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## **ANTIMICROBIAL ACTIVITY OF COTTON FABRIC TREATED WITH EXTRACTS FROM THE BANANA BRACTS**

**Ms. A.Jeevarathinam<sup>1</sup>**

<sup>1</sup>Assistant Professor of Food Processing & Quality Control, V.V.Vannia Perumal College for women, Virudhunagar, Tamil Nadu, India

**Ms. J.Rajathi Preethi<sup>2</sup>**

<sup>2</sup>II M.Sc Food Processing and Quality Control, V.V.Vanniaperumal College for Women, Virudhunagar, Tamil Nadu, India

### **ABSTRACT**

*Textiles with antimicrobial properties are gaining more interest now a days. Pathogenic microbes can transfer infectious diseases and cause odor, degradation and discoloration of garments. The present study aims at developing an ecofriendly naturally available finish from Banana bracts extract for various textile applications. Some selective species of microorganism are subjected to antimicrobial activity against cotton fabric treated with banana bracts extract. An extensive study was conducted to assess the antibacterial effectiveness of the bracts by employing standard test methods.*

**KEYWORDS:** *Banana Bracts Extract, Antibacterial, Cotton Fabric, Microorganism.*

### **INTRODUCTION**

Textile materials are good carriers of various type of microorganism and can cause health related problems to the wearer. Humid and warm environment still aggravate the problem. Infestation by microbes cause cross infection by pathogens and development odor where the fabric is worn next to skin. In addition, the staining and loss of the performance properties of textile substrates are the results of microbial attack. Basically, with a view to protect the wearer and the textile substrate itself antimicrobial finish is applied to textile materials (Ramachandran et al., 2004).

Antimicrobial fabrics gained significant importance in the recent years due to its wide acceptance as surgical apparels, baby clothing, undergarments etc. (Erkan et al., 2004) Antimicrobial textiles with improved functionality find a variety of applications such as health and hygiene products,

specially the garments worn close to the skin and several medical applications, such as infection control and barrier material (Pamela et al., 2009). Many commercial products are currently available in the market with a range of antimicrobial properties under different trade names for textile industry. Majority of such products are synthetic based and may not be environment friendly.

With the growing concern for the environment, the use of natural products to impart various functions to textiles has attracted increasing attention (Yi EJ et al., 2010). Extracts from different parts of diverse species of plants like root, flower, leaves, seeds, etc. exhibit antibacterial properties. Many of the plant contain compounds like phenolic, terpenoids, flavonoids, alkaloids, polypeptide, etc. which are acting as antibacterial. Some of them act as bactericides (which kills bacteria) and some act as

bacteriostatic (interfere with the multiplication, growth or activity of bacteria) (M M Cowan et al., 1999). There is a good deal of demand for the fabrics having functional / specialty finishes in general but antimicrobial finishes in particular to protect human being against microbes (Klaus et al., 2001). Hence, in this study the banana bracts extracts were used to apply on the cotton fabrics as antimicrobial agents.

**OBJECTIVES**

- To prepare banana bracts extract.
- To prepare the cotton fabric.
- To analyze the antibacterial activity of cotton fabric treated with banana bracts extract.
- To find out the qualitative and quantitative antimicrobial assessment.

**MATERIALS AND METHODOLOGY**

**Preparation of banana bracts powder:**

The bracts were collected from the market place in and around Tuticorin. They kept these bracts as waste material. The bracts were cleaned and washed well with water and drained. The bracts were shadow drying for one week, ground to powder using electronic blender and sieved. The powder was stored in air tight container at ambient temperature.

**Extraction of banana bracts:**

10 g of banana bracts powder was weighed and soaked in 100ml of distilled water for 24 hours. The sample was centrifuged to get pure extract.

**Preparation of cotton fabric:**

The pure cotton cloth was purchased. The cloth was cut into small size circle of diameter 2.5cm. The cloth was soaked in hot water for 2minutes to remove starch and other impurities. The cloth was drained and

dried at room temperature. The cloth was kept in sterilization at 120°C for 15 minutes and kept aside. The fabrics were immersed in aqueous extract of banana bracts extract five minutes and then dried at room temperature.

**Antimicrobial Activity Assessment:**

**Qualitative Method (Thamarai et al., 2011):**

Antimicrobial activity of treated cotton fabric was evaluated by qualitative method. For disc diffusion method, specimen of test material and untreated control fabrics were placed in Muller Hinton agar medium which has been previously spreaded with the test organisms. After incubation, a clean area of interrupted growth underneath and along the sides of test material indicates antimicrobial activity of specimen. The average with a zone of inhibition was calculated using the following formula.

$$W=(T-D)/2$$

W= Width of clear zone of inhibition in mm,

T= Total diameter of test specimen and clear zone in mm,

D= Diameter of the test specimen in mm.

**Quantitative Method:**

Antimicrobial activity of treated cotton fabric was evaluated by quantitative method. Control fabrics were inoculated with the test organisms in a liquid medium. After incubation, the number of microorganism present in this liquid was determined by viable count method and percentage reduction by the treated specimen was calculated using the following formula.

$$\text{Bacteriostatic ratio (\%)} = [(B-A)/B]*100$$

A= Number of bacteria in test sample,

B= Number of bacterial in control.



a. Banana bracts



b. Banana bracts powder



c. Banana bracts extract

**Antimicrobial Activity Assessment:  
Qualitative Method (Kyung et al 2014):**

**Figure 1: Qualitative antimicrobial analysis test results of treated fabrics**

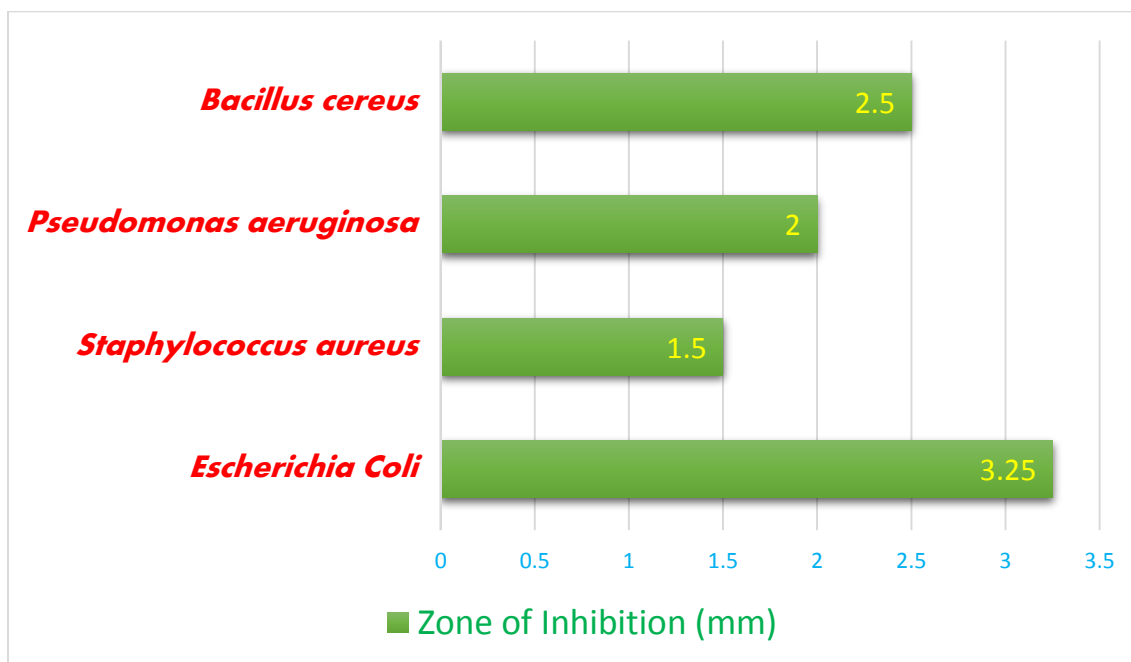


Figure 1 shows the result of Disc diffusion test for antimicrobial activity against test bacterial culutres such as *Escherichia coli*, *Staphylococcus aureus*, *Pseudomonas aeruginosa* and *Bacillus cereus*. The Zone of bacterial inhibition by treating cotton

fabric with banana bracts extract possesses excellent activity against all the organisms. It is concluded that bacterial inhibition is due to the slow release of active substances from the fabric surface.

**Quantitative Method**

**Table 2: Quantitative antimicrobial analysis test results of treated fabrics.**

S.No	Name of the Microbes	Bacterial reduction
1	<i>Escherichia coli</i>	37.2 %
2	<i>Staphylococcus aureus</i>	32.4 %
3	<i>Pseudomonas aeruginosa</i>	79.1 %
4	<i>Bacillus cereus</i>	29.2 %

Quantitative bacterial reduction by the cotton fabrics treated with aqueous extract of banana bracts was calculated and tabulated above *Table 2*. The fabric treated with banana bracts extract, finishes showed an increased bacterial reduction percentage when compared to control sample in the study. It is evident that the cotton treated with 10% banana bracts extract showed reduction 37.2 %, 32.4 %, 79 % and 29.2 % against *Escherichia coli*, *Staphylococcus aureus*, *Pseudomonas aeruginosa* and *Bacillus cereus* respectively.

**CONCLUSION**

Textiles have always played a central role in the evolution of human culture by being at the forefront of both technological and artistic development. Microbial invasion poses danger to both

living and non-living matters. The people are more aware of the hygienic life style and there is a necessity and expectation for a wide range of textile products finished with antimicrobial properties. The present study findings confirmed that the banana bracts can be used in the textile industry as antimicrobial agent, when applied on the surface of cotton fabrics. It shows great potential of banana bracts extract for obtaining highly efficient antimicrobial textiles.

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