
**ANTI MICROBIAL ACTIVITY USING *COCOS NUCIFERA* LEAF
SHEATH**

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Article Received: 12 February 2026, Article Revised: 03 March 2026, Published on: 23 March 2026

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DOI: <https://doi-doi.org/101555/ijarp.2355>

ABSTRACT

Wound infections significantly delay the healing process and may lead to serious complications. Antimicrobial agents play a crucial role in wound management by preventing microbial colonization and promoting tissue repair. The present study aimed to evaluate the antimicrobial activity of *Cocos nucifera* leaf sheath extract for its potential application in wound healing. The leaf sheath of *Cocos nucifera* was collected from Kasaragod and authenticated by a botanist. The dried plant material was powdered and subjected to Soxhlet extraction using methanol as the solvent. The obtained extract was used for antimicrobial evaluation by the disc diffusion method. The activity was tested against common wound pathogens, namely *Escherichia coli* and *Staphylococcus aureus*, at concentrations of 50, 100, 150, and 200 mg/ml. Ciprofloxacin (10 µg/ml) was used as the standard drug, and water for injection served as the control. The methanolic extract of *Cocos nucifera* leaf sheath showed a concentration-dependent increase in antimicrobial activity. The highest zone of inhibition was observed at 200 mg/ml, measuring 3.1 cm against *E. coli* and 3.5 cm against *Staphylococcus aureus*, while the standard drug showed zones of 3.6 cm and 4.0 cm respectively. No inhibition was observed in the control group. The results indicate that *Cocos nucifera* leaf sheath possesses significant antimicrobial activity against common wound pathogens, supporting its traditional use in wound healing and suggesting its potential as a natural antimicrobial agent in topical formulations.

INTRODUCTION

Antimicrobial activity refers to the ability of a substance to inhibit the growth of or destroy

microorganisms such as bacteria, fungi, viruses, and parasites. In wound management, antimicrobial activity plays a vital role in preventing infection, reducing microbial load, and promoting faster healing. Wound infections are commonly caused by pathogens like *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Escherichia coli*, and *Candida albicans*, which can delay tissue repair and lead to chronic wounds.

Herbal plants are a rich source of natural antimicrobial agents. Their activity is mainly attributed to bioactive phytochemicals such as flavonoids, phenolic compounds, tannins, alkaloids, terpenoids, and saponins. These compounds exert antimicrobial effects by disrupting microbial cell membranes, inhibiting protein and nucleic acid synthesis, precipitating microbial enzymes, and interfering with metabolic pathways. Some plant constituents also prevent biofilm formation, which is a major cause of persistent wound infections.¹

Cocos nucifera, commonly known as the coconut palm, is a tall, tropical tree belonging to the family Arecaceae. It is often referred to as the “Tree of Life” because almost every part of it is useful to humans. Each part of the coconut has economic, nutritional, and medicinal value - the oil is used for cooking and skincare, the water serves as a refreshing drink and natural electrolyte source, and the husk and leaves are used for crafts and fuel. Its various parts are used in traditional medicine to treat fever, infections, burns, and digestive disorders.²

The *Cocos nucifera* leaf sheath is obtained from the coconut palm, scientifically known as *Cocos nucifera* Linn., belonging to the family Arecaceae (Palmae).³ It is the hard, fibrous material that encircles the stem base of every frond (leaf) of the coconut palm tree (*Cocos nucifera*). It serves as a protective covering for new leaves and ultimately dries and falls off the tree. The coconut leaf sheath has various medicinal uses, particularly in traditional and folk healing practices. Although less studied compared to other parts of the coconut tree, such as the oil or water, the leaf sheath is known for its antimicrobial and healing properties. It is known for its medicinal properties, as traditional practices use ashes or extracts from burnt leaf sheaths to treat minor wounds, cuts, and skin rashes due to their natural antimicrobial and wound-healing effects.



Fig 1: Cocos nucifera leaf sheath.

METHODOLOGY

1. PLANT COLLECTION AND AUTHENTICATION

The leaf sheath of *Cocos nucifera* were collected from Kasaragod. The plant materials were taxonomically identified by the botanist, Dr.Biju, Associate Professor (FDP substitute), Head of Department of Botany, Govt College Kasaragod, and dried under shade for about 7 days, powdered with the mechanical grinder and stored.

2. PREPARATION OF EXTRACT OF *Cocos nucifera* Leaf sheath

Extraction of dried powder of *Cocos nucifera* leaf sheath was carried out by using Soxhlet apparatus assembly using methanol as solvent. Two rounds of extraction were carried out. Around 25g of powder was weighed, moistened with the respective solvent and packed in the Soxhlet apparatus and was then extracted with 500ml of methanol. The extracts were then filtered, the solvent distilled off and finally the dried extract was obtained. The percentage yield of each extract was calculated. These extracts were used for phytochemical screening, evaluation of wound healing activities like anti-microbial, anti-inflammatory and anti-oxidant tests.



Fig 2: Methanolic extract.

3. DISC DIFFUSION METHOD

Agar plates were inoculated by streaking the swab of bacterial strains over the entire sterile agar surface for 2–3 times by rotating the agar plate at 60° for uniform distribution of the inoculum. The plates were dried at room temperature under aseptic condition following by boring of 9 mm diameter wells in them. Impregnated the sterile paper disc with known test drugs of concentration 50,100,150 and 200 mg/ml and standard drug used is Ciprofloxacin (10 µg/ml) and a control, used is water for injection. The plates were then incubated at incubator at 37 °C for 24 h. The zone of inhibition of each bacterial strains were measured.³

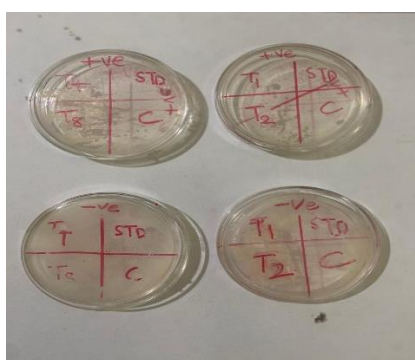


Fig 3: Zone of inhibition produced by *Cocos nucifera* leaf sheath.

RESULTS

ORGANISM	ZONE OF INHIBITION					
	A Test 1	B Test 2	C Test 3	D Test 4	STD Ciprofloxacin	CONTROL Water for injection
E.coli	2.2	2.4	2.7	3.1	3.6	0
Staphylococcus aureus	2.5	2.6	2.9	3.5	4.0	0

CONCLUSION

The present study demonstrated that the methanolic extract of *Cocos nucifera* leaf sheath possesses significant antimicrobial activity against the tested bacterial strains, namely *Escherichia coli* and *Staphylococcus aureus*. The extract exhibited a concentration-dependent increase in the zone of inhibition, indicating that higher concentrations (200 mg/ml) showed better antibacterial efficacy compared to lower concentrations.

Although the standard drug ciprofloxacin showed a higher zone of inhibition, the test extract also produced appreciable antimicrobial effects, while the control (water for injection)

showed no inhibitory activity. This confirms that the observed antibacterial effect is solely due to the bioactive constituents present in the plant extract.

The antimicrobial activity of the leaf sheath can be attributed to the presence of phytochemicals such as flavonoids, tannins, phenolic compounds, and terpenoids, which are known to disrupt microbial cell membranes and inhibit essential metabolic processes.

Overall, the results suggest that *Cocos nucifera* leaf sheath extract has promising antibacterial potential and supports its traditional use in wound healing. The study indicates that the extract can be considered a potential natural antimicrobial agent for topical formulations, especially in the management of wound infections.

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