



***Thespesia populnea*: A Comprehensive Review of Botanical, Phytochemical, Pharmacological, and Therapeutic Perspectives**

Tanuja M S^{*1}, Hanumanthachar K Joshi², N.Venkat Rao³

Department of Pharmacognosy^{1,2}, Sarada Vilas College of Pharmacy, Mysuru, India.

Department of Pharmacology³, Sarada Vilas College of Pharmacy, Mysuru, India.

Received: 27 March 2026

Revised: 20 April 2026

Accepted: 29 April 2026

ABSTRACT

Thespesia populnea (Family: Malvaceae), commonly known as Indian tulip tree or Paras pipal, is a medicinal plant widely distributed in tropical and coastal regions. It has been extensively used in traditional medicine systems for treating skin diseases, liver disorders, inflammation, and neurological conditions. This review summarizes its botanical features, phytochemical constituents, pharmacological activities, and therapeutic potential. The plant contains diverse bioactive compounds such as flavonoids, phenolics, tannins, alkaloids, and sesquiterpenes responsible for its wide range of biological activities including anti-inflammatory, antioxidant, hepatoprotective, antidiabetic, and wound-healing effects. Despite promising preclinical evidence, further clinical validation is required to establish its pharmaceutical applications.

Keywords: *Thespesia populnea*, Botanical, Phytochemical, Pharmacological, and Therapeutic Perspectives

1. INTRODUCTION

Thespesia populnea (L.) Sol. ex Corrêa, belonging to the family Malvaceae, is a tropical evergreen coastal plant widely distributed in India, Sri Lanka, and other regions of Asia, Africa, and the Pacific islands. The plant is well adapted to saline and sandy environments and plays a crucial ecological role in coastal stabilization and protection against soil erosion. In addition to its environmental significance, *T. populnea* has been extensively utilized in traditional systems of medicine such as Ayurveda and folk medicine for the treatment of various ailments.^{[1][2]}

Different parts of the plant, including leaves, bark, flowers, and fruits, are reported to possess therapeutic properties and have been traditionally used in the management of inflammatory conditions, liver disorders, skin diseases, wounds, ulcers, and microbial infections. Phytochemical investigations have revealed the presence of a wide range of bioactive constituents such as flavonoids, tannins, alkaloids, phenolic compounds, glycosides, and terpenoids, which are responsible for its diverse pharmacological activities.^{[3][4]}

Recent scientific studies have demonstrated that *T. populnea* exhibits significant antioxidant, anti-inflammatory, antimicrobial, hepatoprotective, antidiabetic, and wound healing properties. These findings highlight its potential as a promising natural source for the development of novel therapeutic agents. However, further studies, particularly clinical investigations, are required to validate its efficacy and safety for therapeutic use.^{[5][6]}

2. Botanical Description

- **Family:** Malvaceae
- **Common names:** Indian tulip tree, Paras pipal
- **Habit:** Medium-sized evergreen tree
- **Leaves:** Broad, heart-shaped
- **Flowers:** Yellow with purple center

- **Fruits:** Capsule containing seeds

The plant thrives in coastal areas and is resistant to saline conditions, making it ecologically significant.^[7]



3. Traditional and Ethnomedicinal Uses

Different parts of the plant are used in traditional medicine:

- **Leaves:** Anti-inflammatory, wound healing
- **Bark:** Skin diseases, liver disorders
- **Fruits:** Used as antidote and for hepatic conditions
- **Seeds:** Purgative

It has also been used in treating malaria, ulcers, and infections.^[8]

4. Phytochemical Constituents

Thespesia populnea contains a wide range of bioactive compounds:

Major Classes

- Flavonoids
- Phenolic compounds
- Tannins
- Alkaloids
- Glycosides
- Saponins
- Terpenoids

Key Bioactive Compounds

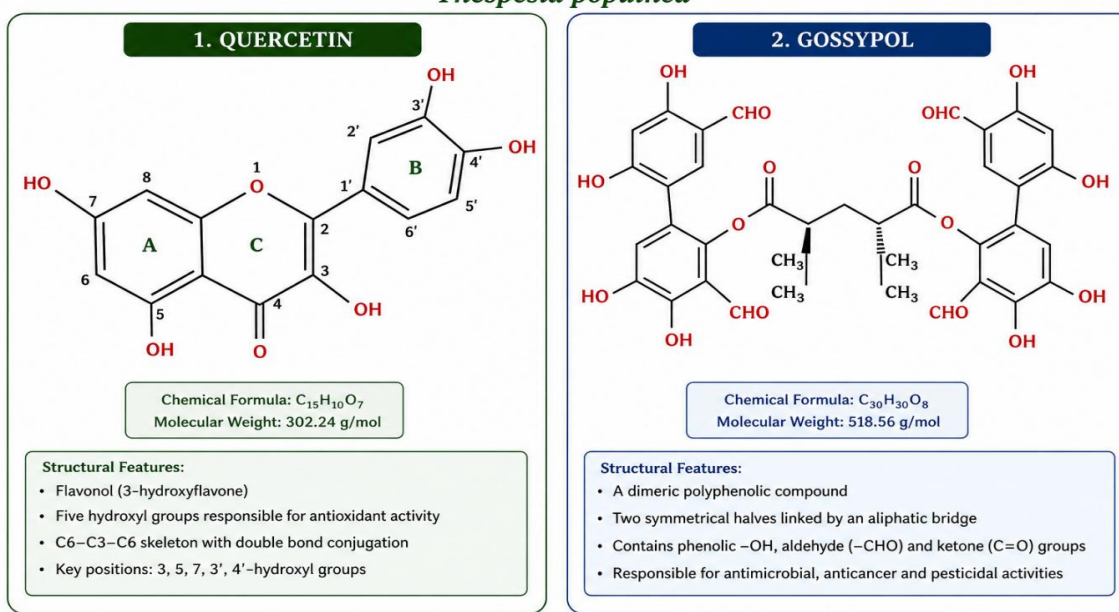
- Gossypol
- Quercetin

- Sesquiterpenes
- Essential oils

Phytochemical screening confirms the presence of carbohydrates, proteins, steroids, and other secondary metabolites contributing to biological activity.^[9]

CHEMICAL STRUCTURES OF MAJOR BIOACTIVE COMPOUNDS

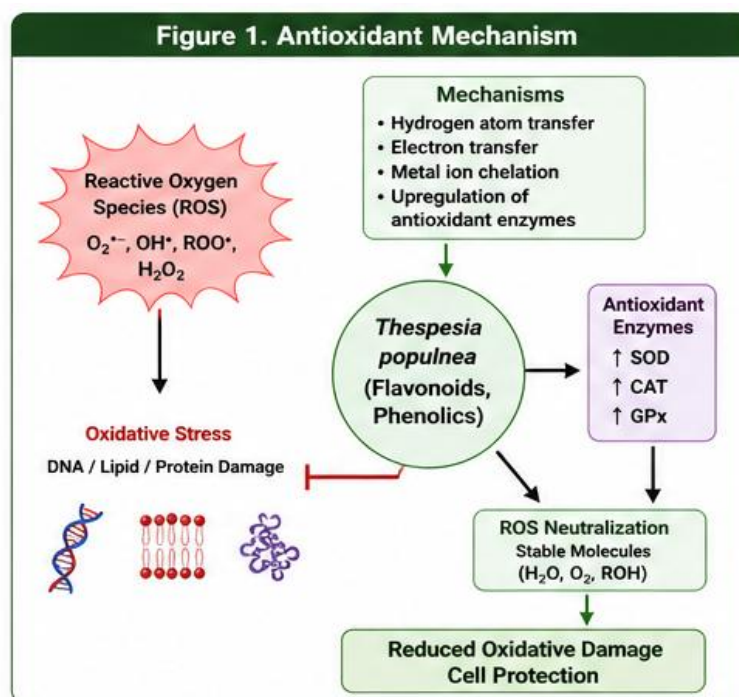
Thespesia populnea



5. Pharmacological Activities

5.1 Antioxidant Activity

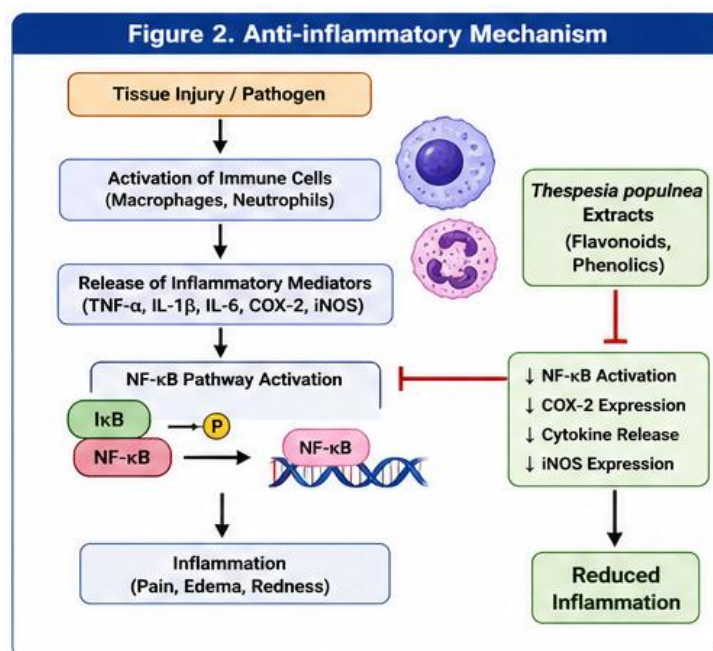
Rich phenolic and flavonoid content contributes to free radical scavenging activity.^[10]



Thespesia populnea protects cells by scavenging ROS and upregulating antioxidant defenses.

5.2 Anti-inflammatory Activity

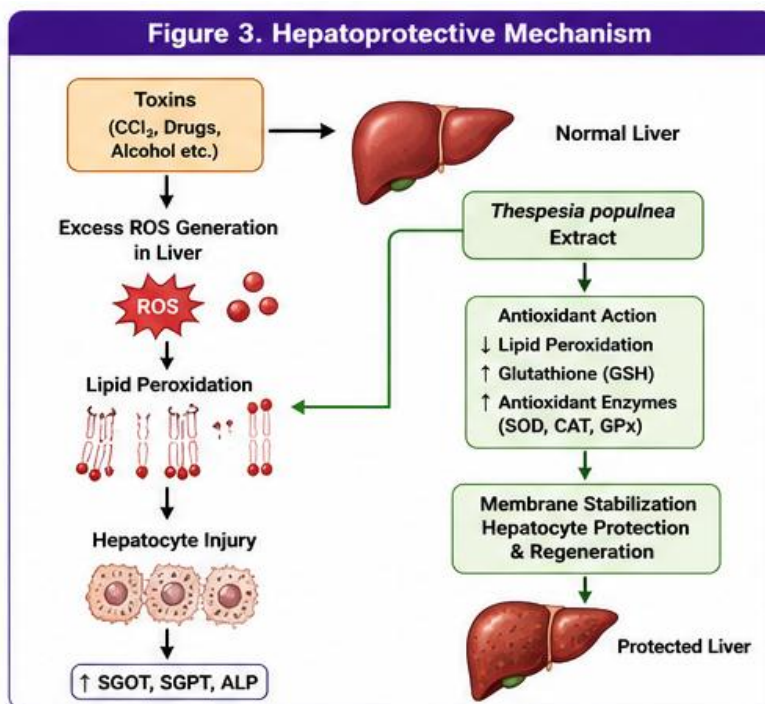
Extracts inhibit inflammatory mediators and reduce edema, supporting traditional use in inflammatory disorders.^[11]



Bioactive compounds inhibit NF- κ B signaling and suppress pro-inflammatory mediators, reducing inflammation.

5.3 Hepatoprotective Activity

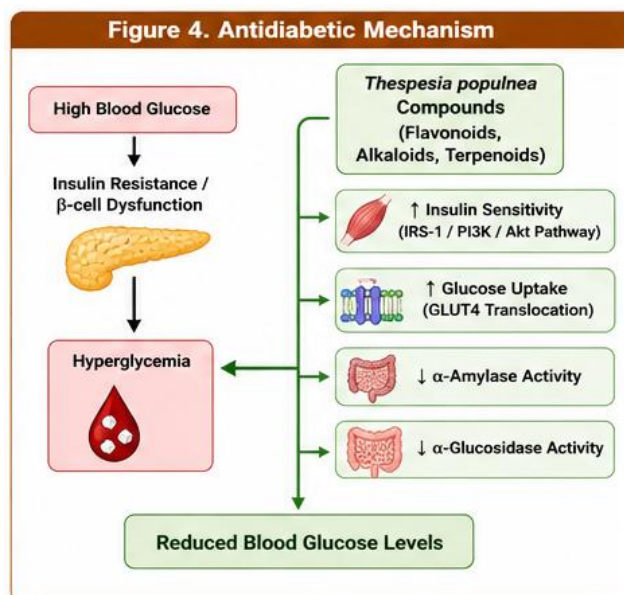
The plant protects liver tissues against toxin-induced damage and improves liver function markers.^[12]



Protects liver from toxins by antioxidant action, reducing lipid peroxidation and improving liver function.

5.4 Antidiabetic Activity

Extracts help regulate blood glucose levels and improve insulin sensitivity.^[13]



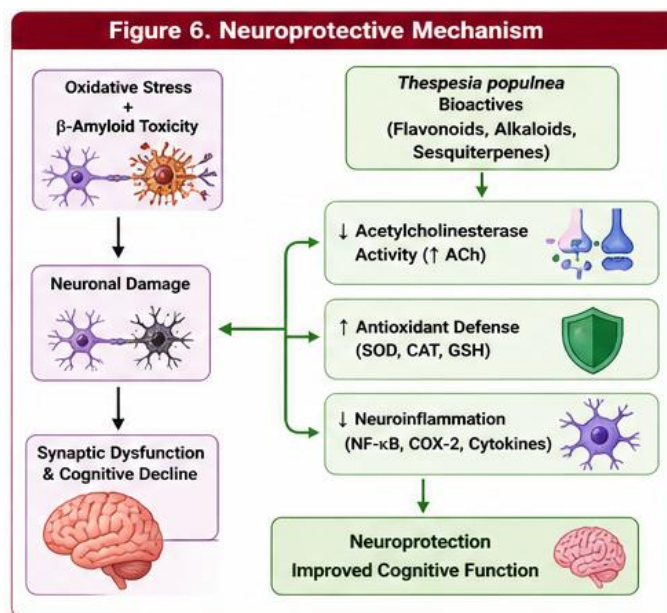
Improves insulin sensitivity, enhances glucose uptake and inhibits carbohydrate-digesting enzymes.

5.5 Antimicrobial Activity

Effective against bacterial and fungal pathogens due to bioactive compounds.^[14]

5.6 Neuroprotective and Anti-Alzheimer Activity

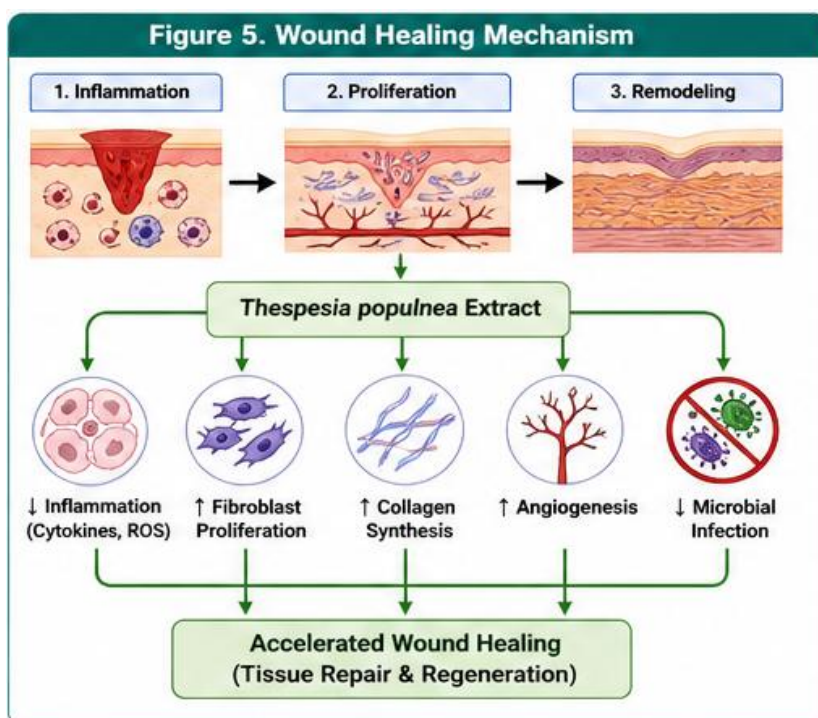
Studies show improvement in cognitive function and inhibition of cholinesterase activity.^[15]



Protects neurons by antioxidant action, reducing inflammation and inhibiting acetylcholinesterase.

5.7 Wound Healing Activity

Promotes tissue regeneration and accelerates healing processes.^[16]



Enhances all phases of wound healing by anti-inflammatory, proliferative and antimicrobial actions.

5.8 Anti-ulcer and Anti-psoriatic Activity

Demonstrates protective effects on gastric mucosa and skin disorders.^[17]

6. Mechanism of Action

The pharmacological effects are attributed to:

- Antioxidant mechanisms (ROS scavenging)
- Enzyme inhibition (e.g., cholinesterase)
- Anti-inflammatory pathways (COX and cytokine inhibition)
- Modulation of metabolic pathways ^[18]

7. Toxicity and Safety

Limited toxicity studies indicate that plant extracts are generally safe at therapeutic doses. However, detailed clinical safety evaluations are still lacking.^[19]

8. Therapeutic Applications

- Liver disorders
- Skin diseases
- Diabetes
- Neurodegenerative disorders
- Inflammatory conditions
- Wound management ^[20]

9. Future Perspectives

- Isolation and characterization of active compounds
- Clinical trials for efficacy and safety
- Development of standardized formulations
- Exploration of nano-formulations and drug delivery systems ^[21]

10. Conclusion

Thespesia populnea (L.) Sol. ex Corrêa is a pharmacologically important medicinal plant characterized by a diverse spectrum of bioactive constituents, including flavonoids, phenolic compounds, tannins, alkaloids, and terpenoids. These phytoconstituents are responsible for its wide range of biological activities, such as antioxidant, anti-inflammatory, antimicrobial, hepatoprotective, antidiabetic, and wound-healing effects, as demonstrated in various in vitro and in vivo studies. The traditional use of different plant parts in the management of skin disorders, liver diseases, inflammatory conditions, and infections is well supported by contemporary pharmacological evidence, highlighting its therapeutic relevance.

However, despite extensive preclinical investigations, the clinical efficacy and safety profile of *T. populnea* remain inadequately explored. There is a critical need for systematic clinical trials, toxicity profiling, and pharmacokinetic studies to establish its safety, dosage standardization, and therapeutic efficacy in humans. Furthermore, the isolation and characterization of active principles, along with elucidation of their molecular mechanisms, are essential for targeted drug development.

The incorporation of advanced technologies, including phytochemical standardization, molecular docking studies, and novel drug delivery systems, may significantly enhance its clinical applicability. In conclusion, *Thespesia populnea* holds considerable



promise as a potential source of novel therapeutic agents; however, rigorous scientific validation is imperative to translate its traditional uses into evidence-based clinical practice.

REFERENCES.

1. Wanjari AS, Wanjari DS. An overview on herbal medicine. *Research Journal of Pharmacognosy and Phytochemistry*. 2019;11(1):14-7.
2. Aejazuddin D. Herbal medicine: A comprehensive review. *Int. J. Pharm. Res.* 2016;8:1-5.
3. Craig WJ. Health-promoting properties of common herbs. *The American journal of clinical nutrition*. 1999 Sep 1;70(3):491S-9S.
4. Saravanakumar A, Venkateshwaran K, Vanitha J, Ganesh M, Vasudevan M, Sivakumar T. Evaluation of antibacterial activity, phenol and flavonoid contents of *Thespesia populnea* flower extracts. *Pakistan journal of pharmaceutical sciences*. 2009 Jul 1;22(3).
5. Vasudevan M, Parle M. Memory-Enhancing Activity of *Thespesia populnea*. in *Rats*. *Pharmaceutical Biology*. 2007 Jan 1;45(4):267-73.
6. Kathirselvam M, Kumaravel A, Arthanarieswaran VP, Saravanakumar SS. Characterization of cellulose fibers in *Thespesia populnea* barks: Influence of alkali treatment. *Carbohydrate polymers*. 2019 Aug 1;217:178-89.
7. Acharya R, Padiya R, Patel ED, CR H, Shukla VJ. Phytochemical study of an ethno medicinal plant *Limnophila rugosa* Roth.(Merr)(Scrophulariaceae) whole plant. *Ann. Ayur. Med.* 2012;52(1):23-31.
8. Admani M, Kumar KS, Mallya SV. Pharmacognostic characterisation of flowers *Woodfordia fruticosa* Kurz.(Dhataki Pushpa) used as fermentation initiators. *Journal of Ayurvedic and Herbal Medicine*. 2015;1(1):09-12.
9. Alamgir AN, Rahman M. Phytochemical characteristics, antimutagenic, cytotoxic and antiinflammatory activities of *Coccinia grandis* (L.) J. Voigt. Alamgir ANM, Rahman M and Rahman A. 2014 Feb:218-25.
10. Al-Snafi AE. The chemical constituents and pharmacological effects of *Chenopodium album*-An overview. *International J of Pharmacological Screening Methods*. 2015;5(1):10-7.
11. Amponsah IK, Mensah AY, Otoo A, Mensah ML, Jonathan J. Pharmacognostic standardisation of *Hillieria latifolia* (lam.) H. Walt.(Phytolaccaceae). *Asian Pacific Journal of Tropical Biomedicine*. 2014 Dec 1;4(12):941-6.
12. Marimuthu J, Aparna JS, Jeeva S, Sukumaran S, Anantham B. Preliminary phytochemical studies on the methanolic flower extracts of some selected medicinal plants from India. *Asian Pacific Journal of Tropical Biomedicine*. 2012 Jan 1;2(1):S79-82.
13. Badugu LR. Phytochemical screening, quantitative estimation total phenolics and total flavonoids, anti microbial evaluation of *Cyamopsis tetragonoloba*.
14. Bhardwaj M, Soni A, Mishra S, Tripathi S. Protective effect of *Commiphora wightii* in metabolic activity of streptozotocin (STZ) induced diabetes in rats. *J Diabetes Endocrinol*. 2014;5(3):19-28.
15. Adelman AM, Daly MP. Initial evaluation of the patient with suspected dementia. *American Family Physician*. 2005 May 1;71(9):1745-50.
16. Agnolli A. Effect of cholinergic and anticholinergic drugs on short term memory in electroencephalographic study. *Clin. Neuro. Pharmacol.* 1983;6:311-23.
17. Balaraman R, Shingala J. Nootropics. *Indian Journal of Pharmacology*. 2002 Nov 1;34(6):439-40.
18. Butterfield DA, Lauderback CM. Lipid peroxidation and protein oxidation in Alzheimer's disease brain: potential causes and consequences involving amyloid β -peptide-associated free radical oxidative stress. *Free Radical Biology and Medicine*. 2002 Jun 1;32(11):1050-60.
19. Floyd RA, Hensley K. Oxidative stress in brain aging: implications for therapeutics of neurodegenerative diseases. *Neurobiology of aging*. 2002 Sep 1;23(5):795-807.
20. Gauthier S, Emre M, Farlow MR, Bullock R, Grossberg GT, Potkin SG. Strategies for continued successful treatment of Alzheimer's disease: switching cholinesterase inhibitors. *Current medical research and opinion*. 2003 Jan 1;19(8):707-14.
21. Johnson J, Gandhidasan I, Murugesan R. Cytotoxicity and superoxide anion generation by some naturally occurring quinones. *Free Radical Biology and Medicine*. 1999 May 1;26(9-10):1072-8.

How to cite this article:

Tanuja M S et al. *Jcp.Human*, 2026; Vol. 22 (5): 1-8.

Conflict of Interest Statement:

The authors have no conflicts of interest to declare.

This is an open access article under the terms of the Creative Commons Attribution-NonCommercial-NoDerivs License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.