# ANTIBACTERIAL FINISH OF METHANOL EXTRACTED MICROBIAL PIGMENTS ON POLYESTER FABRICS BY USING ALUM MORDANT

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***Abstract:*** Natural colours, as they have no adverse effects on humans and the environment, have been seen as a potential alternative to artificial colours. Micrococcus Luteus is a Gram-Positive bacterium. M.luteus pigment, with the largest spectrum of anti-carcinogenic properties and immune modulation. Anti-carcinogenic (a material that kills or stops cancer cells). The yellow pigment has shown promising antioxidant, antibacterial and anti-UV activity. In this analysis, microorganisms were collected, and colour pigments were prepared using soxhlet instruments. One mordant (Alum) finished the cotton fabrics extracting the ethanol pigments in colour. The pigments extracted from methanol sow excellent antibacterial activity. Alum-made fabrics demonstrated excellent colour on fabric. M.luteus extracted colour pigment which shows promising colour to fabrics. The natural dye-finished fabrics therefore have a wide range of applications in different fields, such as Medical textiles, Home Textiles, Sportswear fabrics, Performance fabrics, etc.

***Keywords:*** Micrococcus Luteus, methanol extraction, color pigments, antibacterial activity, alum mordant finishing, polyester fabric.

## I.INTRODUCTION

### 1.1. Micrococcus Luteus

This is a bacterium which is Gram-positive. M.luteus can function against bacteria that are Gram negative and positive. The microbial dyes are attracted more attention. Carotenoid presence in this that gives a bright yellow colour. It has many advantages such as cheaper production, faster processing, higher yields, raw material efficiency and lack of multiple variations. Bacterial pigments offer promising prospects in industries such as food, pharmaceuticals , cosmetics, textiles, etc. for various applications. Anti-carcinogenic (an agent that kills or prevents cancer cells) due to biodegradability and greater protection of the environment. This yellow pigment has shown promising Ultraviolet, antioxidant, and antibacterial activity. The findings clearly demonstrate the potential for use of these pigments in the food and pharmaceutical industries as natural colouring agents as well as UV defence agents following clinical evaluations. The strain was of cheap pigment. Pigment used to minimise UV radiation when machining the sunscreen. It is a source of vitamin which is used in natural colours.

### 1.2. Polyester Fabric

Polyester is a synthetic material, primarily extracted from petroleum. This fabric is one of the world's most popularly used textiles, used by thousands of different customers, industries, and businesses. Chemically, polyester is a polymer that consists primarily of compounds within the functional ester group. Many artificial and some plant-based polyester fibres are made of ethylene which is a petroleum constituent that can also be extracted from multiple sources. Although certain types of polyester are biodegradable, the majority are not environmentally friendly, and the manufacture and use of polyester is equal to global pollution.

### 1.3. Finishing

Finishing is the very core of textiles manufacturing. Textile fabric finishing is achieved to make the fabrics more attractive and flexible. There are different finishing techniques used to produce different results, which improves the value of the textile materials. Although processing is a crucial part of making it available, finishing gives added values and makes the garment attractive and comfortable to wear. Also the finishing process can incorporate desirable properties. Fabric finishes are processes, wet or dry, that complete a textile. Various finishing treatments are available for various effects that add value to the basic textile content

### 1.4. Natural Dyeing

Natural colours are the colourants and pigments derived from the renewable resources of nature, while natural colours are also produced from the minerals of Earth. Natural dyes are extracted from plants, animals , and microorganisms; their environmentally friendly nature is one of the reasons for their increasing worldwide significance. The production of natural dyes is an art and has been followed as one of the most important methods of dyeing. Although the natural dyes were obtained mainly from berries and fruits during the ancient days, the colouring of vegetables and flowers with experimentation and slow development has led to a highly improvised art.

### 1.5. Antimicrobial Property

Today more and more focus has been drawn to antimicrobial material that can create safe living environments. The growing demand for stylish, attractive, durable, practical and healthy textile products dictates the production of new and innovative manufacturing and textile design techniques. Textile materials are ideal media for the production and propagation of micro-organisms. The antibacterial property with fabrics in direct contact with the human body is considered to be important among various functional abilities. The growth of micro-organisms in clothing is causing undesirable odour, staining and loss of mechanical strength as well as user-related health issues. Therefore it is important to have sufficient protection from the microorganism that must have the fabric's antibacterial properties. Various antibacterial agents are used to increase the functional quality of the clothing material. But lately there is a lot of interest to natural herbs as an antibacterial agent because of their eco-friendly and health-free nature.

## II.MATERIALS AND METHODS

### 2.1. Extraction of microbial pigments from bacteria

#### 2.1.1. Isolation and Identification of pigment producing bacteria



**PLATE I** **PLATE II** **PLATE III**

(Bacteria colonies) (Agar plate) (Colonies)

Soil suspensions are extracted using the sterile distilled water from the samples of the soil. The loop was streaked on sterile nutrient agar plates packed with soil suspension, and the plates were incubated 24 hours at 37 ° C. Only the pigmented bacterial colonies were picked and sub-cultivated for further study on the nutrient agar plates.

#### 2.1.2. Extraction of pigments



**PLATE IV** **PLATE V** **PLATE VI**

(Purified Pigment) (Soxlet) (Ethanol extraction)

Method for extraction of oil fluid used to remove pigments. The plants are inoculated in flasks with 100 ml of sterile Nutrient Broth. Two sets had been prepared: one in the 37o C static incubator, and one in the 37oC environment of the 90 rpm rotary shaker. The pigment was extracted using cold centrifuge at the end of 7 days of incubation, with conditions set at 6000rpm/12C/15minutes. It replaced the supernatant, and the pellet mixed with methanol was discarded. The pigmented supernatants were further isolated by the use of a separating funnel. Separate the supernatant coloured, and flow through the philter paper What Man No.1.

For establishing functional finishes on fabrics, antimicrobial property of extracted natural dyes is important. Staphylococcus aureus and Escherichia coli are the model pathogens used for the analysis that represent one gram positive and one gram negative organism. Staphylococcus aureus and Escherichia coli have also been found to be common pathogens that occur in and throughout the human skin. Natural dyes have been derived from the microbial pigment using two different solvents (Water and Methanol) to determine the strongest.

### 2.2. Mordanting


**PLATE VII** **PLATE VIII**

(Alum) (Mordant mixed solution )

Alum mordant was used in the present study to identify the mordant used to dye the fabrics. Mordants were used for fabric dyeing at 2 per cent of fabric weight (o.w.f.). The fabric is treated with these mordants that serve as cross-linking agents to efficiently bind fibre and dye. To achieve a material liquor ratio (MLR) of 1:40, mordant and distilled water are mixed. At room temperature, fabric was mordantly soaked and elevated steadily to 90 ° C, and allowed to stand for 30 minutes. The mordant solution was then allowed to cool, and the sample was left to air dry in laboratory conditions.

### 2.3.Dyeing of fabric


**PLATE IX** **PLATE X**

(Dye bath) (Finished fabric)

Dyeing of fabrics was done at a temperature of 90 ° C for 1-hour in an open dye beaker bath with dyes and mordants. The dyed samples were allowed to cool at 40-50 ° C, and the excess dye was removed by running water wash, which also helps to eliminate unreacted mordants and extra deposits on the surface. Tissue drying was done for 2min at 80 ° C and curing at 150 ° C followed. The residual dye and other chemical substances were extracted using non-ionic detergent (NID) in soaping for 10 minutes. The samples were then dried in air at room temperature, under laboratory conditions.

## III. RESULT AND DISCUSSION

### 3.1. Antibacterial Properties of Methanol Extracted Pigments


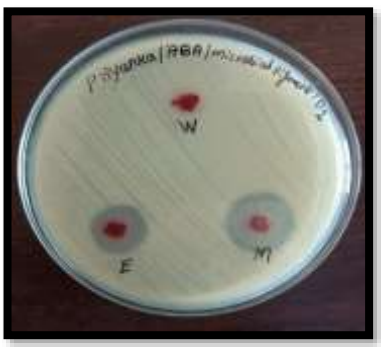

**PLATE XI** **PLATE XII**

(Microbial pigment – *E. coli*) ( Microbial pigment – *S. aureus*)

| S. No | Sample | Solvent | Inhibitory zones(mm) | |
|---|---|---|---|---|
| | | | ***Staphylococcus aureus*** | ***Escherichia coli*** |
| 1 | Microbial pigment | Water | 0 | 0 |
| | | Methanol | 19 | 20 |

**Table-1: Antibacterial properties of the extracted Natural dyes.**

Microbial pigment aqueous extracts displayed no inhibitory zones, Methanol extracts showed 19 mm of inhibitory zones against S. Aureus, and 20 mm to E. Coli; water extracts did not show inhibitory zones whereas methanol extracts displayed higher inhibitory zones than other solvents. Table-1 demonstrates the antibacterial properties of Natural dyes removed.

## IV.CONCLUSION

Color pigments extracted from M.luteus give a very good colour. Extraction of methanol pigments gives a bright colour to the fabric. The colour pigments extracted from M.luteus give a very good colour, even in polyester fabrics. By using natural mordant, the colour solution offers good colour over fabric. Color pigments derived from this methanol have special properties such as antibacterial action. It investigates the properties of the dyeing. Color velocity measurements give a very good result. You can carry out more experiments by adjusting the mordents to offer different shades and colours

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