

Review Article

Therapeutic Relevance of *Sterculia urens*: Phytochemical Insights and Pharmacological Evidence- A Review

Ashish Sambhaji Uzgare^{1*} 

¹Dept. of Chemistry, Faculty of Science, Wilson College (Autonomous), Mumbai-400007, Maharashtra, India

*Corresponding Author: 

Received: 13/Jan/2026; Accepted: 06/Feb/2026; Published: 28/Feb/2026. | DOI: <https://doi.org/10.26438/ijrsbs.v13i1.752>

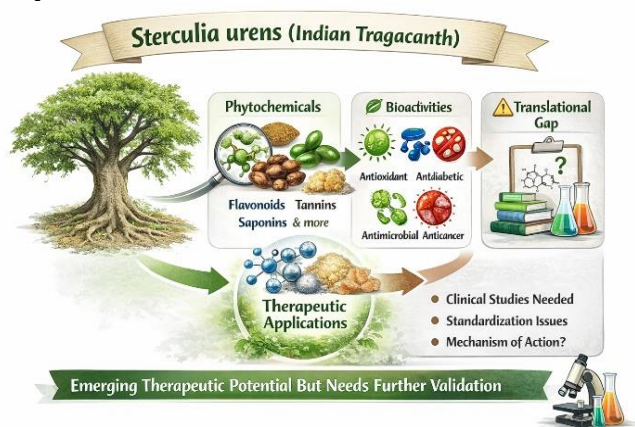


Copyright © 2026 by author(s). This is an Open Access article distributed under the terms of the [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/) which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited & its authors credited.

Abstract—*Sterculia urens* (Malvaceae), commonly known as Karaya or Indian Tragacanth, is an important ethnomedicinal tree extensively used in traditional healthcare practices throughout India. Different parts of the plant, including the bark, roots, leaves, seeds, and gum exudates, have long been utilized for managing wounds, infections, inflammation, constipation, oligospermia, and various metabolic disorders. The present review comprehensively compiles and critically analyzes available literature on the phytochemical constituents, biological activities, and therapeutic potential of *Sterculia urens*. A systematic literature search was performed using major scientific databases such as Google Scholar, ScienceDirect, and PubMed, covering both experimental and non-experimental studies published up to 2026. Phytochemical investigations indicate that the plant is rich in diverse bioactive compounds, including flavonoids, phenolics, tannins, alkaloids, saponins, terpenoids, and proteins, which contribute to its wide range of pharmacological properties. Experimental evidence from in vitro and in vivo studies demonstrates notable antioxidant, antidiabetic, antimicrobial, antipyretic, and anticancer activities. In addition to its conventional medicinal value, recent advancements such as eco-friendly synthesis of silver nanoparticles and development of colon-specific drug delivery systems based on *Sterculia urens* gum highlight its growing relevance in modern pharmaceutical research. Despite these promising findings, challenges remain, including insufficient clinical validation, lack of standardized formulations, and limited understanding of underlying molecular mechanisms. Overall, *Sterculia urens* emerges as a valuable natural resource with significant potential for drug discovery and therapeutic applications, warranting further clinical, mechanistic, and formulation-based investigations.

Keywords— *Sterculia urens*, Antioxidant, Antidiabetic, Antimicrobial, Anti Anticancer, Medicinal plants, Bioactives

Graphical Abstract-



Source to science: *Sterculia urens* (Indian tragacanth) is highlighted as a medicinal plant rich in key phytochemicals such as flavonoids, tannins, and saponins, forming the biochemical basis of its therapeutic value.

Biological relevance: These phytochemicals are associated with multiple bioactivities, including antioxidant, antidiabetic, antimicrobial, and anticancer effects, indicating broad pharmacological potential.

Future direction: Despite promising therapeutic applications, significant translational gaps remain, particularly the need for clinical validation, standardization, and clear mechanistic understanding before clinical use.

1. Introduction

Sterculia urens Roxb., belonging to the family *Malvaceae*, is widely known as Karaya or Kaday. The species is known by various vernacular names, including Kadayo/Kogdol (Gujarati), Pandruk (Konkani), and Kulu/Katira (Hindi). In English, it is referred to as Indian Tragacanth [1]. *Sterculia urens* Roxb. is a medium-sized deciduous tree, reaching about 15 m in height, with a short, crooked trunk and broad, spreading branches. The bark is smooth, greyish-white to reddish and papery, while the large palmately 3–5-lobed leaves

(20–30 cm) are long-petioled, clustered at branch tips, glabrous above and tomentose beneath [2]. *Sterculia urens* Roxb. is an economically important medicinal tree with extensive applications in pharmaceutical and industrial sectors. Its gum exudate is highly valued and is traditionally used by tribal populations to treat ailments including oligospermia, leucorrhoea, constipation, swelling, throat infections, and wounds [3]. Bark, root, seed, and leaf of *Sterculia urens* are also extensively used in traditional medicine. The bark is widely employed to treat wounds, throat infections, labor pain, menstrual disorders, oligospermia, rheumatoid arthritis, uterine cleansing, and cracked feet, while root formulations are used to reduce body swelling. Seeds and leaves, alone or in combination with gum and bark, are applied for wound healing, infections, fractures, and skin [4-6].

1.1 Objective of the study:

This review aims to summarize current studies on *Sterculia urens* as a natural source of antioxidant, antidiabetic, anticancer, and antimicrobial compounds, focusing on its phytochemistry, biological activities, and therapeutic potential.

1.2 Organization:

This review article is organized into sections as follows: Section 1 contains Introduction of the study. 1.1 and 1.2 contain objective and organization of study respectively, Section 2 contains literature review, section 3 is material and methods related to the current study with section 3.1 to 3.2. Section 4 results and discussion, while section 5 is conclusion and future scope and section 6 is references.

2. Literature Review

2.1 Antioxidant Potential and Phytochemical Composition of *Sterculia urens*

Phytochemicals of plant origin are recognized for their anti-inflammatory properties, and studies demonstrate that both crude extracts and purified compounds from medicinal plants can effectively control inflammatory responses [7]. *Sterculia urens* Roxb. root extract is rich in phenolics and secondary metabolites, including flavonoids, tannins, and alkaloids. Fourier Transform Infrared (FT-IR) spectroscopy confirmed diverse functional groups, and the extract showed strong antioxidant activity ($IC_{50} = 27.06 \mu\text{g/mL}$, 2,2-diphenyl-1-picrylhydrazyl [DPPH] assay), highlighting its potential as a natural source of bioactive compounds for therapeutic use [8]. The bark of *Sterculia urens* Roxb., traditionally used for diarrhea and constipation, was extracted via Soxhlet using aqueous, ethanol, and methanol solvents. Phytochemical analysis revealed tannins, saponins, phenolics, and reducing sugars in the aqueous extract, supporting its ethnomedicinal use, while ethanol and methanol extracts showed additional bioactive compounds with pharmacological potential [9]. Leaf extracts of *Sterculia urens* Roxb. showed antifungal activity against six pathogenic fungi, with chloroform extract most effective (*Colletotrichum oxysporum*, $87.96 \pm 1.85\%$), comparable to Amphotericin-B. Phytochemical analysis confirmed alkaloids, phenols, flavonoids, saponins, tannins, and terpenoids, highlighting the plant's potential as an eco-friendly source of antifungal agents [10]. In *Sterculia urens*,

regenerating calli showed increased antioxidant enzyme activities and protein content, while non-regenerating calli had higher phenols and flavonoids. Six peroxidase isoenzymes and SDS-PAGE profiles indicated proteins' role in shoot regeneration, optimized on MS medium with 0.5 mg/L BAP + 2–4 mg/L NAA [11]. *Sterculia urens* root extract contains proteins, sugars, starch, amino acids, phenolics, and tannins, supporting its traditional medicinal use and warranting further bioactive compound characterization [12]. Phytochemicals in *Sterculia urens* Roxb., traditionally used by the Gondu tribes of Telangana for treating dog bites. Leaf, bark, and root extracts were prepared using water, acetone, petroleum ether, chloroform, and ethanol. Bark showed the highest number of phytochemicals, particularly in methanolic and acetone extracts, followed by leaves and roots, suggesting the plant's potential for developing therapeutic agents and further pharmaceutical research [13]. *Sterculia urens* seeds are rich in protein (30.88%) and lipids (39.2%). The defatted cotyledon flour is dominated by glutamic acid, arginine, and aspartic acid, with cysteine, methionine, tyrosine, and histidine in smaller amounts; the essential-to-nonessential amino acid ratio is 0.45, and isoleucine exceeds FAO/WHO recommendations. Major fatty acids include stearic (31.72%), linoleic (28.83%), and palmitic (26.79%) acids, with minor eicosadienoic (4.98%) and eicosatrienoic acids (2.96%) [14]. *Sterculia urens* Roxb. bark contains alkaloids, flavonoids, tannins, saponins, phenolics, and triterpenoids, with major compounds including gallic acid, quercetin, rutin, and β -sitosterol. The methanolic extract exhibited significant dose-dependent antipyretic activity in rats, supporting its traditional use as a natural fever remedy [15].

2.2 Antidiabetic Potential of *Sterculia urens*

The worldwide prevalence of diabetes mellitus is rising, contributing to severe health risks and increased mortality. Poor glycemic control can cause serious complications, and although standard antidiabetic drugs are effective, their side effects make medicinal plants an attractive alternative with potentially fewer adverse effects [16]. *Sterculia urens* Roxb., commonly known as Indian tragacanth or Karaya gum, is a tree native to India with recognized medicinal value in Ayurveda and Unani. While traditionally used for its mucilaginous, anti-inflammatory, and wound-healing properties, extracts from its seeds have demonstrated hypoglycaemic effects, particularly in southern India, indicating potential antidiabetic activity. These findings highlight *Sterculia urens* as a promising natural resource for diabetes management, warranting further pharmacological investigation [17]. Methanolic root extract of *Sterculia urens* Roxb. exhibited strong α -amylase inhibitory activity ($IC_{50} = 127.73 \mu\text{g/mL}$) and antioxidant potential (DPPH $IC_{50} = 26.74 \mu\text{g/mL}$). Preparative HPLC and spectroscopy identified two alkaloids (Sterculinine I & II) and three flavonoids (Gossypetin, Apigenin, 6-Hydroxyluteolin), reported for the first time, which may underlie its antidiabetic effects [18].

2.3 *Sterculia urens* as a Natural Source of Antimicrobial Agents

Pathogens including bacteria, fungi, protozoa, viruses, worms, and prions cause infectious diseases, with drug-resistant strains

posing a greater societal threat [19]. The growing incidence of infectious diseases and the emergence of antimicrobial resistance have significantly undermined the efficacy of conventional antibiotics. In response, natural bioactive compounds, have gained attention as promising alternatives for novel drug discovery [20,21].

Plant-derived compounds with strong antimicrobial properties are increasingly studied as potential therapies against bacterial, fungal, viral, and parasitic infections. Plant extracts remain valuable sources for developing effective antimicrobial agents [22]. *Sterculia urens* gums, including karaya and chicha, are branched heteropolysaccharides whose properties can be enhanced via chemical modification. In this study, modification with maleic anhydride increased antimicrobial activity, confirmed by FTIR, X-ray diffraction, thermogravimetric, and elemental analyses. The derivatives effectively inhibited *Staphylococcus aureus* growth (~100%) and showed minimal mammalian cytotoxicity, indicating potential for biomedical applications against bacterial infections [23].

Sterculia urens powder extracts obtained with different solvents and methods showed significant antioxidant and antimicrobial activities. Phytochemical screening revealed steroids, terpenoids, flavonoids, phenols, glycosides, coumarins, and saponins, with hot ethanol extracts exhibiting the highest antioxidant activity (DPPH, FRAP, ABTS), while ethyl acetate extracts were most effective against *Streptococcus pyogenes*, *Escherichia coli*, and *Bacillus subtilis*. These findings highlight *Sterculia urens* as a promising source of natural antioxidants and antimicrobial agents for pharmaceutical and food applications [24].

Aqueous leaf extract of *Sterculia urens* Roxb. was used for eco-friendly, cost-effective biosynthesis of silver nanoparticles (AgNPs). Characterization via UV-Vis, FTIR, zeta potential, EDX, and SEM confirmed stable, well-dispersed nanoparticles (40–60 nm) mediated by plant metabolites. The AgNPs exhibited significant antimicrobial activity, highlighting the potential of *S. urens* in biogenic nanoparticle synthesis and microbial control [25]. Gum karaya (*Sterculia urens*) and chitosan were tested for antimicrobial activity against bacteria and yeasts. Both 1% GK and 0.5–1% chitosan inhibited most pathogens, with the GK–chitosan combination showing enhanced effects, especially against Gram-positive bacteria. Limited bactericidal activity was observed, mainly in *Candida* spp., indicating further work is needed for Gram-negative strains [26]. Cholera, caused by *Vibrio cholerae*, poses a major threat in densely populated regions due to rising antimicrobial resistance. Phytocompounds from *Sterculia urens* Roxb. were screened against the virulence regulator ToxT, identifying three leads 4,4,5,8-Tetramethylchroman-2-ol, Beta-Bisabolol, and Ledol with favorable ADMET profiles. Molecular dynamics and MM/GBSA analyses highlighted Beta-Bisabolol as the most promising candidate, suggesting *S. urens* as a potential source for novel anticholera agents [27].

2.4 Anticancer Bioactive Phytochemicals from *Sterculia urens*

Cancer is a major global health concern affecting all populations. Medicinal plants are promising for cancer prevention and treatment due to their anticancer properties and ability to inhibit tumor growth [28]. The methanolic extract and solvent fractions of *Sterculia* species bark exhibited notable cytotoxic, anticancer, and immunomodulatory activities. Phytochemical analysis revealed alkaloids, flavonoids, saponins, and glycosides. Among fractions, n-hexane showed the highest cytotoxicity (LD₅₀: 7.0 µg/mL), while dichloromethane and ethyl acetate fractions demonstrated strong anticancer (IC₅₀: 5.9–9.5 µg/mL) and immunomodulatory effects (IC₅₀: 21.0–25.3 µg/mL), indicating the presence of bioactive anticancer and immune-enhancing compounds [29]. In study modification of *sterculia gum* to create a novel colon-specific drug delivery system (CDDS) for colon cancer (CC) treatment. *Sterculia*–acrylic acid (AA) hydrogels were synthesized and characterized using Fourier Transform Infrared Spectroscopy (FTIR), Scanning Electron Microscopy (SEM), Thermogravimetric Analysis (TGA), and swelling studies. The effects of monomer, initiator, *sterculia gum*, and crosslinker concentrations, as well as the swelling medium, on hydrogel swelling were investigated. Swelling kinetics and in vitro release of the anticancer drug methotrexate (MTX) were analyzed to determine the mechanisms of swelling and drug release. Diffusion exponent values of 0.883, 0.910, and 0.787 in distilled water, pH 2.2 buffer and pH 7.4 buffer, respectively, indicated a non-Fickian diffusion release mechanism [30].

3. Materials and Methods

3.1 Literature review strategy

The information for this review was gathered from multiple sources, including Google Scholar, ScienceDirect, and PubMed. Both meta-analyses and systematic reviews were considered, as they provide evidence-based recommendations. The search focused on both experimental and non-experimental studies published between 2002–2026.

3.2 Data extraction

The studies identified through the search engines were initially screened for relevance. Selected studies were imported into Microsoft Excel and categorized based on their abstract, objectives, and conclusions. This process allowed for systematic organization and comparison of findings, ensuring that only the most pertinent and high-quality studies were included in the review.

4. Results and Discussion

4.1 Results

4.1.1 Pharmacological Activities of *Sterculia urens*

Figure 1 shows Pharmacological Activities of *Sterculia urens*.

Figure 1. Pharmacological Activities of *Sterculia urens*Table 1. Summary of Pharmacological Activities of *Sterculia urens*

Activity	Bioactive Compounds	Pharmacological Effects	References
Antioxidant	Phenolics, flavonoids, tannins, alkaloids.	Strong antioxidant activity; $IC_{50} = 27.06 \mu\text{g/mL}$ (DPPH); supports traditional medicinal use.	[8-14]
Antipyretic	Alkaloids, flavonoids, tannins, saponins, triterpenoids; bark methanolic extract.	Dose-dependent antipyretic activity in rats; supports traditional fever remedy.	[15]
Antidiabetic	Flavonoids, alkaloids (Sterculinine I & II), seed extracts.	(Sterculinine I & II), seed extracts α -amylase inhibition ($IC_{50} = 127.73 \mu\text{g/mL}$); lowers blood glucose; antioxidant support.	[17,18]
Antimicrobial	Flavonoids, tannins, saponins, glycosides; gums (karaya, chicha);	Inhibits bacteria and fungi; enhanced effect with gum-chitosan; potential antimicrobial agent.	[23-27]

Anticancer	silver nanoparticle s. Alkaloids, flavonoids, saponins, glycosides; bark & leaf extracts; n-hexane fraction.	Cytotoxicity ($LD_{50} = 7 \mu\text{g/mL}$); inhibits cancer cell proliferation; immunomodulatory activity.	[28-30]
------------	--	---	---------

Table 1 indicates the major pharmacological activities of *Sterculia urens*, highlighting the key bioactive compounds responsible and their observed therapeutic effects. The table summarizes antioxidant, antidiabetic, antimicrobial, and anticancer activities.

3.6 Therapeutic Insights: Advantages and Limitations of *Sterculia urens* Bioactivities

Table 2. Advantages and Limitations of Pharmacological Activities of *Sterculia urens*

Activity	Advantage	Limitation	References
Antioxidant	Natural source of antioxidants; reduces oxidative stress; potential for therapeutic and nutraceutical use.	Activity may vary with extraction method and solvent; in vivo efficacy not fully validated.	[8,14]
Antipyretic	Effective natural alternative to synthetic antipyretics; minimal reported side effects in traditional use.	Limited clinical studies; precise dosing and toxicity in humans unclear.	[15]
Antidiabetic	Potential natural antidiabetic agent; multi-targeted effects (enzyme inhibition + antioxidant).	Most studies in vitro or in animal models; human trials lacking; variability in bioactive content.	[17,18]
Antimicrobial	Broad-spectrum antimicrobial activity; can be enhanced via chemical modification; eco-friendly nanoparticle synthesis.	Limited efficacy against Gram-negative bacteria; in vivo efficacy and safety data limited.	[23-27]
Anticancer	Potential natural anticancer agent; bioactive compounds show multiple mechanisms	Mostly in vitro studies; clinical efficacy and safety unknown; standardization	[28-30]

	(cytotoxic + immunomodulatory).	n of extracts needed.	
--	---------------------------------	-----------------------	--

Table 2 summarizes the major pharmacological activities of *Sterculia urens*, highlighting their therapeutic advantages and associated limitations.

4.2 Discussion

Sterculia urens has emerged as a medicinally important plant exhibiting a wide range of pharmacological activities, including antioxidant, antipyretic, antidiabetic, antimicrobial, and anticancer effects. These biological activities are largely attributed to its rich phytochemical composition, particularly phenolics, flavonoids, alkaloids, tannins. Phenolic compounds and flavonoids appear to play a dominant role in reducing oxidative stress, which is implicated in the pathogenesis of numerous chronic disorders. However, antioxidant efficacy varies depending on the extraction method and solvent used, and most studies remain limited to in vitro evaluations, highlighting the need for in vivo validation and standardized extraction protocols [8–14]. *Sterculia urens* also demonstrates considerable antimicrobial potential against a range of bacterial and fungal pathogens. Extracts, chemically modified gums, and plant-mediated silver nanoparticles have shown enhanced antimicrobial efficacy, indicating its promise as a source of alternative antimicrobial agents. Synergistic effects observed with gum–chitosan combinations further support its applicability in biomedical formulations. However, reduced activity against Gram-negative bacteria and limited in vivo safety data highlight critical gaps that must be addressed before therapeutic use [23–27]. Overall, the pharmacological evidence supports *Sterculia urens* as a promising natural source of bioactive compounds with multi-target therapeutic potential. However, future research should focus on standardization of extracts, detailed mechanistic studies, in vivo validation, and well-designed clinical trials to fully establish its safety, efficacy, and clinical relevance [29,30].

5. Conclusion and Future Scope

Sterculia urens, commonly known as Karaya or Indian Tragacanth, is a medium-sized deciduous tree with significant ethnopharmacological and industrial importance. Its leaves, bark, roots, seeds, and gums are rich in bioactive compounds such as flavonoids, phenolics, tannins, alkaloids, saponins, and proteins, which underlie its diverse pharmacological activities, including antioxidant, antidiabetic, antimicrobial, antipyretic, and anticancer effects. Traditional uses for wound healing, infections, oligospermia, constipation, and inflammation are supported by modern experimental evidence. Additionally, innovative applications such as biogenic silver nanoparticle synthesis and colon-targeted drug delivery highlight its potential for pharmaceutical development. While the current studies provide promising insights, clinical validation, standardization, and mechanistic understanding remain limited, restricting its translation into therapeutic products.

Future research on *Sterculia urens* should focus on clinical trials to confirm safety, efficacy, and dosage in humans,

particularly for antidiabetic, antimicrobial, and anticancer applications. Isolation and characterization of novel bioactive compounds, such as Sterculinine I & II, may lead to the development of new multi-targeted drugs. Standardization of extracts and development of advanced formulations, including hydrogels and nanoparticles, could improve therapeutic efficacy and targeted delivery. Additionally, sustainable cultivation, conservation strategies, and eco-friendly applications, such as antioxidant and antimicrobial agents, are essential to support its industrial and medicinal utilization. Systematic integration of traditional knowledge with modern pharmacology and biotechnology will be key to unlocking the full potential of *Sterculia urens* as a natural therapeutic and industrial resource.

Acknowledgements- The authors would like to acknowledge the valuable contributions of fellow researchers, whose work is cited in the references section, for their insightful publications that have stimulated and enriched this review paper. The tables and figures are made by the authors themselves and are not copied from any sources.

Funding Source- No particular grant from a governmental, private, or nonprofit funding organisation was obtained for this study.

Authors' Contributions- Manuscript written by Ashish Uzgar.

Conflict of Interest - Authors declare no competing or conflict of interest.

Data Availability- None

References

- [1] K. Rathod *et al.*, “*Sterculia urens*: Traditionally important medicinal tree,” *J. Med. Plants Stud.*, vol. 10, no. 1, pp. 23–26, 2022.
- [2] N. R. Galla and G. R. Dubasi, “Chemical and functional characterization of gum karaya (*Sterculia urens* L.) seed meal,” *Food Hydrocolloids*, vol. 24, no. 5, pp. 479–485, 2010.
- [3] M. Dhiman, A. Singh, and M. M. Sharma, “A review on *Sterculia urens* Roxb.: A boon to the livelihood for tribal people and industry,” *Ind. Crops Prod.*, vol. 130, pp. 341–351, 2019.
- [4] S. D. Jagtap, S. S. Deokule, and S. V. Bhosle, “Some unique ethnomedicinal uses of plants used by the Korku tribe of Amravati district of Maharashtra, India,” *J. Ethnopharmacol.*, vol. 107, pp. 463–469, 2006.
- [5] S. B. Padal and Y. Vijayakumar, “Traditional knowledge of Srikakulam District, Andhra Pradesh, India,” *Int. J. Innov. Res. Dev.*, vol. 2, pp. 1310–1319, 2013.
- [6] M. K. Seth, “Trees and their economic importance,” *Bot. Rev.*, vol. 69, pp. 321–376, 2003.
- [7] F. M. R. Shaikh and A. Uzgar, “From pathogens to probiotics: The antimicrobial spectrum of lectins – A review,” *Int. J. Sci. Res. Biol. Sci.*, vol. 12, no. 6, pp. 40–47, 2025.
- [8] A. Shukla, K. Desai, and N. Modi, “In vitro antioxidant and antimicrobial potential of *Sterculia urens* Roxb. root extract and its bioactive phytoconstituents evaluation,” *Future J. Pharm. Sci.*, vol. 6, p. 45, 2020.
- [9] S. S. Mety, M. Dagawal, and S. Thakur, “Qualitative phytochemical analysis of bark of *Sterculia urens*,” *Biol. Arch.*, vol. 1, pp. 11–20, 2024.

- [10] T. Kanoje, K. Sharma, and J. N. Verma, "Qualitative phytochemical screening and in vitro antifungal activity of *Sterculia urens* Roxb. leaf extracts from Narayanpur, Bastar, Chhattisgarh," *Int. J. Creative Res. Thoughts*, vol. 9, no. 7, 2021.
- [11] P. S. Devi, B. Satyanarayana, A. Arundhati, and T. R. Raghava Rao, "Activity of antioxidant enzymes and secondary metabolites during in vitro regeneration of *Sterculia urens*," *Biol. Plant.*, vol. 57, pp. 778–782, 2013.
- [12] P. S. Devi and B. Satyanarayana, "Analysis of primary and secondary metabolites in root extract of *Sterculia urens* Roxb., a traditionally important medicinal tree," *Int. J. Acad. Res.*, vol. 9, no. 11, 2022.
- [13] N. Rathnavath and K. Palakurthy, "Phytochemical screening from plant extracts of medicinal plant *Sterculia urens* Roxb.," *Int. J. Food Nutr. Sci.*, vol. 12, no. 1, 2023.
- [14] N. R. Galla, P. R. Pamidighantam, and S. Akula, "Chemical, amino acid and fatty acid composition of *Sterculia urens* L. seed," *Food Hydrocolloids*, vol. 28, no. 2, pp. 320–324, 2012.
- [15] P. Arya and H. K. Khanuja, "Study of phytochemicals and antipyretic activity of *Sterculia urens* bark extract," *Eur. J. Biomed. Pharm. Sci.*, 2025.
- [16] H. Salehi *et al.*, "Antidiabetic potential of medicinal plants and their active components," *Biomolecules*, vol. 9, no. 10, p. 551, 2019.
- [17] D. K. Meena, R. Singh, and S. Kumar, "Medicinal value of *Sterculia urens* Roxb. under different agroecological regions in India," *J. Pharmacogn. Phytochem.*, vol. 13, no. 2, pp. 733–737, 2024.
- [18] C. Darapureddy, K. R. S. Prasad, and P. R. S. Ch, "Phytochemical analysis, pharmacological activities, isolation and characterization of bioactive compounds from the roots of *Sterculia urens* Roxb.," *Turk. Online J. Qual. Inq.*, vol. 12, no. 8, p. 7142, 2021.
- [19] B. Alberts, "Introduction to pathogens," in *Molecular Biology of the Cell*, 4th ed. New York, NY, USA: Garland Science, 2002, pp. 1–20.
- [20] P. O. Méthot and S. Alizon, "What is a pathogen? Toward a process view of host–parasite interactions," *Virulence*, vol. 6, no. 6, pp. 775–785, 2015.
- [21] W. Fang *et al.*, "Diagnosis of invasive fungal infections: Challenges and recent developments," *J. Biomed. Sci.*, vol. 30, no. 1, p. 42, 2023.
- [22] F. M. R. Shaikh and A. S. Uzgare, "Antimicrobial efficacy of *Eleusine coracana* (finger millet): Phytochemical insights and therapeutic prospects – A mini review," *J. Adv. Acad. Funct. Res.*, vol. 3, no. 12, pp. 468–474, 2025.
- [23] S. C. C. Silva *et al.*, "Antibacterial and cytotoxic properties from esterified *Sterculia* gum," *Int. J. Biol. Macromol.*, vol. 164, pp. 606–615, 2020.
- [24] A. S. Haji, S. R. Maurya, and N. Shah, "Solvent-based comparative analysis of antioxidant and antimicrobial activities in *Sterculia urens* extracts," *J. Pharmacogn. Phytochem.*, vol. 13, no. 4, pp. 289–295, 2024.
- [25] M. Dhiman, L. Sharma, A. Singh, and M. M. Sharma, "Biogenic fabrication of silver nanoparticles using *Sterculia urens* Roxb. and assessment of their antimicrobial efficiency," *Mater. Today: Proc.*, vol. 43, pt. 5, pp. 3206–3210, 2021.
- [26] B. Lipový *et al.*, "Antimicrobial effect of novel hydrogel matrix based on natural polysaccharide *Sterculia urens*," *Epidemiol. Mikrobiol. Imunol.*, vol. 67, no. 4, pp. 166–174, 2018.
- [27] M. O. Rahman *et al.*, "Insight into novel inhibitors from *Sterculia urens* against cholera via pharmacoinformatics and molecular dynamics simulation approaches," *J. Biomol. Struct. Dyn.*, vol. 42, no. 19, pp. 10022–10043, 2024.
- [28] F. M. R. Rehan Shaikh and A. S. Uzgare, "Lectins as bioactive molecules: Emerging applications and therapeutic insights – A review," *Int. J. Chem. Res.*, vol. 10, no. 1, pp. 12–18, 2026.
- [29] F. Rabbi *et al.*, "*Sterculia diversifolia* bears anti-cancer and immunomodulatory activities," *Bangladesh J. Pharmacol.*, vol. 12, no. 1, pp. 51–55, 2017.
- [30] B. Singh and N. Sharma, "Synthesis and characterization of *Sterculia* gum based pH responsive drug delivery system for use in colon cancer," *J. Macromol. Sci. A*, vol. 46, no. 4, pp. 381–396, 2009.

AUTHOR PROFILE

Dr. Ashish S Uzgare, Assistant Professor at Wilson College (Autonomous), Mumbai, India. 28+ years of UG & PG teaching experience, alumnus of University of Pune, and recognized PG teacher & Ph.D. guide at University of Mumbai. Served in key administrative roles including Vice Principal, Dean of Students, Treasurer, and Warden, and coordinated DST-FIST programs. Co-author of 2 textbooks, published 16+ research/review papers, presented at 10+ national/international conferences, and recipient of best oral presentation awards (Thailand 2011, Bangalore 2018).

Research interests: Characterization of antimicrobial compounds, Protein chemistry, Biochemistry.

