# A Study On Antimicrobial Properties Cotton Fabric Using Plectranthusamboinicus Sperg Leaves Extract

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**ABSTRACT - Textiles are indispensable part of human life. In present scenario the textile not only improve the feel and drape of fabric but can also prove amazing hygienic properties like making it antimicrobial in nature. For thousands of years nature has been a source of medicinal agents and an extraordinary number of modern drugs have been isolated from nature sources. In this present study work an extract obtained from plectranthusamboinicus.sperg leaves were applied on cotton fabric by means of the exhaust and the antimicrobial activity on the finished fabric assessed quantitatively by the AATCC leaf method 100gram positive microbes applied on the finished sample using all three method to protect the mankind from pathogens and to avoid cross infection, a special finish like antimicrobial finish has become necessary. As consumers have become more aware of hygiene and potentially harmful effects of microorganisms the demand for antimicrobial finished clothing is more. This research evaluate the antimicrobial property of plectranthusamboinicus sperg were analyzed against bacteria that normally exist like staphyloccusaureus, streptoccus and klebsiellasp.**

***Keywords: Plectranthusamboinicus, Hygience, Antimicrobiyal, Microorganisms, Textiles.***

## I. INTRODUCTION

The word "textile" was originally used to define a woven fabric and the processes involved in weaving. Textile refers to anymaterial made of interlacing fibres or Yarns. Yarn was twisted by spinning raw fibres of wool, flax, cotton, or other material to produce long strands. Textiles was formed by weaving, knitting, crocheting, knotting, or pressing fibres together.Plectranthusamboinicus (Lour) Spreng also called as Indian borage has been in use in the Indian system of medicine. It belongsto the family Lamiaceae and it's also known as country borage in English. A decoction of the leaves is used for several medicinal purposes,especially respiratory diseases Cotton is a soft, fluffy staple fiber that grows in a boll, or protective case, around the seeds of the cotton plants of the genus Gossypium in the family of Malvaceae.

The fiber is almost pure cellulose. Under natural conditions, the cotton bolls will tend to increase the dispersal of the seeds Natural dyes are dyes or colorants derived from plants, invertebrates, or minerals. The majority of natural dyes are vegetable dyesfrom plant sources—roots, berries, bark, leaves, and wood—and other biological sources such as fungi and lichens.An antimicrobial was an mediator that kills microorganisms or inhibits their growth. Antimicrobial medications can be gathered according to the microorganisms they act mainly against. The use of antimicrobial medicines to treat infection is known as antimicrobial chemotherapy, while the use of antimicrobial medicines to prevent infection is known as antimicrobial prophylaxis

**OBJECTIVES:**

➢ To study about the Karpooravali (plectranthusamboinicus) leaf extract
➢ To improve the color strength of the sample.
➢ To evaluate the antimicrobial effect in plectranthusamboinicus leaf using dye extract
➢ Leaves can be used for cold and cough treatment.
➢ The studies have been carried out in the present work to fine tune the physical properties of plectranthusamboinicus for special application.

## II. MATERIALS AND METHODOLOGY

**PLANT MATERIALS**

Healthy and young leaves of Plectranthusamboinicus were selected. They were collected from in and around Thanjavur , Tamil Nadu,India and identified with help of the standard manuals such as "The Flora of the presidency of Madras"(Gamble,1967) and Indian Medicinal plants(Kirtikar and Basu,1994)..

**BACTERIAL STRAINS**

The present study was to investigate the antibacterial activity fabrics of cotton dyed with natural colorant from Plectransthusamboinicus, Investigationwas carried out with

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Staphylococcus aureus, Streptococcus, Klebsilla. According to AATCC Standard nethod these 3 organisms was considered to be reference strains used of antimicrobial susceptibility testing.



**PREPARATION OF SAMPLE**

**KARPOORAVALLI LEAF KARPOORAVALLI POWDER SOXHLET EXTRACTION**

**EXTRACTION**

The freshly collected leaves were dried in shade at 40ºc for 20 days. These dried leaves of karpooravalli extracted in soxhlet in apparatus using ethanol.

**EXTRACTION OF PLANT MATERIALS** (Harborne, 1984)

The leaves ofPlectranthusamboinicuswere cleaned and dried in shade for seven days, then ground well to fine powder. About 500 g of dry powder was extracted with methanol (80%) at 70°C by continuous hot percolation using soxhlet apparatus. The extraction was continued for 24 hrs. The methanolic extract was then filtered and kept in hot air oven at 40°C to evaporate for 24 hrs the methanol from it. A dark brown residue was obtained. The residue was kept separately in air tight containers and stored in a deep freezer.

## III. QUALITATIVE ANALYSIS

Standard qualitative methods are employed for the phytochemical analysis of the plan extract. It refers to the identifying, screening and extracting the medicinally active substance found in plants like alkaloids, carotenoids , tannin, antioxidants, flavonoids, carbohydrates ,phytosterols,proteins, saponins and phenolic compounds.

**Alkaloids:**

Dragendroffs test :

(kraut Reagent- potassium bismuth iodine)

8g of bismuth nitrate pentrahydrate { $bi(Bi(no)_3\ 5H_2o$} dissolved in 20 ml of nitric acide [$HNo_3$] and 2g of potassium iodide in 50 ml of distilled water separately. Then mixed and allowed to stand till [ $KNO_3$] potassium nitrate got crystallized . the alkaloid was regenerated from the precipitate treating with sodium carbonate [na2 co3] and the liberated base is extracted with other.

To o.5ml of plant extract 2 ml of hydrochloric acid [ hcl] is added along with the 1ml of reagent in this acidic medium . An arrange red precipitate is produced which indicates the presence of Alkaoloids.

**Wagners reagent**

[iodine – potassium iodide solution]

1.2g o\f iodine and potassium iodide are dissolve ed in 5ml of sulphuric acid [h2 so4] and then this solution diluted to 100ml. 10ml of plant extract acidified by 1.5% ofHcl and then a few drops of wagner's reagent are added ,yellow brown precipitate is formed confirmed the presence of alkaloids.

**Meyer's reagent**

1.36 g of mercuric chloride and 5 g of potassium iodide iare dissolved in 60 ml and 10 ml of distilled water separately. The two solution were diluted and mined together in 100ml of distilled water . in 1ml of plant extract a few drops of meyer's reagent added showing the formation of alpale precipitate indicates the presence of alkaloids

**FLAVONODS:**

0.5 ml of plant extract , 5-10 drops of dilute Hcl. And a pinch of zinc or magnesium were added in a tube and boiled for few minutes. The presence of flavonoids shows the reddish pink \dirty brown colour.

CARBOHYDRATES:

**Fehling's Test**

**Solution A**: 34.65g of copper sulphate dissolved and made up to 500ml in water.

**Solution B**: 125 g of potassium hydroside and 173g of Rochelle's SoH dissolved
and made up to 500 ml in water.

Solution **A** and **B** are added in a test tube and boiled for a few minutes . A Red or brick red precipitate was formed.

**BENEDICT'S TEST**:

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173 g of Sodium citrate and 100g of sodium carbonate dissolved in 500ml and 17.3g of copper sulphate dissolved in 100ml of water. To 0.5 ml of plant extract 5ml of the reagent was added and boiled and boiled for 5 min. Bluish green colour is formed.

**PORTEINS:**

Millions Test

1 part of mercury dissolved in 2 parts of concentrated $HNO_3$ and the solution of was diluted with 2 volumes of water . T a small Quality of plant extract 5-6 drops of million's reagent was adde , White precipitate turns red of heating

**PHENOLS:**

1ml of plant extract ,2ml of distilled water and few drops of 105 of aqucous $Fecl_3$ Solution are added . Blue \ green precipitate is formed.

**LEAD ACETATE TEST**

1ml of plant extract was take and dilute was 5ml of distilled water . few drops of 1% a aqueous solution of lead acetate was added yellow precipitate is formed

**Libermann's Test**

To a few amount plant extract 0.5 ml of 20% sulphuric acid was dissolved followed by the addition of few drops of aqueous sodium nitrate . On dilution red colour was obtained and turned in to blute when made alkaline with aqueous sodium hydroxide solution

**SAPONINS:**

5ml of plant extract was taken in test tube, a drop of sodium bicarbonates was added . The mixtures was shaken vigorously and kept of 3 minutes. Honey

Comb like froth was formed showing the presence of saponins.

**Tannins** Fabric Chloride A few drops of 5% aqueous $fecl_3$ solution was added to 2ml of plant extract. A bluish black was formed and disappears on addition of few ml of $H_2So_4$ . yellowish brown precipitate was formed.

**LEAD ACETATE TEST:**

In 5ml of plant extract a few drop of 1% solution of lead acetate was added. Yellow or red precipitate was formed.

**PHYTO STEROLS**

A test solution 0.5ml mixed with minimum quantity of chloroform and the 3-5 drops of acetic acid and 1 drop of concentrated $H_2So_4$ was added .Deep blue or green colour was formed showing the presence of steroids.

**Terpenoids**

To 5 ml of extract 2 ml of chloroform was mixed .A large was formed on adding 3 ml of concentrated H2SO4.At the interface a reddish brown precipitate colouration was formed

**PHLOBATANNINS:**

when an aqueous extract of each plant sample was boiled with 1 % aqueous Hcl a red precipitate was deposited showing the presence of phlobatannins

**GC-MS ANALYSIS**

In 75 ml of methanol 30 g of powdered sample Plectranthusamboinicussoaked was dissolved soaked for 24 hrs. By evaporation the filtrates were collected under liquid nitrogen .The analysis was carried out by Clarus 500 Perkin- Elmer (Auto System XL)GasChromatograph equipped and coupled to a mass detector Turbo mass gold – Perking ElmerTurbomas . spectrometer with an Elite1(100%Dimethyl ply siloxane), 300 m x 0.25 mm x 1µm df capillary column.

**PROCEDURE**

For 2 min. this temperature pf 110 set as a initial temperature was maintained. At the end , the oven At the end of the oven temperature was raised upto 280°C, at the rate of an increase of 5°C/min, and maintained for 9 min.It is ensured the injection port temperature was 250°C and Helium flow rate as 1 ml/min. The ionization voltage as 70 eV. The samples were injected in split mode as 10:1. Mass Spectral scan range was set at 45- 450 (mhz). The chemical constituents were identified by GC-MS analysis. Each component was calculated from relative peak area of each component in the chromatogram

**TABLES**

| S.N | PHYTOCHEMICAL COMPOUNDS | REPORT |
|---|---|---|
| 1. | Alkaloids | + |
| 2. | Terpenoids | + |
| 3. | Flavonoids | + |
| 4. | Carbohydrates | + |
| 5. | Protein | + |
| 6. | Phenols | + |
| 7. | Saponins | + |
| 8. | Tannins | + |
| 9. | Phytosterols | - |
| 10. | Phlobatannins | - |

**+denotes present,- denotes absent**

**Qualitative determination of biochemical constituents in Plectranthusamboinicus**

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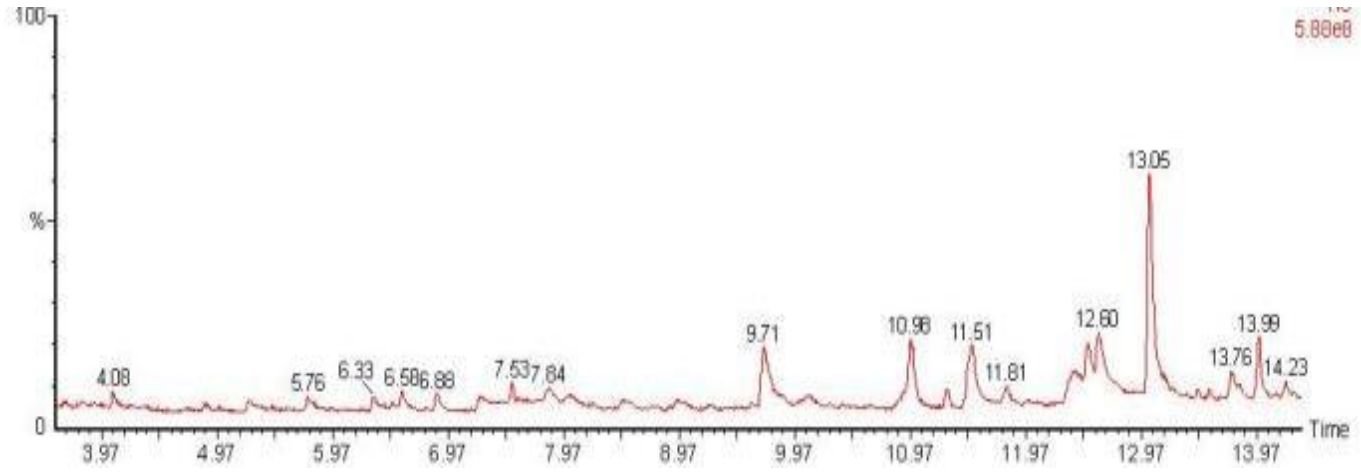


## IV. RESULT AND DISCUSSION

The bacterial strains were Streptococcus sp. Staphylococcus sp. and Klebsiellasp. which were gifted from Sharmila Institute ofMedicinal Products Research Academy, Scientific and Industrial Research Organization (SIRO), Thanjavur, Tamil Nadu, India. These strains was cultured on nutrient broth at 37 °C and the OD of these broth cultures were adjusted to 0.1 equivalents to an inoculums concentration of 108 CFU ml-1 (according to McFarland turbidity standards). MHA plates were swab cultured with 100 µl of individual bacterial strains.I am very much proud to submit this research report of my own findings about the antibacterial activity of karpooravalli extr act (plectranthumamboinicus) in dying the fabrics and other uses. which are useful and productive to the human society.

Antimicrobial activity of an organic compound stained sample cotton fabric and direct sample concentration were assessed byMuller-Hinton agar method. Antibacterial property of plectranthemamboinicus (Karpooravalli) leaves extract at different concentrations was tested against growth of different bacterial species such as streptococcus, straphylococcus and klebsiella. The concentrations were 20ml, 40ml, 60ml, and 100ml. The results were obtained in terms of zone of inhibition. phytochemical chemical compound analysisshows that the concentrations 20ml,40ml,60ml, enhibited moderate zones of inhibition. while 100mg/ml concentration had a strong zone of inhibition (ie) 28mm and 26mm against staphylococcus sp. Thus with an increase in the concentration of karpooravalli leaves extract, its zone of inhibition indicatinger yield percentage was obtained. Accordingly the extraction time of 24hours was selected for research.

**Table 1 showing the antimicrobial activity of direct sample concentration against different bacterial species**

| S.No | Microorganisms | Zone of inhibition with direct sample concentrations | | | | |
|---|---|---|---|---|---|---|
| | | Control | 20µl/ml | 40µl/ml | 60µl/ml | 100µl/ml |
| 1 | *Streptococcus sp.* | - | 10mm | 13mm | - | 25mm |
| 2 | *Staphylococcus sp.* | - | 13mm | 20mm | 23mm | 28mm |
| 3 | *Klebsiella sp.* | - | 15mm | - | - | 20mm |

**Table 2 showing the antimicrobial activity of cloth strained with different sample concentration against different bacteria**

| S.No | Microorganisms | Zone of inhibition with cloth at different sample concentrations | | | | |
|---|---|---|---|---|---|---|
| | | **Control** | **20µl/ml** | **40µl/ml** | **60µl/ml** | **100µl/ml** |
| **1** | ***Streptococcus sp.*** | **-** | **16mm** | **-** | **-** | **26mm** |
| **2** | ***Staphylococcus sp.*** | **-** | **21mm** | **23mm** | **24mm** | **26mm** |
| **3** | ***Klebsiella sp.*** | **-** | **-** | **25mm** | **-** | **27mm** |

It is found that the treated fabric samples possess maximum antimicrobial activity against streptococcus, staphylococcus and klebsiella. Cotton fabric dyed with this extract through this research believes in restoring the balance with in the body's system and strengthen the immune system with good aroma.

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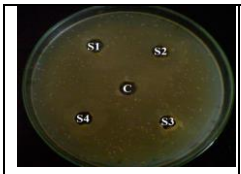
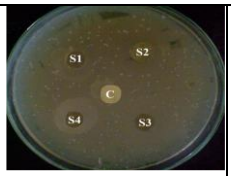
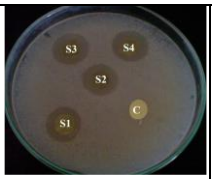
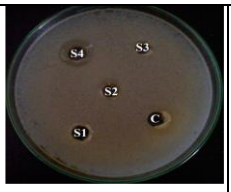
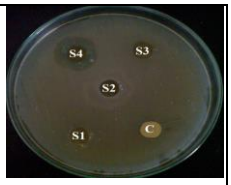
|  |  |  |  |  |  |
| **Fig.1: Antimicrobial activity of the sample dilution against *Streptococcus* sp** | **Fig.2: Antimicrobial activity of the cloth prepared using different sample concentration against *Streptococcus* sp.** | **Fig.3: Antimicrobial activity of the sample dilution against *Staphylococcus* sp.** | **Fig.4: Antimicrobial activity of the cloth prepared using different sample concentration against *Staphylococcus* sp.** | **Fig.5: Antimicrobial activity of the sample dilution against *Klebsiella*sp.** | **Fig.6: Antimicrobial activity of the cloth prepared using different sample concentration against *Klebsiella*sp.** |

The results of Hinton agar method against the test organisms streptococcus sp., staphylococcus sp. and klebsiella sp.It was clear zone of inhibition around the fabric dyed with natural extract from plectranthusamboinicus against three testorganisms in contrast with control fabric which allowed the growth or organism. The natural extract treated sample exhibited a zone ofstreptococcus sp. – 26mm, staphylococcus sp. - 26mm and klebsiella sp.- 27mm. Investigated the Gupta, D.,Laha, A., 2007.Antimicrobial activity of cotton fabric treated with Quercusinfectroia extract.

Which result the antimicrobial activity of natural dye treated cotton fabric as experienced by the antimicrobial activity of direct sample concentration against different bacterial species and more better result to antimicrobial activity of fabric strained with different sample concentration against different bacteria.

## V. CONCLUSION

The natural dyeing solutions were obtained from plectranthusamboinicus which is applied for dyeing cotton fabrics. The medicinal values of leaf extract, dyability, and antimicrobial effects were studied. The natural extract gives more affinity towards cotton fabrics and they are more stable colorant. The observation study of plectranthusamboinicus against microorganisms such as streptococcus,

Staphylococcus and klebsiella shows this particular medicinal herb contains a special antibacterial activity. In comparing of anti-bacterial Activities against streptococcus, staphylococcus and klebsiella. The klebsiella is more erraticated at the concentration of 100mg/ml but streptococcus, staphylococcus are less killed at the concentration of same level. In these research study noticeably demonstrate that utilizing extracted natural colorant as dyeing materials radically make easy obtaining quality fabrics having both dye ability and antibacterial properties. This natural extracted fabric may help in increasing the export also creates a bacterial free environment to the Infants, aged and Patients.

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