



# EXTRACTION AND APPLICATION OF FERN HERBAL FOR MOSQUITO CURTAIN

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## ABSTRACT

This study focuses on the extraction of fern herbal compounds and their application in the production of mosquito curtains. The fern herbal extract is known for its natural mosquito repellent properties. The extraction process involves collecting fern leaves, drying them, and extracting the active compounds. These compounds are then incorporated into the fabric used for making mosquito curtains. The effectiveness of the fern herbal-infused curtains in repelling mosquitoes will be evaluated through laboratory testing and field trials. This research aims to provide an eco-friendly and sustainable solution for mosquito control. With the persistent threat of mosquito-borne diseases, there is a pressing need for innovative and eco-friendly mosquito control measures. Ferns, recognized for their historical medicinal uses, are explored as a potential source of potent mosquito-repellent compounds. The study details the extraction process of active compounds from ferns, their incorporation into mosquito curtains, and their effectiveness in deterring mosquitoes. The research aims to offer a sustainable, natural, and health-conscious solution to combat mosquito-borne diseases while reducing the environmental impact associated with traditional mosquito control methods. The findings from this investigation have the potential to significantly contribute to the field of vector-borne disease prevention.

**KEY WORDS:** Eco-friendly, Mosquito-repellent, curtains.

## INTRODUCTION

Mosquitoes can be quite a nuisance and pose health risks, so it's important to find effective and natural ways to repel them. This study explores the extraction of compounds from fern herbs, which are known for their mosquito-repellent properties. The goal is to incorporate these compounds into the fabric used for making mosquito curtains, offering a sustainable and eco-friendly solution for mosquito control. Join us on this exciting journey as we delve into the world of fern herbal extracts and their potential in keeping those pesky mosquitoes away.

The extraction and application of fern herbal for mosquito curtains represent an innovative approach to natural mosquito repellents. This involves the utilization of herbal extracts from various fern species to create

eco-friendly and effective mosquito curtains. These curtains serve as a non-toxic alternative to chemical-based repellents, contributing to the reduction of mosquito-borne diseases and promoting sustainable living. In this discussion, we'll explore the process of extracting fern herbal compounds and their potential applications in mosquito curtains for a safer and more environmentally friendly way to combat mosquito-related issues

As the world grapples with the increasing challenges posed by mosquito-borne diseases, there is a growing demand for effective and environmentally sustainable alternatives to traditional chemical repellents. Ferns, with their diverse array of natural compounds, have emerged as a promising source of herbal extracts that can repel mosquitoes. These extracts can be integrated into the production of mosquito curtains, offering a safe, non-toxic, and biodegradable means of protection against mosquito bites. This approach not only addresses health concerns but also aligns with the principles of eco-friendliness and sustainability. In the following discussion, we will delve deeper into the process of extracting fern herbal compounds and their potential applications in the creation of mosquito curtains, shedding light on a novel and nature-inspired approach to mosquito control.

## MATERIALS AND METHODS

### SELECTION OF HERB:

Fern leaves, also known as fronds, are fascinating botanical structures characterized. These leaves are a defining feature of ferns, a group of vascular plants belonging to the division Pteridophyta. Fern leaf extract is used as a natural mosquito repellent due to its potential insect-repelling properties. Unlike the leaves of flowering plants, sizes, making them stand out in the plant kingdom. Fern leaves are typically compound, meaning they consist of multiple smaller leaflets, known as pinnae, arranged along a central stem called the rachis. Their unique leaf architecture and reproductive mechanisms make ferns a captivating subject of study in the field of botany, while their cultural and aesthetic significance adds to their appeal in human culture and horticulture.



FIG 1: Fern (Tracheophyta)

### FERN [PTERIDOPHYTA OR FILICOPHYTA]

#### Collection And Extraction Of Leaf:

Fern leaf was collected from Ooty. The selected leaves were extracted using hot water. First, the leaves were water-washed thoroughly to remove the dirt. The leaves were kept for shadow dry for 15 days. The leaves were grained to a nearly powder-like consistency<sup>(13)</sup>. A fine strainer was used to remove large particles. Add 200 gms

of Fern leaf powder. Terminalia chebula (kadukai powder) for 4 litres of distilled water. The powders are added in the boiling water.

This water is boiled for 30 mins. The extracted liquor was filtered off by using filter paper<sup>(18)</sup>. Filtering was used to get rid of the tiny particles that were scattered in the solution.



Fig.2. Before 15 days of drying the leaf



Fig.3. After 15 days of drying the leaf



Fig.4. Fine powder of fern(Tracheophyta)leaf





Fig.5. Water extraction

### Selection of additional powders:

#### Terminalia chebula:

Chebula, also known as chebulic myrobalan or harda, is a traditional medicine found in Asia and Africa. It possesses various properties, including laxative, diuretic, cardiogenic, hypoglycemic, antibacterial, antifungal, antioxidant, and anticancer properties. Myrobalans contain hydrolyzable tannins, such as chebulagic acid, chebulinic acid, gallic acid, and ellagic acid. They also yield Natural Red dye. This dye, with its yellow application to textile substrates, offers a wide range of colors and fastness properties. Ongoing research aims to develop eco-friendly natural dyes, but challenges remain in achieving fastness properties and reproducibility. Comprehensive physical studies are crucial to understanding the dyeing mechanism and improving natural dye performance on various textile materials<sup>(9)</sup>.



Fig. 6. Terminalia chebula

### Selection of fabric:

The investigation into natural dye extraction for cotton fabric accentuates its inherent characteristics. Recognized for exceptional absorbency, cotton seamlessly incorporates natural dyes, ensuring vibrant coloration. This absorbent quality, coupled with the fabric's breathability, enhances the comfort of dyed textiles. The soft texture of cotton elevates wearability, making it optimal for garments. The fabric's versatility allows for a wide array of products. Additionally, cotton's sustainability as a natural and biodegradable fiber aligns with eco-friendly

practices. Exploring the synergy between natural dyes and cotton underscores dedication to aesthetically pleasing, eco-friendly textile outcomes with potential applications across diverse domains<sup>(23)</sup>.



Fig.7. cotton fabric

### **Finishing: Extract Application**

The non-woven cotton fabric was soaked in terminalia chebula distilled water. for 30 mins. Then the Mosquito curtain was left to dry at room temperature for 1 day. The dyed fabric is then shadow-dried and expertly transformed into curtains through the art of stitching. This intricate process results in beautifully crafted as mosquito curtains with vibrant hues derived from the Fern leaf .



Fig.8. mosquito curtain

## ANTIMICROBIAL STUDY:

### PREPARATION OF THE BACTERIAL INOCULUM

Stock cultures were maintained at 4° C on slopes of nutrient agar and potato dextrose agar. Active culture for experiments were prepared by transferring a loop full of cells from stock cultures to test tubes of 50ml nutrient broth bacterial cultures were incubated with agitation for 24hours and at 37°c on shaking incubator and fungal cultures were incubated at 27°c for 3-5 days. The test organisms were streaked onto both nutrient agar and potato dextrose agar media. Bacterial cultures were then placed in an incubator at 37°C for 24 hours, while fungal cultures were incubated at 27°C for 3-5 days. After incubation, a single colony was selected and transferred to slants of nutrient agar, which were again incubated at 37°C for 24 hours. Similarly, slants of potato dextrose agar were incubated at 27°C for 3-5 days. These stock cultures were kept at 4°c. For use in experiments, a loop of each test organism was transferred into 50ml nutrient broth and incubated separately at 37°c for 18-20 hours for bacterial culture.

### WELL DIFFUSION METHOD

The antibacterial activity and antifungal activity of crude extract extracts was determined by Well Diffusion method (Bauer et al., 1996). MHA plates were prepared by pouring 20ml of molten media into sterile petriplates. After solidification of media, 20-25µl suspension of bacterial inoculums was swabbed uniformly. The sterile paper discs were dipped into required solvents then placed in agar plates. Then 10-50 µl of plant extract was poured into the wells. After that, the plates were incubated at 37°C for 24 hours. Assay was carried into triplicates and control plates were also maintained. Zone of inhibition was measured from the edge of the well to the zone in mm. The tested cell suspension was spread on mullerhintonagar plate and potato dextrose agar. well were put into the agar medium using sterile forceps. plant extract were poured on to wells. Then plates were incubated at 37°c for about 24 hours and control was also maintained. Zone of inhibition was measured from the clear zone in mm.

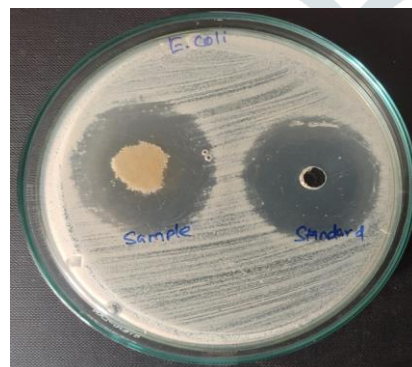
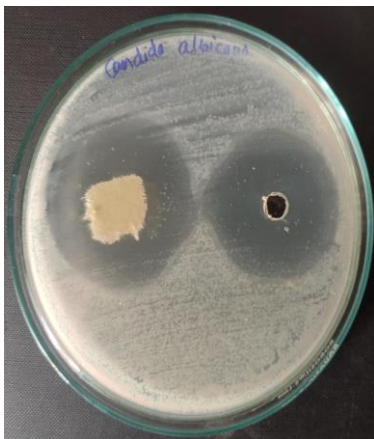
Antibacterial activity was performed by agar diffusion method. Van der Watt et al., 2001. The stock culture of bacteria(E.coli, S.aureus and Candida albicans) were received by inoculating in nutrient broth media and grown at 37 % for 18 hours. The agar plates of the above media were prepared. Each plates was inoculated with 18 hours old cultures the bacteria were swab in the sterile plates. Placed the extract treated cloth and untreated cloths were placed. All the plates were incubated at 37oC for 24 hours and the diameter of inhibition zone was noted in Cm.

Agar well diffusion method has been used to determine the antimicrobial activities and minimum inhibitory concentrations or plant extracts against Gram positive, Gram negative bacteria. The extracts exhibited antibacterial activities against tested microorganisms.

Organisms	<i>E.Coli</i>	<i>S.aureus</i>	<i>Candida albicans</i>
Herbal treated cloth	1.5 cm	1.6 cm	1.4 cm
Standard (Bacteria-Chloramphenicol) Fugues- Fluconazole	1.5 cm	1.5 cm	1.5 cm

### ANTI-MICROBIAL REPORT:

The result find Herbal treated cloth having antimicrobial activity against the *E.Coli*, *S.aureus* and *Candida albicans*. The result shows the given 1 Herbal treated cloth heaving Anti-microbial activity .



### MOSQUITO BOX REPELLENT TEST:

Individual mosquitoes are released into a test arena formed by a 10cm x 10cm x 10cm box. The person conducting the test also serves as the source of host attractants by placing either a finger or a forearm against a 2.5cm diameter aperture in the box, which contains a piece of test netting. This setup is designed to mimic scenarios where a

person is sleeping under an intact bed curtain, allowing mosquitoes to approach but not bite. To achieve this, a barrier is placed between the host's finger or forearm and the test area, allowing attractant odors to permeate through the box while preventing mosquitoes from feeding. The test is conducted in darkness and filmed using infrared cameras to replicate, as closely as possible, the conditions under which *Anopheles* sp. mosquitoes typically feed on humans.

TEST	NO.OF. MOSQUITOS
No.of. mosquitos	8
No.of. mosquitos killed	6
No.of. mosquitos	2



Fig.9. Mosquito Box Repellent Test



## CONCLUSION

Fern (Pteridophyta or Filicophyta) is easily dissolved in water, non-toxic have medicinal value and pigment easily penetrate in the fiber of fabric and developed attractive Sandal colour shade. All selected mordants, terminalia chebula powder are found to be effective for infuse fixation and also develop attractive colours.

This research underscores the enduring relevance of traditional medicinal plants in healthcare and innovative applications, presenting a holistic perspective on their multifaceted benefits to human well-being.

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