



ANTIMICROBIAL ACTIVITY OF LAXMITARU (*SIMAROUNA GLAUCA*) AGAINST CERTAIN BACTERIAL SPECIES

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Abstract

Simarouba glauca belongs to family *Simarubaceae*. This plant is known for its medicinal properties. The leaf and bark of *Simarouba glauca* contain Glaucarubin a chemical useful in curing several diseases. The fresh and dried leaves cold and hot water and Ethanol and Methanol extract were tested against *Bacillus cereus*, *Staphylococcus aureus* and *Streptococcus* sp. by disc diffusion method. In all the extracts *Bacillus subtilis* exhibited maximum inhibition zone when compared to other microorganisms.

Key words : Antimicrobial activity, Laxmitaru, Bacterial species.

Introduction

Simarouba glauca belongs to family *Simarubaceae*, commonly known as “The paradise Tree” (or) “King of oil seed Tree”. This plant is also known for its medicinal properties. The leaf and bark of *Simarouba glauca* contain Glaucarubin a chemical useful in curing amoebiasis, diarrhea and resistance against malaria. The seeds are economically very important as they contain 60-75% oil which can be used in the manufacture of vegetable fat. It is also has many pharmacological properties such as homeostatic anthelmintic, antiphorastic, antidysentetic and anticancer (Patil and Gaikwad 2011).

The antimicrobial activity of many plants have been reported by many researchers (Reddy *et al.*, 2001; Abtele and Erdourul 2003; Pinkusatnami *et al.*, 2016 and Syed Nyamath and Karthikeyan 2018). However the studies of antimicrobial activities of laxmitaru are very limited towards to antimicrobial activities of certain bacterial species.

Materials and Methods

Plant collection

Laxmitaru (*Simarouba glauca*) leaf and fruits of the tree was collected from Chidambaram area of Cuddalore district of Tamilnadu, India.

Simarouba glauca leaves extraction

Fresh leaf Dry leaf and Extract

The fresh leaves are plucked from the tree and washed with tap water. The leaves were dried in oven at 35 - 40°C for 3 days.

The leaves were pulverized using a sterile electrical blender to obtain powder form was stored in airtight glass containers. The leaves are dried at room temperature and powdered in a electronic blender. Both the fresh and dry powdered leaves are packed into soxhlet apparatus and extraction was done. The plant material was located in the inner tube of the soxhlet apparatus and then filled into a round bottom of flask containing hot water, cold water, Ethanol, Methanol and petroleum ether separately. The Extraction was carried for an hour and temperature is maintained at 75°C. Colour of the extract was green. The solvent was removed at the reduced pressure with help of a rotary vacuum evaporator to get dark green residue.

Test organisms

Microorganisms for the study were obtained from the laboratory of Department of Microbiology, Faculty of Agriculture, Annamalai University. The followed microorganisms were used: *Bacillus cereus*, *Staphylococcus aureus* and *Streptococcus* sp. The stock cultures of microbial strains were maintained in nutrient slants at 4°C at refrigerator.

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Preparation of antimicrobial activity

Nutrient agar media were prepared and sterilized at 121°C for 15 psi and poured in sterile petridishes in laminar air flow chamber to avoid contamination.

Antibacterial activity of *Simarouba glauca*

Disc diffusion method were carried out for the test organisms. The disc of *Simarouba glauca* leaf extracts with cold water, hot water and different solvents (Ethanol, and Methanol) and placed in quadrangular manner in each in different concentration of 250 ppm, 500 ppm and 1000 ppm petridishes. Then petridishes were incubated at 30 ± 2°C for 24 hrs. After 24 – 48 hrs were noted for the zone of inhibition was measured in millimeters (mm).

Results and Discussion

The inhibition effect of cold water and hot water leaves extract of *Simarouba glauca* against certain microorganisms were presented in Table 1, Plate 1 and

2.

Among the different concentration *viz.*, 250 ppm, 500 ppm and 1000 ppm of fresh and dried leaves cold water extracts of *Simarouba glauca* were tested of which 1000 ppm produced highest inhibitory activity against *Bacillus subtilis*, *Staphylococcus aureus* and *Streptococcus* spp. The maximum area of inhibition zone were observed 17.00 mm, 8.80 mm in the fresh and dried leaves cold water extract of *Bacillus subtilis* followed by *Staphylococcus aureus* and *Streptococcus* sp. Plate 3 and 4.

In our investigation the highest zone of inhibition were found in both fresh and dried leaves cold water extract of *Simarouba glauca* in accordance with the results obtaining by Nair and Chanda (2005) and other researchers (Syed and Karthikeyan, 2018).

The fresh leaves cold water extract of *Simarouba glauca* contains aminoacids pectins, glycosides, tannins, phenols and Saponins. The saponins of plants have often considered as antimicrobial anti inflammatory and

Table 1: Inhibition effect of cold water and hot extract of *Simarouba glauca* against certain bacterial species.

S. No.	<i>Simarouba glauca</i>	<i>Bacillus subtilis</i>			<i>Staphylococcus aureus</i>			<i>Streptococcus</i> sp.		
		250 ppm	500 ppm	1000 ppm	250 ppm	500 ppm	1000 ppm	250 ppm	500 ppm	1000 ppm
1.	Cold water fresh leaves extract	9.40	12.50	17.00	4.40	6.50	8.66	3.11	5.20	7.30
2.	Cold water dried leaves extract	4.00	5.80	8.80	3.20	5.40	6.86	2.29	3.50	5.66
3.	Hot water fresh leaves extract	4.00	5.44	6.67	2.50	3.00	5.00	3.00	3.50	4.20
4.	Hot water dried leaves extract	3.00	5.50	5.80	1.90	2.45	3.60	2.40	3.20	3.70

Table 2: Antimicrobial activity of Ethanol leaves extracts of *Simarouba glauca* against different microorganisms.

S. No.	<i>Simarouba glauca</i>	Microorganisms	Zone of inhibition (mm)		
			250 ppm	500 ppm	1000 ppm
1.	Ethanol fresh leaves extract	<i>Bacillus subtilis</i>	6.50	8.50	18.00
		<i>Staphylococcus aureus</i>	2.60	4.70	8.00
		<i>Streptococcus</i> sp.	2.80	5.20	8.00
2.	Ethanol dried leaves extract	<i>Bacillus subtilis</i>	6.40	8.20	17.00
		<i>Staphylococcus aureus</i>	3.60	5.00	8.00
		<i>Streptococcus</i> sp.	3.40	5.40	7.00

Table 3: Antimicrobial activity of Methanol leaves extracts of *Simarouba glauca* against different microorganisms.

S. No.	<i>Simarouba glauca</i>	Microorganisms	Zone of inhibition (mm)		
			250 ppm	500 ppm	1000 ppm
1.	Methanol fresh leaves extract	<i>Bacillus subtilis</i>	5.80	8.20	15.50
		<i>Staphylococcus aureus</i>	3.50	5.60	7.00
		<i>Streptococcus</i> sp.	3.20	5.00	8.00
2.	Methanol dried leaves extract	<i>Bacillus subtilis</i>	5.40	7.70	14.00
		<i>Staphylococcus aureus</i>	3.80	4.80	6.50
		<i>Streptococcus</i> sp.	2.50	4.90	7.00

antitumor activities (Lakshmi *et al.*, 2014).

Among the tested microorganisms with hot water extract of fresh and dried leaves of *Simarouba glauca* exhibited maximum inhibition of *Bacillus subtilis* followed by *Staphylococcus aureus* and *Streptococcus* spp Table 2. The hot water fresh leaves extract which shown a better antimicrobial activity, in according with the results obtained by Nair and Chanda (2005).

Among the two solvents, the fresh leaves extracts of ethanol have maximum inhibition zone against *Bacillus subtilis* (18.00 mm and 17.00 mm) followed by *Staphylococcus aureus* and *Streptococcus* sp. at 1000 ppm concentration. These results



Plate 1: Overall view of extraction using Soxhlet apparatus.



Plate 2: *Simarouba glauca* fresh and dried leaves extract of different solvents.

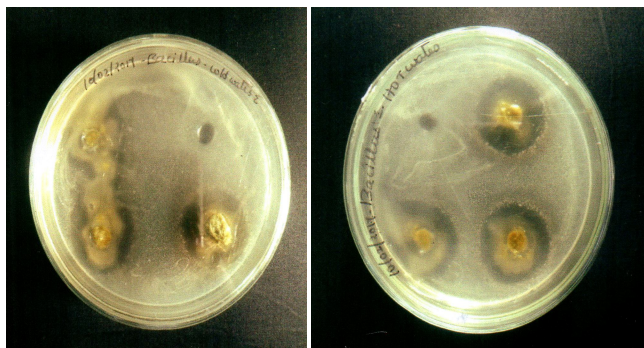


Plate 3 and 4: Inhibition effect of cold and hot water extracts of *Simarouba glauca* against *Bacillus subtilis*.

earlier reported by Khating *et al.*, 2014 and Antasen and Amla batra (2012) Table 2, Plate 5.

Among the microorganisms tested against fresh and dried leaves of methanol extract, *Bacillus subtilis* recorded maximum inhibition zone of 15.50 mm, 14.00 mm followed by other microorganisms. Our results confirmed with earlier findings of Lakshmi *et al.*, 2014. Table 3

Conclusion

Antimicrobial activities of *Simarouba glauca*

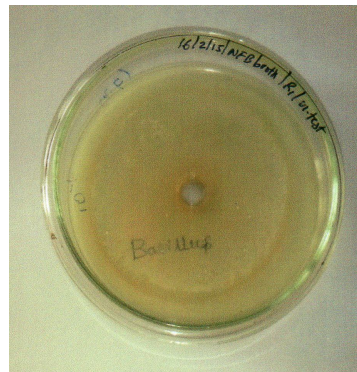


Plate 5: Inhibitory effect of ethanol extract of *Simarouba glauca* against *Bacillus subtilis* at 1000 ppm.

medicinal plants were examined using cold water, hot water and solvents like ethanol and methanol showed maximum antimicrobial activities against all the strains.

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