EFFECT OF BATIK ON CREPE

By

VIJAYALAKSHMI, K.

A Dissertation Submitted to the University of Madras in Partial Fulfilment of the requirement for the Degree of Master of Science through Sri Avinashilingam Home Science College (Autonomous) Coimbatore

May 1983

ACKNOWLEDGEMENT

The author records her humble and most reverential gratitude to Tmy.Kamala Ranganathan, M.Sc.,Dip.Ed.,M.Phil., (Madras), Assistant Professor of Textiles and Clothing, Sri Avinashilingam Home Science College for her guidance and valuable advice during the entire course of this study.

She records her sincere thanks to Selvi R.Raji, M.S.(Tennesse), Post-Graduate Professor of Textiles and Clothing, Sri Avinashilingam Home Science College, Coimbatore, for all the help rendered.

The investigator wishes to express her thanks to Dr.(Tmy.) Rajammal P.Devadas, M.A.,M.Sc.,Ph.D.(Ohio State) D.Sc.(Madras), Director and Dean of Post-Graduate Studies and to Dr.(Tmy.) Godavari Kamalanathan, M.S.(Cornell), Ph.D.(Madras), Principal, Sri Avinashilingam Home Science College, for the facilities offered for conducting the study.

The investigator takes this opportunity to express her heartful thanks to Thiru.Kannakumar, B.Tech., Textile Technology Department, PSG College of Technology, Peelamedu for having provided the crepe material for the study and the continuous encouragement given.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF PLATES

LIST OF FIGURES

LIST OF APPENDICES

I. INTRODUCTION

Clothing is one of the fundamental necessities of man, second to food only. It gives protection against the elements of nature and at the same time reflects the culture of the wearer. The nature and quality of cloth is an indicator of the scientific advancement attained by the manufacturer.

A glance through the history of man reveals a gradual change in the costume, design and material. The industrial revolutions of the Western countries have added number of new techniques and finishes resulting in innumerable varieties.

The textiles in common use today include the ones that are obtained from natural sources and the synthetically produced fibres. Since natural fibres alone cannot meet our ever increasing requirements, manmade fibres grew in importance.

Today, among the manmade fibres, Rayon is playing an ever increasingly important part in our national economic growth as stated by Jackman and Rogers (1954). It is probable that soon India will be one of the world's leading rayon producers.

While at the moment, only one in five families in urban areas uses rayon, the rayon market is increasing exponentially every day. Even illiterates and under privileged occupational groups are beginning to come into the rayon market. Rayon lightly assumed to be a luxury fabric is in fact a cloth of the people. There is a ready export market for rayon in all its forms like film, staple, yarn, cord and fabric. While all these items are standardised, fabrics alone lend themselves to much variation in construction as well as processing.

A preliminary study conducted by the investigator proved that Batik printed rayon lungies have a ready export market as exploited in Erode. As pointed out by Hollen and Saddler (1973) Batik is a hand process in which hot wax is poured on a fabric in the form of a design, when the wax is set, the fabric is piece dyed.

The main reasons for the popularity of Batik is the unlimited varieties possible in colour and design at low cost. The material used for batik printing is mainly made of plain weave. For obtaining novelty effect, the investigator has attempted to do Batik on crepe fabric.

According to Labarthe (1975) crepe texture is given to fabrics in the weaving by using high twisted yarns. Wingate (1976) suggests that more permanent crepe effect can be produced by giving fabrics of high twisted yarns a caustic soda treatment.

The investigator by this analysis intends to study the effect of batik on a crepe fabric and the problems encountered in the above process.

II. REVIEW OF LITERATURE

The literature collected for the study are reviewed under the following headings:

1. Rayon - manufacture and uses
2. Crepe effect
3. Methods of obtaining crepe effect
4. Batik
5. Methods of doing Batik
6. Dyes suitable for Batik

1. Rayon manufacture and uses

Rayon is a fibre of this century mainly made to duplicate silk.

According to Evans and Mc Gowan (1947) Rayon is a generic name of filaments made from various solutions of modified cellulose by pressing and drawing the cellulose through an orifice and solidifying it in the form of a filament.

Rayon is a manufactured fibre composed of regenerated cellulose in which substituents have replaced not more than 15 per centof the hydrogents of the hydroxyl groups (Lyle, 1976).

According to Dantyagi (1964) there are four main procedures by which cellulose is transformed into rayon. These are--

a. The nitrocellulose method

b. The cuprammonium method

c. The viscose method

d. The cellulose acetate method

As Hall (1952) points out, viscose rayon is more popular than others and is now being manufactured in almost all countries of the world where there is a textile industry. Dantyagi (1964) opines that the main reason for the popularity of viscose is the low cost of production.

Wingate (1976) says that the steps in the manufacturing process of viscose is as follows:

1. Bleached sulfite wood pulp is cut into sheets.
2. The sheets are steeped in caustic soda. The product (alkali cellulose) is aged.
3. It is treated with carbon bisulfide to form cellulose xanthate.
4. It is treated with a weak solution of caustic soda.
5. The honey colored solution is forced through spinnerets into sulphuric acid which regenerates the cellulose as a continuous filament.

Joseph (1980) feels that the finishes suitable for viscose rayon are as follows: Rayon can be made permanently crimp by adding finishes such as fresh text and cranpress. The other finishes are mildew resistant, resin relectant, durable press, crepe, glazed finish, shrinkage control and flame retardent.

According to Taylor (1972) the finishes suitable for rayon are crease resistance, durable press, fire retardent, crepe, flame resistance and resin finishes.

The uses of rayon are manyfold, linings are particularly good in viscose rayon. It has always been the cheapest of the artificial fibres. Typical uses of viscose rayon are curtains, chair coverings, transport, furnishings, table cloths, cushions, bed spreads, quilt covers, lace, fine fabric bridal and evening gowns, sports and underwear (Moncriff, 1970).

Viscose rayon is superior in appearance, washability and durability than natural fibres. There was a general demand for home furnishing fabrics all over the country especially for viscose cotton blends (Samira's Bulletin, 1980).

According to Mills (1970) viscose is the cheapest rayon to produce and is made in greater quantity than any other man made fibres. It can be dyed with same kinds of dye used for cotton. It is moth proof and can be dry cleaned satisfactorily.

2. Crepe effect

Crepe is a French word meaning crinkle. Crepe weave gives the fabrics a pebbly creped surface (Dantyagi, 1974).

Marsh (1966) says that creping is due to contraction in length of high twisted yarn and the tendency to untwist on wetting and based on the swelling properties of the fibres.

According to Grosicki (1975) crepe fabrics have an irregular or broken surface appearance and are produced by very hard twisted threads either in warp or weft or both warp and weft.

Labarthe (1975) states that crepe texture is given to fabrics in the weaving by using alternate filling yarns of right hand and left hand twist. It is possible how ever to impart texture by finishing process.

Editors of American Fabrics Magazine (1972) state that crepe signifies crimping by means of hot iron. Most of the crepes are made in the crepe weave which is a variation of plain weave.

Moncriff (1970) is of the opinion that crepe yarns are usually woven as weft in a plain warp and when the fabric is wetted the filaments swell and then because of the high twist they snarl and distort so that they give pebble effect to the fabric.

Taylor (1972) feels that crepe effects can also be obtained by printing small designs on the surface with paste containing caustic soda. When the caustic soda is absorbed, the fibres swell and consequently the yarns shrink.

Hollen and Saddler (1973) states that crepe weave is made with floats of irregular lengths which give the cloth appearance of being covered with minute seeds.

According to Potter and Corbman (1959) crepe is a fabric made of highly twisted yarn extremely versatile in textureranging from a fine flat crepe to pebbly and mossy effects.

3. Methods of obtaining Crepe effect

A balanced crepe is formed by alternating two rows of hard 'S' twisted yarns with two rows of hard 'Z' twisted yarns, in both warp and weft (Birrell, 1959).

According to Wingate (1976) a more permanent creping is done by the caustic soda method. Caustic soda paste is rolled on to the cloth in stripes. The fabric is washed and the parts to which the paste was applied shrink. The rest of that cloth does not shrink but appears creped, some times a paste that resists the effect of caustic soda is put on the cloth in spots where the fabric is not to shrink. Then the whole cloth is immersed in caustic soda. The untreated spots shrinks and the rest crepes (or) puckers.

Labarthe (1975) says that the two common method of making crepe are (1) The cloth is passed between hot rollers in the presence of steam. The rollers are indented to reproduce the pucker figures in the cloth. The method is inexpensive but the crepe will wash and iron out. (2) Chemical seer sucker are much more permanent. A caustic soda paste is rolled on to the cloth, when the fabric is washed, parts to which the paste is applied shrinks and the rest of the cloth puckers.

Hollen and Saddler (1973) are of the opinion that crepe effect by finish is achieved by plisseing or embossing a plain weave fabric.

According to the Editors of American Fabrics Magazines (1972) light weight fabrics of silk, rayon, wool, synthetic are characterised by a crinkling surface obtained by the use of hard twisted yarns chemical treatment, weave and embossing.

4. Batik

Batik is the Indonesian word for wax resist dyeing. Liquid wax is applied to the fabric and the fabric is then dipped in the dye. The areas covered with wax "resist" the dye and retain their previous colour. The waxing process is repeated with each new colour (Hersh, 1974).

According to Lee (1973) Batik is a form of resist printing and is largely a hand process. In this type of printing, wax is used as the resist.

Butterworths (1964) opines that Batik is an Indonesian word describing a form of resist printing though it is known and practised as a native craft in South East India, Europe and parts of Africa. The characteristic of Java Batik is that the resist is obtained by applying wax to both sides of the fabric. Dyeing is then carried out in cold to avoid melting of the wax thus confining the coloration to the unwaxed area.

Stout (1970) states that Batik for which the Javanese people are particularly well knownis some timesmore a hand painting than a printing operation.

According to Editors of American Fabrics Magazines (1972), batiks is resist dyeing process in which parts of a fabric are coated with wax. Only the uncovered parts take dye, often imitated in machine printing.

Leeming (1950) suggests that Batik is a Javanese work which means "wax printing". It is based on the principle that the wax, where ever it is applied will prevent the dye from touching the cloth and coloring it.

Singh (1981) feels that Batik is an Indonesian word denoting a process by which those design parts of a design intended to resist the colour in particular dyeing operation are protected by covering with wax, starch paste (or) clay. Desikar (1967) states that Batik is a form of resist Dyeing which produces patterns like those in prints.

Cockett and Hilton (1955) are of the opinion that Batiks are produced by painting wax (or) resin on fabric, cracking the film, dyeing and removing the resisting material..

According to Held (1978) Batik is a patterning method that employs wax (or) a similar nonporous material for the resist. Joshi (1982) feels that Bati, an ancient popular hand printing technique is an art which is still appreciated all over the world for its exquisite beauty and artistry.

5. Methods of doing Batik

The materials suitable for batik are 100 per cent cotton, linen, viscose rayon, linen and silk. There are four types of waxes used in Batik-paraffin, bees wax, sticky wax and Batik wax. Batik wax is a combination of paraffin (1/3) and bees wax (2/3). Tools needed for Batik are natural bristle brushes for applying wax, stamping tool like a printing block which is dipped into molten wax and stamped on to the fabric leaving a design in wax and a tall table.

The procedure involved in Batik printing involves the following steps: Melting of wax at a low and constant temperature, brushing the hot melted was on to the fabric, sliming the measured amount of powdered dye in one cup of hot water, adding the strained dyed mixture to a pot filled with warm water, rinsing the waxed fabric in water and placing it unfolded into the dye bath. After the fabric has reached the desired colour intensity the fabric is removed from the dye bath and wax is removed by boiling method (or) ironing out method (Herak, 1975).

According to Stout (1970) Batik is a resist type of printing. In one type of Batik printing, the design is first lined on the fabric and then the parts to be left in the original colour are wax coated. The material is dyed and wax is applied over the areas to remain that colour. This process continues alternately waxing and dyeing until the last and darkest colour has been applied, the fabric is put in hot water to remove the wax. In another method wax is applied before each colour then removed after the colour is applied and reapplied before the next addition of next colour. In this way printing is of one colour over another is avoided except for belines and cracks that occur in the wax.

According to Textile Magazine (1982) the Batik process involves several stages first the fabric is washed to remove the original starch. The second stage involves the pounding the cloth on a large board with a heavy wooden hammer until the surface is smooth.

The patterns are drawn in liquid wax on both sides of the fabric with a pipe like bamboo stylus. Then the fabric dyed.

After all the desired colours have been obtained, all of the wax is removed by steeping the fabric in boiling water. When the wax has been removed, the fabric ready to be used.

Joshi (1982) says that wax resist printing of Jaisalmer are a particular speciality. The table for printing is covered with sand of 1 inch thick and sprinkled with water. A wet cloth is put over it. By the side of the table the wax is kept in Karhai on top of a brazier where slow fire keeps the wax in a liquid state. A wooden block for printing which is specially prepared for this purpose as it has a more raised surface with deeper grooves is dipped into the liquid wax and printed over the prepared surface. As soon as it comes in contact with the material which has been kept cool, the wax solidifies. The material is dyed and later immersed in hot water for melting the wax. The wax resist area gets a light pink colour and the background material is of dark red.

Deulker (1967) says that Batik is a form of resist dyeing. A full sized design is drawn on the material. Hot melted wax is applied on the lines of the design with paint brush. The size of the brush depends on the thickness of the lines of the design. After coating the lines with wax the fabric is immersed in cold water to harden the wax and to wet the fabric. The dye bath is prepared. The dye bath vessel must be large enough to be moved freely with out any pressure. The material is kept in the dye bath long enough for the cloth to be thoroughly impregnated with the dye. The cloth is then rinsed and dried and the wax is removed.

Held (1978) feels that liquid wax is painted on to the fabric according to a planned design, then allowed to harden, after which the fabric is immersed in dye. When there are several colours involved more wax can be added after each dye bath. After the dyeing process is finished the wax is removed by locking the fabric in water. The fabric need not be white, but it must be light enough in value to accept over dyeing. Most synthetic fibre fabrics with the exception of rayon do not dye easily.

According to Colourage (1982) the cloth meant for Batik is washed in hot water to remove the traces of starches and then the outline of the motif is drawn on the cloth and with the help of hot bees wax, paraffin wax and resin the motif is painted with a brush. The hot wax penetrates into the fabric and dyeing is done with cold dye.

Cockett and Hilton (1955) are of the opinion that Batik is produced by printing wax or resin on fabric. Cracking the film, dyeing and removing the resisting material. The cloth will then be dyed only where the film was broken. Shaded effects may be obtained by spraying portions of a fabric to be immersed in a dyebath for longer periods than the remainder.

6. Dyes suitable for Batik

The dyeing process is the most exciting step in doing Batik. There are many chemical dyes on the market today that can be used for Batik. Cold water dyes (or) dyes that are dissolvable in warm water are best for Batik Vinegar or uniodised salt is added to the dye bath as a mordant that helps the dye adhere to the fibres in the fabric (Mersk, 1975).

Butterworths (1964) suggests that dyestuffs suitable for this work must be capable of being applied from a cold dye bath, since a heated dye bath would remove the wax resist.

Deulkar (1967) feels that cold water dyes which can be used at low temperature are used for Batik dyeing. Birrell (1959) opines that dyes used must be cold. At least they must be kept at a lower temperature to avoid melting of wax.

III. EXPERIMENTAL PROCEDURE

The procedure adopted for the study consists of the following steps:

1. Selection of material
2. Batik printing
   a. Selection of method
   b. Details of block used
   c. Setting up of the table
   d. Selection of wax
   e. Method of waxing
3. Dyeing
   a. Selection of dye
   b. Preparation of dye solution
   c. Method of dyeing
   d. Dewaxing
4. Wear study
   a. Selection of garment
   b. Size of material
   c. Selection of subject
   d. Actual wear
5. Laundering
   a. Selection of detergent
   b. Preparation of detergent solution
   c. Selection of method for washing

d. Actual washing

6. Evaluation by laboratory tests

a. Fabric thickness

b. Tensile strength

c. Bursting strength

d. Abrasion resistance

e. Crease recovery

f. Drapability

7. Analysis of data

1. Selection of material

Rayon is known for its Silkiness, coolness, attractive appearance and ease of washing says Lancaster (1962). He further feels that good quality rayon is less expensive and last long if treated with care.

The preliminary study conducted by the investigator at Erode revealed that rayon was more in use than cotton for batik printing and also had a ready export market. Hence rayon material was selected for the study. With the intension of bringing novelty effect, the investigator selected a rayon crepe material for doing batik.

According to Grosicki (1975) crepe fabrics are woven with very hard twistdd threads éither in the warp or weft or in both directions. Taylor (1972) suggests that crepe texture is brought about by giving a caustic soda treatment to the high twisted yarn fabric.

Since a crepe fabric of the above nature was available in the market readily, the investigator bought the same for the study on payment. The details of which are given in Appendix 1.

2. Batik printing

a. Selection of method

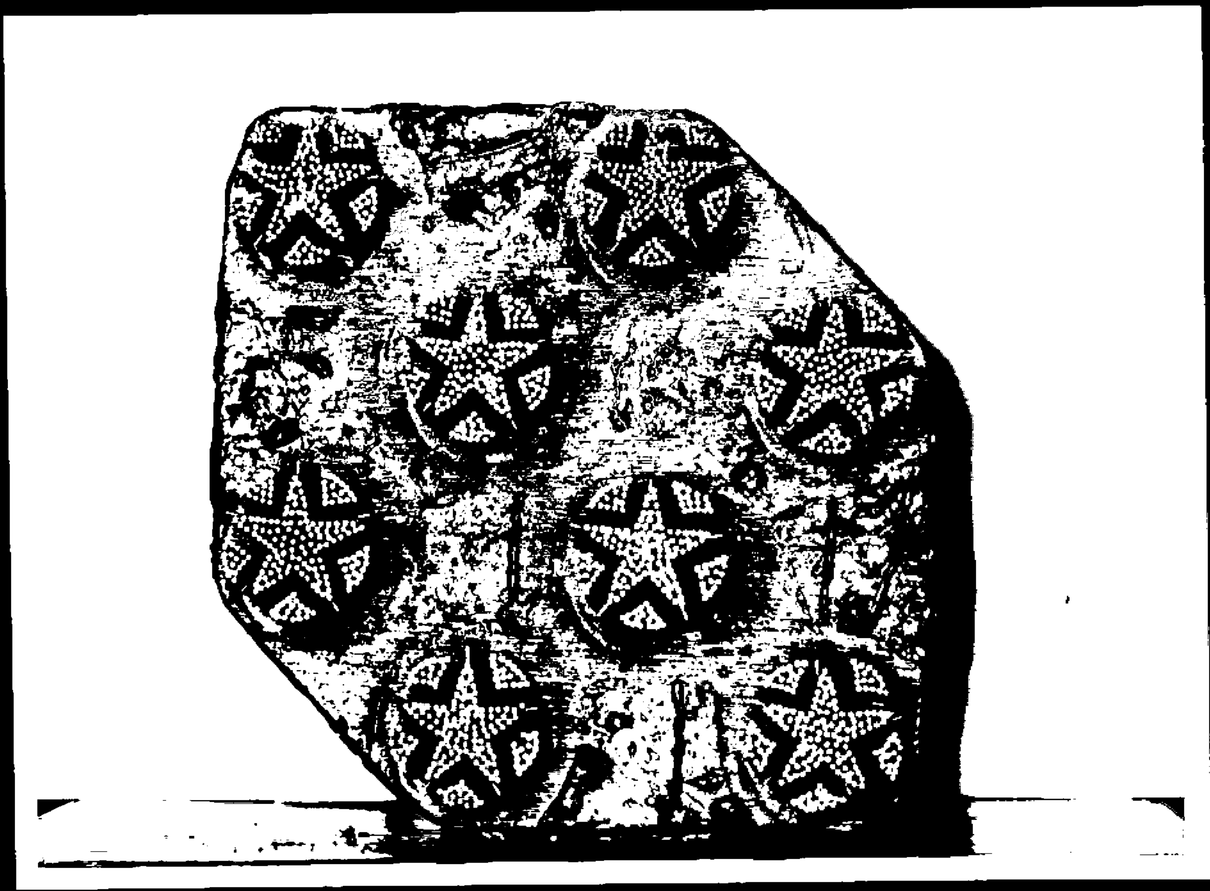
The method selected for applying wax was block printing because it is possible to obtain uniform design at regular intervals.

b. Details of block used

The block was made of wood, with iron pins arranged in the form of a geometrical design (Plate I). The size was 32 x 32 cm. To suit the single colour selected for dyeing the investigator used only one block for the application of wax. The block had eight repeats of the same design.

c. Setting up of the table

A rectangualr table made of wood was used for the application of wax. As suggested by Joshi (1982) the table



BLOCK USED FOR BATIK PRINTING

PLATE I

surface was padded uniformly by spreading fine wet sand evenly on top of the table. The presence of sand helped in the even penetration of wax on the other side of the material.

d. Selection of wax

A combination of paraffin and bee's wax were selected for the study. Houston (1975) points out that paraffin wax, being brittle cracks easily where as bees wax is pliable and hence cracks less. He also advises that a combination of both yields the best result. Hence both paraffin and bees wax inequal quantity were used for the study.

e. Method of waxing

The material to be wax printed was spread evenly on the sand table. The waxes were melted over fire (under low heat). The block was dipped in the molten wax and pressed against the prepared material. Care was taken to maintain equal distance between the repeats and also regarding the pressure in application.

3. Dyeing

a. Selection of dye

Butterworths (1960) says that dyestuffs suitable for Batik work must be capable of being applied from a cold dye bath, since a heated dye bath would remove the wax resist. The following classes of dyes are of interest.

1. Indigo and other cold dyeing vat dye stuffs
2. Azoic (Brenthal) Dyestuffs
3. Procion Dyestuff
4. Soledon Dyestuff
5. Direct Dyes

According to Bixell (1959) dyes used for batik must be cold. Basu (1964) opines that to dye fast colour with minimum time and temperature naphthol is the best one. Hence the same was selected for the study.

b. Preparation of dye solution

Joseph (1972) points out that naphthol dyeing requires the preparation of naphthol and base solution separately. The procedure recommended by Kikoettar (1965) was followed for the preparation of naphthol and base solution. The same is given below.

Naphthol solution

0.5 to 1 gm detergent
Caustic soda 3.5 gm/litre
Naphthol (AS BS) 3 gm
Temperature - 100 to 110° F

Procedure: The dye powder was made into a paste with monopal soap and dissolved in hot water. To this 3.5 gms/litre of caustic soda was added. The solution was stirred well and kept aside to turn completely cold.

Base solution

Base .. 4.30 gms

Concentrated Hydrochloric acid 5 ml

Sodium Acetate .. 0.2 gm

Sodium Nitrate .. 0.2 gm

Aluminium sulphate .. 0.2 gm

The base was dissolved with the help of hydrochloric acid and a little cold water then the required amount of cold water was added followed by sodium nitrite. The solution was stirred well and the bath was settled for 15 to 20 minutes till the brownish fumes exhausted indicating the completion of diazotisation. Sodium acetate was used in the diazotisation bath for the removal of excess Hydrochloric acid from the bath. The bath had every apprehension of being inactive with sun rays. Aluminium sulphate as its preventive was used in the bath.

c. Method of dyeing

The sample material was wetted out in water before the actual dyeing. The sample was first immersed in the naphthol bath for 5 minutes with constant stirring to ensure uniform naphtholation (Basu, 1964). After that the material was carefully lifted and put in the base bath for developing the colour. Care was taken to turn the material frequently for even dyeing.

The dyed material was rinsed thoroughly in water to remove the excess dye which had failed to penetrate into the fabric structure.

d. Dewaxing

As Stout (1970) feels, dewaxing is an essential step in Batik printing. This process helps in removing the wax after the purpose is over.

As suggested by Stout (1970), the batik printed material was dewaxed by immersion into boiling water to which a pinch of detergent was added. The completely dewaxed material was rinsed in water, dried and ironed.

4. Wear study

a. Selection of garment

The garment selected for wear study was Kameeze mainly to suit the interest of the wearer.

b. Size of material

Twelve metres of bleached crepe fabric was purchased for the study. Two metres were kept aside as original and it was named as Sample A. The remaining material was cut into two bits of 4 and 6 metres length. The former was named as B and it was utilised for the construction of one kameez.

The material of six metres size was used for Batik printing. After which 2 metres was reserved as sample C. The remaining 4 metres was utilised for the construction of the second Kameeze, namely D (Appendix II).

c. Selection of subject

One of the post-graduate students was selected as the subject for the wear study, mainly because of the cooperation rendered.

d. Actual wear

Each of the kamees was worn for a period of 20 days, eight hours a day. Thus each of the kamees underwent a total of twenty washes. The eight hours wear was distributed between day and night in such a way that each of the Kamees could be worn both during day and nigh times.

5. Laundering

a. Selection of detergent

A detergent is any substance that cleans, says Binnie and Boxall (1974).

Alexander (1977) feels that detergents make water to penetrate the soiled fabric more easily, loosen dirt from the fabrics and then suspend the dirt, so that will not be redeposited on fabric.

The detergent selected for washing was surf mainly because of its availability.

b. Preparation of Detergent solution

As suggested by Williams (1949) the detergent solution was prepared by dissolving 7.2 gms of surf in 2 litres of water.

c. Selection of method for washing

Henry and Byett (1959) opine that kneading and squeezing is the most useful method of washing clothes. It does not damage any of the textile fibres nor the texture, weave (or) colour of the fabric. It is very suitable for washing wool, silk and rayon Hence kneading and squeezing method was selected for washing the samples.

d. Actual washing

The samples were soaked in detergent solution for about 10 minutes and washed thoroughly by following the kneading and squeezing method. The washed samples were rinsed in three changes of water, each time taking 5 litres of fresh water. The washed samples were dried in the shade to be used for the next wear.

6. Evaluation

The following laboratory tests were carried out to compare the performance of washed samples with that of the originals.

a. Fabric thickness

b. Tensile strength

c. Bursting strength

d. Abrasion resistance

e. Crease recovery

f. Drape

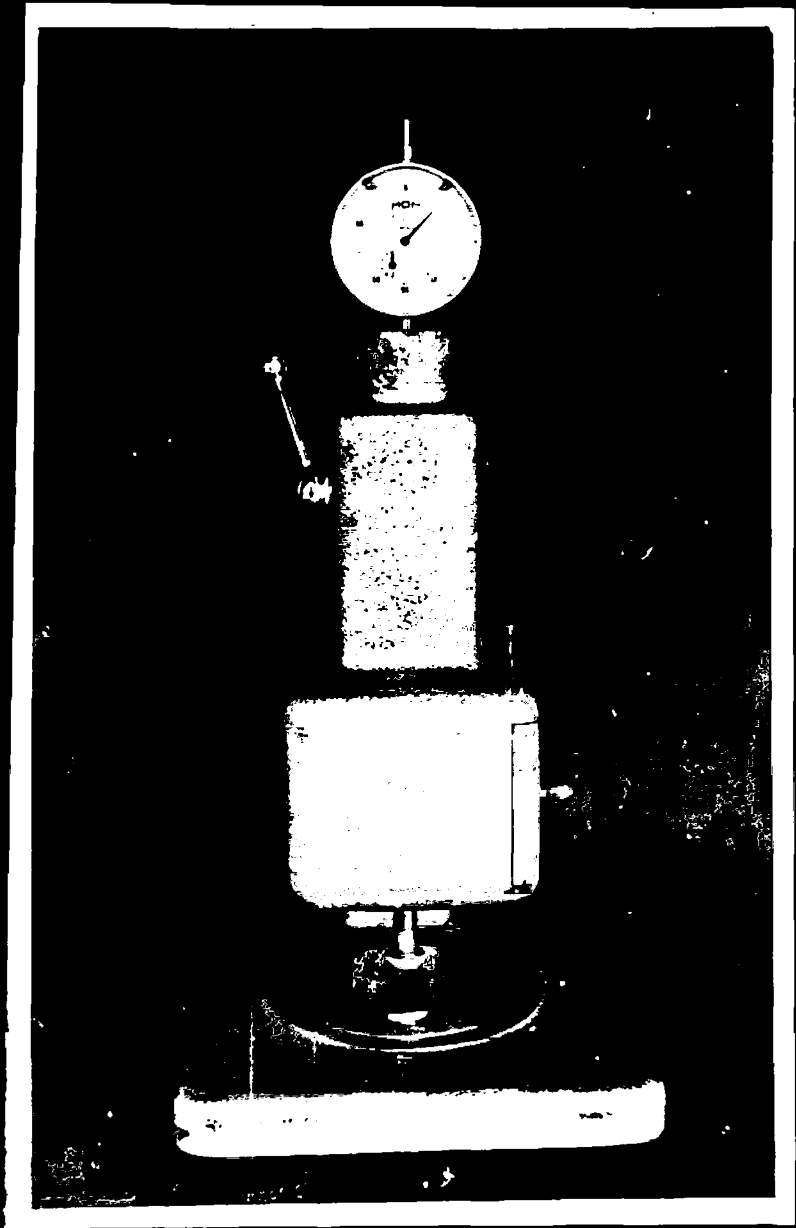
a. Fabric Thickness

Lomax (1956) feels that it is necessary to measure the thickness of a fabric, chiefly in order to find the density. According to the ASTM Standards (1963), the thickness of textile material shall be the distance between two parallel surfaces while exerting a specified pressure on the material.

A thickness tester (Plate II) was used to find out the thickness of the material. It has a broad anvil upon which a presser foot was pressed by a spring. The material was placed on the anvil and the presser foot was lowered slowly. The dial then indicated the thickness of the material as number in thousands of an inch. Ten readings were taken for each sample and the mean was calculated.

b. Tensile strength

The breaking strength is the load at which the specimen breaks, usually expressed in grams weight (or) pounds weight, says Booth (1970).



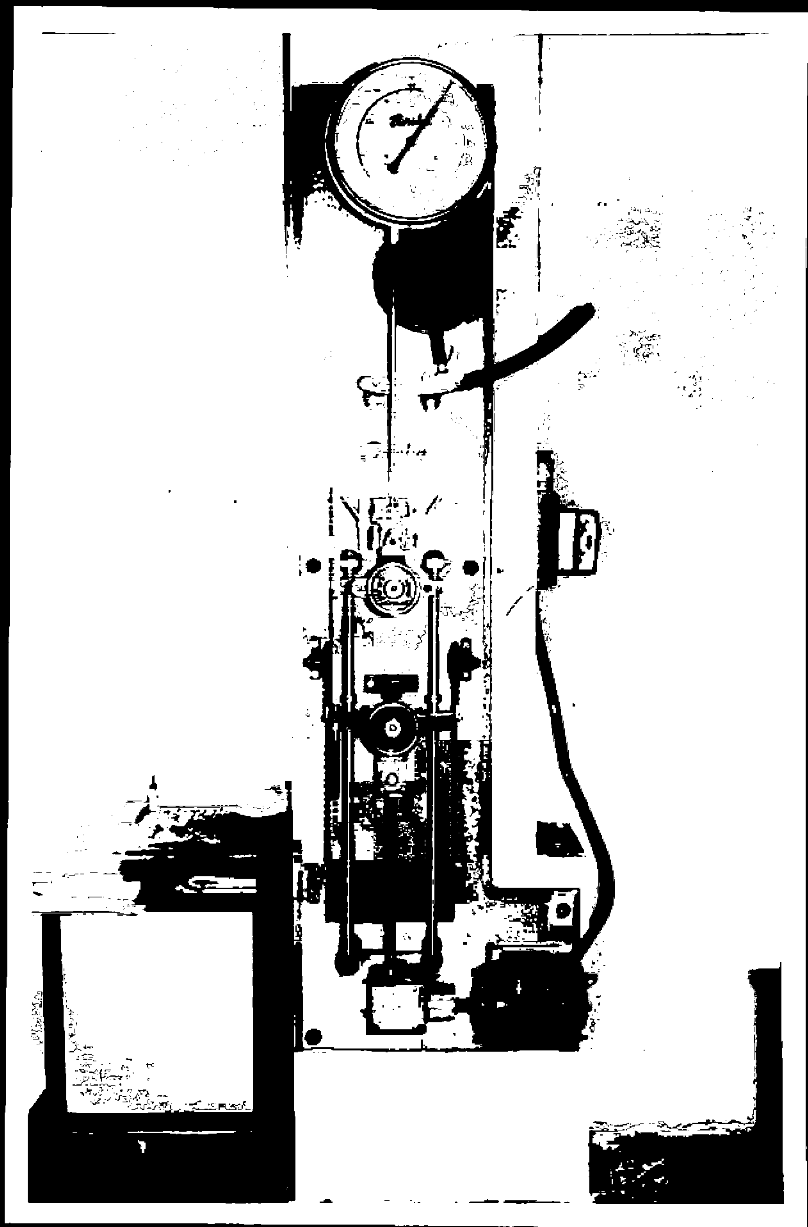
THICKNESS TESTER

PLATE II

According to Grover and Hamby (1969) breaking strength is a measure of the resistance of the fabric to a tensile load in warp (or) weft. Elongation is the deformation in the direction of load caused by a tensile force, Mauresberger (1947). The Good Brand Tensile Strength Tester (Plate III) was used for the study. The rate of traverse and the capacity of the machine were 18" per minute and 500 pounds, respectively. The gauge length was kept as nine inches. The dial of the machine was calibrated in pounds and kilograms. Ten samples each with a length of 13" and a width of 1 1/2" were cut from warp and weft direction. They were ravelled down to a width of 1" by drawing approximately the same number of length wise yarns from each side. The sample was clamped between the two jaws. Care was taken to note that the yarns were perpendicular to the load. The load was applied and the reading was recorded as soon as the sample broke. The elongation of the sample was also recorded simultaneously. The mean of ten readings both for tensile strength and elongation was calculated and recorded.

C. Bursting strength

Lyle (1977) says that bursting strength is the amount of pressure required to rupture a fabric. Skinkle (1972) states that bursting strength is the force applied to break



TESSILE STRENGTH TESTER

PLATE III

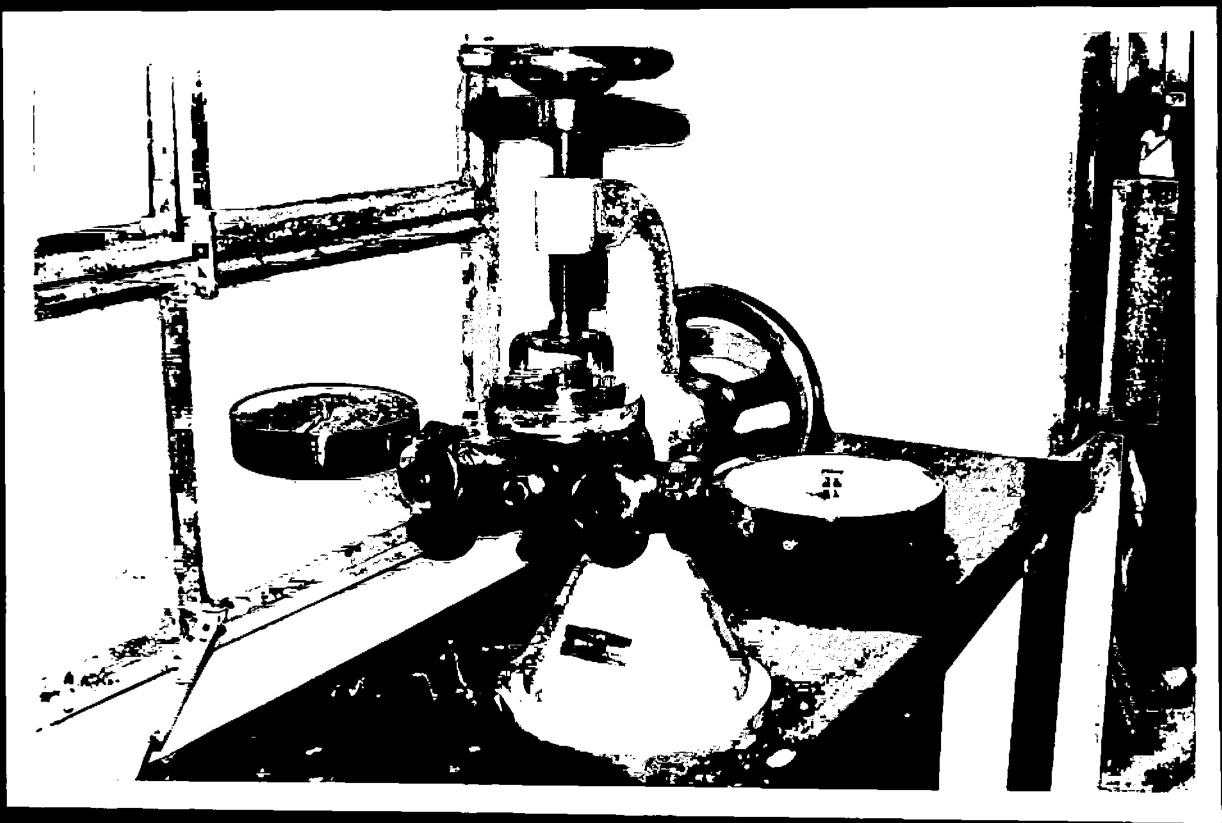
a fabric when applied at right angles to the fabric and uniformly distributed over a given area.

The Eureka brand bursting strength tester (Plate IV) was used for the study. It consisted of a device for holding the sample. The internal diameter of the calmp ring was 1-2". The dial was calibrated in pounds per inch^2 and in kilogram per cm^2. The material was subjected to test. The load necessary to burst the fabric by means of the diaphragm gave the bursting strength. The test was repeated for ten times and the mean value was calculated.

d. Abrasion test

Booth (1970) defines that abrasion is just one aspect of wear and is the rubbing away of the component fibres and yarns of the fabric. According to the ASTM Standards (1963), abrasion is the wearing away of any part of material by rubbing against another surface.

The Eureka wear tester (Plate V) was used for the study. Ten specimens of 1¼" in diameter were cut from the original and printed material. The weight of each sample was taken accurately to know the initial weight. The samples were mounted on the sample holder one by one and rubbed against the abrasive paper (fine paper). The rubs were standardized to 15. The final weight of each sample was taken after abrasion. The mean value of ten



BURSTING STRENGTH TESTER

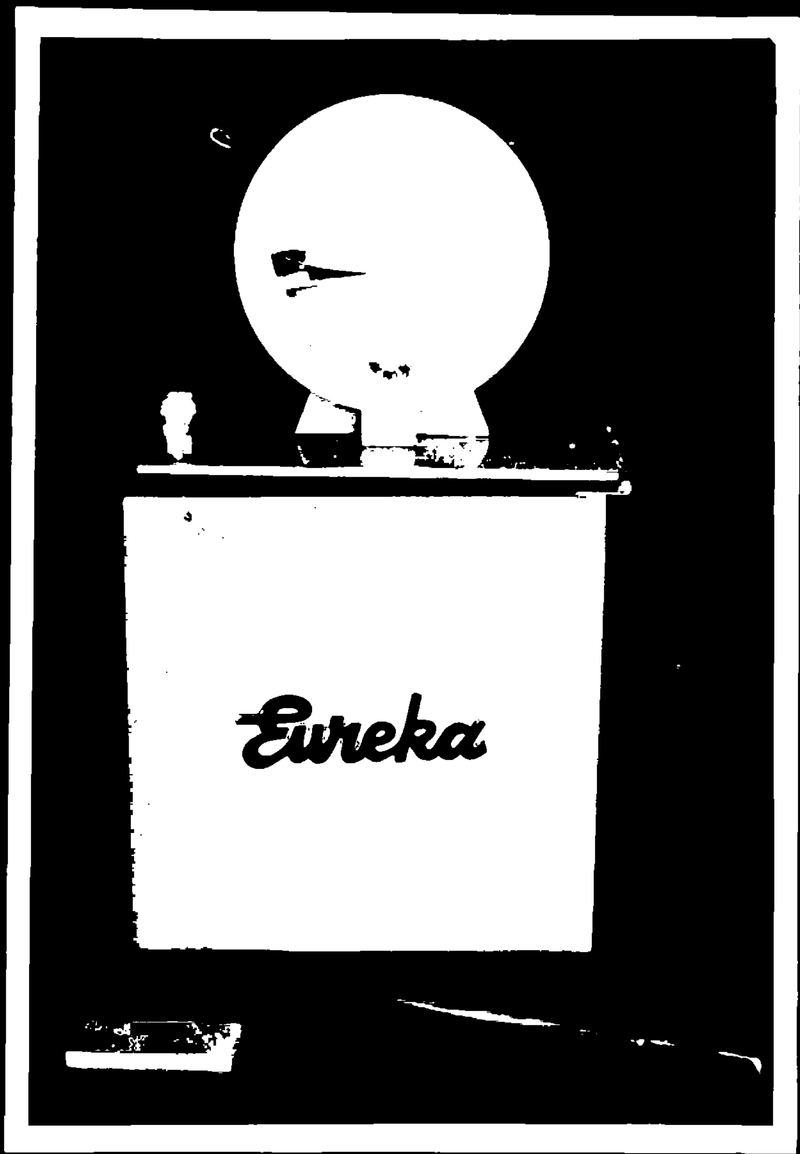
PLATE IV

readings was taken for the original and printed samples, and the loss in weight due to abrasion was found out for each of the samples.

e. Crease recovery

Skinkle (1972) says that crease recovery is the ability of the fabric to recover from deformation in any length of time. According to B.S.Standards (1963) the crease recovery angle of a specimen is the angle between the two arms of the test specimen after loading and recovery.

Shirley crease recovery tester (Plate VI) was used. Specimens were cut from the fabric at random with a template, 2" long by 1" wide. It was carefully creased by folding in half and placed on the anvil of the thickness tester. A weight of 2 kg was applied by lowering the presser foot. After one minute, the weight was removed and the specimen was transferred to the fabric clamp of the instrument and allowed to recover from the crease, the time was adjusted to 1 minute with a stop watch. After the recovery period, the dial of the instrument was rotated to keep the free edge of the specimen in line with the knife edge. The crease recovery angle was read in degrees on the engraved scale.



CREASE RECOVERY TESTER

PLATE VI

6. Drapability

Drape is the ability of a fabric to assume a graceful appearance in use (Booth, 1970). Eureka Brand Drape meter was used for the study (Plate VII).

Five samples were cut with he template of 10" diameter from the original and printed materials before and after wear. Same number of brown papers each of the template size were also cut and the weight of each was noted (A). Each of the cut material was placed over a 5" diameter circular disc in the Drape meter. After 10 minutes the outline of the sample was traced on the brown paper by placing it over the cover plate. The paper was cut, following the outline of the draped area and the weight of the same was noted (B). The Drape coefficient was obtained in percentage from the ratio between the two weights A and B. Thus Drape coefficient--

$$F = \frac{\text{Initial wt (A)} - \text{Final wt (B)}}{\text{Initial wt (A)}} \; 100$$

7. Analysis of the data

The data obtained in the laboratory tests were statistically analysed using Analysis of Variance Test, as suggested by Gupta (1980) and Garrett (1976). The same is presented in Results and Discussion.

DRAPOMETER

PLATE VII

IV. RESULTS AND DISCUSSION

The results of the study are discussed under the following headings:

A. Fabric thickness

B. Tensile strength

C. Bursting strength

D. Abrasion resistance

E. Crease recovery

F. Drapability

A. Thickness

The results obtained in the thickness test are presented in Table I and Figure I.

TABLE I

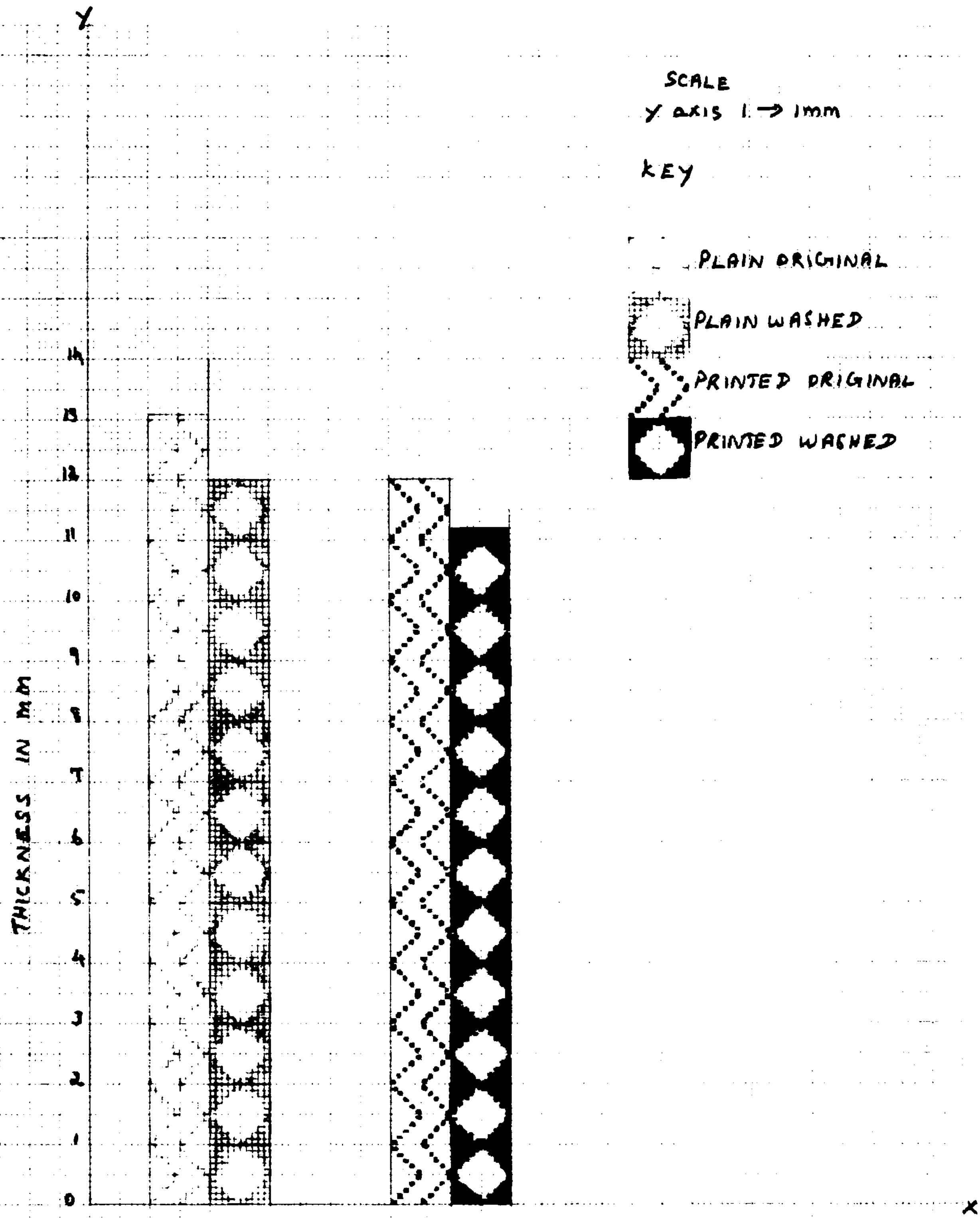
THICKNESS

Type of material	Condition of the sample: Before washing in mm	After washing in mm	'F' value
Plain	13.1 (A)	12 (B)	1.01435
Printed	12 (C)	11.2 (D)	

A	B	C	D
13.1	12	12	11.2

An analysis of the above table revealed that there was a significant difference between the sample A and others. While the difference of sample D when compared to B or C was insignificant.

The conclusion that is drawn from the above analysis is that (1) Printing has reduced the thickness (2) While washing affected the thickness of the plain material, it had no effect on the printed fabric.



THICKNESS

FIGURE - 1

B. Tensile strength

The Tensile strength of the samples in warp direction are presented in Table II and Figure II.

TABLE II

TENSILE STRENGTH—WARP

S.No.	Type of material	Condition of the sample: Before washing in kgm	Condition of the sample: After washing in kgm	'F' value
1.	Plain	12.6 (A)	8.5 (B)	1.957
2.	Printed	12.45 (C)	10.05 (D)	

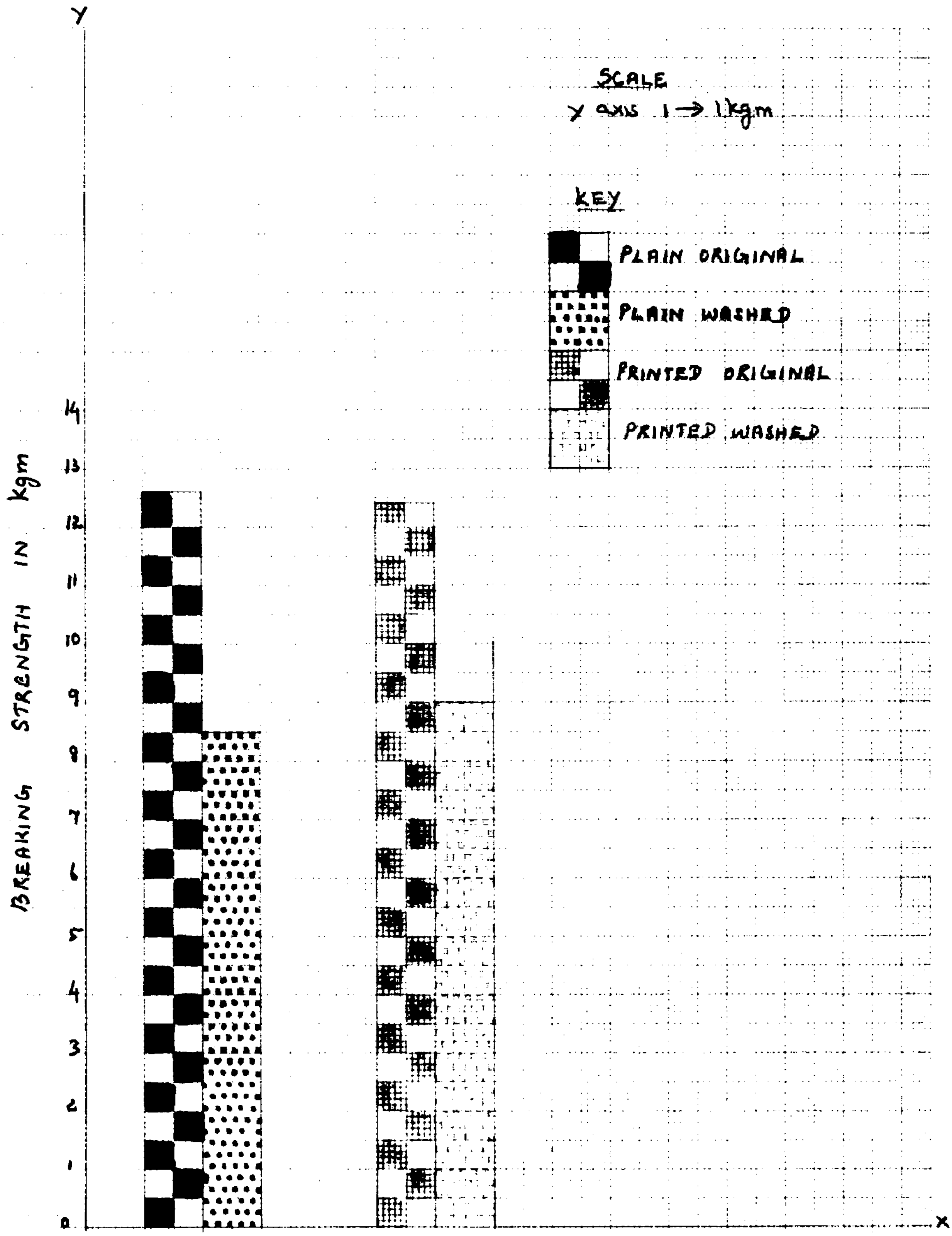
A B C D

12.6 8.5 12.45 10.85

The statistical analysis of the above table revealed that there was significant difference between samples A and B, B and D, whereas the difference between A and C and C and D were not significant.

Conclusions that can be derived from the above analysis are as follows:

1. Washing affects both the plain and printed crepe materials to a significant extent though it is more predominant in the case of plain material namely A.



BREAKING STRENGTH - WARP

FIGURE - 11

2. Printing do not affect the breaking strength of the sample in the warp direction.

The Tensile strength of the sample in the weft direction is given in Table III and Figure III.

TABLE III

TENSILE STRENGTH—WEFT

S.No.	Type of material	Condition of the sample: Before washing in kgm	Condition of the sample: After washing in kgm	'F' value
1.	Plain	11.55 (A)	9.55 (B)	1.717
2.	Printed	10.4 (C)	7.95 (D)	

A	B	C	D
11 55	9.55	10.4	7.95

Table III, when analysed statistically proved that there was significant difference between samples A and B, C and D and A and D. The difference between sample D and others were not significant. From the above analysis the following conclusions are drawn:

1. Washing affected the breaking strength in the weft direction irrespective of the fabric whether it is plain or printed crepe.
2. Printing has not affected the breaking strength in the weft direction.

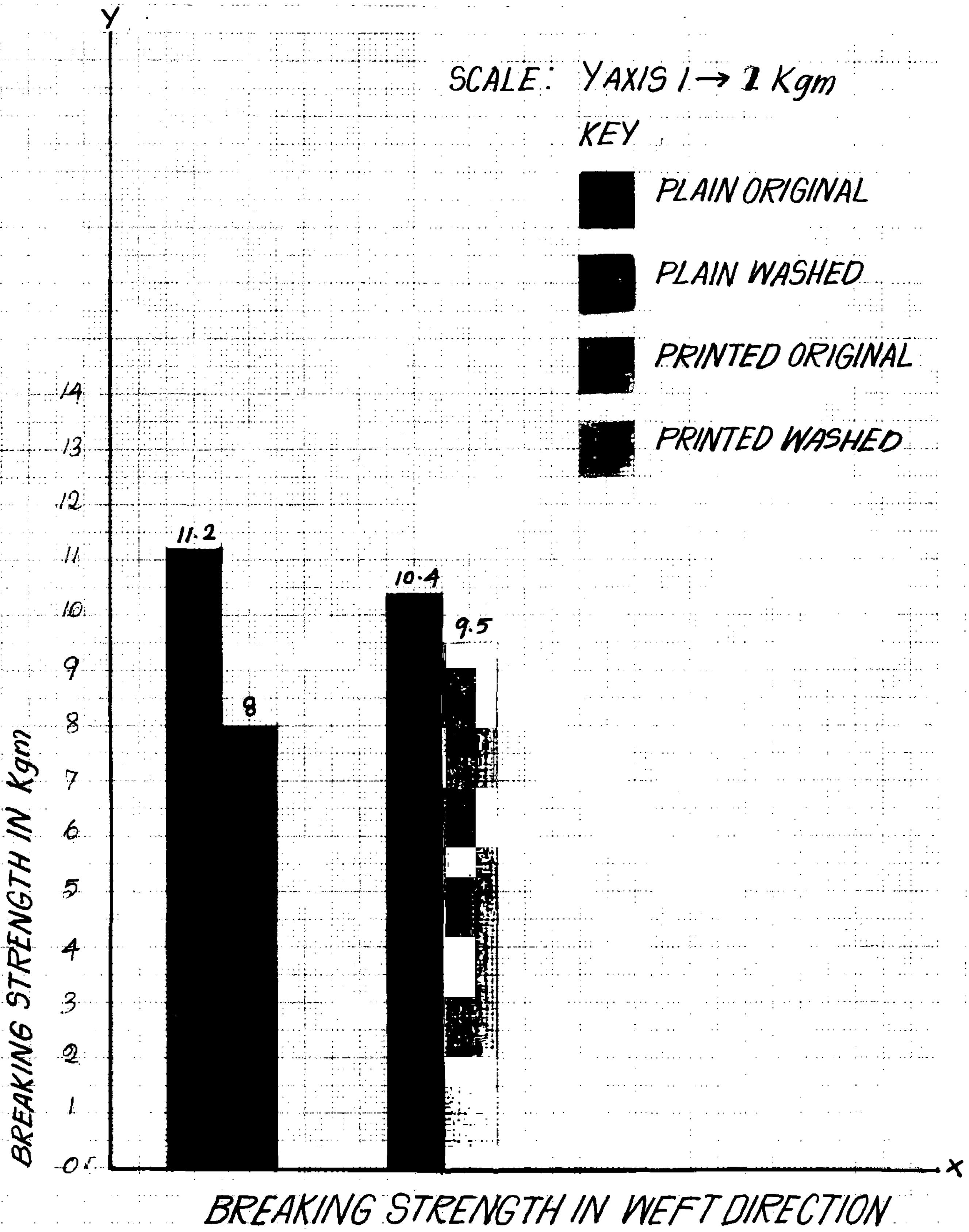

SCALE: Y AXIS 1 → 1 Kgm
KEY
PLAIN ORIGINAL
PLAIN WASHED
PRINTED ORIGINAL
PRINTED WASHED
Y
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
X
11.2
8
10.4
9.5
BREAKING STRENGTH IN Kgm
BREAKING STRENGTH IN WEFT DIRECTION

FIGURE III

Elongation in the warp

The elongation of the samples in the warp direction is discussed in Table IV.

TABLE IV

ELONGATION—WARP

Variation	Condition of the sample		'F' value
	Before washing in inches	After washing in inches	
Plain	1.53 (A)	1.62 (B)	.1823
Printed	1.50 (C)	1.69 (D)	

A	B	C	D
1.53	1.62	1.5	1.69

Analysis of Table IV proved that there was no significant difference between sample A and others while there was a significant difference between sample C and D, the difference between sample B and D was insignificant.

The following conclusions can be drawn from the above analysis:

1. Printing do not affect the elongation in the warp direction.
2. While washing do not affect the plain material, it increased the elongation of the printed fabric.

Elongation in the weft

The elongation of the samples in the weft direction is shown in Table V.

TABLE V

ELONGATION—WEFT

Type of material	Condition of the sample: Before washing in inches	Condition of the sample: After washing in inches	'F' value
Plain	1.64 (A)	1.92 (B)	
			.194
Printed	1.71 (C)	1.90 (D)	

A	B	C	D
1.64	1.92	1.71	1.90

On analysing Table V statistically, it was found that there was significant difference between sample A when compared with sample B and D. No significant difference was observed in samples such as C and D, A and C and B and D.

Hence it may be concluded that—

1. While washing effects the elongation of the plain sample in the weft direction, printed samples do not get affected.
2. Printing had no effect on the elongation when compared to a corresponding plain material.

C. Bursting strength

The bursting strength of the samples is presented in Table VI and Figure IV.

TABLE VI

BURSTING STRENGTH

S.No.	Type of material	Condition of the sample: Before washing in kgm/cm^2	After washing in kgm/cm^2	't' value
1.	Plain	77.5 (A)	75.4 (B)	
				2.109
2.	Printed	83 (C)	90.8 (D)	

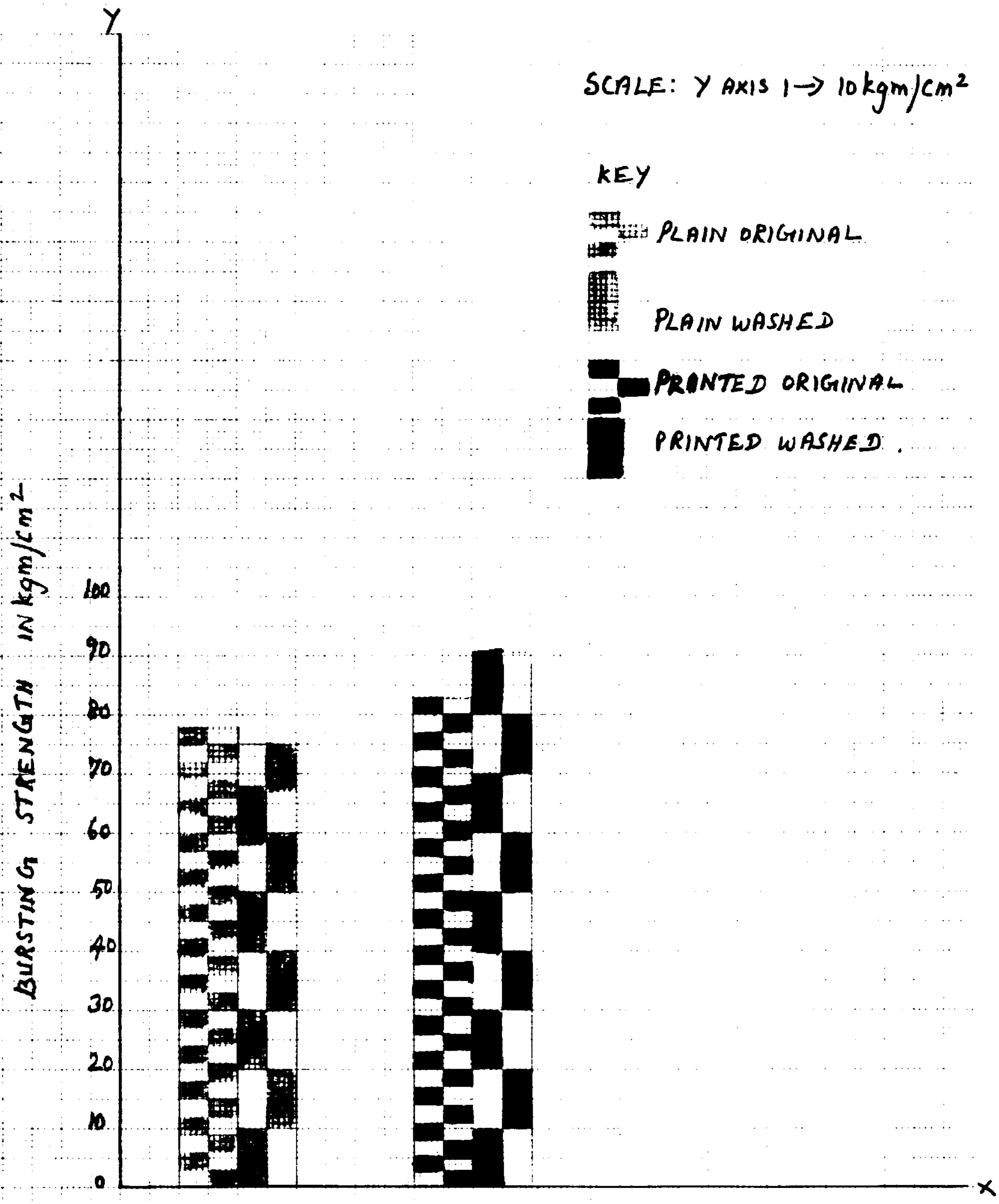
A	B	C	D
77.5	75.4	8.3	90.8

The analysis of Table VI showed that there was a significant improvement in the bursting strength of sample C when compared to A, of sample D when compared to others.

The change in bursting strength of sample B with respect to A was not significant.

From the above it may concluded that--

1. Printing improves the bursting strength of the material.
2. While washing resulted in a marginal reduction in the bursting strength of the plain material, it results in a considerable improvement in the case of printed material.



BURSTING STRENGTH

FIGURE - IV

D. Abrasion resistance

The results obtained in the Abrasion resistance, is indicated in Table VII and Figure V.

TABLE VII

ABRASION RESISTANCE

S.No.	Type of	Condition of the sample: Before washing in gms	Condition of the sample: After washing in gms	'F' value
1.	Plain	1.88 (A)	2.36 (B)	0.457
2.	Printed	2.43 (C)	3.1 (D)	

A	B	C	D
1.88	2.36	1.43	3.1

Table VII on analysis, proved that there was significant difference between sample A and others. A similar difference was noticed when sample D was compared with others.

From the above it is evident that both washing and printing have improved the abrasion resistance of the samples.

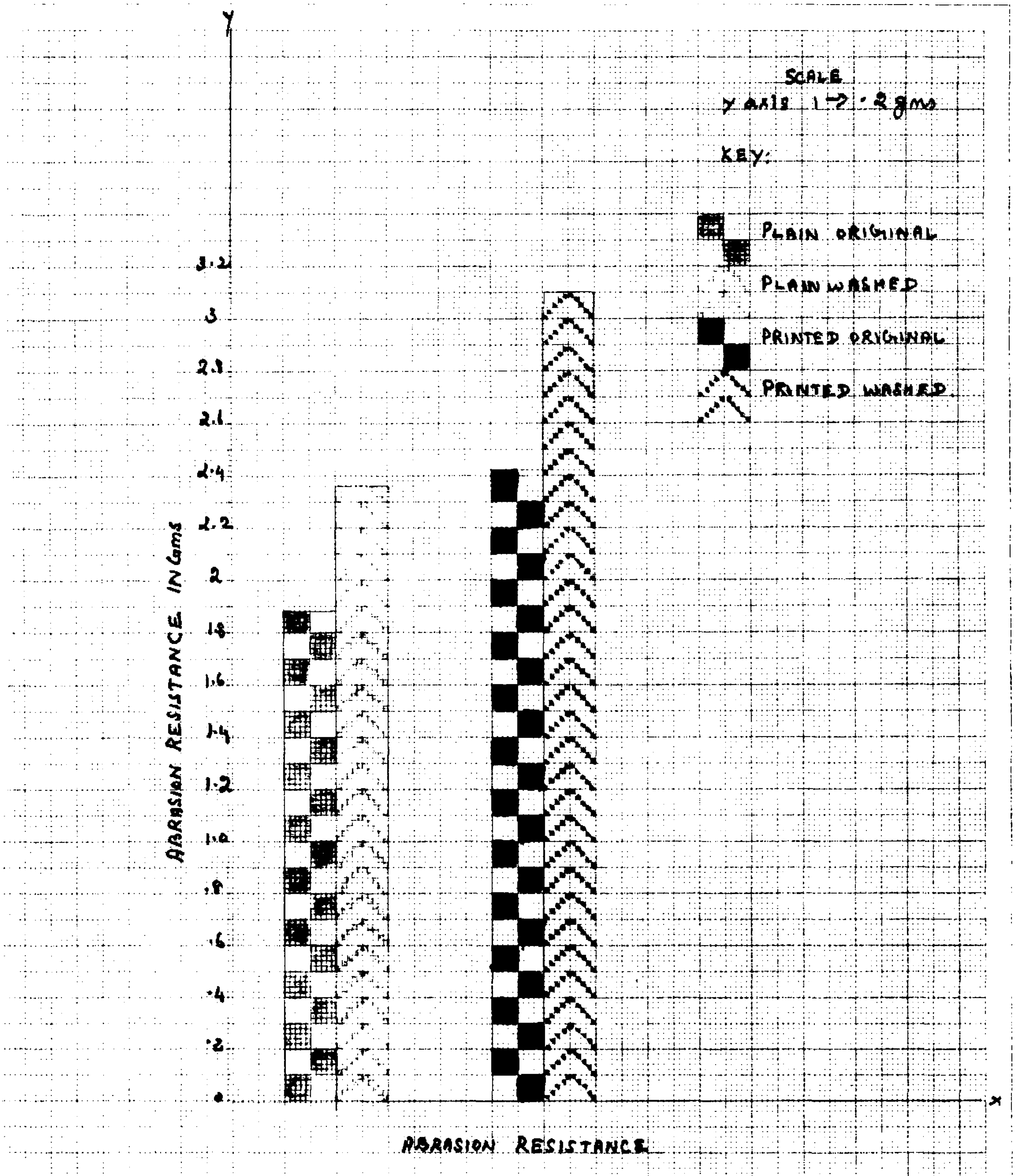

SCALE
Y AXIS 1 - 2 · 2 gms
KEY:
PLAIN ORIGINAL
PLAIN WASHED
PRINTED ORIGINAL
PRINTED WASHED
ABRASION RESISTANCE IN Gms
ABRASION RESISTANCE

FIGURE - V

B. Crease Recovery--Warp

Crease recovery of the samples in the warp direction is discussed in the Table VIII and Figure VI.

TABLE VIII

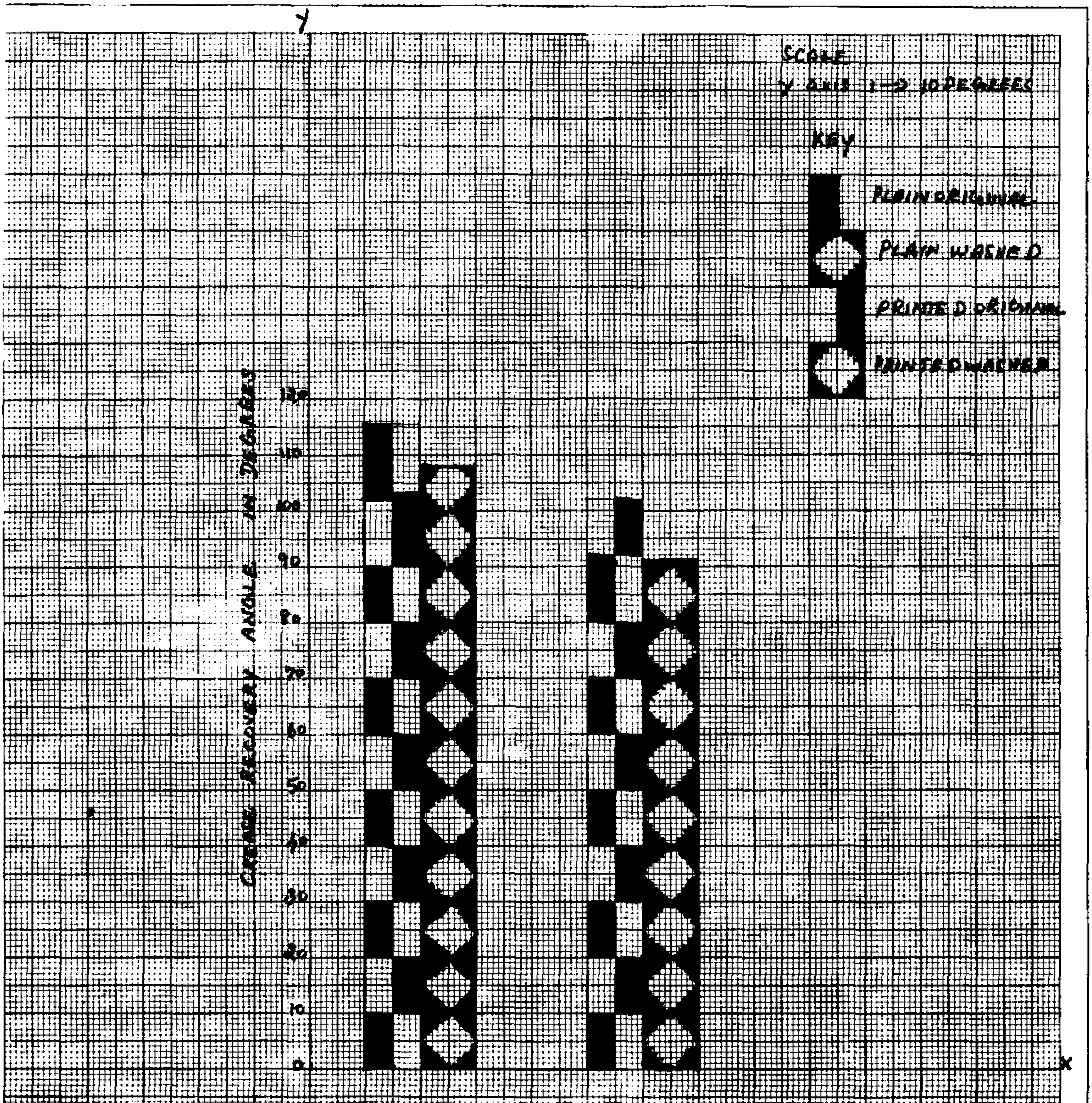
CREASE RECOVERY--WARP

S.No.	Type of material	Condition of the sample: Before washing in degrees	Condition of the sample: After washing in degrees	'F' value
1.	Plain	115.55 (A)	108.05 (B)	
				4.276
2.	Printed	102.25 (C)	91.4 (D)	

A	B	C	D
115.55	108.05	102.25	91.4

An analysis of the above table indicated that there was significant difference between sample A and others. A similar difference was found between sample D and others.

Hence it may be concluded that printing the resulted in the reduction of crease recovery angle of the samples in the warp direction.



CREASE RECOVERY – WARP

FIGURE VI

Crease recovery--weft

The crease recovery in the weft direction is shown in Table IX and Figure VII.

TABLE IX

CREASE RECOVERY--WEFT

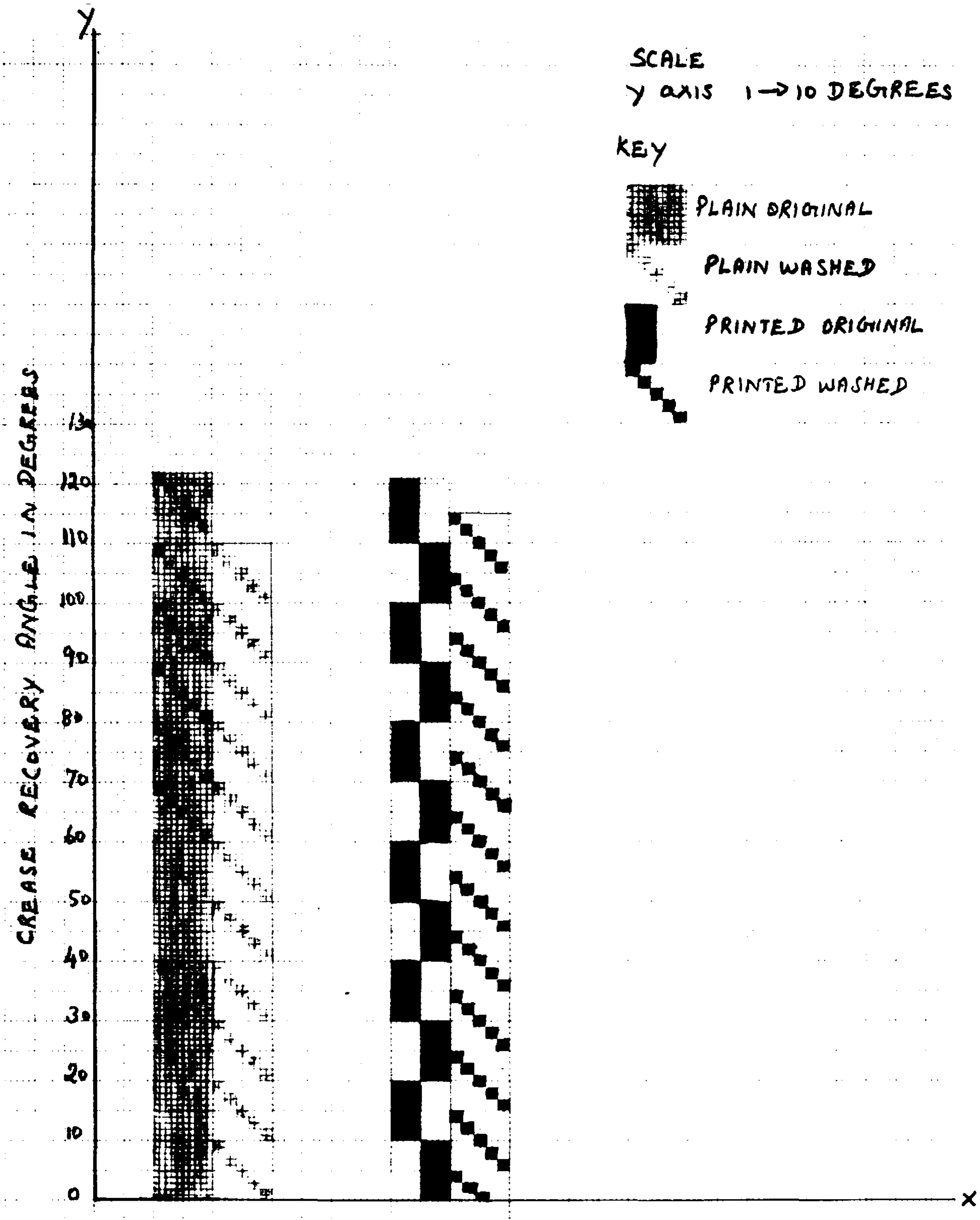
S.No.	Type of material	Condition of the material: Before wash in degrees	Condition of the material: After wash in degrees	'F'-value
1.	Plain	122.35(A)	114.45(B)	
				3.353
2.	Printed	120.65(C)	114.6(D)	

A	B	C	D
122.35	114.45	120.65	114.6

The statistical analysis of Table IX proved that there was significant difference between samples such as A and B, C and D and A and D., in the crease recovery angle in the weft direction. Whereas the difference between samples A and C and B and D were found to be insignificant.

The following conclusions may be drawn from the above analysis:

1. Washing has affected both the plain and printed materials.
2. Printing has no effect on the crease recovery angle in the weft direction.



CREASE RECOVERY - WEFT

FIGURE - VII

F. Drapability

The results obtained in the drapability test are given in Table X.

Table X

DRAPABILITY

Sno.	Type of material	Condition of the sample: Before wash in gms	Condition of the sample: After wash in gms	'F' value
1.	Plain	1.96 (A)	2.09 (B)	0.1449
2.	Printed	2.124 (C)	2.126 (D)	

A	B	C	D
1.96	2.09	2.124	2.126

Table X on analysis, revealed that there was significant difference in the drape coefficient of samples A and C and A and D. The difference between samples such as A and B, C and D and B and D were found to be in significant.

Hence it is evident that while washing had no effect on the drapability, printing had improved the drapability of the material.

V. SUMMARY AND CONCLUSION

Batik printed Rayon is gaining popularity both in the local as well as in the foreign market. A pilot study conducted by the investigator at Erode, proved that these materials are mainly plain woven. With the intension of introducing novelty effect, an attempt has been made to do batik on a rayon crepe fabric, which is available in the market.

Twelve metres of bleached crepe fabric was purchased for the study and two metres were kept aside as original. It was named as sample A. The remaining material was cut into two bits of four and six metres size. The former was utilised for the construction of one Kameez and named as B. The later was batik printed. From that two metres of material was reserved as sample C. The remaining four metres was utilised for the construction of the second Kameez, namely D. Each of the Kameez was worn for a total period of 160 hours and under went a total of twenty washes. They were evaluated by laboratory tests in comparison with the original.

The findings of the study are as follows:

1. A reduction in thickness was observed due to Batik printing.

2. No appreciable change was noticed in the breaking strength of the samples, in the warp and weft direction due to printing.

3. No change in elongation was observed in the warp and weft directions due to printing.

4. Bursting strength of the sample improved due to printing.

5. Printing increased the abrasion resistance of the crepe fabric.

6. While the crease recovery angle reduced in the warp direction due to printing, it remained unaffected in the weft direction.

7. Printing resulted in an improvement in the draping quality of the fabric.

Hence it may be concluded that it is advantageous to do Batik printing on a Rayon crepe fabric.

The investigator would like to suggest that a further study can be undertaken on a cotton crepe as well as silk material.

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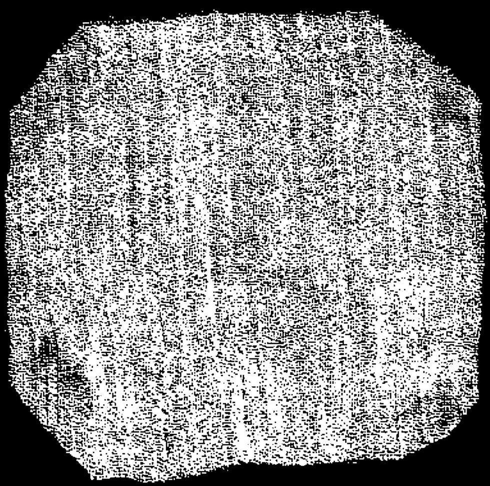
APPENDIX I

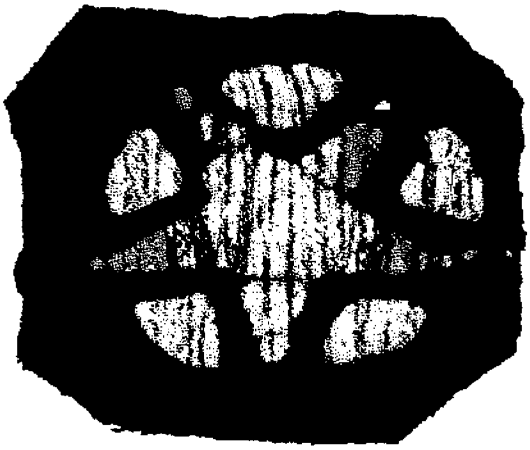
DETAILS OF THE MATERIAL

Type of material	..	Rayon made of high twisted yarns
Width of the fabric	..	52"
Count	..	30 twist per inch
wt/sq.yd.	..	125 gms
Weave	..	Plain
Cost/mt	..	Rs.7.20
Amount purchased	..	12 mts.

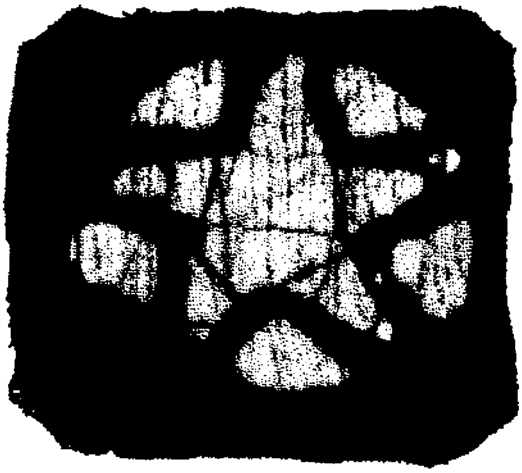


SAMPLE A

SAMPLE B



SAMPLE C



SAMPLE D

APPENDIX III

Formula used for Statistical Analysis

THICKNESS

x_1	x_1^2	x_2	x_2^2	x_3	x_3^2	x_4	x_4^2
13	169	13	169	13	169	11	121
13	169	12	144	11	121	11	121
13	169	11	121	12	144	12	144
13	169	12	144	12	144	11	121
14	196	13	169	12	244	11	121
14	196	12	144	12	144	11	121
12	144	12	144	13	169	11	121
12	144	12	144	12	144	12	144
14	196	11	121	11	121	11	121
13	169	12	144	12	144	11	121
$\Sigma x_1 =$	$\Sigma x_1^2 =$	$\Sigma x_2 =$	$\Sigma x_2^2 =$	$\Sigma x_3 =$	$\Sigma x_3^2 =$	$\Sigma x_4 =$	$\Sigma x_4^2 =$
131	1721	120	1444	120	1444	112	1256

Total sum of all the items of various samples

$$= \Sigma x_1 + \Sigma x_2 + \Sigma x_3 + \Sigma x_4$$

$$= 131 + 120 + 120 + 112$$

$$\text{Correction factor} = \frac{T^2}{N} = \frac{(483)^2}{40} = 5832.225$$

Total sum of squares $= \Sigma x_1^2 + \Sigma x_2^2 + \Sigma x_3^2 + \Sigma x_4^2 - \frac{T^2}{N}$

$= 1721 + 1444 + 1444 + 1256 - 5832.225$

$= 5865 - 5832.225 = 32.775$

Sum of squares between the sample is obtained as follows:

$$\frac{(\Sigma x_1)^2}{N} + \frac{(\Sigma x_2)^2}{N} + \frac{(\Sigma x_3)^2}{N} + \frac{(\Sigma x_4)^2}{N} - \frac{T^2}{N}$$

$$= \frac{(131)^2}{10} + \frac{(121)^2}{10} + \frac{(120)^2}{10} + \frac{(112)^2}{10} - 5832.225$$

$= 1716.1 + 1440 + 1440 + 1254.4 - 5832.225$

$= 5850.55 - 5832.225 = 18.25 = 18.25$

Sum of squares with in the samples $= 32.775 - 1825$

$= 14.5$

Sources of variation	Sum of squares	Degrees of freedom	Mean square
Between samples	18.25	3	6.083
within samples	14.5	36	.40277

Critical Difference = CD = S.E. x $\sqrt{2}$ x 't'

Standard error $= S.E. = \sqrt{\frac{EMS}{n-1}}$

EMS = Mean square with in samples

SE $= \sqrt{\frac{.40277}{(4-1)}} = \sqrt{.13425} = 0.366$

$\sqrt{2} = 1.414$

't' = 1.96

CD = 0.366 x 1.414 x 1.96

= 1.014347