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ECO FRIENDLY FLY REPELLENT FINISH ON COTTON FABRIC USING VEGETATIVE PRODUCTS

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Abstract - *Flies are the smallest insect that can transmit diseases to human. Worldwide, diseases are highly spread because of flies. Flies may contaminate food and food surface by defecating on them which spread diseases like food poison and dysentery. Although mosquito repellents and insect repellents are now practiced, there is no repellent to reduce flies. This project is to develop an eco-friendly fly repellent cotton fabric by herbal materials like neem, tulasi, mint etc. The repellent finish is given on the fabric with extracted chemical by pad – dry-cure method. The repellence behaviour of the fabric were tested after and before washing. Finally, the treated fabric showed a great repellence properties. The fly repellent cloth is very new and can be used in hotel, dining table, fish market where there is more disturbance of flies. This will reduce the number of diseases caused by flies to humans. And, also useful to society.*

Key Words: **cotton, fly, Repellent, pad -dry -cure, mint, tulasi, dining table**

1. INTRODUCTION

Many insects affect human health. Insect bites generally have a couple of harmful effects - irritation and illness. The less severe effect is the simple irritation, swelling and pain that sometimes come from bites by certain insects such as mosquitoes, bees, some spiders and also flies. There is only a small amount of vaccine available to treat these types of diseases. Thus, the occurrence of diseases should be prevented in advance. There are many ways to repel an insect like spray, smoke and chemical coils. This is a danger to humans due to the high use of chemicals. Therefore, it is necessary to develop a natural repellent that can be used.

Protective textiles are a challenge to the human race. It is the textile industry that has to make many changes to meet the need. Insect repellent helps to repel insects in tropical areas. It also helps to make a new technology in the textile industry [1] .Organic cotton is made naturally without the addition of any chemicals. It is called the gift of men because medicinal plants cure countless diseases [2]. Chemical treatment can cause many problems in human skin. But by using the stems, bark, leaves, tubers etc. of plants and trees, harm can be prevented [3]. The important test are repellence and wash durability test [4].

2. Literature review:

Various protective methods have been mentioned like spray, smoke and synthetic chemicals. And also mentioned natural protective method using 12 organic material. Four types of techniques have been used like Absorption, incorporation, polymer coating, micro encapsulation. In this method, the micro encapsulation has been give good result. The application of the project was like curtains, jacket etc. [1]. Anti mosquito repellent finish was developed on cotton fabric with marigold flower petals. Methanol and Ethanol are used in natural mosquito repellents for extraction. The finish is done with different concentrations of marigold flower petals and tested for mosquito repellence and wash durability. Finally got a good repellent property [2]. The test is performed on cotton (woven and knitted) fabrics. The neem, basil and mint are take in such that the weight is equal to the fabric weight. Extraction is done with the help of ethanol. Pad dry cure method has been used. Mosquito repellent test and wash durability test has been done. In the 9th wash, basil leaves treated fabric lose their repellence effect compare to other treated fabric. Neem and mint has 90% repellent and tulsi has 70 % repellent both cotton (woven and knitted) [3] .Cotton fabric is treated with six herbal materials like Rosemary, mint, lemongrass etc. Mosquitoes are more likely to die when the treated fabric is burned compared to chemical coil. It can be used as a material like curtains, bed sheets. It can be burn to repel mosquitoes when needed [4]. Mosquito repellent is made from cotton cloth using flowers and leaves of 13 different plants like basil, neem, marigold flower petals etc. Each fabric is given separate finish. Fabric treatment was done using dip and dry method. Untreated fabric and treated fabric with herbs like neem, marigold and tulasi are tested in the cage chamber for repellence. And wash durability test has also been carried out. Marigold petals treated fabric is highly repellent compare to other treated fabric. The cloth treated with marigold petals had a higher repellent property and the cloth treated with custard apple leaf had a lower repellent property [5]. Cotton fabric is treated with custard oil and binder. Mosquito repellent test is taken before and after washing. Tensile strength, shrinkage, fabric stiffness is carried out after washing. Before washing gives good repellence and after washing gives poor repellency [6]. Mosquito repellent cotton cloth is made using only mint leaves. After finishing, the cotton fabric showed good repellent property compare to untreated fabric. Here also, the test was done with cage method and wash durability [7].

They have used the cotton fabric which gives the finish in four ways. Used cage test here. The fabric that is finished with lavender oil and cymbopogancitros oil instead of the fabric that is finished with herbs was given a good result [8]. Cow dung, Neem leaves, Saw dust, loban, Tulsi, Maida and Lemon grass oil all these are ready to use coil model. They have compared this with other chemical coils. Herbal ready coil has given good results [9]. Both herbal extraction and herbal oil are made with various natural herbs. They have conducted the test using the cage method. Finally, herbal oil gave good repellent [10].

All these above papers, present details of different methods used to develop insect repellent and mosquito repellent. But, no one has ever made a repellent against flies. Flies are just as annoying as mosquitoes. So, in this projected a fabric is developed to repel flies. To make Cotton fabric is treated with different plant leaves, flowers like basil, cinnamon, neem, cloves etc for fly repellency finish. Solution extracted from these herbs are treated on fabric by Pad dry cure method used. Fly repellent test and washing test is carried out.

3. Objectives:

- To collect the herbal materials like mint, basil, cinnamon etc.
- To convert the herbal material to powder.
- To make the solution and finishing on the cotton material.
- To use pad dry cure method.
- Testing the developed herbal cotton material.

4. Materials

In this experiment the cotton fabric was used. There are huge differences in the quality of cotton fabric. Cotton is very popular because it is versatile, relatively inexpensive and, has good quality, also durable. Organic cotton is grown without harmful chemicals.

Sourcing of fabric: These items were collected from my home garden and some items were purchased from the store.

4.1 Specification

EPI	74
PPI	55
GSM	147
Warp count (EPI)	20s
Weft count (PPI)	30s
Warp cover factor	16.5
Weft cover factor	10

Table – 1: Fabric specification of cotton fabric

Fig -1: Cotton fabric

4.2 Selection of plants:

These types of natural insect repellents are made using the leaves and stems of plants. In this project 10types of natural ingredients like tulasi, Neem, Cloves, Cinnamon, Pepper, Marigold flower petals, Orange peel, Bay leaves, Mexican mint, Mint.

Leaves: Neem

Bay leaves

Mexican mint

Mint

Tulasi

Flowers: Marigold flower petals

Cloves

Pepper

Skin: Orange peel

Stem: Cinnamon

Properties of herbal plant

Tulasi:

Tulasi is a wonderful fly repelling herb plant, because they have a very strong aromatic property. Due to basil enzyme

and eugenol synthase, eugenol is produced.. It is the characteristic scent of the tulasi plant called eugenol.

Neem:

Usually neem is not used in large quantity , because of this products smell. The normal glycerides from other oil seeds and its contain oleic acid (50-60%), palmitic acid (13-15%), stearic acid (14-19%), linoleic acid (8- 16%) and arachidic acid (1-3%), these are similar to the neem kernel lipids. The product in brownish yellow and non – drying oil with an acrid taste and its odour is unpleasant.

Cloves:

Basically the cloves are dried flower buds of plant , it is named as syzygium aromaticum. It is good at repelling flies. Eugenol influence the aroma of cloves, 2-heptanone and methyl salicylate are minor compounds which is also significant contributors.

Cinnamon:

The smell of cinnamon is over powering and its components is toxic to flies. So, it was hated by flies for cinnamon its flavour and odour is given by cinnamaldehyde an organic compound. Naturally this pale yellow viscose liquid is occurred in the cinnamon trees and also the other species of the genus cinnamomum.

Pepper:

The significant of green pepper is the contributor to aroma, it is commonly known as bell pepper pyrazine. The heat creates in pepper is act as the deterrent for pest, insect and also spider. The name suggest has smell which is characteristics of green pepper.

Marigold flower petals:

The scent of marigold flowers is used to repel flies. The most common oil scent given offered by flowers is methylbenzoate. This is why flowers smell so good.

Orange peel:

Orange peel acts as a mosquito repellent, promotes insect infection and fills the atmosphere with good smell. . The D-isomer, commonly occurring in nature as the smell of oranges.

Bay leaves:

Flies hate the smell of bay leaves .A component of many essential oils used in perfumery, can be extracted from migraine bay leaf and also contain eugenol.

Mexican mint:

To repel flies mint is useful. This herb is inexpensive herb. Mint is harmful against not only flies but also to mosquitoes, ants and mice. Spearmint pill is abundant compound and it gives distinctive smell.

Mint:

For insecticide and pest repellent mint is used. It is due to the various properties such as culinary, insecticide, abortifacient and it also repel ants and flies. The active component such as methyl acetate is familiar to mint taste and its aroma is associated.

Fig -1: Herbal materials

5. Methodology:

Collect the material
↓
Converted to powder form
↓
Extract the solution
↓
Pad- dry- cure method used to treat the fabric
↓
Testing the developing material (cage test and water durability)

The leaves and plants were wetted and dried in shade for ten days. After drying, the dried leaves and plants are ground into powders. 250 g of grounded powder was mixed in 300 ml of water and boiled at 100 degree Celsius for 1 hour after 10 min of boiling salt is added. Then the boiled solution is kept idle for an hour to cool. The herbal solution is extracted and kept idle for a day. Cotton cloth of 15”*15” was cut pre-treated in boiled water for an hour. Then the fabric is squeezed to remove the excess water and dry in shade for a day.

At the MLR ratio, 52.2 ml of solution was taken. The cloth was soaked in the solution for one day. After a one day, the treated fabric was done with pad dry cure method. Next, the fabric was test with wash durability and fly repellent.

6. Testing:

Fly repellent test: The most commonly used method for cage test fly repellents For concentrated textiles, there are several methods to determine the effectiveness of the treated textiles.

Wash durability test:

An important aspect of fabric quality is durability for continuous cycles of laundry wear. Durability performance testing involves measuring strength , resistance to abrasion , pilling and requires a basic understanding of sample preparation, testing and evaluation.

7. Result and discussion:

This research work is a new idea that gives a fly repellent finish on cotton fabric. This method is very hygienic. The details results were presented above graphs:

Fly repellent property:

The fly repellent property of the herbal materials extract treated fabrics and untreated fabric was shown in graph 1. The 100% efficiency of the fly repellent is treated by pad-dry- cure method . Within an hour a fly came close to the untreated fabric. Within a two hours number of four flies came close to the untreated fabric. But, within a one hour and two hour flies are not came close to the treated fabric.

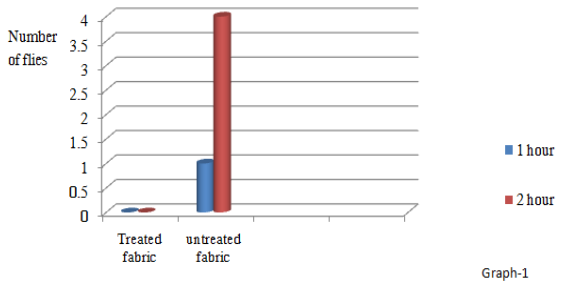

Chart -1: Fly repellent

Wash durability:

The wash durability of the treated fabric was shown in graph 2.In the first two wash the treated fabric showed 100% wash durability. And, the 3rd wash the treated fabric showed 50% wash durability property. Then, the 4th wash the fabric showed only 25% wash durability property. Finally, the 5th wash the treated fabric fully lost its smell and effect.

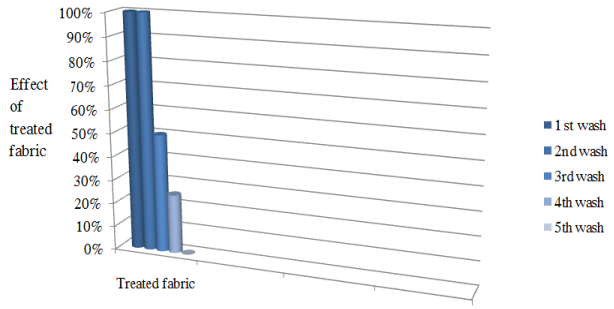

Chart -1: Wash durability

8. CONCLUSION

The treated fabric gives a good effect. This will definitely reduce the impact of flies on the society. This method is very eco friendly. So, there is no harm to humans.The formulation was safe, eco-friendly, cheap, easy to use and has maximum repellence against flies. This project proved that fly repellent finishes can be given to the cotton materials in order to provide external protection in the form of door curtains, bed sheets, and dining table and sofa covers, to prevent the flies.

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