EAS Journal of Pharmacy and Pharmacology
Abbreviated Key Title: EAS J Pharm Pharmacol
ISSN: 2663-0990 (Print) & ISSN: 2663-6719 (Online)
Published By East African Scholars Publisher, Kenya

OPEN ACCESS

Volume-8 | Issue-1 | Jan-Feb- 2026 | DOI: https://doi.org/10.36349/easjpp.2026.v08i01.002

Original Research Article

Comparative *In vitro* Anti-Bacterial Activity on Various Extracts of *Dalbergia oliveri* and *Lagerstroemia speciosa* Leaves

Suresh Kannan V[1], Dr. Vivek Gupta[1]*, Dr. Rajesh Sharma[1], Dr. Amain Fatma[1]

[1]Faculty of Pharmacy, P.K. University, Shivpuri

Article History
Received: 03.12.2025
Accepted: 20.01.2026
Published: 22.01.2026

Journal homepage:
https://www.easpublisher.com

Quick Response Code

Abstract: The present investigation compares the in vitro phytochemical composition and biological activities of extracts from Dalbergia oliveri and Lagerstroemia speciosa. Qualitative phytochemical screening confirmed the presence of various secondary metabolites, including alkaloids, flavonoids, tannins, saponins, and terpenoids in both extracts. Antibacterial evaluation against Staphylococcus aureus, Escherichia coli, and Pseudomonas aeruginosa indicated that D. oliveri displayed superior inhibitory activity. Collectively, the results demonstrate that both plant species exhibit substantial phytochemical and bioactive potential, supporting their relevance in the development of natural antimicrobial therapies.

Keywords: *In-Vitro* Anti-Bacterial, *Lagerstroemia Speciosa, Dalbergia Oliveri,* Comparative Studies.

1. INTRODUCTION

Herbal Medicine

Human beings have depended on nature for their simple requirements as the source for medicines, shelters, foodstuffs, fragrances, clothing, flavors, fertilizers, and means of transportation throughout the ages. For the large proportions of the world's population, medicinal plants continue to show a dominant role in the healthcare system. This is mainly true in developing countries, where herbal medicine has a continuous history of long use. The development and recognition of medicinal and financial aids of these plants are on the rise in both industrialized and developing nations. The foundations of typical traditional systems of medicine for thousands of years that have been in existence have formed from plants. The plants remain to offer mankind new medicines [1-24].

Lagerstroemia Speciosa

Banaba (*Lagerstroemia speciosa*) under the family Lythraceae. It is a type of crepe myrtle that grows in India, Philippines, and Southeast Asia [2-25]. The leaves are used as medicine; Banaba might reduce blood sugar and help the body use insulin more efficiently. Plants that contain chemical constituents are ellagic acid and its derivatives, triterpenes, tannins, triterpenoids, Corosolic acid, quercetin, iso quercetin, flavones and glycosides. The different parts of the plant that used for anti-viral, xanthine oxidase inhibition, cytotoxic activity [3], anti-obesity, anti- tussive, anti-oxidant, anti-inflammatory and anti-microbial activity.

Dalbergia Oliveri

Dalbergia Oliveri under the family as Fabaceae. *Dalbergia oliveri* is a deciduous tree that grows about 30 m in height and with an open, spreading crown. It is commonly found in Southeast Asia, specifically in Myanmar, Thailand, Laos, Cambodia, and Vietnam. It is highly valued for its red lumber used in making furniture, cabinets, and handicrafts among others. It is considered as an endangered species due to overharvesting [3-28]. Plant that contain the chemical constituent are Flavonoids (orientin, vitexin, hispidulin, scrophulein, chrysin, 5-hydroxy-6,7-dimethoxy-2 phenyl-4H-chromen-4-one, diosmetin), Eight isoflavones (daidzin, ononin, daidzein, glycitin, genistein, glycidein, formononetin, biochanin A), One flavonol (isorhamnetin), 3 flavanones (liquiritigenin, 2-(3,4-dihydroxyphenyl)-7-hydroxy-3,4-dihydro-2H-1-benzopyran-4-one, naringenin) [5-22].The different parts of the plant that used for cardiovascular health, anti-diabetic activity, wound healing, cough and respiratory relief, treat fever, anti-fungal, antibacterial, anti-oxidant and anti-inflammatory activity [5-23].

***Corresponding Author:** Dr. Vivek Gupta
Faculty of Pharmacy, P.K. University, Shivpuri

2. MATERIALS AND METHODS

Plant Collection and Authentication

The leaves of *Lagerstroemia speciosa* and *Dalbergia oliveri* plants were collected which was originated from Western Ghats near Mettur Dam and Yercaud, in October 2023. The leaves of both plants were collected by the pick-and-pluck method from the plant. The leaves of both plants were identified, documented and authenticated by Professor Dr. P. Radha Research officer a botanist, at siddha medicinal plants garden (central council for research in siddha, Ministry of Ayush, Government of India) located in Mettur Dam, Dist. Erode, Tamil Nadu, India. The authentication of both plants was documented with reference number L071224227S and D081432428O.

Preparation of Plant Extracts by Soxhlet Apparatus

A coarse powder consisting of 200 grams of dried leaves from *Lagerstroemia Speciosa* and *Dalbergia oliveri* were packed into a Soxhlet apparatus for extraction [6, 7]. The organic solvents were selected based on polarity (from low to high) for the extraction of both plant leaves coarse powder. The solvents used for extraction process were included i.e. petroleum ether, ethyl acetate, alcohol. Extraction was carried out for minimum 72 hours at temperature between 60 to 80 degrees Celsius.

Preliminary Phyto Chemical Investigation

To determine the primary and secondary phytochemical component characteristics of the of all plants extract, various qualitative chemical analysis was carried out [8-10]. The methodologies were followed in the qualitative phytochemical screening evaluation described by Dr. C.K. Kokate. To find out what different plant-based constituents present in these extracts.

Anti-Bacterial Activity

Agar Diffusion Method

Antibacterial activity of leaf extracts is tested by using the agar diffusion method with some modifications. Using Mueller Hinton agar, the presence of a zone of inhibition (mm), indicated antibacterial activity by the plant extracts. From our diluted bacteria in the LB broth tubes, 100 uL should be inoculated to Mueller Hinton agar plates. Bacteria are spread on to the plate using a sterilized L- shaped rod, while being rotated 15 times clockwise on a platform, to ensure equal distribution of the inoculum [12]. Sterile Whatman 6 mm antibiotic assay discs will be impregnated with 5,25,50,100,250 µL of the lyophilized plant extracts dissolving in dimethyl sulfoxide (DMSO) at a concentration of 0.5 mg/ µL [11]. The solvent to prepare extract solutions is DMSO. DMSO served as the negative control due to DMSOs inability to inhibit bacterial growth. The following antibiotic discs are used as the antibiotic positive controls for the following bacteria: E. coli, P. aeruginosa, B. Subtilis, S. aureus 10 µg of Ciprofloxacin (Carolina Biological). After completing the disc diffusion assay, plates should be incubated at 37°C for 18-20 hours. After incubation, presence of a zone of inhibition (ZOI) and the diameter of the ZOI (largest and smallest) are measured in millimeters using a Vernier caliper [13-32]. The test was replicated three times and each replicate with three trials for the determination of antibacterial activity.

3. RESULTS

Phytochemical Investigations

The phytochemical analysis is very much important to evaluate the possible medicinal utilities of a plant and also to determine the active principles responsible for the known biological activities exhibited by the plants. Hence, two or more different tests should be performed for more accurate results represented in the Table 1.

Table 1: Phytochemical investigation of both plant extracts

Plant Name	***Lagerstroemia Speciosa***			***Dalbergia Oliveri***		
Extract	**Pet.ether**	**Ethyl acetate**	**Ethanol**	**Pet.ether**	**Ethyl acetate**	**Ethanol**
Alkaloid	-	+	+	-	+	+
Flavonoid	-	+	+	-	+	+
Phenolic	-	+	+	-	+	+
Carbohydrates	+	+	+	+	+	+
Glycoside	-	+	+	-	+	+
Protein and amino acids	-	+	+	-	+	+
Tannin	+	+	+	+	+	+
Terpenoid	+	+	+	+	+	+
Steroid	+	+	+	+	+	+
Saponin	+	+	+	+	+	+

Anti-Bacterial Activity

The study indicates that Dalbergia Oliveria and *Lagerstroemia speciosa* extracts exhibit significant antimicrobial activity against both Gram-positive (*S. aureus and B. subtilis*) and Gram-negative (*E. coli and P. aeruginosa*) bacteria. The extracts were tested at concentrations ranging from 5 to 250 µg/ml, with their antibacterial effect increasing as the concentration dose in Table 2.

Table 2: Comparative anti-Bacterial Activity of *Lagerstroemia Speciosa* and *Dalbergia Oliveri*

Anti-Bacterial Activity											
MICROORGANISMS	**Extract**	***Lagerstroemia Speciosa***					***Dalbergia Oliveri***				
	Concentration in (µg/ml)	**5**	**25**	**50**	**100**	**250**	**5**	**25**	**50**	**100**	**250**
E. coli	Pet.ether	0	2	5	5	5	0	0	2	5	10
	Ethyl acetate	0	7	7	10	12	0	0	5	8	12
	Ethanol	0	6	8	12	14	0	6	9	12	13
P. aeruginosa	Pet.ether	0	1	4	4	4	0	0	3	5	11
	Ethyl acetate	0	5	6	8	11	0	2	6	8	12
	Ethanol	0	5	9	12	15	0	7	8	12	12
B. subtilis	Pet.ether	0	1	1	2	2	0	0	2	6	10
	Ethyl acetate	0	6	6	7	9	0	0	6	9	11
	Ethanol	0	5	5	7	9	0	6	9	13	12
S. aureus	Pet.ether	0	0	1	2	2	0	0	2	5	10
	Ethyl acetate	0	5	5	7	7	0	2	6	8	12
	Ethanol	0	5	6	8	8	0	6	9	12	12

Comparative Studies for Antibacterial Activity

The comparative results of treatments for antimicrobial activity are presented in Figure 1 and 2. According to our agar diffusion tests, the ethanolic extracts of *Dalbergia Oliveria* and *Lagerstroemia speciosa* showed antimicrobial activity at all applied levels against the chosen microorganisms and their antimicrobial activity increased significantly at 4 mg/disc. The antimicrobial activity of the *Dalbergia Oliveria* and *Lagerstroemia speciosa* against four microorganisms *Staphylococcus aureus* and *Bacillus subtilis* a Gram-positive bacteria, *Pseudomonas aeruginosa* and *Escherichia coli* a Gram-negative bacteria. Over all plant extracts of *Dalbergia Oliveria* marginally potent antibacterial activity comparatively with plant extracts of *Lagerstroemia speciosa*.

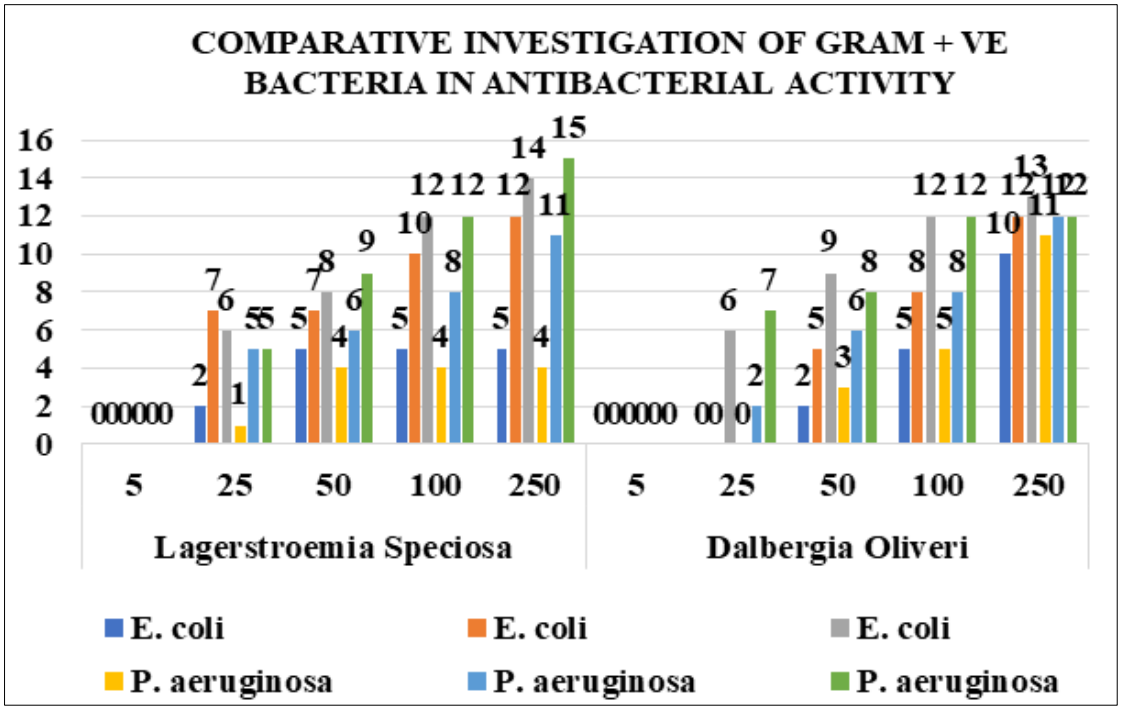

Figure 1: Comparative investigation of Gram-negative bacteria in Anti-Bacterial Activity

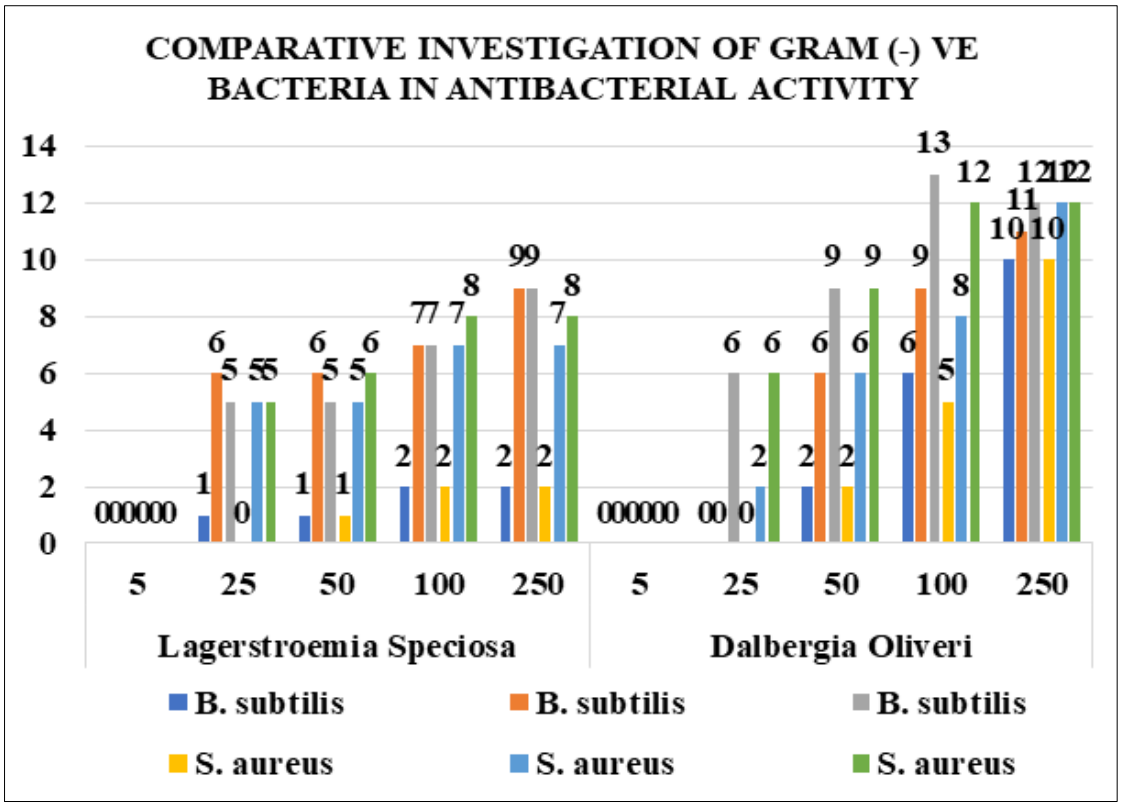

Figure 2: Comparative investigation of Gram-positive bacteria in Anti-Bacterial Activity

4. DISCUSSION

This study presents a comparative phytochemical analysis and evaluation of the in vitro antibacterial activity of extracts from two medicinal plants: *Dalbergia oliveri* and *Lagerstroemia speciosa*. Qualitative phytochemical screening revealed the presence of bioactive compounds such as alkaloids, flavonoids, tannins, saponins, terpenoids, and phenols in varying concentrations across different solvent extracts. The antimicrobial potential was assessed against selected bacterial strains (*Escherichia coli*, *Staphylococcus aureus*, *Pseudomonas aeruginosa*) and fungal species (*Candida albicans*, *Aspergillus niger*), using standard disc diffusion methods. Both plant extracts exhibited significant antimicrobial activity, with *Dalbergia oliveri* showing stronger inhibition zones, particularly in ethanol extracts. Overall, the findings suggest that both *Dalbergia* oliveri and *Lagerstroemia speciosa* are rich in bioactive compounds with promising antimicrobial, highlighting their potential use in natural drug development.

5. CONCLUSION

The comparative analysis of *Dalbergia oliveri* and *Lagerstroemia speciosa* extracts confirms the presence of various phytochemicals, including flavonoids, alkaloids, tannins, and saponins, which are likely responsible for the observed biological activities. Both plant species exhibited notable antibacterial effects, with *Dalbergia oliveri* showing slightly higher efficacy in antimicrobial assays. These findings suggest that both plants possess significant pharmacological potential and could serve as sources of natural bioactive compounds for the development of antimicrobial agents. Further studies, including isolation of individual compounds and *in vivo* evaluations, are recommended to better understand their mechanisms of action and therapeutic applications.

6. Acknowledgement

I express my sincere gratitude to Almighty God for giving me the strength to complete this research. My heartfelt thanks go to my Supervisor, Prof. (Dr.) Vivek Gupta, and the respected authorities of P.K. University for their guidance, support, and facilities.

I am grateful to all faculty members, staff, and librarians whose assistance contributed to my work. My deep appreciation extends to external mentors and collaborators for their valuable cooperation. Above all, I thank my parents, family, wife, and children for their constant love, encouragement, and support.

REFERENCES

1. WHO, (1998). Regulatory situation of herbal medicines. A worldwide review. Pp 1-5. Geneva, Switzerland.
2. Fakim, A.G. (2006) Medicinal plants: Traditions of yesterday and drugs of tomorrow. Molecular aspects of medicine 27: 1-93.
3. Harrison, P. (1998). Herbal medicine takes roots in Germany. Canadian Medical Association Journal10: 637-639.

4. Jones, W.B. (1998) Alternative medicine-learning from the past examining the present advancing to the future. Journal of American Medical Association 280: 1616-1618.
5. Hamburger, M. and Hostettmann, K. (1991). Bioactivity in plants: the link between phytochemistry and medicine. Phytochemistry 30: 3864- 3874.
6. Singh, P. and Singh, C. L. (1981). Chemical investigations of Clerodendraon fragrans. Journal of Indian Chemical Society 58: 626-627.
7. Rastogi, P. R. and Meharotra, B. N. (1990). In Compendium of Indian Medicinal Plants. Vol. I, 339; a) (1993) III: 194. PID, CSIR, New Delhi, India.
8. Philipson, M. N. (1990). A symptomless endophyte of ryegrass (Lolium perenne) that spores on its host a light microscope study. New Zealand Journal of Botany 27: 513–519.
9. Galbley, S. and Thiericke, R. (1999). Drug Discovery from Nature, Series: Springer Desktop Editions in Chemistry, Springer, Berlin.
10. Cragg, G.M., Newman, D. J. and Snader, K. M. (1997). Natural products in drug discovery and development. Journal of Natural Products 60: 52-60.
11. Abdallah E.M. Plants: An alternative source for antimicrobials. J. Appl. Pharm. Sci. 2011; 1:16–20. [Google Scholar]
12. Thomson W.A.R., Schultes R.E. Medicines from the Earth. McGraw-Hill; New York, NY, USA:1978. [Google Scholar]
13. Goodman L.S., Gilman A. The Pharmacological Basis of Therapeutics: A Textbook of Pharmacology, Toxicology and Therapeutics for Physicians and Medical Students. Macmillan; New York, NY, USA: 1943. [Google Scholar]
14. Ventola C.L. The antibiotic resistance crisis: Part 1: Causes and threats. Pharm. Ther. 2015; 40:277. [PMC free article] [PubMed] [Google Scholar]
15. Schcolnik-Cabrera A. Current Approaches to Overcome Antimicrobial Resistance. Curr. Med. Chem. 2023; 30:3–4. doi: 10.2174/0929867330012211041215 52. [DOI] [PubMed] [Google Scholar]
16. Khwaif J., Hayyawi A., Yousif T. Cholera outbreak in Baghdad in 2007: An epidemiological study. EMHJ-East. Mediterr. Health J. 2010; 16:584–589. doi: 10.26719/2010.16.6.584. [DOI][PubMed] [Google Scholar]
17. Murray C.J., Ikuta K.S., Sharara F., Swetschinski L., Aguilar G.R., Gray A., Han C., Bisignano C. Rao P., Wool E. Global burden of bacterial antimicrobial resistance in 2019: A systematic analysis. Lancet. 2022; 399:629–655. doi: 10.1016/S0140-6736(21)02724 0. [DOI] [PMC free article] [PubMed] [Google Scholar]
18. WHO Global Priority List of Antibiotic-Resistant Bacteria to Guide Research, Discovery, and Development of New Antibiotics. 27 February 2017. [(accessed on 20 February 2022)];2020 Available online: http://www.who.int/medicines/publications/WHO-PPL Short_Summary_25Feb-ET_NM_WHO.pdf.
19. Rosenblatt-Farrell N. The Landscape of Antibiotic Resistance. National Institute of Environmental Health Sciences; Durham, NC, USA: 2009. [DOI] [PMC free article] [PubMed] [Google Scholar]
20. Dantas G., Sommer M.O. How to fight back against antibiotic resistance. Am. Sci.2014; 102:42–51. doi: 10.1511/2014.106.42. [DOI] [Google Scholar] (at the golden era)
21. Santos Filho, D.; Sarti, S.J.; Bastos, J.K.; Leitão Filho, H.F.; Machado, J.O.; Araujo, M.L.C.; Lopes, W.D.; Abreu, J.E. Atividade antibacteriana de extratos vegetais. Rev. Cien. Farm. 12, 39-46, 1990.
22. Saxena, G.; McCutcheon, A.R.; Farmer, S.; Towers, G.H.N.; Hancock, R.E.W. Antimicrobial constituents of Rhus glabra J. Ethno pharmacol 42, 95-99, 1994.
23. R.V. Fleming et al. Emerging and less common fungal pathogens Infectious Disease Clinics of North America (2002)
24. Pramono, E. 2002. The Commercial Use of Traditional Knowledge and Medicinal Plants in Indonesia. Scientific Paper on Multi-Stakeholder Dialoque on Trade, Intellectual Property and Biological Resources in Asia, BRAC Centre for Development Management, Rajendrapur, Bangladesh, April 19-21. 13 pp.
25. Ficker, C.E., J.T. Arnason, V.S. Vindas, L.P. Alvarez, K. Akpagana, M. Gbéasor, C.D. Souza, M.L. Smith. 2003. Inhibition of Human Pathogenic Fungi by Ethnobotanically Selected Plants Extracts. Mycoses, 46: 29-37.
26. Kumar A, Valecha N, Jain T, Aditya P. Dash burden of malaria in India: retrospective and prospective view. Am J Trop Med Hyg. 2007;77 :69–78. [PubMed] [Google Scholar]
27. Senthilkumar N, Varma P, Gurusubramanian G. Larvicidal and adulticidal activities of some medicinal plants against the malarial vector, Anopheles stephensi Liston. Parasitol Res. 2009; 1042:237–44. doi: 10.1007/s00436-008-1180-4. [DOI] [PubMed] [Google Scholar]
28. Jaswanth A, Ramanathan P, Ruckmani K. Evaluation of mosquitocidal activity of Annona squamosa leaves against filarial vector mosquito, Culex quinquefasciatus Say. Indian J Exp Biol. 2002; 403:363–5. [PubMed] [Google Scholar]
29. An account of Dalbergia (Leguminosae-Papilionoideae) in Thailand Publication Thai For. Bull. (Bot.) 30 124-166 2002 Author Chawalit Niyomdham Year2002ISBN
30. Hargreaves, Dorothy; Hargreaves, Bob (1970). Tropical Trees of the Pacific. Kailua, Hawaii: Hargreaves. p.16.
31. Himesh Soni etal. Antimicrobial and Anti-inflammatory Activity of the Hydrogels Containing

Rutin Delivery. Asian Journal of Chemistry; 25(15), (2013), 8371-8373.
32. Himesh Soni etal. Synthesis, characterization and evaluation for antifungal activity of substituted diaryl imidazo [2, 1, b]-benzothiazole. Journal of Pharmacy Research (Science Direct) Volume 7, Issue 1, January 2013, Pages 39–46.

Cite This Article: Suresh Kannan V, Vivek Gupta, Rajesh Sharma, Amain Fatma (2026). Comparative *In vitro* Anti-Bacterial Activity on Various Extracts of *Dalbergia oliveri* and *Lagerstroemia speciosa* Leaves. *EAS J Pharm Pharmacol, 8*(1), 12-17.