

ANTIBACTERIAL ACTIVITY ASSESSMENT OF LINEN FABRIC DYED WITH MANGOSTEEN

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ABSTRACT

Natural dyes are also known as eco friendly dyes. These dyes are extracted from natural resources. These dyes are either plant, animal or of mineral origin. Synthetic dyes were introduced later. Synthetic dyes are found to be harmful to the environment as they emit substances that are found to be hazardous to health and creates imbalance in the atmosphere. Due to modern developments, everybody became aware of the environmental issues and wanted to switch over to the natural dyes. Nowadays people have began to use eco friendly materials. Natural dyes main disadvantage is that the shade is relatively dull and the process of natural dyeing is a tedious one, due to which still people prefer synthetic dyes. Mordants are used to improve the yield of better shades and help the dye particle get fixed to the fibre or fabric. The purpose of this research is to determine the application of dye extracted from the dried peels of Mangosteen on linen fabric with alum mordant is used and tested for subjective and objective evaluation.

Keywords: Natural dyes, eco-friendly, colourants, mordant

1.INTRODUCTION:

The art of Dyeing is believed to be as old as civilization. The remains of the dyed textiles have been seen during research in the archaeological site. Till the nineteenth century, natural dyes were used only to dye textile materials. Natural dyes as the name says, are extracted from natural resources.

Different natural dyeing traditions were followed in different regions of the world, utilizing the resources available in that particular region. Natural dyes started to loose its popularity as soon as the advent of synthetic dyes took place. Synthetic dyes replaced natural dyes completely as there was rapid industrialization and research in the field of synthetic dyes.

Synthetic dyes are available in many different shades, it is cheap and easily available. But these dyes are produced from chemicals which imply that these dyes might be harmful and toxic to the environment and also for the humans. During the production of synthetic dyes, an enormous amount of waste is left behind.^[1,2]

ANTIBACTERIAL FINISH:

Bacteria and fungus are the two types of microorganisms. There are two types of bacteria: gram positive and gram negative. In this study Staphylococcus aureus is used for gram positive bacteria and Klebsiella pneumoniae is used as gram negative bacteria. The bacteria have the capacity to infect the fabric and cause deterioration of the fabric.

Gram positive Staphylococcus aureus:

Staphylococcus aureus is found in skin and nasal passage and the optimum growth temperature is 37 degree^[3]

Gram negative Klebsiella pneumoniae:

Klebsiella pneumoniae is found in the mouth, skin and intestines. The optimum temperature is 37 degree^[4]

NEED OF ANTI MICROBIAL FINISH:

- To protect the textile material from staining, discolouration
- To avoid it from emitting unpleasant odour
- To control the infestation of microbes^[5]

2.MATERIALS AND METHODS:

For this study a plain woven linen fabric is used. Linen Fabric is made from flax fiber obtained from plant Linum sativum. Flax is a bast fibre and is extracted from the stem of the plant. It is a cellulosic fibre. Linen by itself has certain antibacterial properties. Weaving process is carried on by converting flax fibre into yarn. Natural dye was extracted from the dried peels of Garcinia mangostana.



Garcinia Mangostana Fruit

Mangosteen peels contains anti oxidants and also helps in preventing cancer. The peel is dried and powdered which is used as dye extract. The fabric is dyed in post mordanting method where 5% of dye extract is used for dyeing and is shade dried and then the fabric is mordanted in alum solution with 5% of alum in the mordanting solution and the fabric is later shade dried.

The dyed fabric is washed with reeta nut and is evaluated for anti microbial property in comparison to plain dyed fabric under AATCC 100 method.



Reeta nut

3. EXPERIMENTAL PLAN:

Identification and collection of natural dye:

Garcinia mangostana fruit was purchased as a whole fruit from Ooty, Tamil Nadu and the pericarp was used to get the dye extract

Preparation and method of Dye extraction:

The outer rind or pericarp is dried and then it is powdered. The powder is then boiled in water with MLR 1:20 for a duration of 30-45 mins until the extract is exhausted. Then this liquid is strained in a cloth and is used as dye solution.

Antibacterial Assessment:

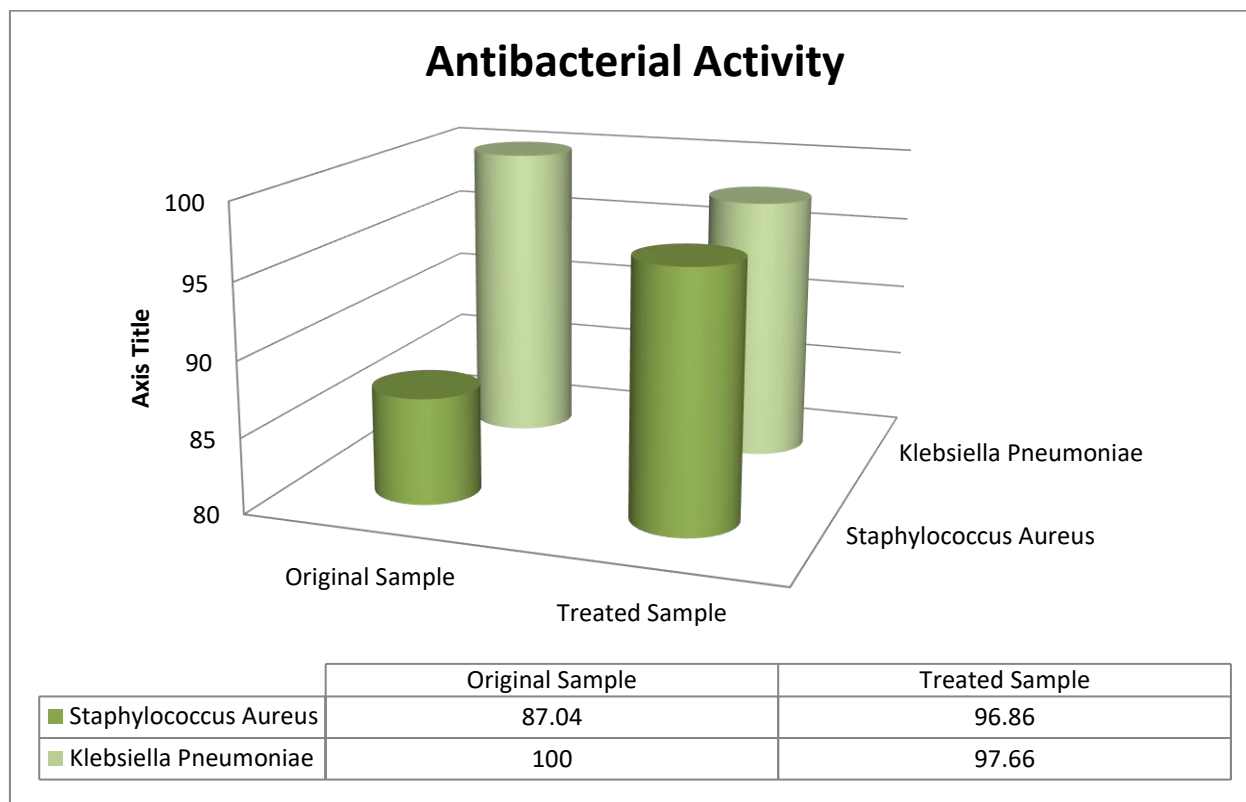
The dyed sample is assessed for its anti bacterial property. It is kept in contact with both gram positive and gram negative bacteria. Staphylococcus aureus is used as gram positive and Klebsiella pneumoniae is used as gram negative bacteria and its resistance to these bacteria are evaluated under AATCC 100 methodology.

4.RESULTS AND DISCUSSION:

Antibacterial assessment by AATCC 100 was done in a laboratory. Quantitative evaluation of the textile material is done to evaluate the degree of antibacterial activity.

As mentioned in the test method, the organisms mentioned: *Staphylococcus aureus* (ATCC 6538) and *Klebsiella pneumoniae* (ATCC 4352) is used.

The sample swatch is inoculated with the organism and the swatch is eluted by shaking in neutralizing solution. In the liquid the amount of bacteria present is determined and percentage reduction is calculated .



Note: The plain woven linen Fabric is dyed with extracts from the rinds of *Garcinia Mangostana* and is evaluated for bacterial assessment. The treated fabric is the one which is washed with reeta nut and the other is the original sample is the plain dyed sample.

From the above given chart it is clear that the linen fabric dyed with extracts of *Garcinia mangostana* does have anti bacterial property, which is improved in the case of Gram positive bacteria after washing with reeta nut and decreases in the case of gram negative bacteria after washing with reeta nut.

5. CONCLUSION:

Plain woven Linen Fabric was successfully dyed with extracts from the rind of *Garcinia mangostana* in the post mordanting technique and alum was used as mordant. 5 % of dye and 5 % of mordant was used. One sample was washed with reeta nut. Both the plain sample and the washed sample have shown good resistance to bacterial activity. Textile materials with anti bacterial finishes are growing in demand because of the fastly developing world which is prone to so many bacteria. It is very much essential to have fabrics with these finishes that will help us to protect our skins from these bacteria.

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