



## Research Article

### Phytochemistry and Antibacterial Activity of *Thespesia populnea* Leaves

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#### ABSTRACT

The main objective of this present work is, to study phytochemistry and to test the antibacterial activity of crude ethanol extracts of leaves, from *Thespesia populnea* against bacteria- *Escherichia coli*, *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Bacillus subtilis* and *Proteus vulgaris*. The study deals with the preliminary phytochemical screening of the leaves ethanol extract. The results showed that the moderate presence of amino acids, flavonoid, tannins, terpenoids, keto-steroids, phenols and carbohydrates. Antibacterial properties of *Thespesia populnea* were evaluated using cup-plate diffusion method. Analysis of the data revealed that, the ethanol extract of the leaves showed antibacterial activity against *S. aureus*: 32 mm, *B. subtilis*; 34 mm, *E. coli*; 33 mm, *P. vulgaris*; 19 mm and *P. aeruginosa*; 15 mm. Results were compared to standard drugs; gentamicin. Based on the current findings, it can be concluded that this *Thespesia populnea* leaves has antibacterial activity, which is as significant as standard antibacterial drugs against certain microorganisms. The anti bacterial activity may be due to presence of secondary metabolites as, flavonoids, tannins and terpenoids.

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## INTRODUCTION

*Thespesia populnea* Linn. (Fam. Malvaceae), a fast growing, medium sized evergreen tree, up to 10 m tall with yellow, cup-shaped flowers having maroon centre and distributed throughout coastal forests of India and also largely grown as a roadside tree. It has heart shaped leaves glossy green in colour and yellow hibiscus-type flowers. *Thespesia populnea* is small evergreen tree with

average height 6– 10 m (20–33 ft), a short, often crooked stem and a broad, dense crown. It is currently place naturalized in tropical climates throughout the world. The tree well grows under full sunlight and tolerates drought conditions. The tree is valuable as coastal windbreak because it is it highly resistant to wind. It propagates

easily and grows rapidly (Phanse, M. *et al.*, 2013).

The bark, leaves, flower and fruits are useful in cutaneous infection such as scabies, psoriasis, eczema, ringworm, and guinea worm. The decoction of the bark is commonly used for the treatment of skin and liver diseases. A compound oil of bark and capsules is useful in urethritis and gonorrhoea. The bark, root, fruits were used in dysentery, cholera and hemorrhoids. The fruits of the plant are used in Ayurveda for the control of diabetes. The barks and flowers possess astringent, hepatoprotective, antioxidant and anti-inflammatory activities in rats (Parthasarathy, R. *et al.*, 2016).

The leaves and bark of this tree are still used to produce oil for the treatment of fracture wounds and as an anti-inflammatory poultice applied to ulcers and boils, as a folk medicine. Gossypol was found to be the major component of *Thespesia populnea* producing antifertility effects in rats as well as in human beings. Four naturally occurring quinones viz thespone, thespesone, mansonone-D, and mansonone-H have been extracted from heart wood of the plant (Parthasarathy, R. *et al.*, 2016).

As the plant already proven for various pharmacological activities with respect to secondary phytochemicals present in it. The hypothesis was made that, leaves of *Thespesia populnea* may have antibacterial activity. After doing further literature survey it came to know that there is no research work on leaves in relation to antibacterial activity. Hence finally, the aim was drawn in this study as; 'Phytochemistry and Antibacterial Activity of *Thespesia populnea* Leaves'.

## MATERIALS AND METHODS

### Procurement of plant material

The leaves of *Thespesia populnea* were collected from college campus, Yeola, Maharashtra, India, in the month of July-Aug 2021. Botanical identification was carried out from Dravyaguna Department of Matoshri Asarabai Darade Ayurved College, Dist. Nashik, Maharashtra, India and voucher specimen of the plant material has been deposited at college level.

### Preparation of plant material

Fresh leaves, of *Thespesia populnea* were shade dried separately. Further material was pulverized to prepare powder that was passing through sieve # 40, and separately kept in air tight polythene bags for further study.

### Chemicals and Instruments

Solvents and reagents were procured from Pallav Chemicals, Mumbai, India. Some apparatus and other common glassware and instruments used for the study.

### Extraction

The 100g powder of *Thespesia populnea* leaves were extracted using ethanol separately. The Soxhlet's apparatus used for hot continuous extraction (6hrs) of plant material. After complete extraction the solvent was evaporated and concentrated to dry residue. % yield was calculated for ethanol extract after drying under vacuum. All final extract obtained was used for further study.

### Preliminary phytochemical test

The Preliminary Phytochemical study for various secondary metabolites (phytoconstituents) carries out as per the procedure of C. K. Kokate (1994).

### Preparation of extract for evaluation

The dilution used for all extracts was 100 mg ml<sup>-1</sup>. Ethanol was known to be inhibitory to the growth of bacteria. Therefore, the ethanol extracts were re-dissolved or suspended in ethanol solvent.

### Microorganisms and medium

The bacteria used were originally from the American type culture collection (ATCC), USA. They were obtained from the stock culture. Strains used were *Escherichia coli* ATCC25922, *Staphylococcus aureus* ATCC25923, *Pseudomonas aeruginosa* ATCC27853, *Bacillus subtilis* NCTC8236 and *Proteus vulgaris* ATCC6380. The media used for antibacterial tests were nutrient broth and Mueller Hinton agar. These media were prepared according to the standard methods.

### Antibacterial Activity

#### Cup-plate diffusion method

Antibacterial activity of plant extracts was carried using cup-plate agar diffusion method (Murray, *et al.*, 2009) with some minor

modifications. One ml from each standard bacterial stock

suspension was mixed thoroughly with 20 ml of sterile Molten Mueller Hinton agar (45 – 50°C), poured into sterile Petri-dishes and left to solidify. Then, four cup-shape wells (10 mm diameter)

were made in each plate using sterile cork-borer (No. 9). The agar disks were removed and four alternate cups were filled with extract using sterile adjustable pipettes. Four Petri-dishes with two

alternate cups were used with the respective solvent instead of the extracts as control. The

plates were then incubated in upright position for 24 hrs. After incubation period, the inhibition zones diameters were measured (Mandal, S.M. *et al.*, 2007).

## RESULTS AND DISCUSSION

### Physical Properties and Extraction Yield

The 13.56% w/w sticky, dark green color ethanolic extract get at the end of extraction procedure.

### Preliminary Phytochemical Test

Results shown in Table 1 indicates presence of phenolic compound, tannins, flavonoid, terpenoids and steroids in flowering top's

**Table 1: Preliminary Phytochemical Test of *Thespesia populnea* Leaves**

Phytoconstituents	Leaves
Steroids	+
Alkaloids	-
Terpenes	+++
Phenolic	++
Flavonoid	++
Tannins	+
Carbohydrates	++
Proteins	++
Steroids	+

+++High Concentration; ++Moderate concentration; +-Low concentration;--Absent

### Antibacterial Activity

Ethanol extract of *Thespesia populnea* leaves showed antibacterial activity against *S. aureus*: 34 mm, *B. subtilis*; 36 mm, *E. coli*; 35 mm, *P.*

*valgaris*; 21 mm and *P. aeruginosa*; 17 mm. Results were tabulated in Table 2 for antibacterial activity and antifungal activity.

**Table 2: Antibacterial Activity of *Thespesia populnea* Flowering top's**

Microorganism	Zone of Inhibition (mm)	
	Leaves	Gentamicin (40 µ/ml)
<i>Staphylococcus aureus</i>	32	23
<i>Bacillus subtilis</i>	34	25
<i>Escherichia coli</i>	33	32
<i>Proteus valgaris</i>	19	29
<i>Pseudomonas aeruginosa</i>	15	35

## CONCLUSION

This initial study demonstrated that *Thespesia populnea* leaves effective against pathogenic microbes. It is an attempt made to prove leaves have antibacterial activity. From the result we can conclude that the leaves may be used for

preparation of any pharmaceutical formulation in future.

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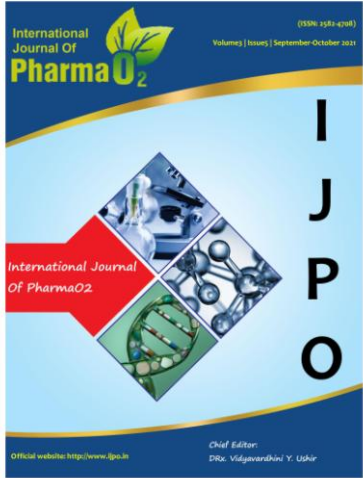
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