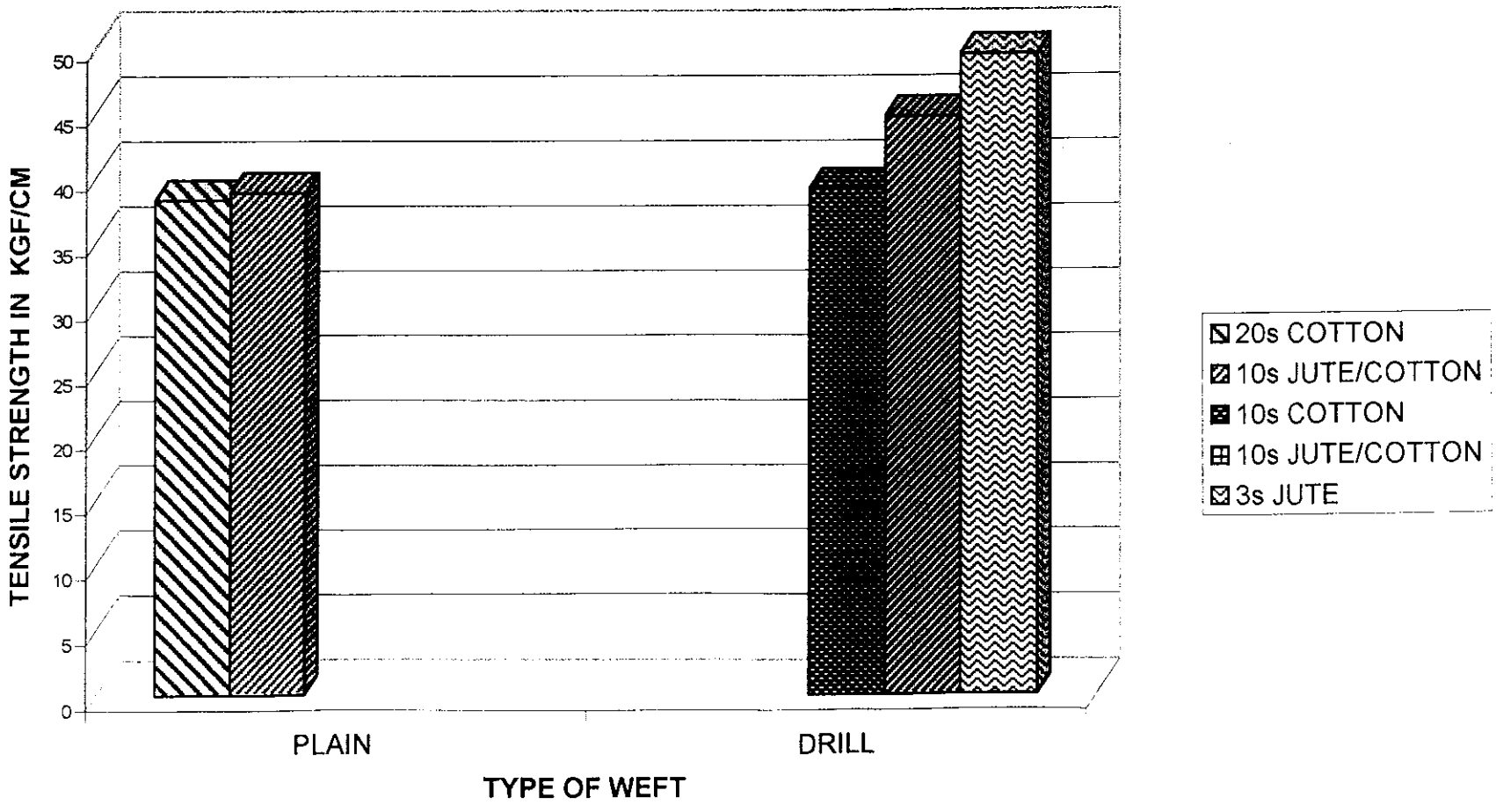
The weft way tensile strength is almost the same for both 100% cotton as well as Jute / Cottton blend fabrics.

In case of drill weave fabrics, warp way tensile strength of 100% cotton fabric and Jute / cotton blended fabric is almost similar, whereas for raw Jute weft fabric, the warp way tensile strength is 3.1% lower compared to cotton weft fabric.

In case of weft way tensile strength raw jute weft fabric has the highest tensile strength followed by Jute / cotton blend fabric and finally very low for 100% cotton weft fabric. The jute and jute / cotton blended weft fabrics have respectively 26.5% and 14.3% higher strength in weft way, compared to cotton weft fabric.


TENSILE STRENGTH (WARP WAY)
TENSILE STRENGTH IN KGF/CM
60
50
40
30
20
10
0
PLAIN
DRILL
TYPE OF WEFT
20s COTTON
10s JUTE/COTTON
10s COTTON
10s JUTE/COTTON
3s JUTE

TENSILE STRENGTH (WEFT WAY)



5.7 Tensile Elongation :

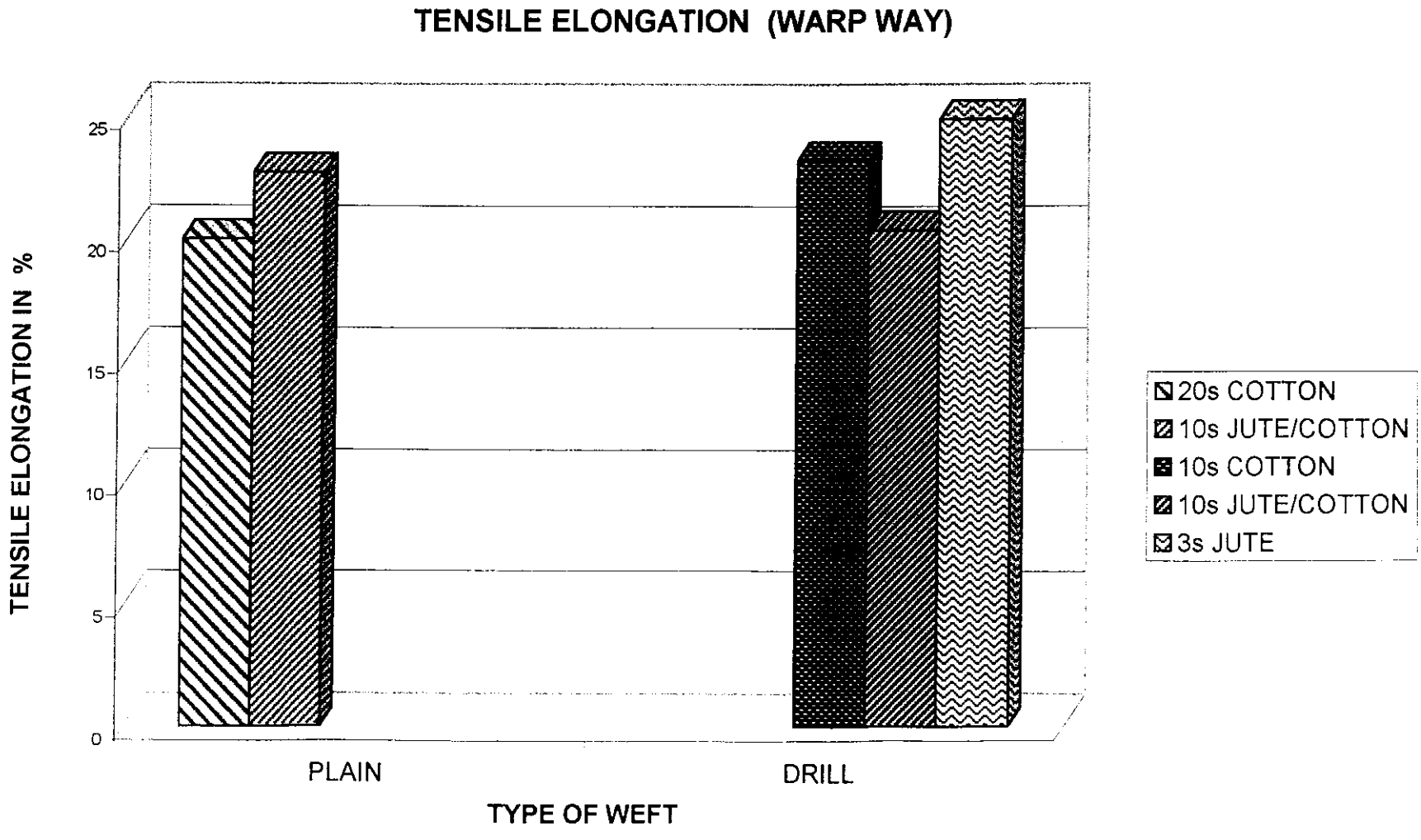
The values of Tensile Elongation for the various fabrics is given in the following table.

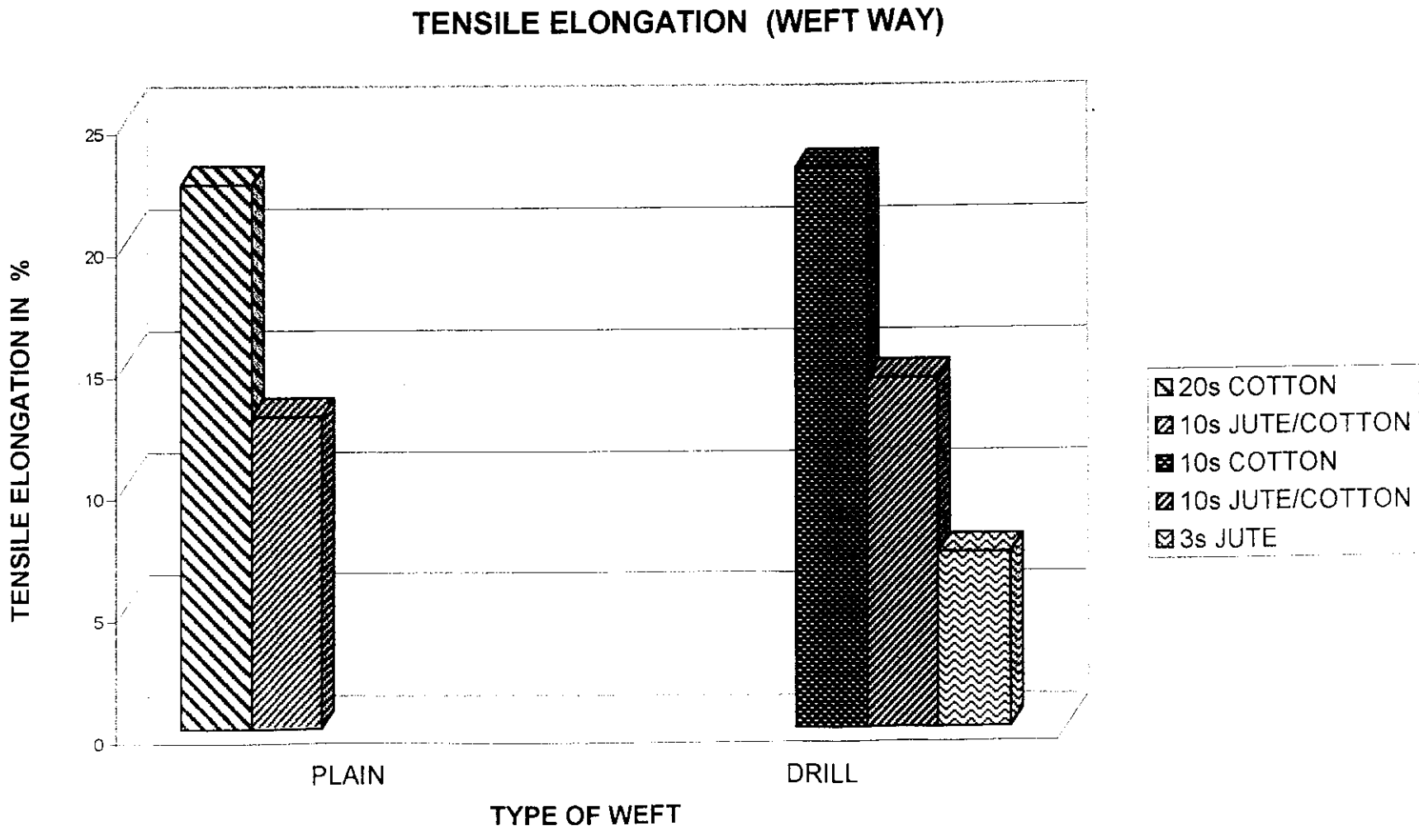
Table 7

TYPE OF WEAVE	S. No.	EPI x PPI	COMPONENT		IN PERCENTAGE	
			WARP	WEFT	WARP WAY	WEFT WAY
PLAIN	1	56 x 60	20s COTTON	20s COTTON	20.00	22.35
	2	56 x 40	20s COTTON	10s J/C	22.73	12.83
DRILL	1	64 x 40	10s COTTON	10s COTTON	23.22	22.94
	2	64 x 40	10s COTTON	10s J/C	20.38	14.34
	3	64 x 24	10s COTTON	3s JUTE	24.93	7.16

When analysing the warp way elongation for both plain and drill fabrics, we find the elongation % is almost similar for all the samples.

But results show that, in weft way elongation for both plain and drill fabrics, 100% cotton weft fabric has the highest elongation. Also jute / cotton blended weft fabric and raw jute weft fabrics have respectively,60% and 74.2% lower elongation compared to cotton weft fabric.


TENSILE ELONGATION (WARP WAY)
TENSILE ELONGATION IN %
25
20
15
10
5
0
PLAIN
DRILL
TYPE OF WEFT
20s COTTON
10s JUTE/COTTON
10s COTTON
10s JUTE/COTTON
3s JUTE


TENSILE ELONGATION (WEFT WAY)
TENSILE ELONGATION IN %
25
20
15
10
5
0
PLAIN
DRILL
TYPE OF WEFT
20s COTTON
10s JUTE/COTTON
10s COTTON
10s JUTE/COTTON
3s JUTE

5.8 Tearing Strength :

The Tearing Strength values of the various fabrics is given in the following table.

Table 8

TYPE OF WEAVE	S. No.	EPI x PPI	COMPONENT		IN gf	
			WARP	WEFT	WARP WAY	WEFT WAY
PLAIN	1	56 x 60	20s COTTON	20s COTTON	1244.8	1369.6
	2	56 x 40	20s COTTON	10s J/C	1513.6	2284.8
DRILL	1	64 x 40	10s COTTON	10s COTTON	2412.8	2118.4
	2	64 x 40	10s COTTON	10s J/C	2291.2	3264.0
	3	64 x 24	10s COTTON	3s JUTE	3795.2	-

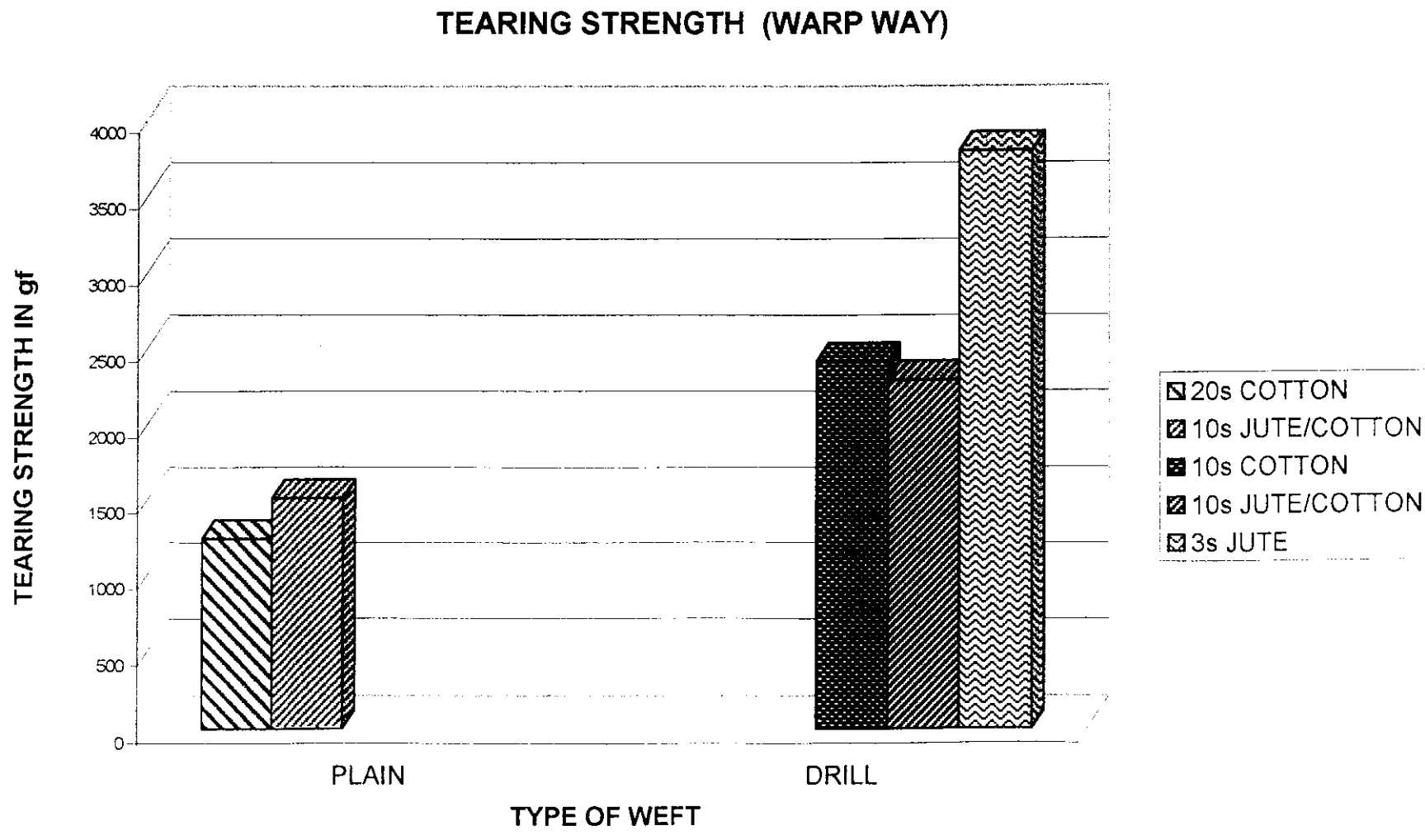
The results shows a marginal difference in the warp way tearing strength of plain fabrics.

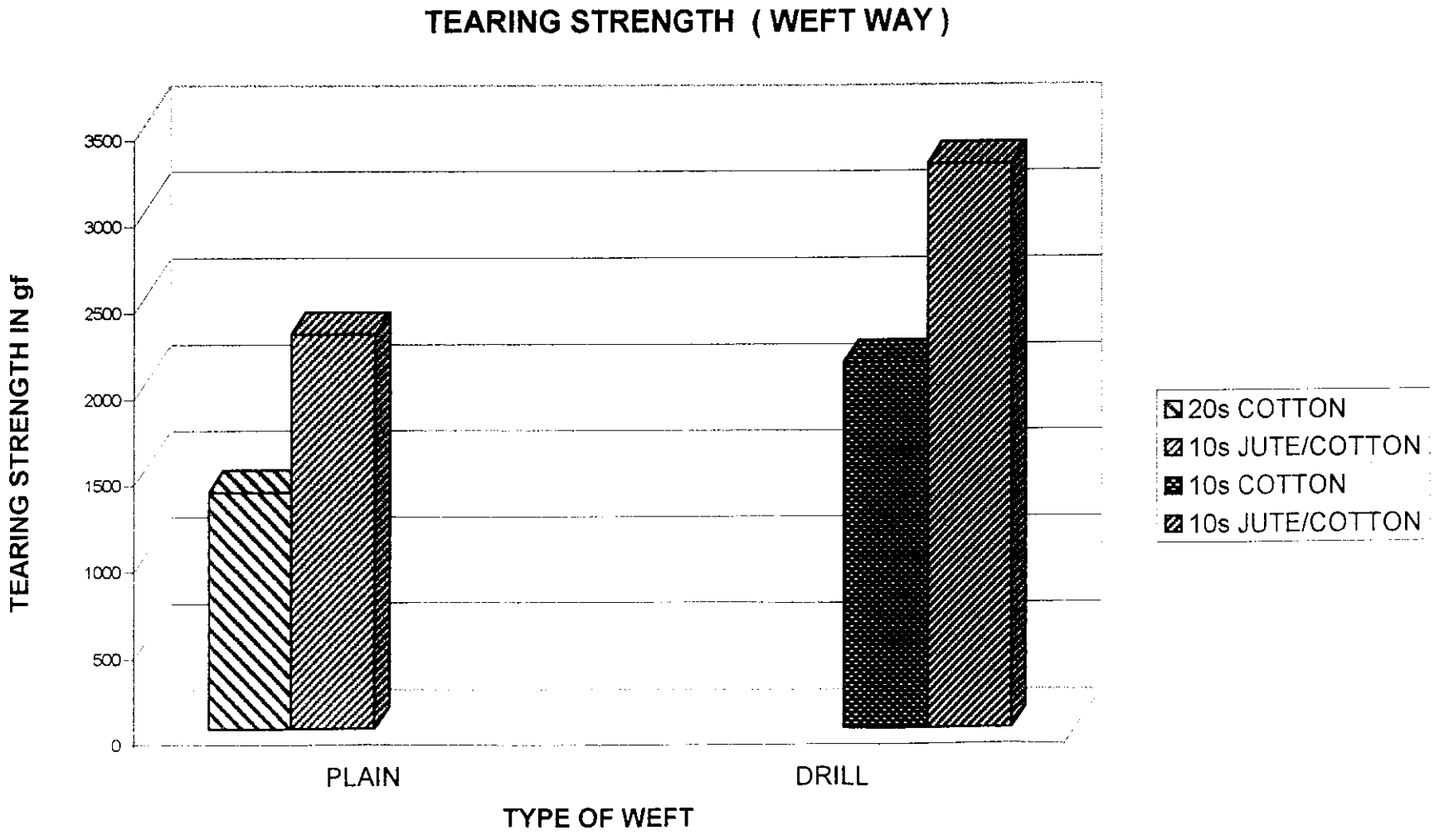
The weft way tearing strength is low in 100 % cotton weft fabric compared to Jute / Cotton weft fabric.

In case of drill fabrics, the tearing strength in warp way is higher in raw jute weft fabric by 36.4% compared to 100% cotton weft fabric,while Jute / Cotton weft fabric has 5% lower tearing strength in warp way compared to 100% cotton weft fabric.

Weft way tearing strength of Jute / cotton weft fabric differs from cotton weft fabric by 35%.

Raw jute weft fabric was unable to tear.


TEARING STRENGTH (WARP WAY)
TEARING STRENGTH IN gf
4000
3500
3000
2500
2000
1500
1000
500
0
PLAIN
DRILL
TYPE OF WEFT
20s COTTON
10s JUTE/COTTON
10s COTTON
10s JUTE/COTTON
3s JUTE


TEARING STRENGTH (WEFT WAY)
TEARING STRENGTH IN gf
3500
3000
2500
2000
1500
1000
500
0
PLAIN
DRILL
TYPE OF WEFT
20s COTTON
10s JUTE/COTTON
10s COTTON
10s JUTE/COTTON

5.9 Bursting Strength :

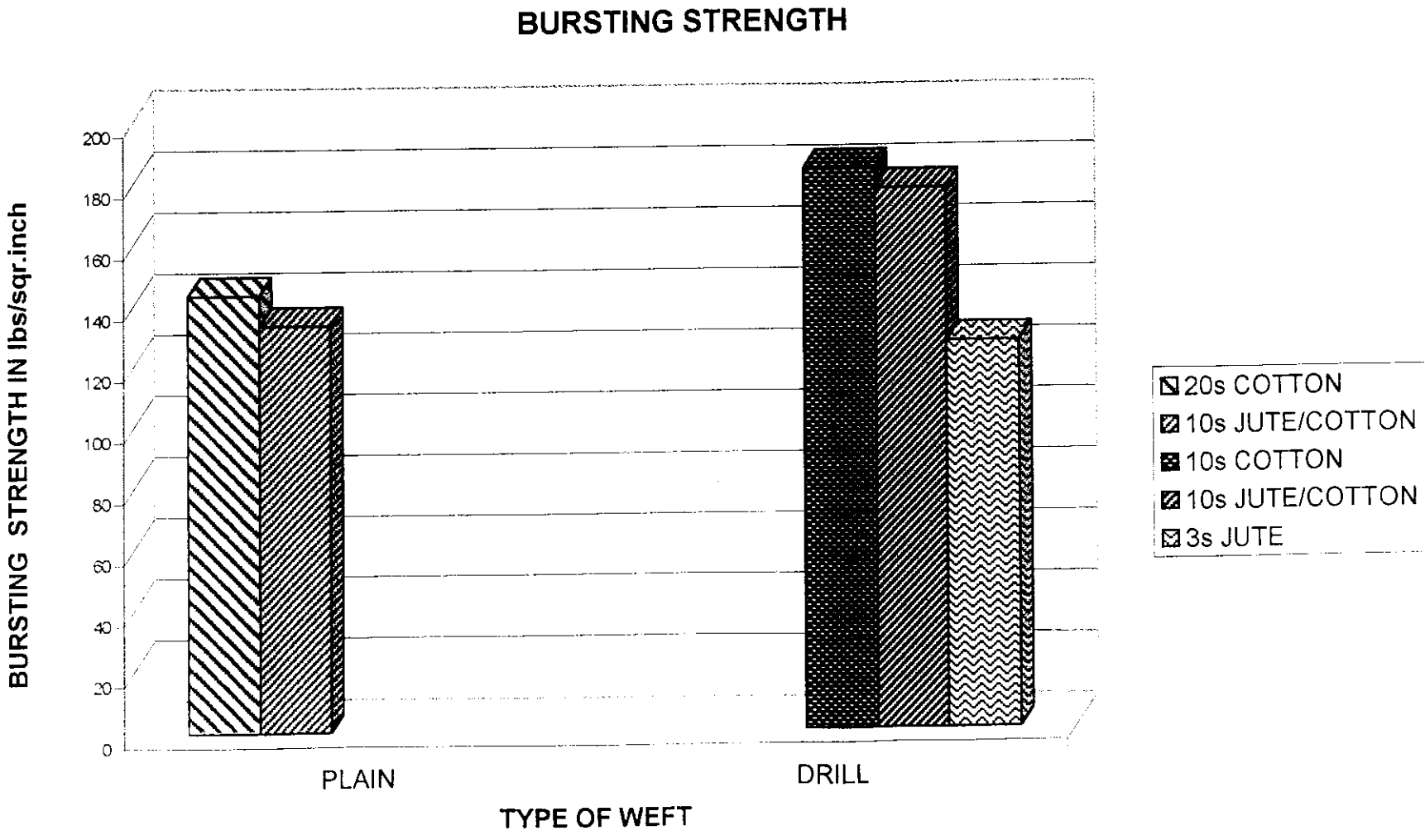
The bursting strength values of the various fabrics is given in the following table.

Table 9

TYPE OF WEAVE	S. No.	EPI x PPI	COMPONENT		IN lbs / sqr. inch	
			WARP	WEFT	GREY	DYED
PLAIN	1	56 x 60	20s COTTON	20s COTTON	132.5	143.3
	2	56 x 40	20s COTTON	10s J/C	123.3	133.3
DRILL	1	64 x 40	10s COTTON	10s COTTON	176.6	183.3
	2	64 x 40	10s COTTON	10s J/C	133.3	176.6
	3	64 x 24	10s COTTON	3s JUTE	170.0	126.6

In case of plain fabrics, the 100% cotton weft fabric has the highest bursting strength.

Also results of drill fabrics shows that, 100% cotton weft fabric has the highest bursting strength and raw jute weft fabric has the lowest.


BURSTING STRENGTH
BURSTING STRENGTH IN lbs/sqr.inch
200
180
160
140
120
100
80
60
40
20
0
PLAIN
DRILL
TYPE OF WEFT
20s COTTON
10s JUTE/COTTON
10s COTTON
10s JUTE/COTTON
3s JUTE

5.10 Bending Length :

The Bending Length values of the various fabrics is given in the following table.

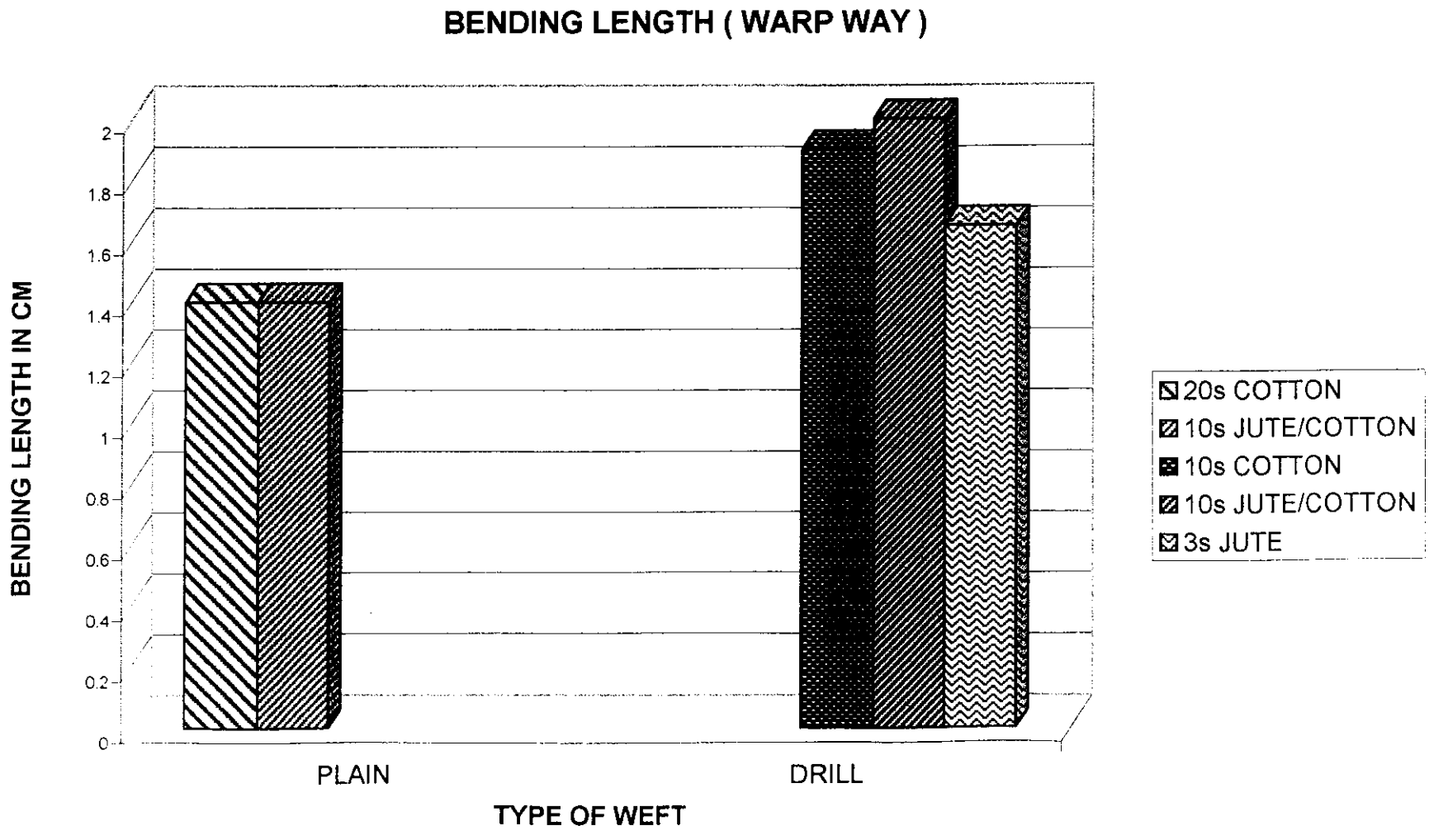
Table 10

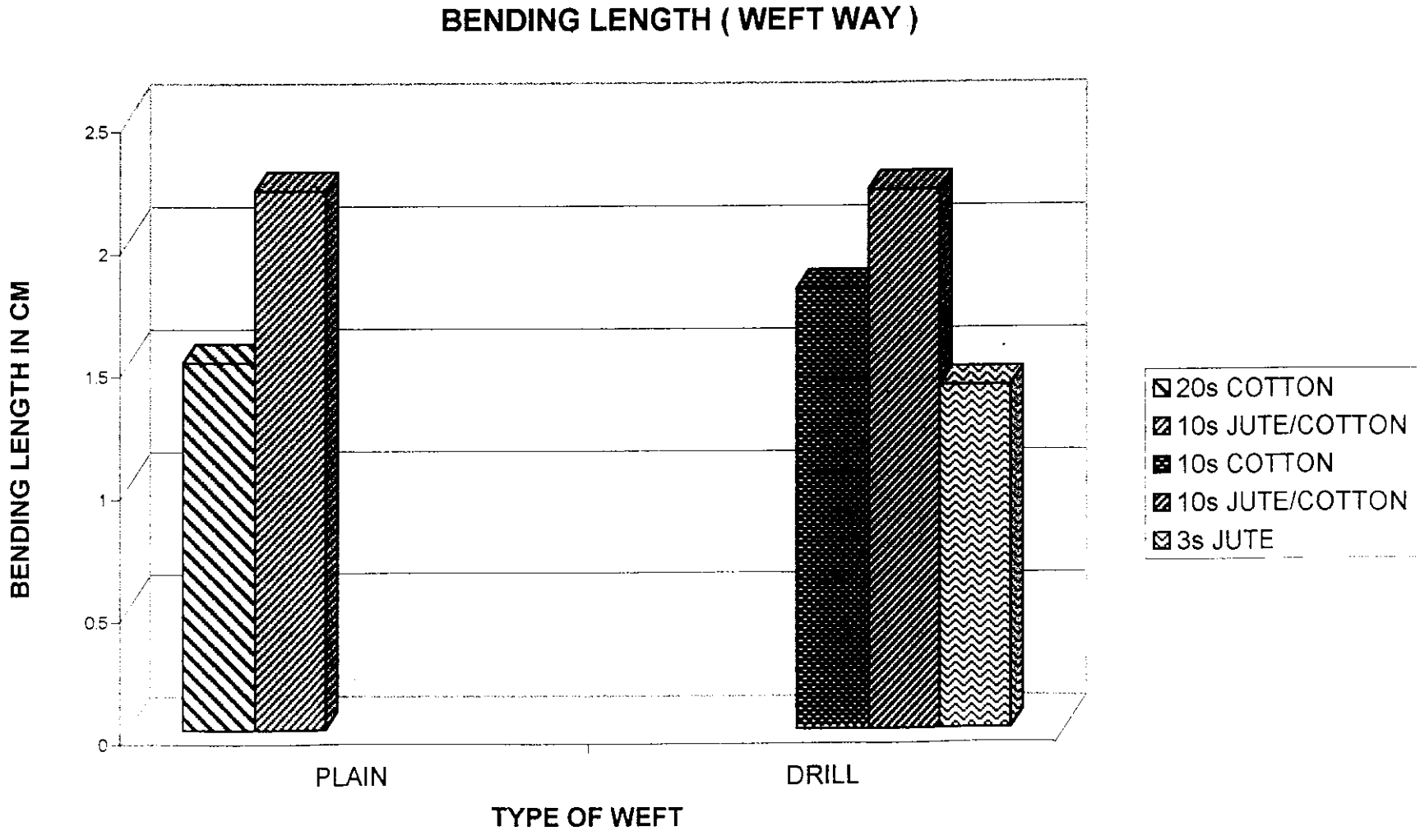
TYPE OF WEAVE	S. No.	EPI x PPI	COMPONENT		IN CM			
			WARP	WEFT	WARP WAY		WEFT WAY	
					GREY	DYED	GREY	DYED
PLAIN	1	56 x 60	20s COTTON	20s COTTON	2.4	1.4	2.0	1.5
	2	56 x 40	20s COTTON	10s J/C	2.2	1.4	2.6	2.2
DRILL	1	64 x 40	10s COTTON	10s COTTON	3.2	1.9	2.1	1.8
	2	64 x 40	10s COTTON	10s J/C	3.2	2.0	2.7	2.2
	3	64 x 24	10s COTTON	3s JUTE	4.0	1.65	4.2	1.4

The warp way bending length for both plain weave fabrics is same and in case of drill fabrics, Jute / Cotton blend fabric and 100% cotton fabric have almost similar results, except for the raw jute weft fabric which is lower by 13.15% from the cotton weft fabric.

But weft way bending length of plain fabric shows that, 100% cotton weft fabric is low when compared to Jute / cotton blend fabric.

Weft way bending length of drill farbics shows that, Jute / Cotton weft fabric and jute fabric differ widely from cotton weft fabric, by about 18.2% and 36.4% in the positive and negative directions respectively.


BENDING LENGTH (WARP WAY)
BENDING LENGTH IN CM
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
PLAIN
DRILL
TYPE OF WEFT
20s COTTON
10s JUTE/COTTON
10s COTTON
10s JUTE/COTTON
3s JUTE


BENDING LENGTH (WEFT WAY)
BENDING LENGTH IN CM
2.5
2
1.5
1
0.5
0
PLAIN
DRILL
TYPE OF WEFT
20s COTTON
10s JUTE/COTTON
10s COTTON
10s JUTE/COTTON
3s JUTE

5.11 Abrasion Resistance :

The abrasion resistance values of the various fabrics is given in the following table.

No. of Revolution-25

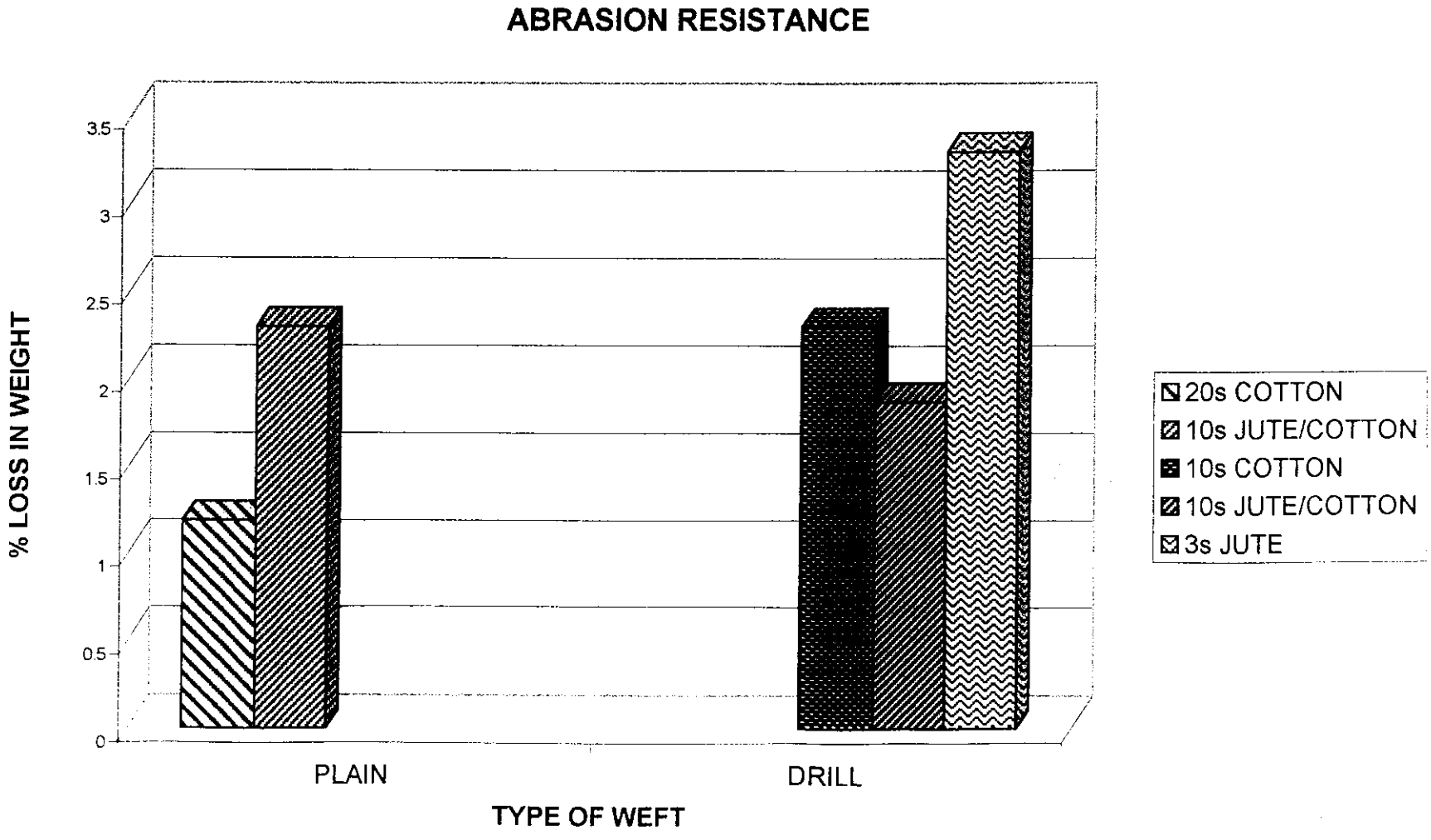
Weight-200gms

Table 11

TYPE OF WEAVE	S. No.	EPI x PPI	COMPONENT		% LOSS IN WEIGHT	
			WARP	WEFT	GREY	DYED
PLAIN	1	56 x 60	20s COTTON	20s COTTON	9.43	1.19
	2	56 x 40	20s COTTON	10s J/C	3.9	2.3
DRILL	1	64 x 40	10s COTTON	10s COTTON	1.17	2.30
	2	64 x 40	10s COTTON	10s J/C	1.55	1.87
	3	64 x 24	10s COTTON	3s JUTE	3.35	3.30

In case of plain fabrics, the Jute / Cotton weft fabric losses more weight when compared to a cotton weft fabric.

For drill farbics, raw jute weft fabric losses more weight compared to Jute / Cotton and cotton weft fabrics.


ABRASION RESISTANCE
% LOSS IN WEIGHT
3.5
3
2.5
2
1.5
1
0.5
0
PLAIN
DRILL
TYPE OF WEFT
20s COTTON
10s JUTE/COTTON
10s COTTON
10s JUTE/COTTON
3s JUTE

5.12 Crease Recovery :

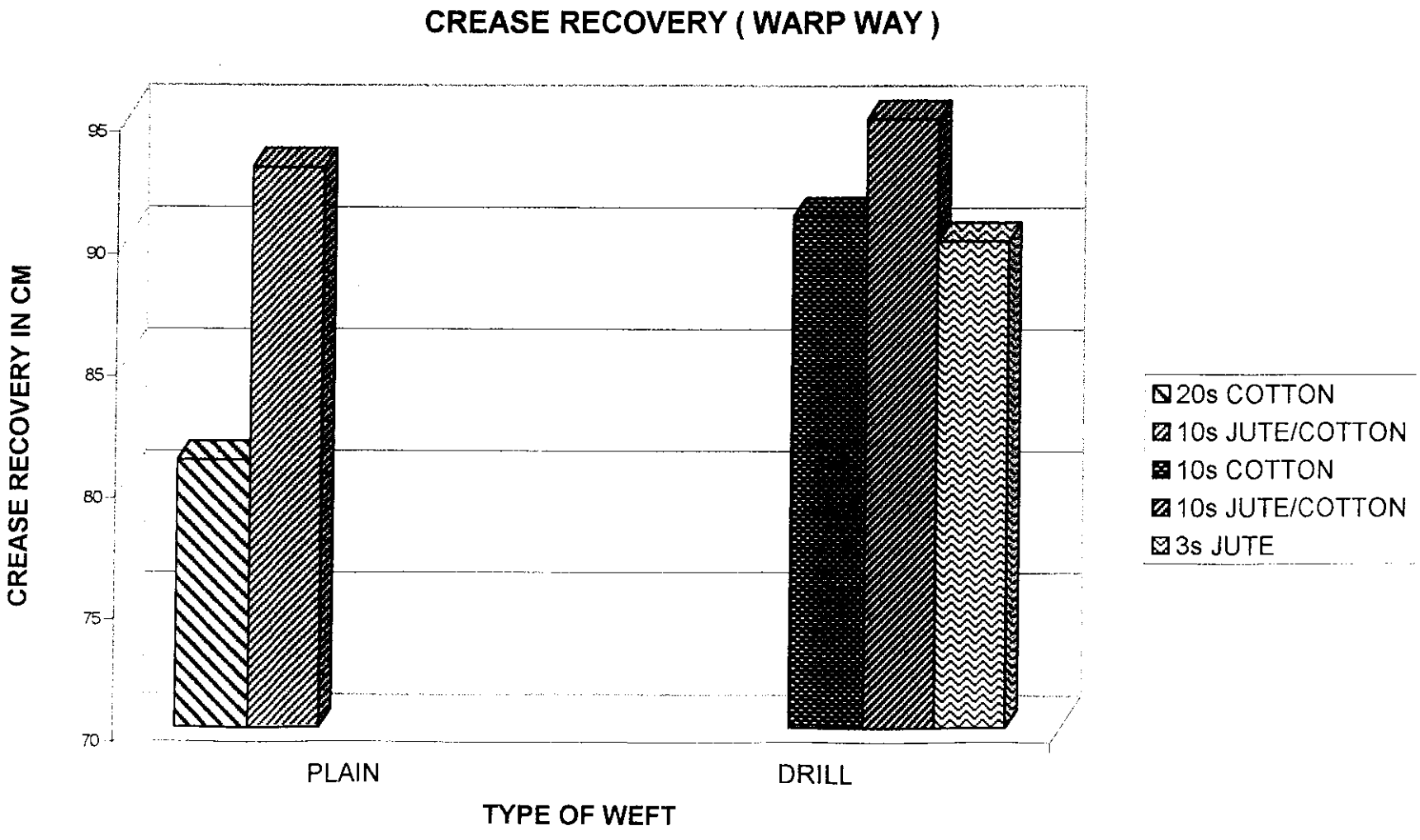
The Crease Recovery values of the various fabrics is given in the following table.

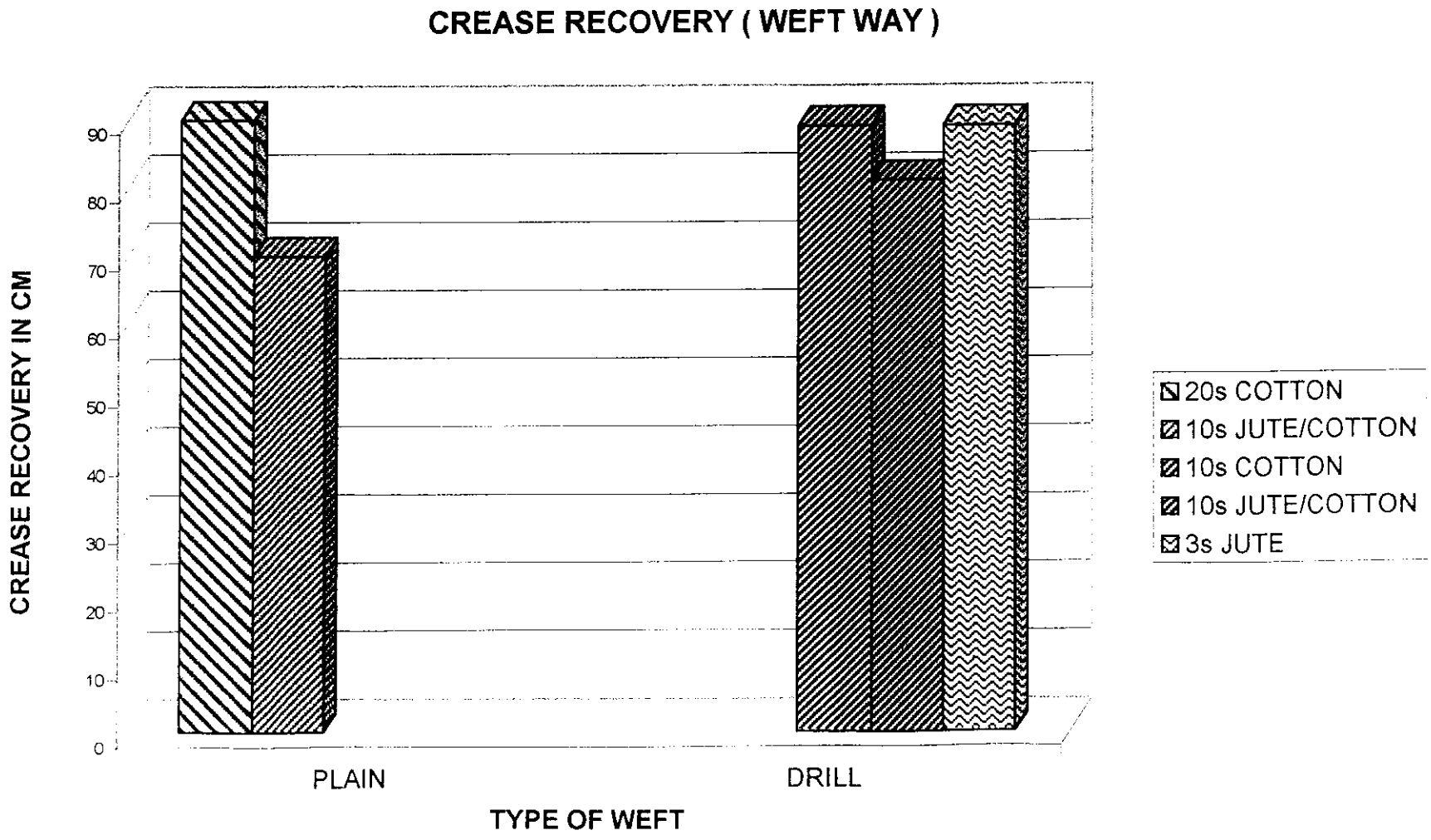
Table 12

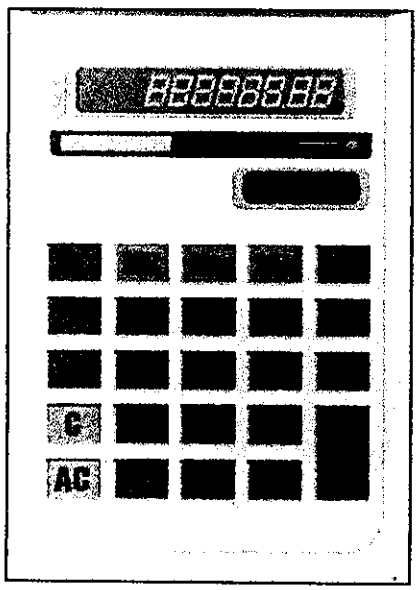
TYPE OF WEAVE	S. No.	EPI x PPI	COMPONENT		IN CM			
			WARP	WEFT	WARP WAY		WEFT WAY	
					GREY	DYED	GREY	DYED
PLAIN	1	56 x 60	20s COTTON	20s COTTON	58	81	56	90
	2	56 x 40	20s COTTON	10s J/C	87	93	48	70
DRILL	1	64 x 40	10s COTTON	10s COTTON	41	91	77	89
	2	64 x 40	10s COTTON	10s J/C	64	95	35	81
	3	64 x 24	10s COTTON	3s JUTE	68	90	72	89

In plain farbics, warp way recovery is high in Jute / cotton weft fabric, whereas in drill farbics, warp way recovery shows a marginal difference among the samples.

For weft way recovery, cotton weft fabric has the highest in plain category and in drill category Jute / Cotton weft fabric has the lower value, compared to other two.


CREASE RECOVERY (WARP WAY)
CREASE RECOVERY IN CM
95
90
85
80
75
70
PLAIN
DRILL
TYPE OF WEFT
20s COTTON
10s JUTE/COTTON
10s COTTON
10s JUTE/COTTON
3s JUTE


CREASE RECOVERY (WEFT WAY)
CREASE RECOVERY IN CM
90
80
70
60
50
40
30
20
10
0
PLAIN
DRILL
TYPE OF WEFT
20s COTTON
10s JUTE/COTTON
10s COTTON
10s JUTE/COTTON
3s JUTE



CALCULATIONS

6. COST ANALYSIS

CALCULATIONS :

As the properties of jute/cotton blended yarn resembles more of 100 % cotton yarn, it can be successfully used in place of cotton. Hence in this project, in addition to the production of jute/cotton blended fabrics, effort has been made to find out the cost economy, if any, by using the jute/cotton blended yarn in place of cotton weft.

WARP/WEFT WEIGHT CALCULATION :

Formula for calculating warp weight /metre :

$$\text{Warp weight /metre} = \frac{\text{Total Ends x Length of fabric x 1.094}}{\text{840 x Count x 2.204}} \text{ in Kgs.}$$

Formula for calculating weft weight /metre :

$$\text{Weft weight /metre} = \frac{\text{Number of Pick/metre x Pick length in metre x 1x 1.094}}{\text{840 x Count x 2.204}}$$

PLAIN FABRICS :

1) 100% Cotton weight :

$$\text{Warp weight /metre} = \frac{3800 \times 1 \times 1.094}{840 \times 20 \times 2.204}$$

$$= 0.1123 \text{ Kgs.}$$

$$\text{Weft weight /metre} = \frac{(60 \times 39.37) \times (65.5 / 39.37) \times 1 \times 1.094}{840 \times 20 \times 2.204}$$

$$= 0.1161 \text{ Kgs.}$$

2) Jute / Cotton blended weft:

$$\text{Warp weight/metre} = \frac{3800 \times 1 \times 1.094}{840 \times 20 \times 2.204}$$

$$= 0.1123 \text{ Kgs.}$$

$$\text{Weft weight/metre} = \frac{(40 \times 39.37) \times (65.5 / 39.37) \times 1 \times 1.094}{840 \times 10 \times 2.204}$$

$$= 0.1548 \text{ Kgs.}$$

DRILL FABRICS :

1)100% Cotton weft :

$$\text{Warp weight/metre} = \frac{3700 \times 1 \times 1.094}{840 \times 10 \times 2.204}$$

$$= 0.2186 \text{ Kgs.}$$

$$\text{Weft weight/metre} = \frac{(40 \times 39.37) \times (60 / 39.37) \times 1 \times 1.094}{840 \times 10 \times 2.204}$$

$$= 0.1418 \text{ Kgs.}$$

2) Jute / Cotton blended weft :

$$\text{Warp weight /metre} = \frac{3700 \times 1 \times 1.094}{840 \times 10 \times 2.204}$$

$$= 0.2186 \text{ Kgs.}$$

$$\text{Weft weight /metre} = \frac{(40 \times 39.37) \times (60 / 39.37) \times 1 \times 1.094}{840 \times 10 \times 2.204}$$

$$= 0.1418 \text{ Kgs.}$$

RAW MATERIAL PRICES:

MATERIAL	QUANTITY (Kgs)	COUNT	PRICE (Rs.)
100% COTTON	1	10s	54
100% COTTON	1	20s	76
100% JUTE	1	3s	35
JUTE/COTTON	1	10s	70

COST CALCULATION :

PLAIN FABRICS :

1)100% Cotton weft :

The price of 100% cotton weft plain fabric /metre

= (0.1123 Kgs. x Rs. 76) + (0.1161 Kgs. x Rs. 76)

= Rs. 17.36

2) Jute/Cotton blended weft :

The price of Jute /Cotton blended weft plain fabrics / metre

= (0.1123 Kgs. x Rs. 76) + (0.1543 Kgs. x Rs. 70)

= Rs. 19.34

DRILL FABRICS :

1)100% cotton weft :

The price of 100% cotton weft drill fabrics /metre :

= (0.2186 Kgs. x Rs. 54) + (0.1418 Kgs. x Rs. 54)

= Rs. 19.46

2) Jute / Cotton blended weft :

The price of jute / cotton weft drill fabrics /metre :

= (0.2186 Kgs x Rs. 54) + (0.1418 Kgs x Rs. 70)

= Rs. 21.73

CONCLUSION

7. CONCLUSION

The study has brought out the following conclusions;

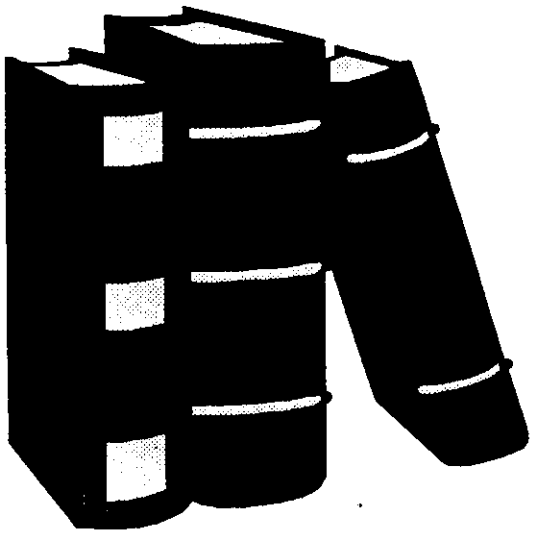
1. Jute cotton blended weft fabrics can be manufactured with a quality comparable to 100% cotton farbics in any type of automatic looms without much of technical problems.

2. Jute cotton blended weft fabrics has comparable quality characteristics with that of 100% cotton fabrics in terms of
    - Tensile strength
    - Bursting strength
    - Crease recovery
    - Abrasion resistance

3. As far as "UNION FABRICS" are concerned, their physical properties differ widely, poses lot of difficulties in weaving, hence in turn makes its suitability very difficult, when compared to Jute / cotton blended weft fabrics.

4. Hence jute can be successfully blended with cotton and the yarn produced out of it can be readily used for the production of fabrics which are comparable to 100% cotton weft fabrics.

5. When analysed with the actual rates of purchase price of cotton and J/C blended yarns, since the cost of J/C blended yarn is high, the fabric will also cost more. But actually, if J/C blend is produced on a commercial basis, then the price of J/C blend yarn will be lower than that of 100% cotton yarn for the same count, which in turn will reduce the cost of the fabric.



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APPENDIX-I

PRODUCTION OF RAW JUTE (1000 TONNES)

WORLD	1988-91		1994-95		1995-96		1996-97	
	3293	100%	3110	100%	3430	100%	2664	100%
INDIA	1455	44	1474	48	1773	52	1404	53
BANGLADESH	850	27	1072	33	1162	33	653	25
CHINA	642	19	355	11	365	11	371	14
THAILAND	172	5	130	4	111	3	115	4
OTHERS	174	5	122	4	19	1	121	4

APPENDIX-II

WORLD EXPORTS OF JUTE GOODS (1000 TONNES)

WORLD	1988-91		1994-95		1995-96		1996-97	
	990	100%	914	100%	791	100%	711	100%
BANGLADESH	481	49	195	54	428	54	410	58
INDIA	205	21	221	24	206	26	162	23
THAILAND	98	10	45	5	25	3	12	1
CHINA	63	6	47	5	24	3	25	4
OTHERS	139	14	100	12	108	14	102	14

APPENDIX - III

CHEMICAL COMPOSITION OF JUTE AND COTTON FIBRES

S.NO	CHEMICAL	JUTE	COTTON
1	CELLULOSE	58-63	82-88
2	HEMI - CELLULOSE	21-24	NIL
3	LIAGNIN	12-14	NIL
4	WAXES	0.4-0.8	0.4-1.5
5	PECTINS	0.2-0.5	0.4-1.2
6	MINERAL MATTER	0.6-1.5	0.7-1.6
7	PROTEIN	0.8-1.5	1.1-1.9
8	TRANIN/PIGMENTS AND OTHERS	0.5-8.0	TRACES
9	MOISTURES	12	7-8

APPENDIX - IV

MORPHOLOGICAL AND PHYSICAL PROPERTIES OF JUTE AND COTTON FIBRES

S.NO	PARAMETER	JUTE	COTTON
1	TECHNICAL FIBRE(MM)	1500-3600	NIL
2	ELEMENTARY CELL (MM)	2-5	15-56
3	DIAMETER (MM)	15-25	12-35
4	FINENESS(DENIER)	13-27	1.2-3.5
5	SPECIFIC GRAVITY	1.46	1.54
6	MOISTURE REGIAN (%)	14	8.5
7	ABSORPTION (%)	12	25-27
8	VOLUME SWELLING (%)	45	40
9	TENSILE (GPA)	0.2-0.5	NIL
10	MAXIMUM STRAIN (%)	1.5-2	NIL
11	FLEXURAL MODULUS (GPA)	2.5-1.3	NIL
12	ELASTICITY MODULUS (GPA)	0.3	NIL

APPENDIX - V

QUALITY STANDARDS FOR JUTE YARN

Yarn Count lbs	Yarn Count Tex	Yarn CV %	Thin Place	Thick Place	Slob Count (+280)	Hair Index	Quality	Tenaxity CN/Tex	Strenth CV %
4.8	159	29.9	1448	1245	91	8.51	78	10.4	27.9
6.0	196	28.9	1071	1116	79	9.66	105	14.0	17.1
8.0	196	28.7	1181	1268	36	11.78	87	17.5	20.5
10.0	306	26.9	534	930	18	13.68	112	14.9	16.3
12.0	413	24.1	287	763	8	14.84	103	13.7	14.6

APPENDIX - VI

STRENGTH AND WEAKNESS OF JUTE

S. No.	PROSPECT	PRODUCT	STRENGTH	WEAKNESS	PRODN.	FINISHED PRODUCT OUT LET
1	Fair	Apparel	Jute yarn can be used in weft	Unsuitable for touch with skin	Can be produced in mill sector	Made up in ancillary industry.
2	Good	Curtain	-do-	Replace thick yarn weft	-do-	Intermediary or retails
3	Good	Upholstery	-do-	-do-	-do-	-do-
4	Good	Floor cover/Door mats	Jute yarn can be used in warp and weft	None	-do-	Intermediary
5	Fair	Wall cover	Novelty item	Low volume	-do-	Intermediary
6	Good	Shopping bags	Growing market requires light wight fabric eco friendly product	Fibre-shedding during machine wash	mill can produce base fabric	Made up item by ancillary industry.
7	Fair	Casual upper lining and soft luggage, handbags	Can be produced in Mills	None	Base fabric at Mills	made up articles at ancillary industry
8	Good	Geotextiles	Mills can, produced application	Can't be used in all	Mills can produce	Through contractor and Govt. Agencies.