

# A STUDY ON APPLICATION OF MOSQUITO REPELLENT PRINT ON CURTAINS USING ESSENTIAL OILS

Ms.C.SARANYA, Mr.K.V.ARUNKUMAR,

Assistant Professors

Department of Costume Design and Fashion ,  
Kongu Arts and Science College (Autonomous), Erode, India

**Abstract:** A Mosquito repellent textile is one of Protective textile. It protects the human beings from the bite of mosquitoes and thereby promising safety from the disease like malaria and Nile fever. Now a day's more number of chemicals is used as mosquito repellent but those chemicals are toxic and harmful to the human beings. The present study was carried out to impart mosquito repellent character to the Curtains. To impart such character, a print is given to the textile material using essential oils which are non toxic and eco friendly. Essential oils like Marigold oil, Clove oil, Cedar wood oil, Garlic oil, Rosemary oil, Lemon Thyme oil were chosen as a mosquito repellent for this study. The selected essential oils are mixed with the printing pigments in different ratios. Screen printing technique is used to printing and the mosquito repellent printed samples can be evaluated subjectively and objectively.

**IndexTerms - Mosquito repellent, Essential oils, Curtains, Pigments Screen printing.**

## I. INTRODUCTION

In today's modern era of the textile world, we are in need of advanced technology in every field. To ensure our safety and security from the future problems we have to equally develop the technology for our protection. In the textile field protective textile is used to fulfill the requirement of safety. A mosquito repellent textile is one of the smart textiles that prevent human beings from the mosquito bite. In this regard a new and more complicated requirement of developing a mosquito repellent fabric which should affect neither the environment nor the user faces the technologists now. So far very few attempts have been made to developing the mosquito repellent fabrics. The investigator has made an attempt to develop mosquito repellent finish on cotton fabric through printing.

The present study has been undertaken with the following objectives, To procure 100 percentage plain weave cotton fabric in 40's count, to select the pigment for screen printing, To mix the selected oils with the printing pigment in different ratios, to screen print the fabric, to test the fabric for selected fabric properties, To analyze the effectiveness of the Mosquito repellent print, evaluate the printed fabrics subjectively and objectively

## II. MATERIALS AND METHODS

### \*SELECTION OF MATERIAL

Cotton, a natural cellulosic fiber, is one of the most important fibers used in textile industries, especially in apparels. Cotton spun yarns or threads can always produce a soft and breathable fabric. Besides, cotton has relatively high tensile strength and resistance to abrasion. The investigator has chosen 100 percentage plain weave cotton fabric in 40's count for the study

### \*SELECTION OF ESSENTIAL OIL:

Marigold oil, Clove oil, Cedar wood oil, Garlic oil, Lemon thyme oil, Rosemary oil are having mosquito repellent properties so the investigator has chosen those essential oils for the study.

### \*SELECTION OF PRINT

Screen printings, screens are easy and cheap to prepare, this type of printing has become very popular, the colors have a transparency, purity and richness which are not screen. The investigator selected resist type screen printing for the study.

### \* MIXING OF ESSENTIAL OIL WITH PIGMENT

5%,10% and15% of Marigold oil, Clove oil, Cedar wood oil, Cedar wood oil, Cedar wood oil, Lemon thyme oil, Rosemary oil are mixed with printing pigments.

### \* NOMENCLATURE OF SAMPLE

S.NO	CODE	SAMPLE
1	O	Original sample
2	MG1	5% Marigold oil mixed with printing pigment
3	MG2	10% Marigold oil mixed with printing pigment
4	MG3	15% Marigold oil mixed with printing pigment
5	C1	5% Clove oil mixed with printing pigment
6	C2	10% Clove oil mixed with printing pigment
7.	C3	15% Clove oil mixed with printing pigment
8.	CW1	5% Cedarwood oil mixed with printing pigment

9.	CW2	10% Cedarwood oil mixed with printing pigment
10.	CW3	15% Cedarwood oil mixed with printing pigment
11.	G1	5% Garlic oil mixed with printing pigment
12.	G2	10% Garlic oil mixed with printing pigment
13.	G3	15% Garlic oil mixed with printing pigment
14.	LT1	5% Lemon Thyme oil mixed with printing pigment
15.	LT2	10% Lemon Thyme oil mixed with printing pigment
16.	LT3	15% Lemon Thyme oil mixed with printing pigment
17.	RM1	5% Rosemary oil mixed with printing pigment
18.	RM2	10% Rosemary oil mixed with printing pigment
19.	RM3	15% Rosemary oil mixed with printing pigment

TABLE-1 The Nomenclature of samples are listed below

## III. RESULT AND DISCUSSION

## 3.1 SUBJECTIVE EVALUATION

## Visual Inspection

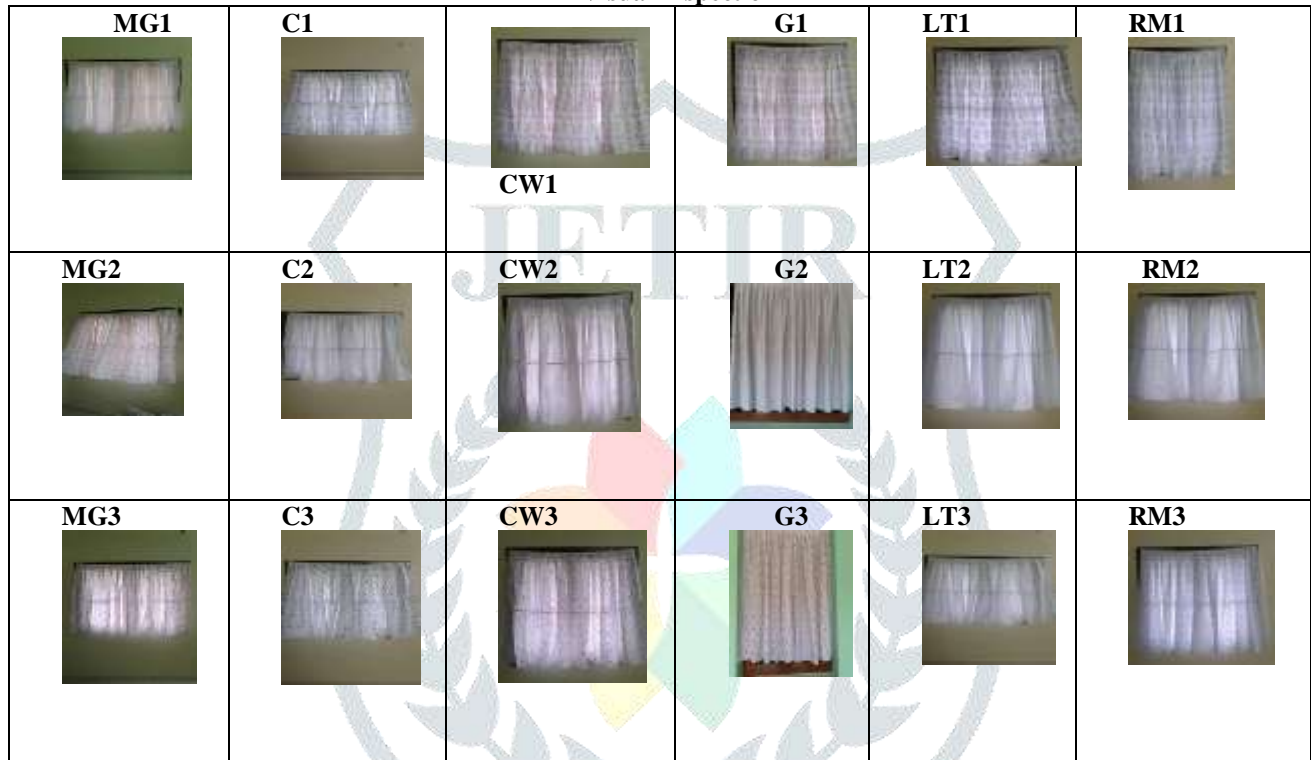


PLATE I:Printed Curtains

## VISUAL INSPECTION FOR THE CURTAINS PRINTED WITH ESSENTIAL OIL

S.N O	SAMP LE	GENERAL APPEARANC E			EVENNESS OF THE PRINT			TEXTURE			ODOR		
		G	F	P	PE	M	IM	S	M	C	G	F	P
1	MG1	72	28	-	84	16	-	68	32	-	80	20	-
2	MG2	76	24	-	72	28	-	76	24	-	88	12	-
3	MG3	80	20	-	64	36	-	84	16	-	92	8	-
4	C1	92	8	-	88	12	-	72	28	-	96	4	-
5	C2	84	16	-	76	24	-	64	36	-	92	8	-
6	C3	76	24	-	68	32	-	88	12	-	84	16	-
7	CW1	64	36	-	72	28	-	60	40	-	84	16	-
8	CW2	88	12	-	60	40	-	80	20	-	72	28	-
9	CW3	80	20	-	76	24	-	76	24	-	92	8	-
10	G1	68	32	-	56	44	-	84	16	-	68	32	-
11	G2	84	16	-	52	48	-	68	32	-	80	20	-
12	G3	72	28	-	68	32	-	52	48	-	76	24	-
13	LT1	64	36	-	52	48	-	64	36	-	84	16	-
14	LT2	56	44	-	64	36	-	48	52	-	80	20	-
15	LT3	52	48	-	80	20	-	56	44	-	76	24	-

16	RM1	60	40	-	88	12	-	80	20	-	96	4	-
17	RM2	76	24	-	84	16	-	76	24	-	84	16	-
18	RM3	68	32	-	92	20	-	72	28	-	80	20	-

FOOTNOTES : G-Good, F-Fair, P-Poor, PE- Perfect, M- Medium, IM-Imperfect, S- Soft, C- Coarse

TABLE: 2 Visual Inspection for the curtains printed with essential oil

The tested samples were evaluated visually. A panel of hundred student’s specialization in field of Costume Design and Fashion were selected as judges for evaluating the samples. The major aspects taken into consideration for visual inspection included a) general appearance b) evenness of the print c) texture d) odor. The samples were evaluated in comparison with the respective original sample. From the Table 2 it was clear that more than 73 percent of the judges rated all the printed samples are good in general appearance. Evenness of the print was rated to be perfect by more than 72 percent of the judges. About 70 percent of the judges rated that the texture of the printed samples was soft. More than 80 percent of the judges rated that the odor of the printed samples were good

3.2 OBJECTIVE EVALUATION

3.2.1 EVALUATION OF FABRIC STRENGTH

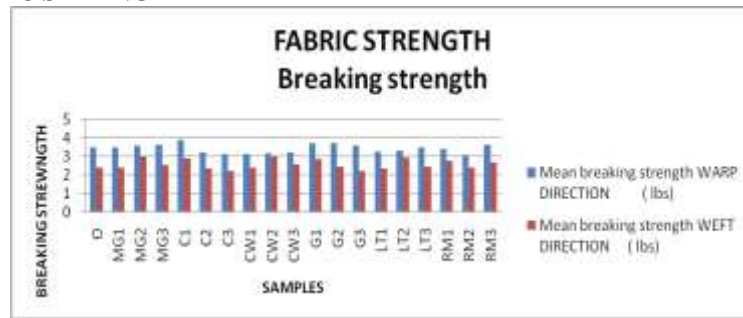


Figure 1: Fabric Breaking Strength

From Figure 1, It is clearly evident that the sample C1 is having high percentage of breaking strength in warp direction and the sample RM2 having the least percentage of breaking strength in warp direction and the sample MG2 having high percentage of breaking strength in weft direction and the sample C3 having the least percentage of breaking strength in weft direction, compared with the original sample O

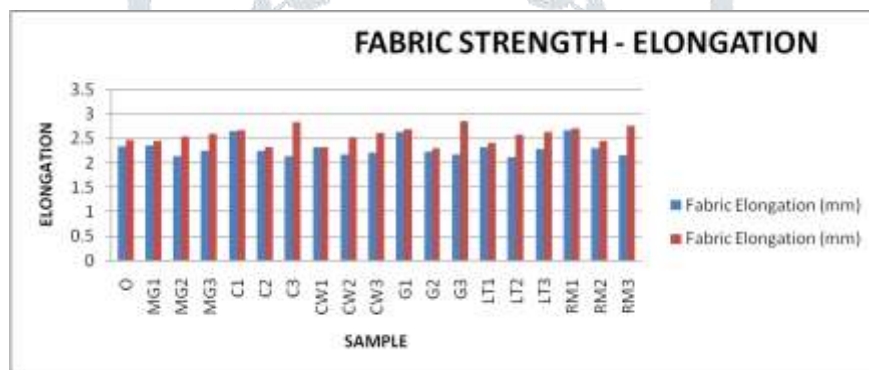


Figure 2: Fabric Elongation

Figure 2 shows that the sample RM1 is having high percentage of fabric elongation in warp direction and the sample LT2 having the least percentage of fabric elongation in warp direction and the sample G3 is having high percentage of fabric elongation in weft direction and the sample G2 having the least percentage of fabric elongation in weft direction, compared with the original sample O.

3.2.2 EVALUATION OF FABRIC STIFFNESS

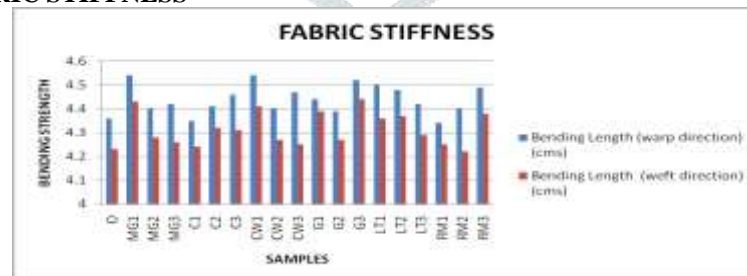


Figure 3: Fabric Stiffness

From Figure 3 it is clearly evident that the sample MG1 and CW1 are having high percentage of fabric stiffness in warp direction, the sample G3 is having high percentage of fabric stiffness in weft direction when compared with the original sample O.

3.2.3 EVALUATION OF FABRIC ABRASION



Figure 4: Fabric Abrasion

From Figure 4 it is clearly evident that all the samples are having high percentage of fabric abrasion when compared to the original sample O. Comparing all these samples, G1 and C1 having the high percentage of fabric abrasion.

3.2.4 EVALUATION OF CREASE RECOVERY

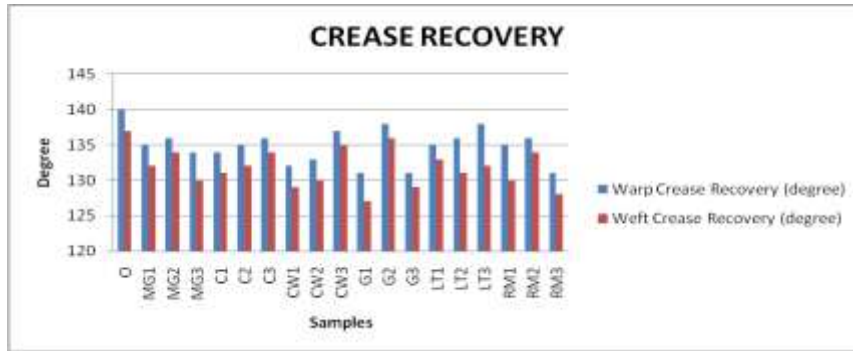


Figure 5: Crease Recovery

Figure 5 shows that sample G1, G3 and RM3 having the least percentage of crease recovery in warp direction. The sample G1 is having the least percentage of crease recovery and G2 having the higher percentage of crease recover angle in weft direction.

3.2.5 EVALUATION OF DRAPE



Figure 6: Fabric Drape

Figure 6, clearly evident that the drape coefficient of the sample C3 is low while compare to O and the sample LT2 is having high drape co-efficient percentage than original sample

3.2.6 EVALUATION OF FABRIC THICKNESS

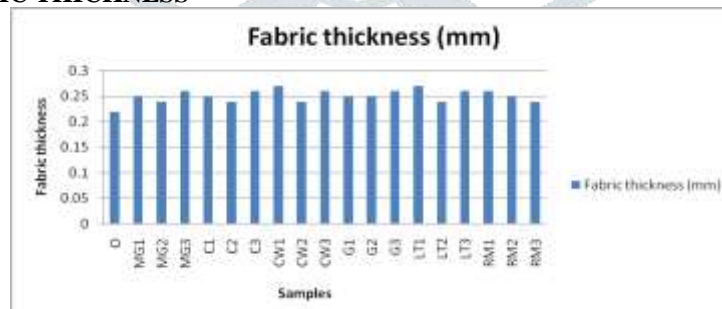


Figure 7: Fabric Thickness

Figure 7 shows that the sample CW1 and LT1 having high percentage of fabric thickness. When compare to all the printed samples with the sample O.

3.2.7 EVALUATION OF COLOR FASTNESS THROUGH CROCKING AND WASHING

3.2.7.1 EVALUATION OF COLOR FASTNESS THROUGH CROCKING

S.NO	SAMPLE	RATING			
		WET		DRY	
		COLOUR CHANGE	STAINING	COLOUR CHANGE	STAINING
1	MG1	5	4/5	5	5
2	MG2	5	5	5	4/5
3	MG3	5	5	5	5



4	C1	5	4/5	5	5
5	C2	5	5	5	5
6	C3	5	5	5	4/5
7	CW1	5	5	5	4
8	CW2	5	4/5	5	5
9	CW3	5	4	5	4/5
10	G1	5	4/5	5	4/5
11	G2	5	5	5	5
12	G3	5	4/5	5	4/5
13	LT1	5	4/5	5	5
14	LT2	5	5	5	5
15	LT3	5	4	5	4
16	RM1	5	4	5	4
17	RM2	5	5	5	5
18	RM3	5	4/5	5	4/5

**FOOTNOTE : 1-Very Poor, 1/2 to 2 – Poor, 2/3 to 3- Moderate, 3/4 - Fair, 4 – Good, 4/5- Very Good, 5 – Excellent**

**Table 3: Color Fastness through Crocking**

Table 3 shows the result of colorfastness through crocking in both dry and wet condition do not show much variation as the scores obtained by the individual samples ranged from 4 to 5. Hence it is clear that all the printed samples have very good fastness to crocking

### 3.2.7.1 EVALUATION OF COLOR FASTNESS THROUGH WASHING

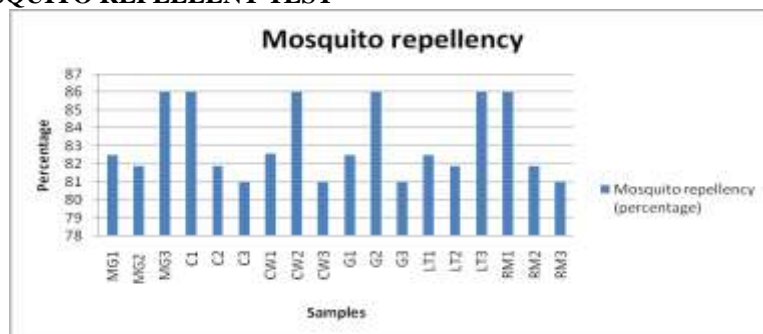
S.NO	SAMPLE	RATING	
		COLOUR CHANGE	STAINING
1	MG1	5	4/5
2	MG2	5	4/5
3	MG3	5	5
4	C1	5	4
5	C2	5	4/5
6	C3	5	5
7	CW1	5	4/5
8	CW2	5	4
9	CW3	5	4
10	G1	5	4/5
11	G2	5	5
12	G3	5	4/5
13	LT1	5	4
14	LT2	5	5
15	LT3	5	4/5
16	RM1	5	4
17	RM2	5	5
18	RM3	5	4/5

**FOOT NOTE:** 1-Very Poor, 1/2 to 2 – Poor, 2/3 to 3- Moderate, 3/4 - Fair,4 – Good, 4/5- Very Good, 5 –Excellent

**Table 4: Color Fastness through Washing**

From the Table 4 it is evident that the result of colorfastness through washing does not show much variation as the scores obtained by the individual samples ranged from 4 to 5.

## 3.2.8 EVALUATION OF MOSQUITO REPELLENT TEST



**Figure 8: Mosquito Repellency**

From the Figure 8 it is clearly evident that the printed samples MG3, C1, CW2, G2, LT3 and RM1 are having high percentage of mosquito repellent property when compared to all the printed samples.

#### IV. CONCLUSION

Essential oils were mixed with printing pigment in different ratios. The investigator concludes that, 15 percentage of Marigold oil mixed with printing pigment, 5 percentage of Clove oil mixed with printing pigment, 10 percentage of Cedar wood oil mixed with printing pigment, 10 percentage of Garlic oil mixed with printing pigment, 15 percentage of Lemon Thyme oil mixed with printing pigment and 5 percentage of Rosemary oil mixed with printing pigment can give better repellency against mosquitoes. It would be concluded that the curtains made up of mosquito repellent print gives good repellency against mosquitoes by means of durability.

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