Research Article

# Antimicrobial Potential of *Albizia lebbeck* Leaf Extract

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**ABSTRACT**

The present study was conducted to investigate the antimicrobial activities of *Albizia lebbeck* against some selective strains of pathogens. The extracts from the leaves of plant were obtained using various solvents- hexane, benzene, ethanol and water. For phytochemical studies the different extracts were evaluated for carbohydrates, saponins, tanins, glycosides, alkaloids, flavonoids, proteins etc. The antibacterial activity was studied against - *E.coli, P.aeruginosa, S. aureus, B. subtilis,* and *B. cereus.* The antifungal was performed against *A.niger.* The greatest antibacterial activity was found with 50mg/ml concentration of ethanol against *B. subtilis* with zone of inhibition (22±1 mm), followed by *B. cereus* and *S.aureus* (20±1 mm). With aqueous extract maximum zone of inhibition was against *E.coli* (17±1 mm), followed by *S.aureus* and *B.* subtilis (15±1 mm). Antibiotics Vancomycin and Ceftazidime/ Clavulanic acid were having zone of inhibition from 0-16. Maximum antifungal activity was reported with 50mg/ml concentration of ethanolic extract with zone of inhibition (20±1 mm) against *A.niger*. Hexane and Benzene extracts were found to have values between 2-10mm. This study indicates that *Albizia lebbeck* can be used as a remedy for infections due to potent antimicrobial activity.

**Keywords:** *Albizia lebbeck*, Antimicrobial, Extract, Inhibition

## INTRODUCTION

Medicinal plants have been playing an important role in primary health care for last so many years. There are still many people, who due to poverty or unavailability of health care facilities and poor connectivity with urban areas rely mostly on traditional medicines. [1] Out of 15,000 species of flowering plants of India, about 17% have their medicinal value and approximately 1,745 belong to Indian Himalayan region mostly from Uttarakhand.[2,3] The Garhwal Himalayas is one of the richest floristic region of India containing more than 300 species of medicinal plants.[4] As per WHO, almost 80% of the world's population depend on traditional medicine for primary health care needs. The use of ethnomedicinal plants by some tribal people of India has been emphasized.[5] Various reasons have forced mankind to look forward to nature. But medicinal plants have gained commercial importance recently, not only as herbal medicine but also as a natural ingredient for cosmetic industry. [6]

*Albizia lebbeck* (Fabaceae) is one of the most common and widespread species of *Albizia* worldwide. Apart from being used for medicine, it is also used for environmental management, forage and wood. The wood obtained from it has quite a high density (0.55-0.66 g/cm$^3$). *Albizia lebbeck* is also known as woman's tongue because its seeds rattle inside the pod.[7] *Albizia lebbeck* is widely distributed as a wild variety as well as an ornamental tree throughout the tropics and northern subtropics. It is found in Columbia, Venezuela, Brazil, and Central America.[8] This plant can survive in almost all soil types like acidic, alkaline and even saline.[9]

## MATERIALS AND METHODS

### Plant Source and Identification

The fresh leaves of *Albizia lebbeck* were collected in the month of August to October 2011-12, from the Department of Forestry, HNB Garhwal University Srinagar, Garhwal, Uttarakhand. The plant sample was authenticated by Dr Sarita Garg, NISCAIR, Delhi, voucher specimen number is NISCAIR/RHMD/2013/2190/196/01.

### Preparation of crude extract

The plant sample was separated into its selected parts (leaves), air dried, ground to moderately fine powder (1000g of each sample), extracted separately in the Soxhlet apparatus in order of increasing polarity of the solvents as Hexane, benzene, ethanol and water for 72 h with each solvent. The solvents were evaporated under reduced pressure to obtain a semisolid mass and then vacuum dried to yield a residue.[10]

### Source of test organism

*Pseudomonas aeruginosa*, *Staphylococcus aureus, E. Coli, Bacillus cereus*, *Bacillus subtilis* and *Aspergillus niger* microorganisms were purchased from Microbial Type Culture Collection and Gene Bank (MTCC), Institute of Microbial Technology (IMTECH) Sector 39-A, Chandigarh-

160036 (India). Nutrient broth and nutrient agar were obtained from Himedia Laboratories Pvt. Ltd., Mumbai, India.

**Culture media**

For bacterial cultures Mueller Hinton agar was dissolved in distilled water and sterilized by autoclaving at 15 psi for 20 minutes. For fungal cultures Peptone water and dextrose were weighed and dissolved in distilled water to prepare Sabouraud dextrose agar.

**Preparation of Inoculum**

One day prior to the testing, inoculations of the above bacterial cultures were made in the nutrient broth and incubated at 37°C for 18 –24 hours.

**Preparation of test solutions**

Sample extracts were dissolved in dimethyl sulfoxide separately to give different solution.

**Antimicrobial activity of extracts**

Agar plates were prepared by pouring the medium in to each sterilized petri dishes and were allowed to set at room temperature. The bacterial or fungal culture was inoculated over the surface of agar medium using sterile cotton swab in inoculating chamber. The method adopted was well diffusion method. With the help of sterile borer of 5mm diameter, required holes (wells) were made in the agar petri plates. Different solutions of the extracts were poured in the holes using micropipette, while antibiotics discs placed firmly onto it. At the end all the plates were incubated at 37°C for 48 hours. The zone of inhibition was measured in mm for each organism.

## RESULTS AND DISCUSSION

Antimicrobial activity is concerned with the investigation of antibacterial and antifungal potential of various plant extracts. The aim is to determine the zone of inhibition on few bacterial and fungal strains. The activity of *Albizia lebbeck* was studied on different microbes namely- *E.coli, P.aeruginosa, S. aureus, B. subtilis, B. cereus,* and *A.niger.* The antibacterial activity was assessed at the doses of 25 and 50 mg/ml and the results of zone of inhibition were compared with the activity of positive control Vancomycin and Ceftazidime/ Clavulanic acid. Maximum antibacterial activity was reported with 50 mg/ml concentration of ethanol against *B.* subtilis (22±1 mm), followed by *B. cereus* and *S.aureus* (20±1 mm). The aqueous extract showed the maximum zone of inhibition against *E.coli* (17±1 mm), followed by *S.aureus* and *B.* subtilis (15±1 mm). The other extracts were not significantly effective. It was observed that with ethanolic extract ZOI was higher as compared to the other extracts. In case of fungus maximum zone was reported in higher dose of ethanolic extract with the value of 20±1mm against *A. niger,* followed by 10±1mm of aqueous extract higher dose. Hexane and Benzene extracts were having value between 2-10 mm. The antibacterial and antifungal activities are illustrated in table no 1 and 2 respectively. Figure 1 demonstrates the activities on the plant.

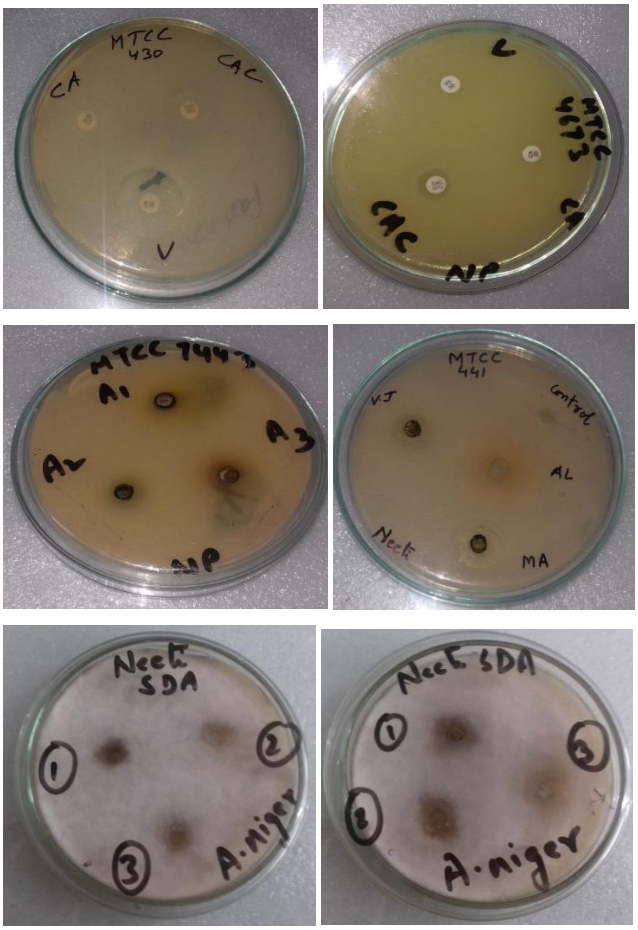


**Figure 1:** Pictures of antimicrobial activity of *Albizia lebbeck*

**Table 1:** Antibacterial activity of *Albizia lebbeck* leaves (inhibitory zone size ±1 mm).

| Name of micro organism | MTCC code | Antibiotics | | Hexane | | Benzene | | Ethanol | | Aqueous | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | V mcg/ml | C/C mcg/ml | 25 mg/ml | 50 mg/ml | 25 mg/ml | 50 mg/ml | 25 mg/ml | 50 mg/ml | 25 mg/ml | 50 mg/ml |
| ***E.coli*** | 40 | 12 | 0 | 4 | 6 | 8 | 10 | 12 | 17 | 10 | 17 |
| ***B.subtilis*** | 441 | 11 | 16 | 0 | 0 | 6 | 8 | 17 | 22 | 9 | 15 |
| ***B.cereus*** | 430 | 20 | 9 | 4 | 6 | 0 | 14 | 14 | 20 | 7 | 10 |
| ***P.aeruginosa*** | 4673 | 0 | 9 | 0 | 6 | 5 | 7 | 12 | 18 | 10 | 14 |
| ***S. aureus*** | 7443 | 12 | 7 | 2 | 6 | 0 | 4 | 9 | 20 | 10 | 15 |

V= Vancomycin (30mcg) C/C= Ceftazidime/ clavulanic acid (30/10mcg)

**Table 2:** Antifungal activity of *Albizia lebbeck* leaves against *Aspergillus niger* (inhibitory zone size ±1 mm).

| MTCC code 2208 | Ketoconazole 30mcg | Hexane | | Benzene | | Ethanol | | Aqueous | |
|---|---|---|---|---|---|---|---|---|---|
| | 12 | 25 mg/ml | 50 mg/ml | 25 mg/ml | 50 mg/ml | 25 mg/ml | 50 mg/ml | 25 mg/ml | 50 mg/ml |
| | | 2 | 6 | 0 | 6 | 14 | 20 | 6 | 10 |

## CONCLUSION

The study revealed that the leaf extracts of *Albizia lebbeck* has potent antibacterial and antifungal activity against the tested organism and amongst all extracts, ethanol showed maximum activity.

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