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PSIDIUM GUAVA HERBAL EXTRACT ANTIMICROBIAL ACTIVITY WITH COTTON FABRIC

[*1]K. Sathya and [2]V. Maheswari

[1]Research Scholar, PSG College of Arts & Science, Coimbatore.

[2]Associate Professor, PSG College of Arts & Science, Coimbatore.

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***Corresponding Author**
K. Sathya
Research Scholar, PSG College of Arts & Science, Coimbatore.

1. ABSTRACT

Guava is the common name for Psidium guajava. It is widespread in India. The tree is very valuable economically since the majority of its components, The wood, branches, seed, and fruits of plants are all used in conventional medicine to cure a wide range of ailments, including cancer and cardiovascular most notably diabetes. The objective of this review is to educate readers on the phytochemical constituents and antibacterial activity of a Psidium guajava extract. Using a conventional technique, Psidium guajava aqueous and methanol extract were used in this study. Antibacterial activity was determined using Staphylococcus aureus and Escherichia coli microorganisms. To determine the antibacterial action, We performed Disk diffusion and Minimum Inhibitory Concentration (MIC) experiments have been performed on this compound. Psidium guajava ethanolic Staphylococcus aureus and Escherichia coli were suppressed by extracts at zones of inhibition of 7.83+0.76 mm and 8.67+1.04 mm.

KEYWORDS: Antimicrobial, physical characteristics, herbal, extracts, microorganisms, phytochemicals, non-toxic to the environment.

2. INTRODUCTION

Since the Stone Age, medicinal plants have played a critical part in resolving human health difficulties. They function as regenerative, protective, and supporting agents that interact with the human body. According to World Health Organization (WHO) 80 percent of the Asian and African populations 80 percent of the Asian and African populations in the nations receives basic health care via traditional medicines. This is often accomplished via the application of plant ex- tracts. Typically, medicinal plants are a significant source of novel

and physiologically active chemicals. Natural antimicrobial compounds are abundant and may be utilised to give beneficial antibacterial properties to textiles.

Plant textiles are totally composed of herbal extracts and do not include any chemicals. These plants are thrown straight to the fabric using natural substances, preserving the herbs' medical properties. During the finishing process, no chemical treatment is used. Numerous botanical compounds have multifunctional finishing characteristics. Plant extracts and plant products have been screened for multifunctional action, indicating that plants may constitute a novel anti-infective medication source.

As a consequence, the number of people who are bio functional Materials has increased with multifunctional properties has risen significantly in recent years. Certain herbal substances derived from plants are well-respected for their multifunctional properties. These are natural substances numerous and extensively dispersed in nature. These plant compounds provide a variety of beneficial qualities, including antibacterial, Anti-rashes, anti-septic, and insect repellant are all properties in the natural substances.

3. METHODOLOGY

Guava is a little medicinal tree that grows in the tropics Psidium guajava). It is often referred to as guava (family Myrtaceae) and it has been utilised medicinally throughout history for a variety of diseases. Guava comes in two main varieties: red and white. The food sector uses guava to make sweets, juices, jams, and frozen pulp are all examples of this. Leaves, seeds, a piece The peel and core fraction that were not split during the manual depluming process are referred to as residual peel and pulp fractions discarded as a result of the fruit processing Due to the exorbitant expense of prescription pharmaceuticals, many people look for alternative treatments for a variety of conditions. As a result, more research is essential to validate the benefits of Medicate herbs. With this study, the researchers want to determine the phytochemical contents and antibacterial properties of cotton fabric that has been treated using P. guava herbal extracts.

3.1. Substances and Methods

- **The fabric** is a bleached cotton cloth that has been washed while using distilled water.
- Citric acid, methanol, and potato dextrose are all **chemicals**, Leaves of Agar Guava.
- **Equipment** includes an autoclave, glassware, a volume pipette, sprit burners, and forceps, among others.

3.2. Plant material collection and extract preparation

We picked the fresh, mature leaves of Psidium guajava plants from their natural habitat their respective plants at Dindugal, Kodaikanal road, Ottanchathiram during their cultivation period. To eliminate dust and other particle matter from freshly harvested Psidium guajava leaves, they were washed with distilled water. In a well-ventilated room, leaves were spread individually on paper sheets. The dried leaves were processed into a fine powder using a food processor. Seiver was used to sift the powder (0.25 mm). Powdered material that had been sieved was kept in closely packed glass jars.

Extraction is the process of physically or chemically separating the desired item using acid is used as a solvent. The extraction efficiency is influenced by many aspects, including the solvent, temperature, and time.

The following procedures were used to extract plant materials.

3.2.1.Aqueous extraction: The plant powder was soaked in water for 5g to produce an aqueous extract in 125 ml of sterile distilled water overnight to break down the cell structure. To separate the extract and eliminate plant residue, the mixture was then centrifuged at 3000 RPM for 30 minutes and the supernatant filtered through Whatman filter paper.

3.2.2.Ethanol extraction: organic solvent extraction techniques are useful for determining the antibacterial activity and sensitivity of microorganisms against human microorganisms including bacteria, fungi, or viruses. 5g of plant powder was soaked overnight in 125 ml of 70% ethanol (distilled water 30% + ethanol 70%) to relax the cell structure. To separate the extract and eliminate plant residue, the mixture was then centrifuged at 3000RPM for 30 minutes and the supernatant filtered through Whatman no.1 filter paper. As indicated, the powdered sample was then kept at 4°C in airtight vials for future research.[1]

Table 1: Phytochemical study of a herbal extract of Psidium Guajava.

Extraction Medium	Alkaloids	Flavonoids	Saponins	Phenol	Tannins	Terpenoids
Ethanol	+	+	-	+	+	+
Water	+	+	-	+	+	+

The phytochemical screening revealed the presence of alkaloids, tannins, terpenoids, and

phenols, among others. Flavonoids Because of their natural ability to alter the physiological resistance to allergic reactions and infectious agents, and also people anti-allergic, anti-inflammatory, antimicrobial, and anti-cancer properties, they have been dubbed "nature's biological response modifiers." They also have anti-allergic, anti-inflammatory, antimicrobial, and anti-cancer properties. Plant sources rich in flavonoids provide effective treatment from a variety of body allergies and gastrointestinal disorders. Tannins are thought to have antiviral, antibacterial, and anti-tumor properties. These characteristics are critical for imparting antibacterial capabilities to fabrics. Tanning agents, such as Tannins are applied in the dyestuff business as caustics for cationic dyes, and they are derived from plants (tannin dyes), as well as the producer of ink. Additionally, it may be utilised as a coagulant in the manufacture of rubber.[2]

4. Antibacterial effect: The parallel streak method is a qualitative antibacterial test that is used to determine whether or not an organism has antimicrobial action to determine the presence of diffusible strong antibacterial activity on textile materials. This approach is effective for estimating the antibacterial activity of a substance by determining the dimensions Size of inhibition zones formed by the presence of an antibacterial agent in a sample.[3]

4.1. Testing Methodology

• sterilized petri plates, incubator, micropipettes, autoclave and laminar air flow chamber inoculation loop, sterile forceps, and test specimens are needed.

• As media, nutrient agar and nutrient broth were used.

• Technique: Parallel streaks (AATCC 147).

• As test organisms, S. aureus and E. coli were employed.

Before inoculating, sterilized nutrient agar was placed into Allowing the mixture to harden fully in petri plates. In a clean, dry container, combine 10.1 millilitres of 24-hour-old broth culture with 9 millilitres of sterile distilled water, completely mixing the mixture. Once asymmetric stretching inoculum diluted to a certain extent by creating five 60 mm long streaks separated by 1cm, Before refilling the loop, cover the central section of the petri plates with a damp cloth. The streak lines have been continuous during inoculation and on the media.[4] Gently push the 25 mm x 50 mm test specimens transversely over the five streaks to achieve frequent relations with the E.agar surface. For 24 hours, The plates were incubated at a temperature of 37^0C. Incubate the plates and look for pauses in the development of bacteria

along the streaks of inoculums, beneath the specimen, and outside the edge of the fabric. By utilising this method, you may determine the approximate width of the inhibition zones across a streak on either side of a test specimen.

$$W = \frac{T - D}{2}$$

Where

W = Width of the inhibition zone that is impeded (mm), T = Test specimen's total diameter plus the clean zone (mm), D = Diameter of the specimen under examination (mm).

4.2. Pilot Study: A pilot test was carried out using aqueous extracts extracts to determine the minimum inhibitory concentration. The antimicrobial activity of ethanolic was known to be successful, as well as the MIC for each bacterial sample was determined to be effective was determined.

4.3. Stock solution: I developed a 100 mL antimicrobial stock solution with a ten percent concentration of antimicrobials (10g of plant source in 100 ml of solvents).

4.4. Culture: For the MIC analysis, a 24-hour culture of S. aureus (Gram positive) and E. coli (Gram negative) were prepared by diluting to a concentration of 1 10-5 dilution for each strain.

The control tubes are a second tube containing nutritional broth (test tube 1). All For 24 hours, the test containers and reference tubes were incubated at 37 degrees. Following incubation, the turbidity of the bacterial isolates in the test tubes was determined using a spectrophotometer set at 600 nm. The minimum inhibitory concentration (MIC) was determined as the lowest dose at which no turbid was recorded. Triplicate samples were analyzed.[5]

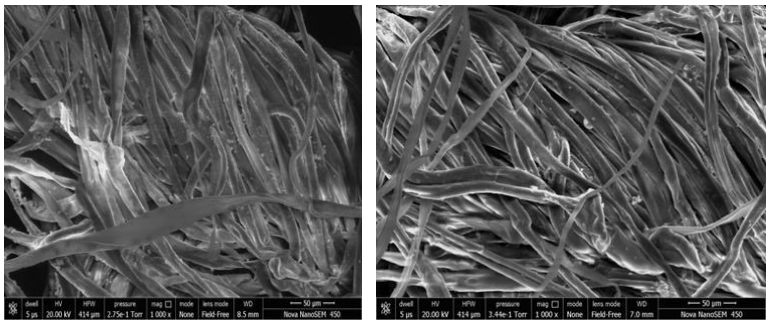
Table 2: Guava Herbal Extract's Minimum Inhibitory Concentration.

Test tubes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
Capacity of nutrient broth (ml)	10	9	8	7	6	5	4	3	2	1	0
Antimicrobial stock solution, volume (V2) (ml)	0	1	2	3	4	5	6	7	8	9	10
Percentage of concentration	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Bacterial culture (ml)1x10-5 cons.	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Extract of Guava	+ve	+ve	+ve	+ve	**-ve**	-ve	-ve	-ve	-ve	-ve	-ve

After a particular length of time has passed, the culture is considered complete 24 hours, growth is determined and the MIC value was determined visually. While full formation of

bacteria living was detected at lower concentrations, no bacterial growth was recorded at higher concentrations. On this basis, it can be said that increasing the quantity of plant leaf extract results in more transparent and There is no bacterial growth with the use of clear therapies On the basis of the MIC against Staphylococcus aureus, a 4 percent concentration of Psidium Guajava was chosen.

4.5. SEM Analyses of completed fabrics: SEM analysis of cotton woven fabrics was used to determine the influence of a herbal finish applied to the cloth by rubbing plant extract into it The investigation was carried out in accordance with industry-standard processes.



This work is a new attempt to antimicrobial properties cotton Fabric regulated properties. The antimicrobial assessment was conducted using the standard method of Parallel streak method (AATCC 147). The following play was executed successfully for cotton fabrics, Guava leaf antimicrobial finish was created.[6]

5. CONCLUSION

The current research examined the antibacterial efficacy of Guava herbal extracts. The findings indicated that Guava herbal extracts might be a suitable source of antibacterial finishing for cotton fabric. The cloth treated with the extract had the highest Escherichia coli and Staphylococcus aureus are two microorganisms that have antibacterial action. Considering the inherent quantity of Guava leaves in Tamilnadu, particularly in Dindugal, the potential for implementing and commercializing herbal extracts to impart antimicrobial finish to textiles is significant. Finally, since the raw material is derived entirely from mineral wealth, it is ecologically friendly and beneficial to the economy, society, and environment.[7]

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