

A STUDY OF MEDI-TECH BY USING EUCALYPTUS AND NEEM DYE ON COTTON FABRIC

D. DEVI
ASST. PROFESSOR
SASURIE COLLAGE OF ARTS AND SCIENCE.

1.1 INTRODUCTION

Cotton is a natural plant seed fibre. It is a soft and cool fibre; it is staple fibre that grows in a form a boll around the seeds of the cotton plant. It is an enormously important commodity throughout the world. This is the cheapest when compared to other fibre. Cotton is one of the fabrics which are more predominantly used in the medical. Its used to make a number of product like crochet, knitting and some home textile product and it is suitable for born baby product like bib, napkins, towel baby dresses. While many of the fibres are blend with cotton including rayon, synthetic fibres such as polyester.

Eucalyptus comes from the family myrtaceae and its subfamily is myrtoideae. Leaf of the eucalyptus tree contains medicinal properties and is used in a number of industries. It is to manufacture a number of skin and personal and hygiene product. The aborigines of Australia considered eucalyptus a "CURE ALL" an opinion that the world at large has come to share, based on the demand for eucalyptus products for medicinal, aromatics and industry.

Neem comes from the family meliaceae, and its botanical name is azadirachta indica. Leaf of the neem tree contains medicinal properties and is used in a number of industries. It is used to manufacture a number of skin and personal and hygiene products. It is a multi functional as well as multi utility natural product and without any side effect. Polysaccharides in neem leaf extract is said to have possess anti-tumour as well as anti-inflammatory properties. Neem leaves are used to treat chickenpox and warts by directly applying to the skin in a paste form or by bathing in water with neem leaf. In order to increase immunity of the body and also taken internally taken internally in the form of neem capsules. The bark contains anti-inflammatory polysaccharide consisting of glucose, arabinose and fructose at a molar ratio 1:1:1 with molecular weight of 8,400.

Yarn dyeing is nothing more than adding colour to the yarn that has been used to create a garment or item, or adding colour to yarn that will soon be used in knitting or crocheting projects. Dyeing is the process in order to dye textile production like fibres, yarns, fabrics. Dyeing is normally done in a special solution containing dyes and particular chemical material. After dyeing, dye molecules have uncut chemical bond with fibre molecules. The temperature and time controlling two key factors in dyeing. There are mainly two classes of dye, natural and man-made.

Weaving is the art of forming a fabric by interlacing at right angles two and more sets of yarn or other material. Weaving is to stretch the warp or longitudinal yarns, which must be very strong. The weft, wool or filling crosses the warp binding the warp threads at either side to form the selvage. The three essential steps after warp is stretched are shedding, or raising every alternate warp yarn or set of yarns to receive the weft picking or inserting the weft and battening or pressing home the weft to make the fabric compact.

Considering these aspects in mind the investigator has chosen the study on "A STUDY OF MEDI-TECH BY USING EUCALYPTUS AND NEEM DYE ON COTTON FABRIC" with the following objectives:

- To give all the pre-treatments to the grey cotton yarn by using alkali and neutral soap.
- To apply two different dyes (eucalyptus and neem) done on pre-treated cotton yarn.
- The dyed yarn is converted into fabric by weaving method.
- The newly innovated natural dyes are arrived to achieve the disinfectant nature to the fabric. So that the garments made up of this fabric can be used in medical garments and specialized home garments.
- This dyed fabrics used in medical garments to study its proprieties.

2.1. EXPERIMENTAL PROCEDURE

2.1.1 SELECTION OF YARN

Cotton yarn were selected for the study. For this study, the investigator has purchased 30's count fibre and 20 kg cotton yarn.

2.1.2 PREPARING PRE-TREATMENT PROCESS

Gray yarn contains various added and natural impurities which in subsequent process, coloration and finishing therefore removal of these impurities assume greater importance to avoid rejection of the final product. With regarding to the pre treatments, the following sequence is followed in this study for pre treatment.

Scouring — > Bleaching

2.1.2.1 SCOURING:

Scouring prepare a bath heat up the water to 300° C and 500 grams of washing soda and 50 grams of neutral soap, allow the both to dissolve the soap thoroughly. Immerge the cotton yarn in the prepared bath at 140° C and maintain the temperature for one hour or until it seems thoroughly cleaned. The yarn washes well in fresh warm to remove all impurity and dry the yarn, with the samples scoured by the use of less alkali.

2.1.2.2 BLEACHING:

After scouring the next pre-treatment process done to the fabric is natural bleaching that is using natural alkali the fabrics are been bleached. Once when they are bleached they would be "Ready for Dyeing". Under this wetting agent (RW) Ultra Wan is used 0.3% and the stabilizer G1 0.2% is used and natural alkali potassium hydroxide 50% is used to impart the Ph. Under this full process the ph is maintained to 11. And all the ingredient are taken on the calculation of the weight of fabric. This natural bleaching is carried out for 1½ at 90° c for 10 minutes to remove the residue from the fabric.

2.1.2.3 SELECTION OF DYE

The health benefits of the Eucalyptus and Neem dye can be attributed to properties like antiseptic, disinfectant, anti bacterial and astringent etc. Considering the beneficial properties of the above, the two dyes were selected for this study. The botanical names of Eucalyptus and Neem dye the parts from which the extract is taken from these sources are shown in the following table.

TABLE-I

COMMON NAME	BOTANICAL NAME	PART USED
Neem	Azadirachta indica	Leaf
Eucalyptus	Eucalyptus globules (LABILLE)	Leaf



2.2. SELECTION OF FINISHING METHOD

Initially, 10 kegs of neem and eucalyptus leaf, dried in closed atmosphere and the leaves grounded in to powder, from put the powder in a pot and add 1 to 2 gallons of water allowed boiling, then reducing heat

and maintaining at the same temperature for an hour and filter the solution. Soak the yarn in the dye vessel and boil 80°C- 90°C to allow your material for an hour.

FOR THE MORDANT

Use 1 cup of Ferrous Sulphate mixed in to 1:2 ratio of water. Soak the fabric in the fabric in the mordant of ferrous Sulphate to allow your material to soak at least 20 minutes and take out the yarn. Rinse the yarn with cool water until the water runs clear and allow the yarn to dry.

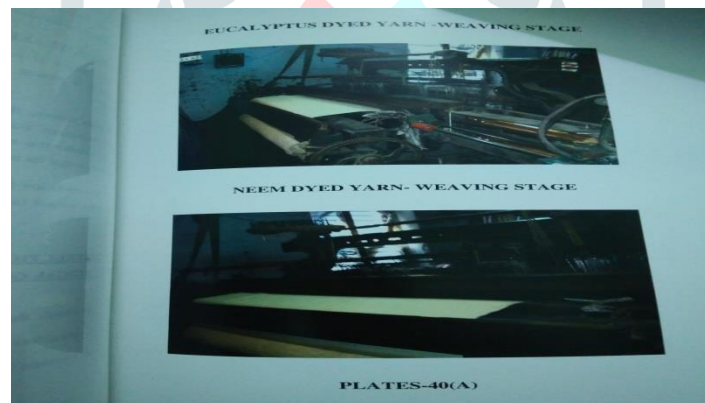
NATURAL DYING METHOD — > Scouring — > Bleaching — > Preparation of dye solution — > Dyed yarn (Tem: 80°C to 90°C and Time:1 hour) — > Using Mordant Ferrous Sulphate (Tem: 50°C to 60°C and Time:20 hour) — > Cold wash — > Dry.

2.3 SELECTIONS OF WEAVING:

The yarn is dyed with two different dyes (Eucalyptus and neem) and converted into fabric by plain weaving method. The plain weave is explained given below.

2.3.1 PLAIN WEAVE:

Plain weave is the most basic of three fundamental types of textile weaves. It is strong and hard-wearing, used for fashion and furnishing fabrics. In plain weave, the warp and weft are aligned so they form a simple criss-cross pattern. Each weft thread crosses the warp threads by going over one, and then under the next weft thread goes under the warp threads that its neighbour went over, and vice versa. Plain weaves are fabrics in which the warp and weft are made of threads of the same weight and the same number of ends per inch as picks per inch.



2.4 CONSTRUCTION DETAILS:

2.4.1 SUGICAL GOWNS:

Finish the front and back pattern by the neck line. Join the shoulders of the front body and back body pattern. Finished back open side seam. Joint the side seam of the back and front. Attached the sleeves to the body. Finished the hem line.

2.4.2 MASK:



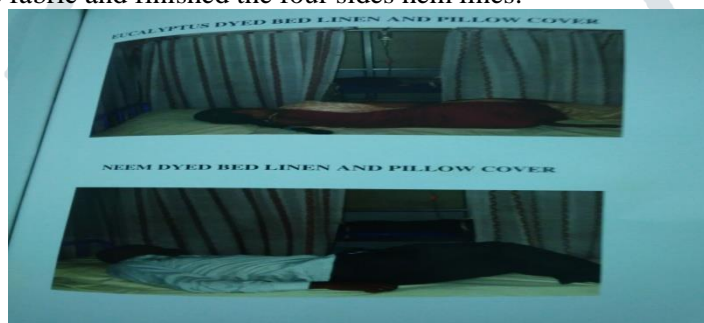
To cut the square fabric and finished the four sides hem line and attached the rope to four sides.

2.4.3 PILLOW COVER:

To join the all side seams and finished the top hem lines. Attached the four ropes on top hem line.

2.4.4 BED LINEN:

To cut the square fabric and finished the four sides hem lines.



2.4.5 TOWEL:

To cut the square fabric and finished the four sides hem lines.

2.5 END USES:

The eucalyptus and neem dyeing with newly innovated natural 100% cotton fabric is used as articles like surgical gowns, mask, cap, bed linen, pillow cover, towel in hospital for medical applications and it is certificated for anti-bacterial activity, non- allergenic and the fabric feels cool and comfortable and proved that both the fabrics are equally good in this study.

NOMENCLATURE OF SAMPLES

The following table indicates the nomenclature of samples for the study.

TABLE

S.NO.	SAMPLE CODE	SPECIFICATION
1.	ESGS1	Eucalyptus Surgical Gown Sample
2.	EMS1	Eucalyptus Mask Sample
3.	EBS1	Eucalyptus Bed Linen Sample
4.	ETS1	Eucalyptus Towel Sample
5.	NSGS1	Neem Surgical Gown Sample
6.	NMS1	Neem Mask Sample
7.	NBS1	Neem Bed Linen Sample
8.	NTS1	Neem Towel Sample

The above samples were named according to the first letter of the samples and process.

3.1 EVALUATION

3.1.1 WEARING TEST:

The project is manufacturing garments by weaving of two different cotton yarns dyed with Eucalyptus and Neem dyes. The dyed fabric is converted into medical garments. It was given to a doctor to wear. As per his feel the garments are comfortable to wear, no allergenic, no irritating smell.

3.1.2 VISUAL EVALUATION:

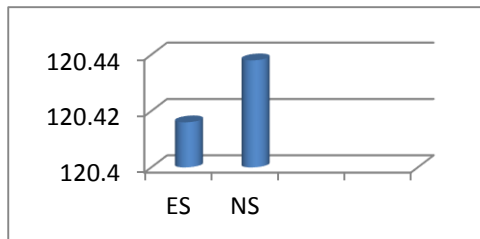
The general appearance of both the sample was visually evaluated. The entire sample considered by good above 87% to 91% of the judges and fair 12% to 16% of the judges for both the fabrics.

The texture of the entire sample was visually evaluated. The entire sample has been considered to be good by above 85% to 91% of the judges and fair 9% to 14% of judges for both the fabrics.

The brilliance of shade of the entire sample was visually evaluated. The entire sample has been good by 86% to 91% of the judges and fair 9% to 17% for both the fabric.

4.1 RESULTS AND DISCUSSION:

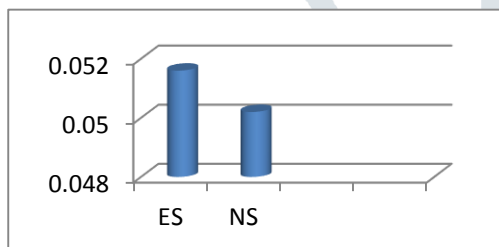
4.1.1 FABRIC WEIGHT



From the above table it is evident that there was increase in weight of the both samples. Among the Es, Ns samples have shown maximum gain of weight, 120.416 and 120.438.

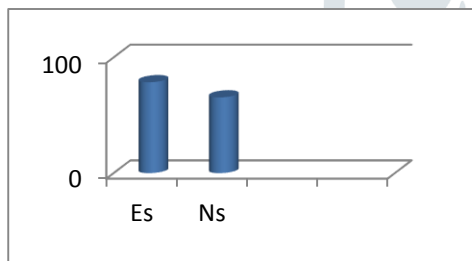
Hence it is clear that natural dye on Es, Ns fabric will give more efficiency.

4.1.2 FABRIC THICKNESS



From the above tables it is obvious that all samples should an increase in thickness. The Es, Ns samples has shown maximum gain thickness.

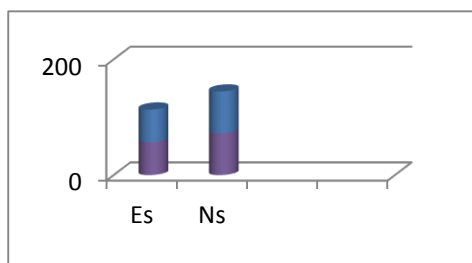
4.1.3 TENSILE STRENGTH-WARP



From the above table most of the samples were increased strength in the warp direction while the result also increased Es, Ns fabrics.

Among the Es, Ns samples (Kgs/cm²) has shown maximum gain of strength about 78.56 Kgs/cm², 65.44Kgs/cm².

4.1.4 TENSILE STRENGTH-WEFT



From the above table most of the samples were increased strength in the weft direction while the result also increased Es, Ns fabrics.

Among the Es, Ns samples (Kgs/cm²) has shown maximum gain of strength about 56.652 Kgs/cm², 72.268Kgs/cm².

4.1.5 WATER ABSORBENCY

It is evident that there was good water absorbency in the samples. As eucalyptus and neem dyed fabric is eco-friendly and Bio-degradable it has good water absorbency.

The sample Es and Ns has good water absorbency hence it is clear that reactive Medi-tech will give more efficiency.

TABLE

S.NO.	EUCALYPTUS DYED FABRIC		NEEM DYED FABRIC	
S.NO.	SAMPLE	TIME IN SECOND	SAMPLE	TIME IN SECOND
1	ES1	3 Second	NS1	3.16 Second
2	ES2	3 Second	NS2	3 Second
3	ES3	4 Second	NS3	4 Second
4	ES4	3.19 Second	NS4	3.20 Second
5	ES5	3.12Second	NS5	3.20Second
		Mean=3.262Second		Mean=3.12 Second

4.1.6 COLOUR FASTNESS TEST TO LIGHT

It is evident that there was good light in the samples. As eucalyptus and neem dyed fabric is eco-friendly and Bio-degradable it has good light fastness.

The sample Es and Ns has good colour fastness to light hence it is clear that reactive Medi-tech will give more efficiency.

TABLE

S.NO.	EUCALYPTUS DYED FABRIC		NEEM DYED FABRIC	
S.NO.	SAMPLE	COLOUR FASTNESS	SAMPLE	COLOUR FASTNESS
1	ES1	4.0	NS1	3/5
2	ES2	4/5	NS2	3/5
3	ES3	4/5	NS3	4.0
4	ES4	4.0	NS4	3/5
5	ES5	4.0	NS5	3/5
	Mean	4.0	Mean	3/5

4.1.6 COLOUR FASTNESS TEST TO PERSPIRATION

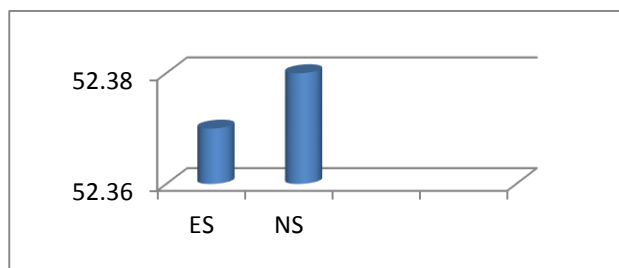
The below table it is obvious that all samples good colour fastness to perspiration. As Eucalyptus and neem dyed fabric is eco-friendly and bio degradable it has well colour fastness to perspiration.

The sample ES and NS has good colour fastness to washing hence it is clear that reactive Medical-tech will give more efficiency.

TABLE

S.NO.	EUCALYPTUS DYED FABRIC			NEEM DYED FABRIC		
S.NO.	SAMPLE	COLOUR FASTNESS		SAMPLE	COLOUR FASTNESS	
		ACID	ALKALI		ACID	ALKALI
1	ES1	4.0	4/5	NS1	4.0	4.0
2	ES2	4.0	4.0	NS2	4.0	4.0
3	ES3	4.0	4.0	NS3	4/5	4.0
4	ES4	4.0	4/5	NS4	4.0	4.0
5	ES5	4/5	4.0	NS5	4.0	4/5
	Mean	4.0	4.0	Mean	4.0	4.0

SINGLE YARN STRENGTH TEST



It is most of the sample were increased in strength in the eucalyptus, neem yarn while the result also increased when compared to the original. Among the Eys, Eys samples have shown maximum gain of strength about.

SUMMARY & CONCLUSION

Cotton is a natural fiber. It is a soft, staple fiber that grows in a form a boll around the seeds of the cotton plant. It is an enormously important commodity throughout the world. But this is the cheapest when compared to other fabric. Cotton is one of the fabrics which are more predominantly used in the medical field.

The pre- treatments are the most important processing which carried before the yarns are subjected to dyeing. Natural pre-treatments are now been the mostly used and preferred in textile industry. All the pre-treatments are done by using natural alkali and enzymes.

Eucalyptus comes from the family myrtaceae and its subfamily name is mytoideae. Leaf of the eucalyptus tree contains medicinal properties and is used in a number of industries. It is to manufacture a number of skin and personal and hygiene product. The aborigines of Australia considered eucalyptus a cure all an opinion that the world at large has come to share, based on the demand for eucalyptus products for medicinal, aromatic and industrial.

Neem comes from the family meliaceae, and its botanical name is azadirachta indica. Leaf of the neem tree contains medicinal properties and is used in a number of industries. It is used to manufacturing a number of skin and personal and hygiene products. It is a multi functional as well as multi utility natural product and without any side effect. Polysaccharides in neem leaf extract is said to have possess anti-tumor as well as anti-inflammatory properties.

Eucalyptus and neem dyed are prepared from dry leaf and it is dried in closed atmosphere and to prepare the powder. The newly innovated natural dyes are arrived to achieve the disinfectant nature to the fabric. So that the garments made up of this fabric can be used in medical garments.

The investigator here attempted to study on 100% cotton fabric to give it natural pre-treatments and dyed with eucalyptus and neem dye and applied with the mordant ferrous sulphate. It was shows resistance to bacteria and per-treatment shows to the quality fabrics are equal in their results and resemble alike.

METHODOLOGY:

The investigator selected 100% cotton fabric of study and for the studied fabrics are given natural pre-treatments and dyed with eucalyptus and neem dye, applied with natural mordant.

After the finishing the sample were subjected to visual evaluation and laboratory test. The visual evaluation test included aspects like general appearance, brightness of color, texture and lustre. The laboratory tests included fabric weight, thickness, tensile strength, color fastness, water absorbency that both the fabrics are equally good in their results.

THE FINDINGS OF THE STUDY:

- That the eucalyptus and neem dyed fabrics are equally good and its cheap and affordable.
- With regard to visual evaluation dyed and finished sample have good texture.
- General appearance of all the samples was found to be good.
- The results of the tests were studied. That is the result of fabric weight and fabric thickness were found and noted that both the fabrics are equally good.
- The tensile strength in warp way and in weft way are also tested and the results were studied. Both are equally good.
- The water absorbed tests were proved that both fabrics. The both fabrics have absorbed quite common.
- The colour fastness test result proved that both the fabrics have very good colour fastness properties.
- The finished fabrics were construction as SURGICAL GOWNS, MASK, CAP, BED LINEN and PILLOW COVER. They were used in the hospital by the fabrics are good. Both the finished samples were equally good in their characteristics after finishing.

CONCLUSION:

The application of the newly innovated eucalyptus and neem dyeing and natural pre-treatments on 100% cotton yarn and the cotton fabrics are proved that they are equally good in all kinds of laboratory test. This eucalyptus and neem dyeing along with the natural mordant will give an added protection from bacterial and it shows 100% protection from the bacterial and fungal infection. In future an attempt to this kind of an eco friendly softening finishes would surely enhance the disease and bacteria.

RECOMMENDATION:

1. This natural dyes when comes to the market it could be used to all types of fabrics for making the fabric feels soft and cool 100% Eco friendly.
2. Further research can be done to give some finishes.
3. The clothes which are been used for wound dressings and baby dresses could prefer this type of fabrics.

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