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Phytochemical analysis, antibacterial and antifungal activity of *Premna tomentosa* bark extract

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ABSTRACT

The present study aimed to investigate the phytochemical profile and antimicrobial efficacy of Premna tomentosa bark extracts using various solvents, including methanol, chloroform, ethyl acetate, and petroleum ether. Qualitative phytochemical screening revealed that methanol was the most effective solvent, extracting a broad range of compounds such as alkaloids, flavonoids, phenols, tannins, glycosides, cardiac glycosides, coumarins, quinones, and resins. Chloroform also demonstrated significant efficacy in extracting alkaloids and flavonoids. Quantitative analysis showed that methanol extracts contained the highest concentrations of alkaloids (480 mg/g), flavonoids (510 mg/g), phenols (428 mg/g), and tannins (340 mg/g), indicating its superior extraction capabilities. The antibacterial activity was assessed using the paper disc diffusion method against four bacterial strains: Pseudomonas fluorescens, Escherichia coli, Staphylococcus aureus, and Bacillus subtilis. The methanol extract exhibited the most potent antibacterial activity, with inhibition zones ranging from 4 mm to 7 mm. Chloroform and ethyl acetate extracts also showed significant inhibition, while petroleum ether was the least effective. In the antifungal assays, the methanol extract again demonstrated the highest efficacy, particularly against Fusarium oxysporum NCIM1008, Sclerotium rolfsii NCIM 1084, and Phytophthora infestans MTCC 8707. The inhibition percentages were highest with methanol (50% against Fusarium oxysporum and Phytophthora infestans), followed closely by chloroform (52% against Phytophthora infestans), and moderate inhibition was observed with ethyl acetate and petroleum ether. These results indicate that Premna tomentosa bark extracts, particularly those obtained using methanol, possess significant antibacterial and antifungal activities, potentially due to the high concentration of bioactive compounds extracted. This study supports the use of Premna tomentosa as a source of natural antimicrobial agents and underscores the importance of solvent selection in phytochemical extraction.

Keywords: *Phytochemical analysis; Antibacterial; Antifungal activity; Premna tomentosa bark extract*

Introduction

Premna tomentosa Willd, a species belonging to the Lamiaceae family, is a well-known medicinal plant traditionally used in various therapeutic applications. Native to tropical and subtropical regions, this plant has been extensively utilized in Ayurveda, India's ancient system of medicine. The genus *Premna* encompasses over 200 species, many of which possess significant medicinal properties. *Premna tomentosa* has garnered considerable attention due to its diverse pharmacological activities [1]. Traditionally, Premna *tomentosa* has been employed in the treatment of a myriad of ailments. Different parts of the plant, i.e. leaves, bark, and roots, to address conditions such as fever, inflammation, digestive disorders, and respiratory issues. Recent ethnobotanical surveys have reinforced these uses, highlighting the plant's continued relevance in traditional medicine [2]. *Premna tomentosa*, a species within the Lamiaceae family, has long been esteemed in traditional medicine, particularly within Ayurvedic and folk practices across South Asia. Its therapeutic applications are diverse, addressing ailments ranging from respiratory disorders to inflammatory conditions. This plant's widespread use is supported by the extensive range of bioactive compounds found in its various parts, particularly the bark, which is rich in secondary metabolites like flavonoids, alkaloids, terpenoids, and phenolic compounds. These compounds have been identified through phytochemical analyses as key contributors to the plant's medicinal properties [3-4]. The phytochemical composition of *Premna tomentosa* is notable not just for its variety but for the potent biological activities these compounds exhibit. The antibacterial activity, for instance, is primarily attributed to the phenolic compounds, which can disrupt bacterial cell walls and lead to cell lysis, effectively inhibiting bacterial growth [5]. This is particularly significant given the growing concern over antibiotic resistance, where natural products like *Premna tomentosa* offer a viable alternative to synthetic antibiotics. Flavonoids in the bark extract further enhance its antimicrobial profile by inhibiting fungal growth, a process thought to involve the disruption of fungal cell membrane integrity, thereby preventing spore germination and mycelial expansion [5].

Premna tomentosa has been recognized for its potential in treating chronic diseases through its antioxidant and anti-inflammatory activities. Antioxidants in the bark extract help neutralize free radicals, reducing oxidative stress, which is a key factor in developing conditions such as cancer, cardiovascular diseases, and neurodegenerative disorders [6]. The plant's anti-inflammatory effects also contribute to its therapeutic potential, offering relief from inflammation-related conditions, which are often precursors to more severe chronic diseases [7]. The significance of *Premna tomentosa* in traditional medicine, combined with its demonstrated bioactivity in modern scientific studies, underscores its potential as a source of new therapeutic agents. Research continues to explore and validate these traditional uses, aiming to integrate this plant's extracts into modern pharmacological applications, particularly as natural alternatives to synthetic drugs that often come with significant side effects and risk of resistance [8].

This study aims to expand on previous research by providing a comprehensive phytochemical analysis of *Premna tomentosa* bark extract and evaluating its antibacterial and antifungal activities against a range of pathogenic microorganisms.

Methodology

The bark of *Premna tomentosa* was collected from Aleru Forest, Nellikudur (M), Mahbubabad District, and prepared by first washing and air-drying the bark in the shade. The dried bark was then ground into a fine powder. Using a Soxhlet apparatus, the powdered bark was subjected to sequential extraction with four solvents of increasing polarity: Petroleum ether, Ethyl acetate, Chloroform, and Methanol. Each extraction was carried out at the boiling point of the respective solvent to maximize the yield of phytochemicals. After extraction, the solvents were evaporated using a rotary evaporator, and the crude extracts were stored in airtight containers under refrigeration until further analysis [9].

Qualitative phytochemicals in bark of P*. tomentosa*

Phytochemical screening of the bark of *Premna tomentosa* was conducted using standard qualitative methods. Alkaloids were identified by the appearance of a yellow precipitate upon the addition of Dragendorff's reagent. Anthraquinones were detected by treating the sample with chloroform and 10% ammonia, and observing any color change. Flavonoids were screened by adding 10% sodium hydroxide, resulting in an intense yellow color that faded with the addition of dilute acid. Total phenolics were detected using ferric chloride, noting color changes indicative of their presence. Tannins were identified by adding ferric chloride to an aqueous extract, which produced a bluish-black color. Steroids were tested using the Liebermann-Burchardt method, where a dark green color was observed after adding chloroform, acetic anhydride, and sulfuric acid. Saponins were identified by boiling the powdered sample with water and observing persistent frothing after shaking. Glycosides were detected by adding 2% sodium picrate, producing a yellow to orange color. The Keller-Killiani test was used to detect cardiac glycosides by observing a brown ring after adding glacial acetic acid, ferric chloride, and concentrated sulfuric acid. Coumarins were screened by adding 10% sodium hydroxide, which resulted in a yellow coloration. Phytosterols were detected by adding sulfuric acid to the extract, resulting in a red color in the chloroform layer. Quinones were identified by adding dilute sodium hydroxide, observing blue-green or red coloration. Resins were detected by adding acetic anhydride and sulfuric acid, resulting in a bright purple color [10].

Quantitative Phytochemical Analysis of Bark Extracts from *Premna tomentosa*

Total Alkaloid Content: To quantify the total alkaloid content in the bark extract, 1 mg of the extract was dissolved in dimethyl sulfoxide (DMSO) and mixed with 1 ml of 2N HCl. The solution was filtered and transferred to a separating funnel, where it was combined with 5 ml of bromocresol green and 5 ml of phosphate buffer. The mixture was shaken with chloroform in increments of 1-4 ml. The combined chloroform layers were diluted to 10 ml, and the absorbance was measured at 470 nm using a UV/Visible spectrophotometer. The total alkaloid content was expressed as mg of alkaloids per gram of extract, with atropine used as a reference standard [11].

Total Flavonoid Content: Flavonoid content in the bark extract was determined using a colorimetric assay. A 1 ml aliquot of the extract was mixed with 4 ml distilled water, followed by the addition of 0.30 ml of 5% sodium nitrite. After 5 minutes, 0.30 ml of 10% aluminum chloride was added, followed by 2 ml of 1M NaOH. The solution was diluted to 10 ml with distilled water. Absorbance was measured at 510 nm using a UV-Visible spectrophotometer, and the flavonoid content was expressed as mg of quercetin equivalents per gram of extract [12].

Total Tannin Content: Tannin content in the bark extract was quantified using the Folin-Ciocalteu method. A 0.1 ml aliquot of the extract was mixed with 7.5 ml distilled water in a 10 ml flask, followed by 0.5 ml Folin-Ciocalteu reagent and 1 ml of 35% Na2CO3 solution. The mixture was diluted to 10 ml with distilled water, shaken, and incubated at 30°C for 30 minutes. Absorbance was measured at 725 nm using a UV-visible spectrophotometer. The tannin content was expressed as mg of gallic acid equivalents per gram of extract [13].

Total Phenolic Content: Total phenolic content was quantified using the Folin-Ciocalteu method. A 1 ml aliquot of the bark extract was mixed with 9 ml distilled water and 1 ml of Folin-Ciocalteu reagent. The mixture was shaken and, after 5 minutes, 10 ml of 7% Na2CO3 solution was added. The solution was diluted to 25 ml with distilled water and incubated at 30°C for 90 minutes. Absorbance was measured at 550 nm using a UV-Visible spectrophotometer, and phenolic content was expressed as mg of gallic acid equivalents per gram of extract [14].

Antibacterial Activity of Bark Extracts from *Premna tomentosa*

The antibacterial activity of the bark extract of *Premna tomentosa* was assessed using the paper disc diffusion method. Nutrient agar plates were first prepared and inoculated with laboratory cultures of pathogenic bacteria, including *Pseudomonas fluorescens* (MTCC 9768), *Escherichia coli* (MTCC 424), *Staphylococcus aureus* (MTCC 96), and *Bacillus subtilis* (MTCC 3053). After inoculation, sterile filter paper discs (6 mm in diameter) were impregnated with varying concentrations of the bark extract and then placed onto the surface of the inoculated agar plates. The plates were incubated at 37°C for 24 hours to allow bacterial growth and interaction with the bark extracts. Following the incubation period, the antibacterial efficacy of the bark extract was determined by measuring the diameter of the clear zones of inhibition around each disc, which indicated the area where bacterial growth was inhibited. The results were recorded as the diameter of the inhibition zones in millimetres [15].

Antifungal Activity of Bark Extracts from *Premna tomentosa*

The antifungal activity of the bark extract of *Premna tomentosa* was evaluated using the dual culture method. Fungal strains, including *Fusarium oxysporum* (NCIM 1008), *Sclerotium rolfsii* (NCIM 1084), and *Phytophthora infestans* (MTCC 8707), were cultured on potato dextrose agar (PDA) medium. Agar blocks (5 mm in diameter) from actively growing fungal cultures (96 hours old) were aseptically transferred to the center of fresh PDA plates. Sterile paper discs soaked in various concentrations of the bark extract were strategically placed at different points on the 90 mm diameter Petri plates. The plates were incubated at 30 ± 2 °C for 5 days. After the incubation period, the zones of

inhibition, representing the area where fungal growth was prevented by the bark extract, were measured. The percentage of inhibition was calculated using the following formula:

$$I\% = \frac{(C-T) \times 100}{C}$$

Where C represents the colony diameter in the control plate, and T represents the colony diameter in the treatment plate. Fluconazole served as a positive control to compare the antifungal efficacy of the bark extract [16].

Results and Discussion

The solubility profile of the phytochemicals in the bark extracts of *Premna tomentosa* reveals significant insights into the effectiveness of various solvents in extracting bioactive compounds. Methanol emerged as the most effective solvent, displaying high solubility for a wide range of phytochemicals, including alkaloids, flavonoids, steroids, terpenoids, phenols, tannins, glycosides, cardiac glycosides, coumarins, quinones, and resins (Figure 1 & Table 1). This finding is consistent with previous studies that have demonstrated Methanol's ability to extract polar compounds effectively due to its high polarity, which facilitates the dissolution of a broad spectrum of phytochemicals [17].

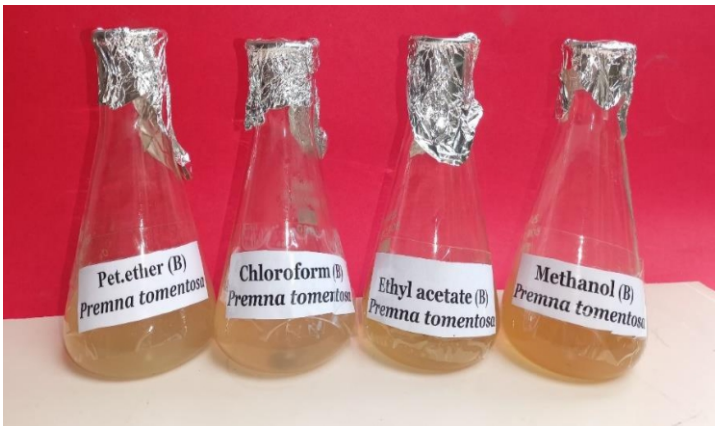


Figure. 1: Qualitative phytochemical analysis of bark extracts of Premna tomentosa

Table 1: Solubility Profile of Phytochemicals in bark Extracts of Premna tomentosa

Sr. No.	Name	Pet .ether	Chloroform	Ethyl acetate	Methanol
1.	Alkaloids	-	++	-	+++
2.	Flavonoids	-	+++	++	+++
3.	Saponins	-	-	-	-
4.	Steroids& Terpenoids	-	++	-	+++
5.	Phenols	-	++	+	+++
6.	Tannins	-	++	+	+++
7.	Glycosides	-	-	+++	+++
8.	Cardio glycosides	-	-	+++	+++
9.	Coumarins	-	-	++	+++
10.	Anthraquinones	-	-	-	-
11.	Quinones	-	-	-	+++
12.	Resins	++	-	-	+++
13.	Gums &mucilage's	-	-	-	-

In contrast, Petroleum ether, a non-polar solvent, was the least effective, primarily extracting resins, which are non-polar. The limited solubility of other phytochemicals in Petroleum ether suggests that most of the bioactive compounds present in the bark of *Premna tomentosa* are polar or moderately polar, which aligns with the findings of other studies on plant extracts [18-19]. Chloroform and Ethyl acetate, with intermediate polarity, showed moderate solubility for certain phytochemicals such as flavonoids, phenols, tannins, and steroids. This pattern is indicative of the semi-polar nature of these compounds, which are more effectively extracted by solvents with similar polarity. The moderate performance of these solvents highlights their role in selectively extracting specific phytochemical classes, a finding that echoes the results from comparative studies on solvent extraction efficacy in other medicinal plants [20-21]. The absence of saponins and anthraquinones across all solvents tested in this study suggests that these compounds may be present in very low concentrations or may require different extraction methods, such as aqueous or acidified solvents, to be effectively isolated [22]. The selective solubility of different phytochemicals across various solvents underscores the importance of solvent choice in the extraction process, which directly influences the yield and efficacy of the bioactive compounds obtained.

Quantitative analysis of phytochemical content in *Premna tomentosa* bark

The quantitative analysis of phytochemicals in the bark extract of *Premna tomentosa* reveals a notable variation in the concentration of key compounds depending on the solvent used, underscoring the critical role of solvent polarity in the extraction process. Methanol, a highly polar solvent, proved to be the most effective in extracting alkaloids, flavonoids, phenols, and tannins, with concentrations of 480 mg/g, 510 mg/g, 428 mg/g, and 340 mg/g, respectively (Fig. 2). These findings align with previous studies that have highlighted the efficacy of methanol in extracting polar compounds due to its ability to penetrate plant cell walls and dissolve a wide range of polar phytochemicals [23-24].

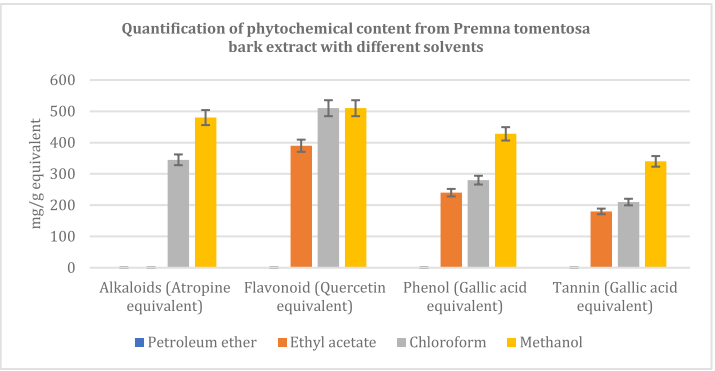


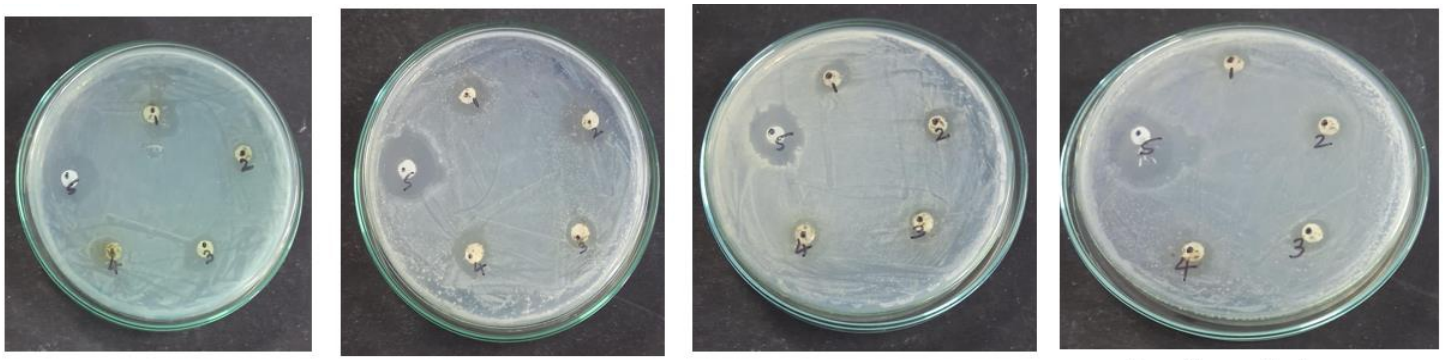
Figure. 2: Quantitative analysis of phytochemical content in Premna tomentosa bark

Chloroform, with moderate polarity, also demonstrated significant extraction capabilities, particularly for alkaloids and flavonoids, each at 345 mg/g and 510 mg/g, respectively. It also showed considerable efficacy in extracting phenols (280 mg/g) and tannins (210 mg/g). This is consistent with findings from other studies that have shown chloroform to be effective in extracting semi-polar compounds, which are less effectively extracted by either highly polar or non-polar solvents [25-26]. Ethyl acetate, which is moderately polar, was also effective in extracting flavonoids (390 mg/g), phenols (240 mg/g), and tannins (180 mg/g), though its extraction efficiency was lower than that of methanol and chloroform. This result supports the notion that ethyl acetate is particularly useful for extracting flavonoids and phenolic compounds, as documented in comparative phytochemical studies [26].

The varying concentrations of these phytochemicals across different solvents highlight the importance of selecting the appropriate solvent for specific compounds during extraction. Methanol's superior extraction capacity, especially for polar compounds like phenols and tannins, suggests that it is particularly well-suited for comprehensive phytochemical analysis of *Premna tomentosa* bark. However, the significant levels of phytochemicals extracted by chloroform indicate that a combination of solvents may be necessary to fully capture the diverse range of bioactive compounds present in the bark [20]. These findings have important implications for both research and practical applications, suggesting that the choice of solvent can significantly influence the outcome of phytochemical analysis and the potential therapeutic efficacy of plant extracts.

Antibacterial activity of *P. tomentosa* bark extract

The results of this study clearly demonstrate the varying antibacterial efficacy of *Premna tomentosa* bark extracts, highlighting the influence of solvent polarity on the extraction and effectiveness of bioactive compounds. The methanol extract consistently showed the highest levels of inhibition across all tested bacterial strains, indicating that it is the most effective solvent for extracting antibacterial compounds from *Premna tomentosa* bark (Fig. 3 and Table.2). This finding aligns with previous studies, which have also identified methanol as a highly effective solvent for extracting a wide range of phytochemicals, including phenolics and flavonoids, known for their potent antibacterial properties [12]. The significant inhibitory activity of the methanol extract against *Pseudomonas fluorescens* (6mm) and *E. coli* (7mm) supports the hypothesis that methanol is particularly effective in extracting compounds with activity against Gram-negative bacteria, which are often more resistant to antibiotics due to their unique cell wall structure [13]. The moderate effectiveness of ethyl acetate and petroleum ether extracts, especially against *Pseudomonas fluorescens* and *E. coli*, further suggests that these solvents can extract certain semi-polar and non-polar compounds, though not as comprehensively as methanol [14].



Well No 1: *Premna tomentosa* bark extract with methanol, 2: with chloroform, 3: ethyl acetate 4: petroleum ether and 5 indicate Antibiotic (Ampicillin)

Figure. 3: Antibacterial activity of P. tomentosa bark extract

Table. 2: Antibacterial activity of P. tomentosa bark extract

S. No	Bark extract with various solvents	*Pseudomonas fluorescens* (MTCC 9768)	*E. coli* (MTCC 424)	*Staphylococcus aureus* MTCC 96)	*Bacillus subtilis* (MTCC 3053)
		Zone of inhibition in mm			
1.	Methanol	06	07	05	04
2.	Chloroform	03	05	03	03
3.	Ethyl acetate	04	04	03	03
4.	Petroleum ether	04	05	02	03
5.	Antibiotic (Ampicillin)	10	12	10	12

The lower inhibition observed with chloroform extracts, particularly against *Pseudomonas fluorescens* (3mm) and *Staphylococcus aureus* (3mm), is consistent with other research indicating that chloroform, while effective for extracting some bioactive compounds, may not be as suitable for isolating the more polar antibacterial agents present in *Premna tomentosa* [15]. This highlights the importance of solvent selection based on the specific phytochemicals being targeted and the bacterial strains being tested. The variability in the antibacterial activity of the different solvent extracts also underscores the complex nature of plant-based antimicrobials, which often involve multiple compounds working synergistically.

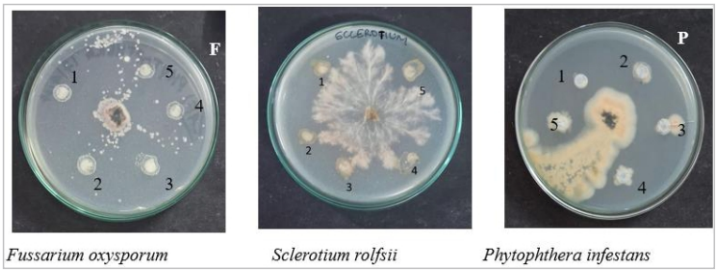
The consistent superiority of methanol extracts across multiple strains suggests that methanol is likely extracting a broader spectrum of active compounds, including phenols, flavonoids, and tannins, which have been extensively documented for their antimicrobial properties [16].

In comparison to ampicillin, the standard antibiotic used in this study, the extracts of *Premna tomentosa* exhibited lower but notable antibacterial activity, which is significant given the growing concern over antibiotic resistance. The moderate inhibition zones observed for *P. fluorescens*, *E. coli*, *S. aureus*, and *B. subtilis* suggest that while these extracts may not replace conventional antibiotics, they could serve as complementary treatments, particularly in cases where antibiotic resistance is a concern [24]. These findings contribute to the growing body of research supporting the potential use of plant extracts as alternative or complementary therapies in the treatment of bacterial infections. Future studies could further explore the specific compounds responsible for the antibacterial activity observed and evaluate their efficacy in combination with traditional antibiotics.

Antifungal activity of *P. tomentosa* bark extract

The antifungal activity of *Premna tomentosa* bark extracts against *Fusarium oxysporum* NCIM1008, *Sclerotium rolfsii* NCIM 1084, and *Phytophthora infestans* MTCC 8707 revealed distinct patterns of inhibition, highlighting the efficacy of different solvent extracts. Among the fungal strains tested, *Fusarium oxysporum* NCIM1008 was notably susceptible to the bark extracts, with the methanol extract showing the highest inhibition at 50%. This was closely followed by chloroform and ethyl acetate extracts, each registering a 48% inhibition, and the petroleum ether extract with a 46% inhibition (Fig. 4 & Table. 3). These results suggest that the polar and semi-polar compounds in the methanol and chloroform extracts are particularly effective against *Fusarium oxysporum*, which aligns with other studies reporting the antifungal potential of these extracts due to their high phenolic and flavonoid content [26].

In the case of *Sclerotium rolfsii* NCIM 1084, the methanol extract again led with a 40% inhibition zone, followed by ethyl acetate (32%) and chloroform (30%) extracts, while the petroleum ether extract showed the lowest inhibition at 28%. Interestingly, Fluconazole, the fungicide used as a control, exhibited a 38% inhibition, which is lower than that of the methanol extract, indicating that *Premna tomentosa* bark extracts, especially methanol, may offer comparable or even superior antifungal efficacy against certain strains. *Phytophthora infestans* MTCC 8707 was also inhibited significantly by the bark extracts, with chloroform extract showing the highest inhibition at 52%, followed by methanol (50%), and ethyl acetate (40%). The petroleum ether extract exhibited moderate inhibition at 30%, while Fluconazole demonstrated a 40% inhibition. The high efficacy of chloroform and methanol extracts could be due to the presence of semi-polar and polar compounds that are particularly effective against this strain. This pattern is consistent with previous findings where chloroform and methanol extracts of various plants have shown significant antifungal activity.



(Inhibition zone measured after 5 days of cultures. Fluconazole served as the positive control for comparison. Well 1: Premna tomentosa bark extract with methanol, 2: Premna tomentosa bark extract with chloroform, 3: Premna tomentosa bark extract with ethyl acetate, 4: Premna tomentosa bark extract with petroleum ether and 5: Fungicide (Fluconazole)

Figure. 4: Antifungal activity of P. tomentosa bark extract

Table. 3: Antifungal activity of P. tomentosa bark extract

S. No	Sample: *Premna tomentosa* bark extract	*Fussarium oxysporum NCIM1008*	*Sclerotium rolfsii NCIM 1084*	*Phytophthera infestans MTCC 8707*
	Percentage of inhibition (%)			
1.	methanol	50%	40%	50%
2.	chloroform	48%	30%	52%
3.	ethyl acetate	48%	32%	40%
4.	petroleum ether	46%	28%	30%
5.	Fungicide (Fluconazole)	40%	38%	40%

These findings underscore the importance of solvent selection in the extraction of antifungal compounds from plant materials. Methanol, known for its ability to extract a broad spectrum of polar compounds, consistently showed strong antifungal activity across all tested strains. Chloroform also performed well, particularly against *Phytophthora infestans*, indicating that semi-polar compounds play a critical role in antifungal efficacy. The moderate performance of ethyl acetate and petroleum ether suggests that while they can extract effective antifungal agents, their efficacy is limited compared to methanol and chloroform. The study's results are promising for the development of plant-based antifungal treatments, particularly for agricultural applications where pathogens like *Fusarium*, *Sclerotium*, and *Phytophthora* pose significant threats. The comparable or superior performance of *Premna tomentosa* extracts relative to Fluconazole highlights the potential for these extracts to be used as natural alternatives or complements to synthetic fungicides, potentially reducing the reliance on chemical agents and mitigating resistance development in fungal populations.

Conclusion

The comprehensive analysis of *Premna tomentosa* bark extracts, spanning from qualitative phytochemical screening to antifungal assays, highlights the significant therapeutic potential of this plant.

The qualitative phytochemical screening revealed that methanol is the most effective solvent for extracting a wide range of bioactive compounds, including alkaloids, flavonoids, phenols, tannins, glycosides, cardiac glycosides, coumarins, quinones, and resins. Chloroform also showed considerable efficacy, particularly in extracting alkaloids and flavonoids, while ethyl acetate and petroleum ether were less effective but still capable of extracting certain phytochemicals. Quantitative analysis further supported these findings, with methanol extracts showing the highest concentrations of alkaloids, flavonoids, phenols, and tannins, confirming the solvent's ability to effectively extract these potent bioactive compounds. These phytochemicals are known for their antimicrobial properties, which was evident in the subsequent antibacterial and antifungal activity tests.

The antibacterial assays demonstrated that the methanol extract consistently produced the largest zones of inhibition across various bacterial strains, including *Pseudomonas fluorescens*, *E. coli*, *Staphylococcus aureus*, and *Bacillus subtilis*, highlighting its broad-spectrum antibacterial activity. Chloroform and ethyl acetate extracts also exhibited significant antibacterial effects, though to a slightly lesser extent, while petroleum ether was the least effective. In antifungal assays, the methanol extract again showed the highest efficacy, particularly against *Fusarium oxysporum*, *Sclerotium rolfsii*, and *Phytophthora infestans*. The results indicate that the polar and semi-polar compounds extracted by methanol and chloroform are likely responsible for the strong antifungal activity observed. Overall, *Premna tomentosa* bark extracts, particularly those obtained using methanol, demonstrate substantial antimicrobial potential, making them promising candidates for the development of natural therapeutic agents. The study emphasizes the importance of solvent selection in maximizing the extraction of bioactive compounds and supports further research into the isolation and characterization of these compounds for potential pharmaceutical and agricultural applications.

Conflict of interest: The authors were declare no conflict of interest to report regarding this research work

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