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A COMPREHENSIVE REVIEW ON PHARMACOGNOSTIC, PHYTOCHEMICAL AND PHARMACOLOGICAL INSIGHTS INTO *THESPESIA POPULNEA*

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ABSTRACT

The Portia tree, or *Thespesia populnea* Linn, belongs to the family Malvaceae and is found in coastal and tropical areas. This review examines its wide range of therapeutic potential, which is backed by both conventional applications and contemporary scientific proof. Anti-inflammatory, antibacterial, antidiarrheal, anticancer, antidiabetic, antipsoriatic, and neuroprotective benefits against Alzheimer's disease are only a few of the plant's many pharmacological activity. Its extracts have been shown to work in concert with traditional antibiotics to increase their effectiveness. Bioactive substances include alkaloids, sesquiterpenoids, flavonoids, and glycosides are found in phytochemical investigations and contribute to the plant's medicinal qualities. Despite their acknowledged advantages, more study is necessary to completely comprehend these compounds' methods of action and investigate their potential for creating innovative pharmaceutical uses. This review highlights the importance of Thespesia populnea as an asset for future drug development and a need for more thorough research that supports its ethnopharmacological claims.

KEYWORDS: *Thespesia populnea*, toxicity, phytoconstituents.

1. INTRODUCTION

The Indian Tulip Tree or Portria Tree, medium-sized evergreen tree, also known as the member of the Malvaceae family and grows along the coast of India and other tropical regions.[1] People have utilized the tree's many therapeutic benefits to cure a wide range of ailments throughout history.[2] The tree's fruits and barks are especially beneficial; they have been demonstrated to have anti-bacterial, cooling, anti-inflammatory astringent, depurative, hemostatic, and anti-diarrheal effects.[3]

Thespesia populnea's leaves, roots, flowers, barks, and fruits are among the parts utilized in Ayurvedic medicine to cure a range of illnesses.[4] The medicinal potential of *Thespesia populnea* has been validated by recent studies, highlighting the significance of studying natural cures and the potential of plants to offer novel 11treatments for a range of ailments.[5]

Scabies, Psoriasis, Skin conditions, Eczema, Ringworm infection, and Guinea worm infection can all be effectively treated with *Thespesia populnea* Plant.[6] The plant contains a variety of therapeutically active substances, including sugars, fatty acids, tannin, alkanes, flavonoids, sesquiterpenoids, saponins, and antioxidants.[7]

2. PHARMACOGNOSY

Figure no. 1 *Thespesia populnea* Plant.

Kingdom: Plantae
Clade: Tracheophytes
Clade: Angiosperms
Clade: Eudicots
Clade: Rosids
Order: Malvales
Family: Malvaceae
Genus: Thespesia
Species: *Thespesia populnea*

2.1 MORPHOLOGY

a. **Leaves:** The leaves are simple, alternate, and arranged spirally.[8,9] The blade is orbicular, deltoid, ovate, or oblong, typically 7 to 23 cm long and 5 to 16 cm wide, with an acuminate apex & a cordate base.[8,9] They are shiny dark green on the upper surface and paler underneath, with 7 main veins.[9] The petioles are 5 to 10 cm long.[8,9]

b. **Flowers**: *Thespesia populnea* has solitary axillary flowers.[8] The flower stalks are 1.3 to 5 cm long. The rounded calyx, which is roughly 10 mm in height and 13 mm in diameter, carries three to five thin green scales.[9] Broad, oblique, rounded, and pale yellow, the petals typically have a crimson patch at the base.[9]

c. **Fruits and Seeds**: The fruit is a massive capsule with a diameter of 2 to 4.5 cm, slightly 5-ridged, and typically indehiscent.[8] The seeds are obovoid, 8 to 15 mm long, and covered by hairs.[8] The spherical, leathery seed capsules have a diameter of 1 to 2 inches.[10] The seeds are 1/4 to 1/2 inch long and have a grayish-brown color.[10]

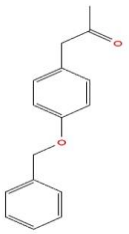
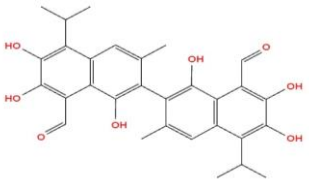
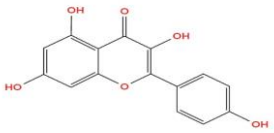
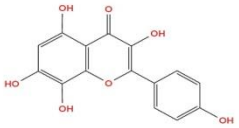
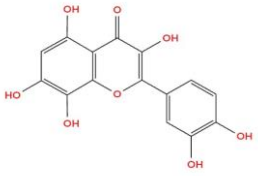
3. TRADITIONAL USES

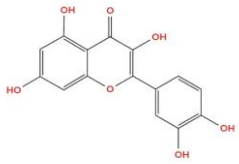
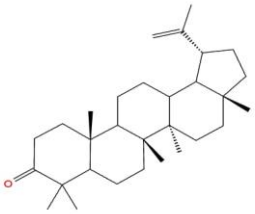
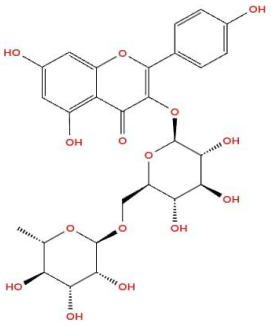
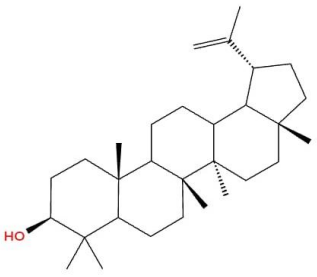
The tree's fruits and bark have anti-inflammatory properties.[11] For painful joints, the paste made from the roots, fruits, and leaves is applied locally to reduce inflammation.[12] *Thespesia populnea* has antimicrobial properties.[11,13] The plant has demonstrated promising as an antidiabetic.[11,13] The plant is used to treat cutaneous infections.[14,15] The flowers, leaves, bark, are useful in treating skin infections like eczema, scabies, psoriasis, and ringworm.[12] *Thespesia populnea* is used to cure liver disorders.[14,15] It also possesses hepatoprotective activity.[12,16] *Thespesia populnea* possesses wound healing activity.[12,14] Fruit juices are used for swellings, scabies, rheumatism, sprains, insect bites, and warts.[15]

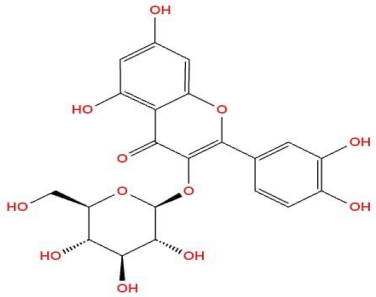
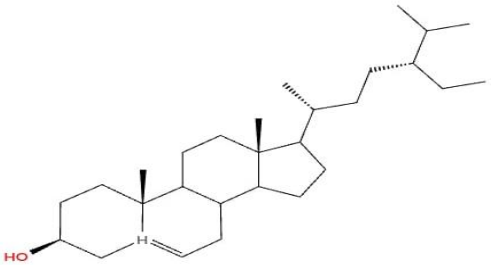
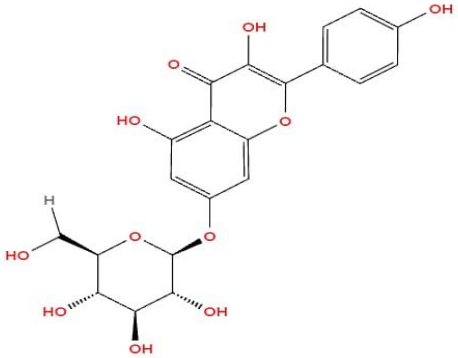
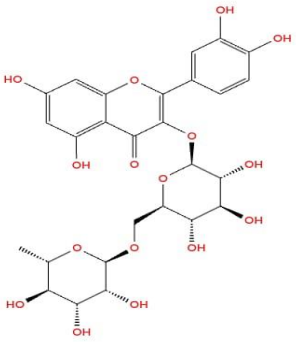
4. PHYTOCHEMISTRY

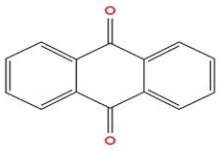
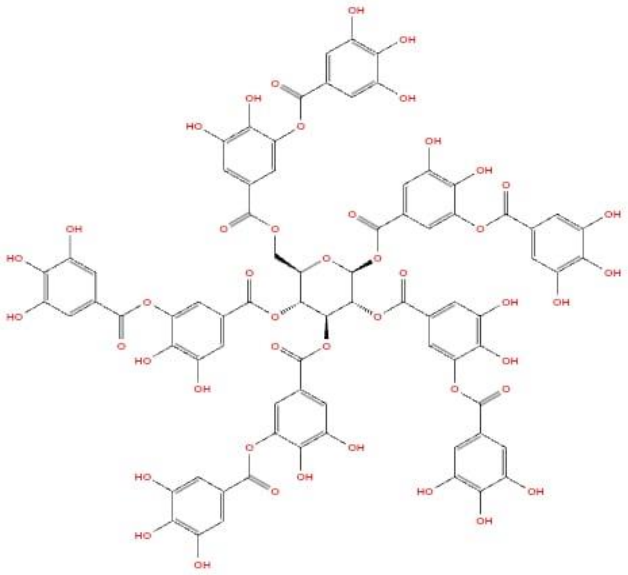
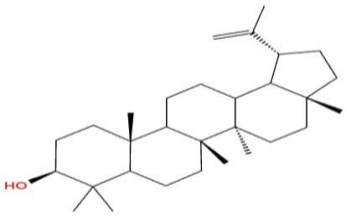
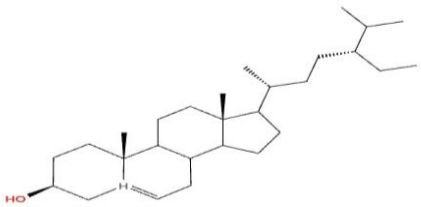
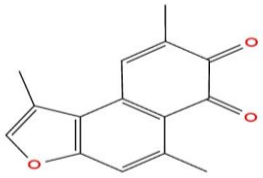
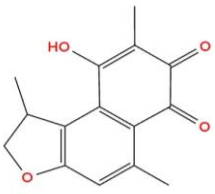
There are number of phytoconstituents in *Thespesia populnea* that have different pharmacological effects. *Thespesia populnea*'s key active phytoconstituents are shown in the table.[17]

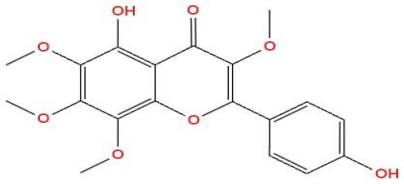
Table no. 1: Phytochemicals found in *Thespesia populnea* plant.

Plant part	Phytochemical name	Structure
Flower	1-[2-(Benzyloxy)-6-hydroxyphenyl]-1-one	
Flower	Gossypol	
Flower	Kaemferol	
Flower	Herbacetin	
Flower	Gossypetin	

Flower	Quercetin	
Flower	1-Triacontanol	
Flower	Nonacosane	
Flower	Lupenone	
Flower	Nicotiflorin	
Flower	Lupeol	

Flower	Quercetin-3-glucoside	
Flower	ß-sitosterol	
Flower	Kaempferol 7-O-glucoside	
Flower	Rutin	
Leaf	Dotriacontane	

Leaf	Anthraquinone	
Leaf	Tannic acid	
Leaf	Lupeol	
Leaf	ß-sitosterol	
Wood	Thespone	
Wood	Thespesone	

Wood	Calycopterin	

5. PHARMACOLOGICAL ACTIVITIES

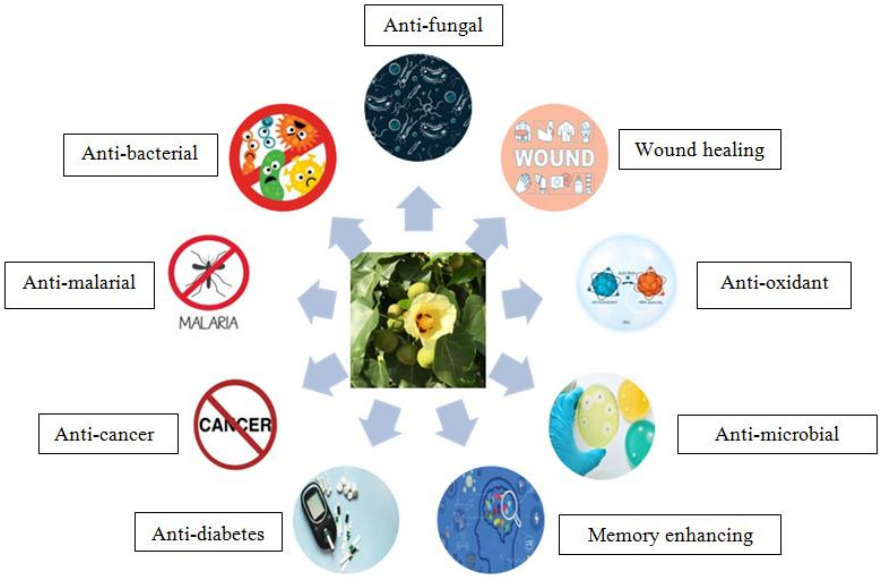


Figure no. 2: Pharmacological activities of *Thespesia populnea* plant.

- **Anti-microbial activity**

The antibacterial and antifungal properties of *Thespesia populnea* leaves ethanol extract with DMSO were assessed in *–vitro* using the Agar cup method against clinical isolates of Aspergillus niger, P. Aeruginosa, Candida albicans and E. Coli. At larger dosages, the leaf extract's antibacterial efficacy against P. aeruginosa and E. coli peaked; at lower concentrations, it was unsuitable for use. Additionally, none of the tested doses showed any antifungal efficacy against A. niger or C. albicans. According to the study, T. populnea possesses strong antibacterial properties. The phenolics, flavonoids, essential oils, and terpenoids in the extract are responsible for all of this. This demonstrates the importance of T. populnea in avoiding bacterial infections. Extracts from root, bark, flower and fruit also show antimicrobial activity.[18]

- **Anti- inflammatory activity**

The ethanolic extract of Thespesia populnea bark (TPE) was examined for its analgesic and anti-inflammatory effects at 100, 200, and 400 mg/kg body weight. Acute models of

inflammation were rats with paw oedema brought on by carrageenan, histamine, and serotonin, and chronic models were rats with arthritis brought on by formaldehyde. Both the early and late stages of mice were used to test the analgesic activity using the pawlicking time generated by formalin and the writhing reaction induced by acetic acid. Formaldehyde-induced arthritis and paw edema caused by carrageenan, histamine, and serotonin were also well prevented by the higher TPE doses (200 and 400 mg/kg, p.o.0). Furthermore, the late phase of pain and writhing responses to an intraperitoneal injection of acetic acid were greatly reduced by TPE (200 and 400 mg/kg, p.o.). Terpenes, gums and mucilage, alkaloids, proteins, carbohydrates, tannins, phenols, and flavonoids are all present in the ethanolic extract of the bark. Acute oral toxicity testing showed no fatalities, even at the highest dose of TPE (OECD-423 recommendations).[19]

- **Anti- oxidant activity**

In the present study of ethanolic extract of flowers of *Thespesia populnea* was screened for anti- inflammatory and anti- oxidant activities. HRBC and Albumin denaturation method were used to assess the ethanolic extract's anti- inflammatory activity. Ethanolic extract's antioxidant activity was assessed using the DPPH assay and the ABTS method. The research findings suggest that the extract from ethanol possesses anti-inflammatory and anti-oxidant characteristics.[20]

- **Anti- psoriatic activity**

Following using the extract, the extract-treated skin revealed significant improvements in psoriasis- related skin changes, such as reduced epidermal thickness overall and stratum granulosum retention. According to histological studies, the number of Ortho keratotic regions has increased, indicating an improvement in skin health. Moreover, the extract was shown to have a 1.2-crease increase in E2A gene activity in Wistar rat skin samples, suggesting a potential function in controlling the inflammatory and immunological reactions linked to psoriasis. These results show the need for additional research into the underlying mechanisms for action of *Thespesia populnea* and emphasizes the potential of this plant.[21]

- **Anti- malarial activity**

The effects of Chloroquine and *Thespesia populnea* extract on parasitemia and anemia in mice infected with Plasmodium berghei ANKA (PbA) were investigated in this study. The levels of parasitemia did not vary, although there was noticeable change from the fourth to

the sixth day. In comparison to the control group, parasitemia levels were decreased with chloroquine treatment. The flavonoids in *Thespesia populnea* extract help to prevent haemoglobin degradation, which has a subtle effect on parasite activity. Perhaps as a result of a flavonoids-chloroquine interaction, the parasitemia was reduced in the group that got both the extract and chloroquine. Additionally, the extract's antioxidant properties may have increased haemoglobin levels, which would have decreased anemia.[22]

- **Wound healing activity**

Alcohol, aqueous, and petroleum ether, aqueous, and alcohol extracts from *Thespesia populnea* leaves were tested for acute toxicity, showing no fatility upto 2000 mg/kg doses. In order to evaluate wound healing, a dosage of 200 mg/kg was selected. In excision wound models, treatment with these extracts dramatically shortened the Escher fall ($P < 0 > 11$), indicating a considerable reduction in epithelization time. In incision wound model, the extracts notably enhanced skin tensile strength by the tenth day post-wounding ($P < 0.001$). These findings highlight the significant wound healing properties of T. populnea leaf extracts, improving epitheliaztion, wound contraction, and skin tensile strength. Such effects suggest their potential therapeutic application in wound treatment.[23] Extracts from bark[24] and fruit[25] also shows signs of wound healing.

- **Anti- diabetic activity**

Potential antidiabetic effects are shown by the ethanolic extract of *Thespesia populnea* leaves and bark. The rats with streptozocin-induced diabetes showed significant reductions in blood sugar levels following oral administration of extracts at a dose of 400 mg/kg body weight over a period of 10 to 15 days. These outcomes were similar to those of glibenclamide, an often prescribed drug. The mechanism of action most likely entails either enhanced peripheral glucose absorption or activation of pancreatic cells for insulin secretion. These results imply that extracts from *Thespesia populnea* may be used therapeutically to treat diabetes.[26] Similarly, roots[27] and bark also have anti- diabetic activity.

- **Anthelmintic activity**

The proposed study's objective was to evaluate the anthelmintic properties of Thespesia populnea root extracted with petroleum ether (60–80 degrees Celsius), chloroform, ethyl acetate, and methanol. Using earthworms as stand-ins, an anthelmintic efficacy experiment investigated the effectiveness of various medications against the human intestinal roundworm

parasites Pheretima posthuma and Ascaris lumbricoides. Over the course of four hours, various treatments, such as piperazine citrate and other extracts, were given to different worm groups. Methanol, chloroform, and ethyl acetate extracts significantly decreased paralysis and mortality as compared to the Pheretima posthuma standard. Ethyl acetate and chloroform extracts showed significant efficacy in reducing paralysis and death in Ascaris lumibricoides, whereas methanol extract also showed promise in this regard. These findings demonstrate the investigated extract's potential anthelmintic properties against both roundworm species.[28] However, bark extract is exclusively effective against Pheretima posthuma species is an anthelmintic.[29]

- **Anti-diarrheal activity**

The bark extracts of *Thespesia populnea* demonstrated the promising antidiarrheal activity, as revealed through various experimental models. Castor oil-induced diarrhea studies demonstrate significant reudctions in fecal weight in both alcoholic and aqueous extracts, with the aqueous extract having the strongest effects. Similarly, both extracts successfully prevent enter pooling in comparison to controls in tests of prostaglandin E2-induced diarrhoea. Furthermore, in the charcoal meal test, both extracts significantly reduced the overall amount of charcoal meal that enters the digestive system, with the aqueous extract showing the best inhibitory properties. These imply that *T. populnea* bark extracts have a promising therapeutic applications in controlling diarrhea, highlighting their significance in the treatment of gastrointestinal illnesses.[30,31]

- **Memory enhancing activity**

Hebb- William's maze was used to evaluate memory-enhancing activities boosted plus maze. In comparison to the control group, *Thespesia populnea* mice of all ages have lower cholesterol levels. According to current study, an extract from *Thespesia populnea* shown potent cholesterol-lowering properties on comparable with the nootropic drug piracetam. Additionally, the bark of *Thespesia populnea* was discovered to considerably enhance mice's memory. *Thespesia populnea* may be employed as an anti-Alzheimer treatment because of its memory-enhancing properties.[32]

- **Anti-cancer and cytotoxic effect**

According to various studies, *Thespesia populnea* has demonstrated possible cytotoxic and anticancer properties. Eleven recognized compounds and 8 new sesquiterpenoids known as

populene A-H were extracted and observed from the plant. Two chemicals demonstrated strong cytotoxic effect against four cancer lines: Mansonone E and (+)-Gossypol.[33] The ethanolic extract from the bark of *Thespesia populnea* showed chemopreventive potential against carcinogenesis in the buccal pouch of mice caused by 7,12-dimethylbenz[a]anthracene (DMBA).[34] In addition to having an anti-lipid peroxidative effect and improving antioxidant levels in rats given DMBA47, the extract significantly reduced the quantity and burden if tumors. Stem, bark, and leaf extracts are highly cytotoxic to cell lines. Dalton's lymphoma ascites and Ehrlich ascites carcinoma. The optimum cytotoxicity levels were seen in the T. populnea chloroform extract.[35]

Against the HEp2 cell line, the acetone extract of *Thespesia populnea*'s bark and stem showed anticancer activity with minimal damage to healthy cells.[36] It was discovered that a decoction made of *Thespesia populnea* could promote apoptosis and prevent the growth of HEp-2 cancer cells without harming Artemia salina.[37] *Thespesia populnea* extract was used to produce bio-fabricated silver nanoparticles (AgNPs) which demonstrated dose-dependent toxicity on human liver and prostate cancer cell lines, resulting in death in the treated cells.[38,39]

6. TOXICITY

a. General toxicity

Oral administration of 5000 mg/kg of bark extract from Thespesia populnea to rats did not result in any deaths during the treatment period. Rats were given oral doses of 500 mg/kg and 1000 mg/kg of bark extract from Thespesia populnea for 28 days; no significant adverse effects or changes in appetite, water intake, or overall behavior were noted. During this time, there were no documented deaths.[40] Using Thespesia populnea nanoparticles in an acute oral toxicity test, mice showed no signs of damage or death.[41]

b. Sub chronic toxicity

Following repeated doses of 500 mg/kg and 1000 mg/kg of the bark's ethanolic extract, over 60% of the tested animals experienced congestion lesions in their livers and kidneys, suggesting that Thespesia populnea should be used sparingly.[40]

c. Specific Extracts and Applications

Even at the highest dosage of 2000 mg/kg, an ethanolic extract of Thespesia populnea bark demonstrated no mortality when evaluated for anti-inflammatory and analgesic properties.[42]

Research conducted on mouse spleenocytes in vitro revealed that 90% of the cells survived at 500 µg/ml of Thespesia populnea extract, providing a safe margin for use at greater concentrations.[41]

7. FUTURE ASPECTS

Thespesia populnea, also known as the Portia tree, holds significant potential for the future across various sectors. Traditionally used in medicine for treating conditions like inflammation and ulcers, future research could uncover new bioactive compounds with applications in pharmaceuticals, such as anticancer and anti-inflammatory drugs. Its environmental benefits are notable as well, as the tree is drought-tolerant and can help prevent soil erosion and support carbon sequestration, making it a valuable resource for combating climate change. Furthermore, the plant's wood could contribute to bioenergy production and provide sustainable timber due to its durability and termite resistance. In the cosmetic industry, the oil extracted from its seeds shows promise for moisturizing and treating skin conditions like eczema. Thespesia populnea could also play a role in agriculture as a shade provider and windbreak, and its ornamental value makes it ideal for urban landscaping. Additionally, its potential in bioremediation and agroforestry offers exciting opportunities for improving soil health and ecosystem biodiversity. With further exploration, this versatile plant could have wide-reaching applications in both commercial and environmental sectors.

8. CONCLUSION

Ayurvedic medicine has traditionally utilised the medicinal plant *Thespesia populnea*, and recent studies have validated its therapeutic benefits. Various chemical compounds with therapeutic properties can be found in every part of the plant, including the bark, seed, roots, stem, fruit, and leaves. These chemical substances have variety of pharmacological activities including anti-psoriatic, anti-oxidant, memory-enhancing, anti-diabetic and anti-cancer properties. Further research is necessary to better understand the mechanisms of action of the plant elements found in *Thespesia populnea*, which may be used as an alternative treatment for a number of ailments. All things considered, this plant is an excellent source of chemical compounds that could be studied to develop potential treatments for a variety of illnesses.

REFERENCES

1. Vishwakarma A, Arora P & Dhobi SM: Thespesia populnea: An Ethnomedicinal, Phytochemical and Pharmacological Review. The Natural Products Journal, 2022; 12(2): 2-12. http://dx.doi.org/10.2174/2210315510999201210142313.
2. Kainuma M, Baba S, Chan HT, Inoue T, Tangah J & Chan EW: Medicinal plants of sandy shores: A short review on Calophyllum inophyllum and Thespesia populnea. International Journal of Pharmacognosy and Phytochemical Research, 2016; 8(12): 2056-62. http://op.niscpr.res.in/index.php/IJNPR/article/view/12710.
3. Mitter CS: Investigation of Ethanol Soluble Bioactive Compounds in Tender Fruits of Thespesia populnea. International Journal of Science and Research, 2014; 3(11): 497-499.
4. Kariyil BJ and Pravisha KR: Phytochemical and Pharmacological Aspects of Thespesia populnea. Cutting Edge Research in Biology, 2023; 3: 45-65. https://doi.org/10.9734/bpi/cerb/v3/4555E.
5. Vaidya SK & Bothra SB: An ethno-phytochemical and pharmacological review on some unexplored medicinal plants belongs to north-east and south-east region of Chhattisgarh. European Journal of Pharmaceutical and Medical Research, 2014; 1: 240-61.
6. Parthasarathy R; Ilavarasan R; Nandanwar R, International Journal of Pharmaceutical Sciences and Research, 2010; 1(2): 72-77.
7. Suvarna CM, Sriya P, Arshad M, Pavan K. A REVIEW ON PHYTOCHEMICAL AND PHARMACOLOGICAL PROPERTIES OF THESPESIA POPULNEA. J. Drug Delivery Ther., Jul. 14, 2018; 8(4): 1-4. https://jddtonline.info/index.php/jddt/article/view/1718.
8. Orwa C, A Mutua, Kindt R, Jamnadass R, S Anthony. 2009 Agroforestree Database:a tree reference and selection guide version 4.0 (http://www.worldagroforestry.org/sites/treedbs/treedatabases.asp)
9. Pasiecznik, N, cabicompendium. 53592, CABI Compendium, doi:10.1079/cabicompendium.53592, CABI International, Thespesia populnea (portia tree), 2022.
10. https://ntbg.org/database/plants/detail/thespesia-populnea
11. Dipti Pal, Smita Suthar, Aman Naskar, Sanmati K. Jain: *Thespesia populnea* for the management of diverse diseases: an overview, International Journal of Pharmaceutical Sciences and Research, 2024; 15(4): 990-1005.
12. S, Solomon; N, Muruganantham and MM, Senthamilselvi, "Anti-oxidant and anti-inflammatory activity of Thespesia populnea (flowers)", Pharmacophore, 2015; 6(1): 53-59.

13. Pal D, Suthar S, Naskar A and Jain SK: Thepesia populnea for the management of diverse diseases: an overview. Int J Pharm Sci & Res., 2024; 15(4): 990-05. doi: 10.13040/IJPSR.0975-8232.15(4).990-05.
14. Ashish Vishwakarma, Poonam Arora, Mahaveer Dhobi, Thespesia populnea: An Ethnomedicinal, Phytochemical and Pharmacological Review, The Natural Products Journal, 12(2): Year 2022, e160921188996. DOI: 10.2174/2210315510999201210142313.
15. D. Sai Koteshwar Sarma, A. Venkata Suresh Babu: Pharmacognostic and phytochemical studies of Thespesia populnea Linn, Journal of chemical and pharmaceutical research, 2011; 3(4): 237-244.
16. Parthasarathy, R. & Singh, Amrender & Bhowmik, Debjit. Pharmacognostical studies on Thespesia populnea Leaf. Research Journal of Pharmacognosy and Phytochemistry, 2016; 8: 16. 10.5958/0975-4385.2016.00004.2.
17. Duke, James A. (2016). Dr. Duke's Phytochemical and Ethnobotanical Databases. Ag Data Commons. Dataset. https://doi.org/10.15482/USDA.ADC/1239279
18. Chaithra K., Pallavi S., Preethu K., Rakshita S., Sadaf Farooq, Sahana H. S.: Comprehensive review on Pharmacological activities of *Thespesia populnea* soland and Pongamia Pinnata Linn, International Journal of Pharmaceutical sciences, 2024; 2(8): 2707-2722.
19. Mani Vasudevan, Kumar Kishore Gunnam, Milind Parle: Antinoiceptive and anti-inflammatory effects of *Thespesia populnea* bark extract, Journal of Ethnopharmacology, 2007; 109(8): 264-270.
20. S. Solomon, N. Muruganantham, M. M. Senthamilsevi: Anti-oxidant and Anti-inflammatory activity of *Thespesia populnea* (flowers), Pharmacophore an International Research Journal, 2015; 6(1): 53-59.
21. Chavhan A., Study of Anti-psoriatic activity and evaluation of E2A Gene expression for Psoriasis levels by RT-PCR of *Thespesia populnea* L. Methanolic leaf extract, International Journal of Life sciences, 2018; 11(5): 382-386.
22. Utami PD, Setianingsih H, Syafitri IF, Wiyono RP: The Anti-malarial effect of *Thespesia populnea* (L.) Soland ex correa extract using Malaria mice model infected with P. berghei, Pharmacog J., 2021; 13(2): 585-590.
23. Shivakumar H, Prakash T, Rao RN, Swamy BJ, Nagappa AN. Wound healing activity of the leaves of *Thespesia populnea*, Journal of Natural remedies, 2007; 1: 120-124.

24. Abdel Halim MB, Eid HH, El Deeb KS, Metwally GF, Masoud MA, Ahmed-Farid OA, El Messiry HM. The study of wound healing activity of *Thespesia populnea* L. bark, an approach for accelerating healing through nanoparticles and isolation of main active constituents. BMC Complementary medicine and therapies, 2024; 24(1): 85.
25. Nagappa AN, Cheriyan B., Wound healing activity of aqueous extract of *Thespesia populnea* fruit, Filterapia, 2001; 72(5): 503-506.
26. Parthasathy R, Ilavarasan R, Karrunakaran CM. Antidiabetic activity of *Thespesia populnea* bark and leaf extract against streptozocin induced diabetic rats, International Journal of PharmTech Research, 2009; 1(4): 1069-72.
27. Shalini CA, Verma P, Bag AK. Blood glucose lowering potency of hydro-alcoholic extract of roots of *Thespesia populnea* against Streptozocin induced hyperglycemia in wistar rats, International Journal of pharmaceutical sciences review and research, 2023; 80(02).
28. SM Shaheedha, R Uma, Ramya K, CH Phanindra, MD Dhanaraju. In-vitro Anthelmintic activity of *Thespesia populnea* Linn roots, Research Journal of Pharmacognosy and phytochemistry, 2010; 2(1): 64-66.
29. Dwivedi A, Dwivedi S, Sitoke AK, Patel R, Jhade D. Anthelmintic activity of polyherbal preparation. Ethnobotanical leaflets, 2009; 2009(1): 33.
30. Viswanatha GL, Srinath R, Nandakumar K, Shylaja H, Lakshman K. Antidiarrheal activity of alcoholic and aqueous extracts of stem, bark of *Thespesia populnea* in rodents. Pharmacologyonline, 2007; 3: 222-3.
31. Viswanatha GL, Hanumanthappa S, Krishnadas N, Rangappa S. Antidiarrheal effects of fractions from stem bark of *Thespesia populnea* in rodents: Possible antimotility and antisecretory mechanisms. Asian Pacific Journal of tropical medicine, 2011; 4(6): 451-6.
32. Vasudevan M, Parle M. Memory- enhancing activity of *Thespesia populnea* in rats. Pharmaceutical biology, 2007; 45(4): 267-73.
33. Boonsri S, Karalai C, Ponglimanont C, Chantrapromma S, Kanjana-Opas A: Cytotoxic and antibacterial sesquiterpenes from *Thespesia populnea*. Journal of Natural products, 2008; 71(7): 1173-7.
34. Dhanarasu S, Al-hazimi A, Sethuraman P, Selvam M: Chemopreventive and anti-lipidperoxidative potential of *Thespesia populnea* (L.) on experimental buccal pouch carcinogenesis, Ibnosina Journal of medicine and biomedical sciences, 2010; 2(06): 269-77.

35. Chandran RP, Manju S, SHaji PK, Nair GA, Sukumar B: In-vito cytotoxic activities of leaf extracts of *Thespesia populnea* and Hygrophilia schulli against Dalton's lymphoma ascites and Ehrlich ascites carcinoma cell lines, Lung cancer research, 2016; 1: 1007.
36. Florance EJ, Dhayabaran D, Nandakumar K: Antimicrobial, anticancer and cytototxic activities of acetone fraction from stem bark of *Thespesia populnea* (Linn.), Research Journal of Pharmaceutical, biological and chemical sciences, 2016; 7(3): 1722-8.
37. Lindamulage Ik, Soysa P: Evaluation of anticancer properties of a decoction containing Adenanthera pavonia L. and *Thespesia populnea* L, BMC complementary and alternative medicine, 2016; 16: 1-8.
38. Kuruppu AI, Parangama P, Goonasekara CL: Medicinal plants commonly used against cancerin traditional medicine formulae in Sri Lanka, Saudi Pharmaceutical Journal, 2019; 27(4): 565-73.
39. Prasannaraj G, Sahi SV, Benelli G, Venkatachalam P: Coating with active phytomolecules enhances anticancer activity of bio-engineered Ag nanocomplex, Journal of Cluster science, 2017; 28: 2349-67.
40. Wuivi Kokou, Kpegba Kafui, Lawson Ata Martin, Evenamede Kodjo Selom and Oudjaniyobi Simalou. Phytochemical screening, gossypol content and toxicological assessment of Thespesia populnea extracts. J Pharmacogn Phytochem, 2023; 12(5): 194-201. DOI: 10.22271/phyto.2023.v12.i5c.14725
41. Jayasri A, P Eswara Prasad, K Padmaja, BDP Kala Kumar, M Gnanaprakash and M Sonali: In vitro and in vivo safety evaluation of Thespesia populnea mediated nanoparticles, The Pharma Innovation Journal, 2021; 10(1): 09-11.
42. Vasudevan M, Gunnam KK, Parle M. Antinociceptive and anti-inflammatory effects of Thespesia populnea bark extract. J Ethnopharmacol, Jan. 19, 2007; 109(2): 264-70. doi: 10.1016/j.jep.2006.07.025. Epub 2006 Jul 29. PMID: 16949778.