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AN UPDATE REVIEW OF THESPENSIA POPULENA AND ITS PHARMACOLOGICAL APPLICATION

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ABSTRACT

Belonging to the Malvaceae family, Thespesia populnea (L.) Soland. ex Correa—frequently referred to as the Portia tree or Indian tulip tree—is a recognized medicinal plant species. family Malvaceae and is widely distributed across tropical and coastal regions. The species of plant boasts a rich heritage of application in time-tested traditional healing systems. for managing various ailments, including dermatological disorders, inflammation, gastrointestinal disturbances, hepatic disorders, wounds, and other inflammatory conditions. Lately, researchers have shown significant interest in studying this species. directed toward T. populnea owing to its diverse phytochemical profile and broad range of reported pharmacological activities. The present review provides an updated and comprehensive assessment of the botanical characteristics, ethnomedicinal applications, phytochemical constituents, and pharmacological properties of T. populnea, with particular emphasis on its therapeutic potential and the current state of scientific evidence.Phytochemical investigations of Multiple parts of the plant contain diverse groups of biologically active compounds, such as flavonoids. phenolic compounds, sesquiterpenoids, glycosides, fatty acids, terpenoids, sterols, and other phytoconstituents. Researchers suggest that specific compounds extracted from the plant are responsible for its medicinal properties. Preclinical investigations have demonstrated a broad spectrum of biological activities, including antioxidant, anti-inflammatory, analgesic, antipyretic, antimicrobial, antidiabetic, hepatoprotective, antiulcer, anti-colitis, wound-healing, antipsoriatic, neuroprotective, anti-Alzheimer's, and anticancer effects. Scientific evaluation using both cell cultures and live models supports the historical medicinal uses of T. populnea in controlling inflammatory conditions, pain, gastrointestinal disorders, and wound healing.

KEYWORDS: Thespesia populnea; Malvaceae; Indian tulip tree; Portia tree; phytochemicals; flavonoids; phenolic compounds; pharmacological activities; ethnomedicine; medicinal plants; therapeutic potential.

INTRODUCTION

Thespesia populnea (Portia tree), belonging to the family Malvaceae, is a fast-growing, evergreen, perennial shrub or small tree that can reach 9–15 m in height and 3–6 m in spread. It reproduces through both seeds and stem cuttings. The species is well adapted to tropical and coastal environments and is highly tolerant of salt spray, marine winds, brackish water, high temperatures, and drought. It can grow in diverse soils, including sandy, saline, volcanic, calcareous, and rocky substrates, making it useful for coastal windbreaks and shoreline stabilisation. Although considered native to the Pacific Islands, historical evidence suggests that Polynesian settlers may have introduced it to some regions. Today, it is widely naturalised throughout Central America, South and Southeast Asia, the Caribbean, Indonesia, the Philippines, and various Indian and Pacific Ocean islands. Morphologically, the plant possesses a short upright or irregularly curved trunk with many horizontal branches. Its bark is brown to pale grey with longitudinal ridges and fissures. The leaves are simple, alternate, and entire, with a glossy green upper surface and paler lower surface. They are broadly heart-shaped (cordate), with a long petiole, pointed apex, and distinctly heart-shaped base. Such traits provide valuable criteria for the precise identification and botanical classification of the plant.[1]

Historical Context and Importance of Herbal Medicine



Fig. no. 1: T. Populnea Leaves.



Fig. no. 2: T. Populnea Flower.



Fig. no. 3: T. Populnea Fruit.



Fig. no. 4: T. Populnea Tree.[2]

Ayurvedic properties and pharmacological profile

Botanical name: Thespensea populnea

Family: Malavaceae

Ayurvedic Therapeutic action

Mutrasangrahaniya: Supports urinary retention and regulation of excessive urinary output

Stambhana: Astringent and tissue-constricting action

Dahaprashamana: Alleviates burning sensation and inflammatory heat

Vishaghna: Traditionally regarded as having antitoxic properties

Medohara: Supports the reduction and regulation of excess adipose tissue

Traditional therapeutic application

Prameha: Disorders associated with abnormal urinary frequency and metabolism

Pradara and Yoniroga: Vaginal disorders and gynecological conditions

Shotha: Inflammatory conditions and edema

Daha: Burning sensations

Atisara: Diarrheal disorder

Arsha: Hemorrhoids

Medoroga: Disorders associated with excessive adiposity

Visha: illnesses due to poison or toxins.[3]

Various species of Thespesia

Thespesia gummifua

Thespesia acutioba

Thespesia robusta

Thespesia multibraceata

Thespesia cubensis

Thespesia populneoides

Thespesia fissicalyx

Thespesia thespesiodes

Thespesia mossambicensis

Thespesia lampas

Thespesia grandifera

Thespesia patellifera

Thespesia acutiloba.[4]

PHYTOCHEMICAL ANALYSIS

Thespesia populnea (Bhendi) contains several important phytochemical constituents, including terpenes, lipids, glucosides, flavonoids, derivatives, sesquiterpenoids, and quinones. Heartwood contains sesquiterpene and orthonapthaquinone compounds, including 3,6,9-trimethyl-2,3-dihydrobenzo[de]chromene-7,8-dione, thespesenone, and dehydrooxoperezinone-6-methyl ether. New sesquiterpenoids (populene A-H) and quinones including mansonone-D, mansonone-H, thespone, and thespesone are isolated. These compounds demonstrate significant cytotoxic and antibacterial activities. Heartwood also contains mansonone derivatives, including 7-hydroxy-2,3,5,6-tetrahydro-3,6,9-trimethylnaptho(1,8-b,c)pyran-4,8-dione. The flower contains gossypol, along with flavonoids such as 5,8-dihydroxy-7-methoxyflavone, and the glycoside kaempferol-β-D-rutinoside. A rare flavonoid, quercetin -7-O-rhamnoglucoside, has also been isolated and reported to possess significant antihepatotoxic activity.[5]

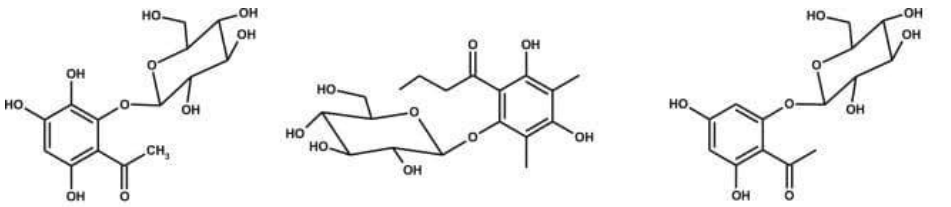


Fig. no. 5: Chemical structure of phytoconstituents of T. populnea (Linn).[6]

The leaves and bark of T.populnea are traditionally used as an oil and poultice for treating fractures, ulcers, boils and inflammation. Gossypol, a major bioactive constituent, has demonstrated significant antifertility activity in both animal and human studies.[7] The bark is 6-10 mm thick when fresh and 3-7 mm when dried, with a corrugated surface and scaly twigs. The outer surface ranges from greyish -brown to dark brown, becoming more fissured with age and bearing scattered lenticels. The inner surface is striated and pale yellowish, with a short, fibrous fracture; it has a characteristic aromatic odour and slightly bitter taste.[8]

The leaves are alternate, glossy green adaxially and pale green abaxially. They are cordate, measuring approximately 10-20 cm into 6-13 cm, with 5-10 cm long petioles. Older lower canopy leaves turn yellow before abscission.[9] The TS of leaves and blades were cordate, broadly ovate, and petioles were relatively long, measuring 5-10 cm in length. The leaf apex was acuminate, with an entire, smooth margin. The main lateral veins exhibited a robust, linear trajectory, whereas the secondary branches appeared noticeably prominent with a clear undulating pattern.[10]

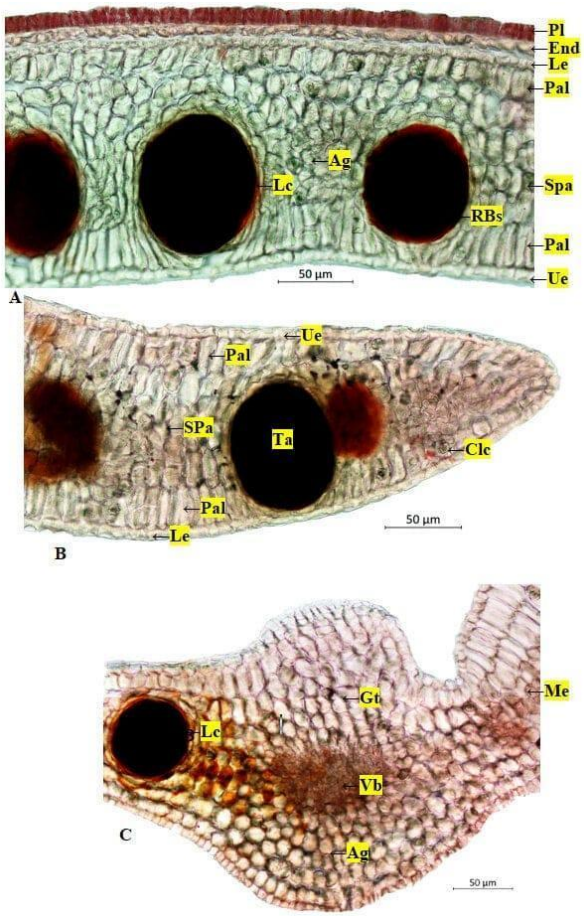
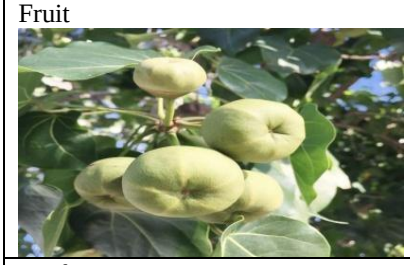


Fig. no. 6: Cross-sectional microscopic view of a Thespesia populnea leaf.[11]

PHYTOCHEMICAL CONSTITUENTS.[12,13,14,15]

Table No .1 Phytochemical constituent of Thespesia populnea

Plant part	Phytochemical	Pharmacological activity
Flower 	Kaempferol Rutin Thespesin Anthroquinone β-sitosterol Herbecetin	Hepatoprotective Antioxidant Cytotoxic Antiproliferative Antiinflammatory
Root 	Tannins Alkaloids Thiols Gums Mucilage	Anto-microbial Antihelmentic Anti-diabetic
Heartwood 	Populnea A-H Quinone Thespone Mansonones C,D,E,F,H 6- Sesquiterpenoid	Ulcer pain Colic pain Anti- inflammatory
Bark 	Alkaloids Flavonoides Glycosides Phenols Tannis	Anti-inflammatory Memory-enhancing Antioxidant
Fruit 	Alkaloid Carbohydrate Steroids Saponine Flavonides	Rheumatism sprains Swelling Warts Pile Migraine Antihyprelipidimic Antihyperglycemic
Leaf 	Lupeol Lupenone Alkanes Syringic Vanillic Ferulic acid Quercetin	Psoriasis Scabies Analgesic anti- inflammatory

Traditional use

This medicinal tree has significant ethnomedicinal importance, with various parts traditionally used to manage several disorders, including diarrhea, skin and liver diseases, hemorrhoids, diabetes, and cancer, particularly in traditional medicine practice in Sri Lanka.[16]

Table no. 2: Medicinal Properties of Thespesia populnea.[17,18,19,20,21,22,23]

Plant part	Primary Health Benefits	Action Mechanisms
Bark	• Protects the liver • Relieves pain and inflammation • Treats skin conditions and liver ailments	Astringent agents; validated by experimental studies for liver protection and anti-inflammatory activity.
Fruits	• Promotes wound healing • Applied topically as a poultice for skin issues	Water-based extracts accelerate skin recovery when applied topically (excision wounds) or taken orally (incision wounds).
Leaves	• Relieves respiratory (cough) and digestive issues (dysentery, indigestion) • Treats headaches, scabies, psoriasis, and ulcers	Broad-spectrum therapeutic activity targeting inflammatory, gastrointestinal, and skin ailments.
Flowre	• Regulates cell growth and reduces inflammation	Flavonoids (gossypetin, herbactin, kaempferol-7-glucoside) that interact with proteins regulating the cell cycle and growth signaling (e.g., EGFR, TNF).
Root	• Fights infections (bacterial, viral, and fungal)	Specialized phytochemical constituents targeting various pathogenic microorganisms.

Pharmacological Actions

Antibacterial activity[24]

Disk diffusion and broth microdilution techniques were employed to assess the antibacterial efficacy of the T. populnea leaf extract. Extracts were tested at different concentrations, with vancomycin and 20 % DMSO serving as positive and negative controls, respectively. Overall, the study demonstrated the antibacterial potential of T. populnea leaf extracts.

Hepatoprotective property[25]

The hepatoprotective potential of Thespeia lampas extracts and fractions was investigated using paracetamol- and CCL 4 -induced hepatotoxicity models in rats. Test treatments were given orally for five days, with liver damage induced via a single oral dose of paracetamol (2 g/kg) on day three. Serum collected on day five was analyzed with commercial diagnostic kits to evaluate biochemical markers of liver injury. The protective butanol fraction was additionally evaluated against CCL 4 -induced hepatotoxicity. Changes in formulation used to determine the hepatoprotective efficacy of the extracts and fractions.

Anti-pyretic Activity[26]

The seeds of T. populnea used for their antipyretic, analgesic activity. Seed oil, unsaponifiable matter, ethanolic extracts and their functions were evaluated to validate the traditional ethnopharmacology claims associated with the plant.

Memory-enhancing activity[27]

Thesesia populnea extracts have demonstrated several neuropharmacological effects, including a reduction in serum cholesterol levels, an increase in cerebral acetylcholine concentration, and an improvement in memory enhancing all aged mice. T. populnea may possess potential neuroprotective and cognitive-enhancing properties. Therefore, further pharmacological and mechanistic investigation are warranted to evaluate its therapeutic potential in the treatment of Alzheimer s disease and other neurodegenerative diseases.

Antipsoriatic activity[28]

PsO is a chronic, non-contagious, multifactorial autoimmune dermatological disorder characterised by dysregulated immune signalling, resulting in excessive propagation and anaplasia of epidermal keratinocytes. Clinically, it is manifested by erythematous, scaly plaques and is associated with increased dermal vascularity and persistent cutaneous inflammation. Psoriasis affects approximately 2–3% of the global population, economic, and quality-of-life consequences. Several medicinal plants, including Radix paeoniae Alba, Rubia cordifolia, Coptis chinensis, Alpinia galanga, Annona squamosa, and Curcuma longa, have previously demonstrated potential anti-psoriatic activity. Four Indian medicinal plants, namely, Phyllanthus simplex, Crotalaria juncea, Leucas aspera, and Vitex glabrata,were selected for the present study based on their traditional use to prevent inflammatory skin diseases and psoriasis-like conditions.

Antidiabetic activity[29]

DM disrupts how the body processes carbohydrates, and lipids, primarily due to insulin deficiency or insulin resistance. Its prevalence is increasing worldwide, and prolonged metabolic disturbances may lead to various complications. Conventional treatment includes insulin and oral antidiabetic drugs. Therefore, a growing need for better and more reliable therapeutic agents. Bioactive plants in holistic medicine are increasingly being investigated as potential plant based original antidiabetic agents with promising therapeutic efficacy and fewer side effects.

Anticancer activity[30]

T. populnea boasts a long standing legacy of botanical remedies in cancer management. Previous laboratory research demonstrated strong in vitro antioxidant activity outfits decoction. Therefore, the study was conducted to scientifically evaluate its potential anticancer effects. An aqueous decoction was made by using equal amounts (30g each) of T. populnea and adnanthera pavonona bark. the powder plant materials were boiled in 1.6 L of water until reduced to 200 mL, filtered, centrifuged, pooled, and freezed -dried . The decoction was stored and was produced. The decoction was previously reported to contain substantial phenolic and flavonoid contents, which may contribute to its observed apoptotic activity.

Antidiarrheal activity[31]

The residue fraction (RF) of Thespesia populnea bark showed the strongest antidiarrheal activity among the tested fractions. It reduced castor oil-and PGE_2-induced diarrhea and inhibited intestinal motility and smooth muscle contractions. These effects suggest both antisecretory and antimotility illuminate its therapeutic pathways and confirm its clinical efficacy to identify the active constituents.

Diuretic activity[32]

Aqueous, chloroform, ethanol, and ethyl acetate extracts of Thespesia populnea exhibited significant diuretic and aquaretic activity in rodents. The extracts increased urine volume and promoted the urinary excretion of sodium, potassium, and chloride, with effects comparable to furosemide. These findings suggest that T. populnea may have potential renal and diuretic activity.

Antioxidant activity[33]

Phytochemical profiling showed that Thespesia populnea contains diverse bioactive compounds (alkaloids, flavonoids, saponins, tannins, polyphenols, anthraquinones, carbohydrates, terpenoids, and glycosides) that are associated with its

therapeutic properties. To determine radical scavenging capacity, extracts (25–150 $\mu\text{g/mL}$) were reacted with 0.1 mM DPPH for 30 min at 37 °C, followed by spectrophotometric measurement at 517 nm. Ascorbic acid served as the reference standard, with scavenging activity quantified by the decline in absorbance.

CONCLUSION

T. populnea offers strong medicinal promise across various health applications. To fully realize its medical utility, future work must prioritize verified human clinical testing, strict exact quality control, and ecological protection efforts are essential to establish its safety, efficacy, and sustainable medicinal utilization. T. populnea is a promising medicinal plant with significant therapeutic potential. Human clinical research, uniform quality benchmarks, and ecological protection are all critical to safely and sustainably utilizing this plant to establish its safety, efficacy, and sustainable medicinal utilization further research and clinical investigations are warranted to validate its therapeutic potential and promote its value-added applications in the nutraceutical and pharmaceutical industries.

REFERENCES

1. CH.Malathi Suvarna, P. Sriya, MD. Arshad, K. Pavan; a review on phytochemical and pharmacological properties of Thespensea populnea; journal of drug delivery & therapeutics, 2018: 8(4): 1-4.
2. *https://share.google/c9mZT4nIlTPZLK4UV*
3. Puneeth Kumar S. L. Dr. T. Balasubramanian, Dr. Suresha B. S. And Ahalyadevi K. H.; A Review On Thesepsia Populnea, 2020; 2(2): 143-150.
4. Battu Ganga Rao, K. Jeevitha, Devarkonda Ramadavi, Heera Battu Review of literature: phyto pharmacology studies on Thespesia populnea: Battu ganga rao et al, j. Global trends pharma sci, 2018: 9(1): 4787-4792.
5. D. S. Chumbhale1, A. A. Pawase1, S. R. Chaudhari1, C. D. Upasani; Phytochemical, Pharmacological and Phytopharmaceutics Aspects of Thespesia populnea (linn.) Soland. A Review , Inventi Rapid: Ethnopharmacology, 2010; 1(2)138: CCC: $10 © Inventi Journals (P) Ltd Published on Web 06/09/2010, www.inventi.in
6. *https://share.google/kwTOAUA8voLYfbRwO*
7. R Parthasarathy, R Ilavarasan, CM Karrunakaran; Pharmacognostical Studies on Thespesia populnea Bark, ISSN 0975- 2331 Research Journal of Pharmacognosy and Phytochemistry, 20091(2): 128-131.
8. Pathak S. G. Kare M. A. Department of Botany, Pratishthan Mahavidyalaya, Paithan, Tal: Paithan, Dist: Chh. Sambhajinagar, (M.S.), Ind, Pharmacognostic Evaluation and Phytochemical Screening of Stem Bark of Thespesia Populnea (L.) Sol. Ex Corrêa; International Journal of Research Studies on Environment, Earth, and Allied Sciences (IJRSEAS), 2025; 2(2): 3066-0637, Website: https://eesrd.us
9. J. B. Friday and Dana Okano, Thespesia populnea (milo), 2006; 2(1).
10. R. Parthasarathy, Amrender Singh, Debjit Bhowmik, Pharmacognostical studies on Thespesia populnea Leaf, ISSN 0975-2331 (Print) www.anvpublication.org 0975-4385 (Online)
11. *https://share.google/IQvr2K4tTMPcn7E3H*
12. Chaithra k, Pallvi. S, Preethu K, Rakshithas. Sadaf Farooq, Sahana H. S., Comprehensive Review On Pharmacological Activities Of Thespesia Populnea Soland And Pongamia Pinnata Linn; 02(08)240207310
13. A Saravanakumar, K Venkateshwaran, J Vanitha, M Ganesh, M Vasudevan And T Sivakumar; Evaluation Of Antibacterial Activity, Phenol And Flavonoid Contents Of Thespesia Populnea Flower Extracts Pakistan J. of pharmaceutical science, 2009; 22(3): 282.

14. S. N. Belhekar, P. D. Chaudhari, J. S. Saryawanshi, K. K. Mali And R. B. Pandhare; Antidiabetic and Antihyperlipidemic Effects of Thespesia ,populnea Fruit Pulp Extracts on Alloxan-induced, Diabetic Rats Indian J. of Pharmaceutical science, 2013; 75(2): 217.
15. R. Ilavarasana S. Mohideenb, and S. Venkataramanc; Analgesic and anti-inflammatory properties of Thespesia populnea leaf extracts Natural product research, 2012; 26(17): 1616-1620.
16. Anchala I. Kuruppu a,c, Priyani Paranagama a,b, Charitha L. Goonasekara c, Medicinal plants commonly used against cancer in traditional medicine formulae in Sri Lanka, 2019; 27: 565-573.
17. Mani Vasudevan, Milind Parle, Kumar kishor Ginnam; Antinociceptive and anti-inflammatory effects of Thespesia populnea bark extract; J. Ethnopharmacology, 2007; 19(2): 264-270.
18. Raju Ilavarasan a, Mani Vasudevan a, Sockalingam Anbazhagan a ,Subramanian Venkataraman b; Antioxidant activity of Thespesia populnea bark extracts against, carbon tetrachloride-induced liver injury in rats ;J. of Ethnopharmacology, 2003; 87: 227-230.
19. A. N. Nagappa, Binu Cheriyan; Wound healing activity of the aqueous extract of Thespesia populnea fruit; Fitoterapia, 2001; 7(2): 503 506.
20. D. Ramya Devi, S. Sowmiya Lakshna, S. Veena Parvathi, B.N. Vedha Hari; Investigation of wound healing effect of topical gel of Albizia amara leaves extract; South African J.of Botany, 2018; 119: 400-409.
21. Oudhia, P 2007. Thespesia populnea (L.) Sol. ex Corrêa. In: Louppe, D., Oteng-Amoako, A.A. & Brink, M. (Editors). PROTA (Plant Resources of Tropical Africa / Ressources végétales de l'Afrique tropicale), Wageningen, Netherlands. Accessed 11 September 2026.
22. Vishal S. Patil, Darasaguppe R. Harish, Umashankar Vetrivel, Sanjay H. Deshpande ,Pukar Khanal, Harsha V. Hegde, Subarna Roy and Sunil S. Jalalpure, Pharmacoinformatics Analysis Reveals Flavonoids and Diterpenoids from Andrographis paniculata and Thespesia populnea to Target Hepatocellular Carcinoma Induced by Hepatitis B Virus; Published, 2022; 12(21): 10691.
23. Senthil-Rajan, D., Rajkumar, M., Srinivasan, R., Kumarappan, C., Arunkumar, K., Senthilkumar, K.L. and Srikanth, M.V, Investigation on antimicrobial activity of root extracts of Thespesia populnea Linn ,Tropical Biomedicine, 2013; 30(4): 570–578.
24. Subodhani S. Kumaria , Nayani P. Weerasingheb, Keddagoda Gamage ,P. Wasanac , Anoja P. Attanayakec and Bhagya Piyasirid ; Antimicrobial Activity of Thespesia populnea (L.) Extracts Against Clinical Isolates of Methicillin-Resistant Staphylococcus aureus (MRSA); Jorden J. of chemistry, 2023; 18(1): 23-32.
25. Purav Mody, Tamoghona Biswas1, Jaykaran Charan2 , Deval Parikh2 ; Hepatoprotective activity of active fractions of Thespesia lampas Dalz and Gibbs (Malvaceae) ;J. of Pharmacology and Pharmacotherapeutics, 2012; 3(4): 326.
26. Shah Amol S. , Alagawadi Kallangouda R. ;Anti-inflammatory, analgesic and antipyretic properties of Thespesia populnea , Soland ex. Correa seed extracts and its fractions in animal models ; Journal of Ethnopharmacology, 2011; 137: 1504–1509.
27. M. Vasuden, M. Parle, Pharmacological actions of Thespesia populnea relevant to Alzheimer's disease, Phytomedicine, 2006; 13(9): 677-687.
28. Sushil K. Singh , Hemendra S. Chouhan , Alekh N. Sahu, and Gopeshwar Narayan; Assessment of in vitro antipsoriatic activity of selected Indian medicinal plants ; ISSN 1388-0209 print/ISSN 1744-5116 online Editor-in-Chief: John M. Pezzuto Pharm Biol, 2015; 53(9): 1295–1301.

29. R. Parthasarathy, R. Ilavarasan, C.M. Karrunakaran Bharath University, Selaiyur, Chennai-600 073, Tamil Nadu. Captain Srinivasa Murthi Drug Research Institute for Ayurveda & Siddha, Chennai-600 109, Tamil Nadu.;Antidiabetic activity of Thespesia Populnea bark and leaf extract against streptozotocin induced diabetic rats;International Journal of PharmTech Research ;CODEN (USA): IJPRIF ISSN:0974-4304, 2009; 1(4): 1069-1072.
30. Indeewari K. S. Lindamulage and Preethi Soysa ,Evaluation of anticancer properties of a decoction containing Adenanthera pavonina L. and Thespesia populnea L.; Lindamulage and Soysa BMC Complementary and Alternative Medicine, 2026; 16(1): 70.
31. Gollapalle Lakshminaraya Shastry Viswanatha1, Shylaja Hanumanthappa , Nandakumar Krishnadas, Srinath Rangappa Department of Pharmacology, PES College of Pha,Antidiarrheal effect of fractions from stem bark of Thespesia populnea in rodents: Possible antimotility and antisecretory mechanisms ,Asian Pacific J. of Tropical Medicine, 2011; 4(6): 451-456.
32. R.Parthasarathy, Amrender Singh, Debjit Bhowmik, A study on preliminary phytochemical and diuretic activity of bark of Thespesia populnea, International Journal of pharma science and Research, 2016; 1(3): 72-77.
33. Prakash M.V. Dass, Prasath G. Sriram and Mani G. Durai Muthu, Evaluation of Antioxidant and Cytotoxic Potency of Thespesia populnea Leaf Extract, International Journal of Zoological Investigations, 2022; 8: 39-45.